STRICTLY RESTRICTED
For Company use only

The information given in this report is not to be communicated either directly or indirectly to the press or to any person not holding an official position in the CIL / Government.

APPROVED ON 22/07/2019

PROJECT REPORT
FOR

RAMPUR BATURA OPENCAST PROJECT (4.0 MTY)

SOHAGPUR AREA

SOUTH EASTERN COALFIELDS LIMITED
(A Mini Ratna Company)

REVISED & UPDATED OCTOBER 2017

REGIONAL INSTITUTE - V
CENTRAL MINE PLANNING & DESIGN INSTITUTE LIMITED
A Mini Ratna & ISO 9001 Company
(A Subsidiary of Coal India Limited)
CMPDIL COMPLEX, SEEPAT ROAD
BILASPUR - (C.G.) 495006

PROJECT REPORT FOR RAMPUR BATURA OPENCAST PROJECT (4.0 MTY)

CONTENTS

Sl. No.	Subject	Page No.
1	**Contents**	i-ii
2	**List of Appendices and Plates**	iii-viii
3	**CIL Board Approval**	
4	**Summarised Data**	S1-S5
5	**Executive Summary**	1-31
6	**CHAPTERS**	
1	Chapter-I (Introduction)	1 – 7
2	Chapter-II (Marketability & Justification)	1 – 2
3	Chapter-III (Project Site Information)	1 – 4
4	Chapter-IV (Geology and Deposit Appraisal)	1 - 41
5	Chapter-V (Mine Boundary, Reserves & Mine Life)	1 – 4
6	Chapter-VI (Method of Mining)	1 – 4
7	Chapter-VII (Mining & Dumping Strategy)	1 – 6
8	Chapter-VIII (Mining Schedule & Equipment Phasing)	1 – 5
9	Chapter-IX (Coal Quality)	1 – 2
10	Chapter-X (Pumping & Drainage)	1 – 10
11	Chapter-XI (Coal Handling & Despatch Arrangement)	1 – 13
12	Chapter-XII (Workshop, Store and Magazine)	1 – 12
13	Chapter-XIII (Power Supply, Illumination &Communication)	1 – 22
14	Chapter-XIV (Civil Construction)	1 – 7
15	Chapter-XV (Safety and Conservation)	1 – 11
16	Chapter-XVI (Environment Management)	1 – 28
17	Chapter-XVII (Land Requirement)	1 – 3
18	Chapter-XVIII (Mine Closure Planning)	1 – 30
19	Chapter-XIX (Manpower, Productivity & Training)	1 – 3
20	Chapter-XX (Project Implementation Schedule)	1 – 3
21	Chapter-XXI (Financial Evaluation)	1 – 7
22	Chapter-XXII (A Chapter on Outsourcing)	1 - 12
7	**APPENDICES**	
I	Appendices A to F - Departmental	X1-X88
II.	Appendices A to F - Outsourcing	X1-X67
III.	Appendices A to F - Partial Outsourcing	X1-X70
8	**ANNEXURES**	
I	Minutes of the planning committee meeting held on 17.2.2011 at SECL	An-1 to An-2
II	Minutes of the planning committee meeting held on 11.1.2011 at CMPDI HQ Ranchi.	An-3 to An-5
III	Conceptual note pre draft discussion at CMPDI HQ Ranchi on 20.08.2010	An-6
IV	Conceptual note discussion at CMPDI HQ Ranchi on 21.09.2010	An-7
V	Minutes of the planning committee meeting held on 6.09.2012	An-8 to An-9
VI	Minutes of 45th TSC held on 13.09.2013 at SECL	An-10 to An-11

Sl. No.	Subject	Page No.
VII	Minutes of 53rd TSC held on 28.05.2014 at SECL	An-12 to An-13
VIII	Extract of the 225th meeting of the Board of Directors of SECL held at Raipur on 5th July 2014	An-14
IX	Minutes of meeting held on 14.08.2014 at the conference room of DT(P&P),SECL.	An-15 – An-16
X	Minutes of 57th TSC held on 08.09.2014 at the conference room of DT(O),SECL	An-17- An-19
XI	Extract of the 229th meeting of the Board of Directors of SECL held at New Delhi on 31st October 2014	An-20
XII	Extract of the 319th meeting of the Board of Directors of CIL held at Kolkatta on 12th August 2015	An-21
XIII	Minutes of the 330th meeting of the Board of Directors of CIL held at Kolkatta on 20th July 2016	An-22
XIV	Minutes of meeting held on 11.04.2017 at the conference room of DT(P&P),SECL to review the PR for Rampur Batura OC(4.0Mty)	An-23
XV	LOI for the work of hiring of HEMM for OB Removal.	An-24- An-25
XVI	Minutes of 91st TSC held on 31.01.2018 at the conference room of DT(P&P),SECL	An-26- An-27
XVII	Minutes of 93rd TSC held on 24.04.2018 at the conference room of DT(P&P),SECL	An-28- An-29
XVIII	Economics of PR Considering revised sale price	An-30
XIX	Simulation analysis for Partial outsourcing and Total outsourcing option	An-31- An-33
XX	Extract of the 279th meeting of the Board of Directors of SECL held at Raipur on 28th Nov 2018	An-34- An-35

LIST OF APPENDICES (PARTIAL OUTSOURCING OPTION)

SL.NO.	PARTICULARS	APPENDIX NUMBER
1	ESTIMATED HEAD WISE CAPITAL INVESTMENT ALONGWITH PHASING	A
2	ESTIMATED CAPITAL INVESTMENT FOR LAND	A.1
3	ESTIMATED CAPITAL INVESTMENT ON CIVIL WORK	A.2
4	ESTIMATED CAPITAL INVESTMENT FOR SERVICE BUILDING (PERMANENT SPECIFICATIONS)	A.2.1
5	ESTIMATED CAPITAL INVESTMENT FOR RESIDENTIAL BUILDING	A.2.2
6	BUILDING COST INDEX AT SOHAGPUR AREA (WITH REF. TO 100 BASE IN DELHI AS ON 1.10.76	A.2.3
7	ESTIMATED CAPITAL INVESTMENT FOR PLANT & MACHINERY WITH PHASING	A.3
8	STATEMENT SHOWING THE ESTIMATED CAPITAL REQUIREMENT FOR HEMM	A3.1
9	ESTIMATED CAPITAL INVESTMENT FOR ELECTRICAL AND COMMUNICATION PLANT & MACHINARY	A.3.2
10	ESTIMATED CAPITAL INVESTMENT FOR EXCAVATION & E&M WORKSHOP	A.3.3
11	ESTIMATED CAPITAL INVESTMENT FOR PUMPS, PIPES AND FITTINGS	A.3.4
12	ESTIMATED CAPITAL INVESTMENT FOR CHP	A.3.5.A
13	ESTIMATED CAPITAL INVESTMENT FOR INPIT CONVEYING	A.3.5.B
14	ESTIMATED CAPITAL INVESTMENT FOR OTHER P&M	A.3.6
15	ESTIMATED CAPITAL INVESTMENT FOR FURNITURE AND FITTINGS	A.4
16	ESTIMATED CAPITAL INVESTMENT FOR RAILWAY SIDING	A.5
17	ESTIMATED CAPITAL INVESTMENT FOR VEHICLES	A.6
18	ESTIMATED CAPITAL INVESTMENT FOR PROSPECTING & BORING	A.7
19	ESTIMATED CAPITAL INVESTMENT ON CAPITAL OUTLAY IN MINES	A.8.1
20	ESTIMATED CAPITAL INVESTMENT FOR ROADS AND CULVERTS	A.8.2
21	ESTIMATED CAPITAL INVESTMENT FOR WATER SUPPLY ARRANGEMENTS	A.8.3
22	ESTIMATED CAPITAL INVESTMENT FOR SEWAGE DISPOSAL SCHEME	A.8.3(A)
23	ESTIMATED REVENUE EXPENDITURE CAPITALISED DURING DEVELOPMENT PERIOD	A.9.1

SL.NO.	PARTICULARS	APPENDIX NUMBER
24	THE JOB/CATEGORYWISE INVESTMENT OF MANPOWER	B
25	SUMMARY OF MANPOWER SCALE/GRADE CATEGORY WISE AND CALCULATION OF ANNUAL SALARY WAGES & BENEFITS	B.1
26	ESTIMATED COST OF PRODUCTION PER TONNE OF COAL AT 100% CAPACITY INCLUDING COST OF EMP	C
27	COST & PROFITABILITY AT DIFFERENT LEVELS OF PRODUCTION	C.1
28	ANNUAL EXPENDITURE FOR EMP & IMPACT OF COST/TE ON COAL	C.2
29	SENSITIVITY ANALYSIS AT DIFFERENT LEVEL OF CAPACITY UTILISATION	C.3
30	SENSITIVITY ANALYSIS OF THE PR	C.4
31	IRR OF THE PROJECT i) AT 100% LEVEL OF PRODUCTION ii) AT 85% LEVEL OF PRODUCTION	 D1 D2
32	THE CALCULATION OF REVENUE CASH OUTFLOW AT 100% LEVEL OF PRODUCTION	E1
33	THE CALCULATION OF REVENUE CASH OUTFLOW AT 85% LEVEL OF PRODUCTION	E2
34	THE ESTIMATED CAPITAL INVESTMENT FOR REHABILITATION AND ENVIRONMENTAL MANAGEMENT	F
35	REPLACEMENT SCHEDULE	I

LIST OF PLATES

Sl.No.	Particulars	Plate No.	Drawing No.	Scale
1	Location Plan	I	RV/MOC/X00518	NTS
2	Topographical and Geological Plans	II	RV /MOC/X00519	1:5000
3	Final Pit Layout	III	RV/MOC/X00520	1:5000
4	Floor contour of Seam-I	IV	RV/MOC/X00521	1:5000
5	Floor contour of Seam-L2	V	RV/MOC/X00522	1:5000
6	Floor contour of Seam-II	VI	RV/MOC/X00523	1:5000
7	Floor contour of Seam-L1	VII	RV/MOC/X00524	1:5000
8	Floor contour, Iso-chore & Iso-grade of Seam-III	VIII	RV/MOC/X00525	1:5000
9	Iso-chore & Iso-grade of Seam-I	IX	RV/MOC/X00526	1:5000
10	Iso-chore & Iso-grade of Seam-L2	X	RV/MOC/X00527	1:5000
11	Seam folio plan of Seam-II	XI	RV/MOC/X00528	1:5000
12	Iso-chore & Iso-grade of Seam-L1	XII	RV/MOC/X00529	1:5000
13	Iso-parting between Seams L2&I	XIII	RV/MOC/X00530	1:5000
14	Iso-parting between Seams II & L2	XIV	RV/MOC/X00531	1:5000
15	Iso-parting between Seams II & L1	XV	RV/MOC/X00532	1:5000
16	Iso-parting between Seams L1 & III	XVI	RV/MOC/X00533	1:5000
17	Dump plan – 5^{th} year Stage Plan	XVII	RV/MOC/X00534	1:5000
18	Dump plan – 10^{th} year Stage Plan	XVIII	RV/MOC/X00535	1:5000
19	Dump plan – 15^{th} year Stage Plan	XIX	RV/MOC/X00536	1:5000
20	Dump plan – 20^{th} year Stage Plan	XX	RV/MOC/X00537	1:5000
21	Total Excavation Plan	XXI	RV/MOC/X00538	1:5000
22	Iso-Top OB Plan	XXII	RV/MEC/X100539	1:5000
23	Land Use Plan	XXIII	RV/MEC/X100540	1:5000
24	Cross-section Plan	XXIV	RV/MEC/X100541	1:2000

****

Coal India Limited
A MAHARATNA COMPANY
Registered Office:- Coal Bhawan, Core-2, 3rd Floor,
Premises No.04 MAR, Plot No.AF-III,
Action Area-1A, New Town, Rajarhat, Kolkata 700156.
PHONE: 033 - 23246526, FAX:033 - 23246510
Email – mviswanathan2.cil@coalindia.in
WEBSITE:www.coalindia.in
CIN – L23109WB1973GOI028844

Ref:CIL:XI(D):04112:2019 12337 2

14th August, 2019.

GM (PMD),
Coal India Limited, New Town,
Rajarhat,Kolkata-700156.

Sub: Minutes of 387th CIL Board Meeting held on 22nd July, 2019.

Reproduced below is the relevant extracts from the minutes of 387th meeting of Board of Directors of Coal India Limited held on 22nd July, 2019 at CIL, Kolkata with regard to the following item.

"ITEM No. 387:4(I)

Sub: Project Report of Rampur Batura OCP (4.0 MTY), SECL

4.8 Director (Technical), SECL made presentation of the project and apprised as under:-

(a) Rampur Batura OCP project report had been prepared under partial out sourcing option to meet the demand of superior grade of coal from SECL. This project report was prepared annexing the virgin property on west side of Batura Block by enhancing the rated capacity.

(b) The net extractable reserve is 65.60 MT and total volume of OB to be removed is 626.07 M Cum with an average Stripping ratio of 9.56 cum/ per tonne. The mine would achieve its targeted production in 6th year and the grade of coal is G-6.

(c) The project report was formulated to mine coal by Surface Miner/Pay Loader/Dumper. Coal from mine to pit top will be transported by conveyor belt. A new railway siding and CHP with RLS are proposed to be constructed at the pit top. Coal from the pit top would be despatched through rail. He clarified that no road transportation would take place.

(d) 1870 Project Affected Families are to be rehabilitated from 7 villages for which necessary capital provision had been made.

(e) EC for 4 MTY is to be obtained.

(f) This project was financially evaluated by M/s. Pricewater house Coopers Private Limited, Hyderabad who had recommended the Project Report as financially viable both under partial out sourcing and total out sourcing. IRR at 85% capacity for partial out sourcing option comes to 20.87%.

In view of above and as recommended by Empowered Sub-Committee of CIL Board for Appraisal, Evaluation and Approval of projects, Board accorded its approval to the proposal as brought out in the agenda note as under :-

Project Report of Rampur Batura OCP for a rated capacity of 4.0 MTY with an estimated capital investment of Rs.1248.93 Crores (Existing Capital: Rs.40.78 Crs. & additional Capital: Rs.1208.16 Crs) under Partial Outsourcing option (i.e. Coal Departmental & OB Outsourcing) by dovetailing PR for Batura OCP (2.0 MTY) with PR of Rampur Batura OCP (4.0 MTY)."

This is for your information and taking necessary action please.

Yours faithfully,

(M Viswanathan)
GM(F)/Company Secretary

PROJECT REPORT FOR RAMPUR BATURA OPENCAST PROJECT (4.0 MTY)

SUMMARISED DATA (UPDATED OCTOBER'2017)

A.	**GENERAL**				
1	Name of Project				RAMPUR BATURA OPENCAST
2	Name of Area / Company/State				Sohagpur Area / SECL/MP
3	Nearest Railway Station from project				Anuppur- 20 km
4	Nearest National / State Highway / Approach road				N.H.-78 passes nearbye the Project
B.	**GEOLOGICAL**				
1	Name of geological blocks considered				Baura OC & Batura Extension
2	Area of the geological blocks				15.951 sq. km
3	Borehole Density within blocks				15.34 BHs / sq.km
4	Description of all coal seams within block				
Stratigraphic Sequence	***ThicknessRange (m)***		***No. of borehole intersections***		***Geological Reserves (Mt)***
	Min.	***Max.***			
Seam-III T	0.11	0.85	17		
Parting	0.36	1.35			
Seam-III M	0.30	1.41	10		
Parting	0.27	2.22			
Seam-III B	0.1	1.10	43		0.3035
Parting with L1	17.37	31.20			
Seam-III	0.75	2.68	9		1.2148
Parting	14.45	26.67			
Local Band L1	0.20	3.00	139		5.5295
Parting	0.70	13.60			
Seam-II	0.27	4.66	216		33.3876
Parting	6.40	16.70			
Local Band L2	0.10	1.75	113		2.8284
Parting	0.28	5.70			
Seam-I	0.33	4.04	217		30.2702
Total					**73.534**
C.	**TECHNICAL**				
	Specification			Unit	Value
1	Area of the proposed mine block (with break-up of different geological blocks)			Sq. km	8.651(Batura OC) 7.30 (Batura Extension)
2	Borehole density within mine area			BHs/sq. km	15.34
3	Mine parameters (seam-wise) Extent along strike (min. – max.) Extent along dip (min.-max.)			 km km	 0.90 – 4.91 1.00 – 3.40

4	Description of coal seams proposed to be worked along with the parting details					
Name of seam	***Thickness Range considered (m)***	***Av. Grade***	***Av. gradient (in degrees)***	***Surface Cover (m)***	***Mineable Reserves (Mt)***	***Volume of OB (Mcum)***
Seam - III	0.75 – 2.68	G-D(F)	1-5	6.0 – 14.84	0.99	301.17
Local Band L1	0.20 – 3.00	G – A(C)		7.75 – 47.25	1.57	37.31
Seam - II	0.27 – 4.66	G - A		4.00 – 56.12	33.67	66.42
Local Band L2	0.10 – 1.75	E-A(B)		27.0 – 72.13	2.07	75.95
Seam - I	0.33 – 4.04	G – A(C)		7.18 – 75.90	27.20	145.22
Total Coal OB					65.50 Mt	626.07Mcum
	Specification		**Unit**	**Value**		
5	Av. Stripping Ratio		cum/t	9.56		
6	Method of Mining			Shovel – Dumper (OB) Surface Miner (Coal)		
7	**Target Output** Nominal production capacity (at 100%) Peak production capacity (at 140%) Production capacity (at 85%)		 Mt Mt Mt	 4.00 5.60 3.40		
8	Year of achieving Target Production (from zero date)			6^{th}		
9	Year of start of Internal Dumping			2^{nd}		
10	Production Phasing (from zero date upto target year)		Mt			

Year / Coal Seam	***Year 2***	***Year 3***	***Year 4***	***Year 5***	***Year 6 / Target year***	
Coal	0.50	1.00	2.00	3.00	4.00	
OB	12.00	14.00	24.00	34.00	37.50	
11	Total Mine Life (at Nom. production capacity)		Years	20		
	Pre-construction period		Years	0		
	Construction period		Years	1		
	Production build-up period		Years	4		
	Production period		Years	14		
	Tapering / mine closure period		Years	1		
12	External OB Dumping (Inside the Quarry)		Mcum	8.00		
				Departmental Option	**Outsourcing Option**	**Partial Outsourcing Option**
13	**Major HEMM Deployed for Coal**		Nos. & Capacity	1)2.0Mty capacity Surface Miner (2 no.) 2)10 cum Pay Loader (2 no.) 3)60 T Coal body(9 no.)	Major HEMM Outsourced	1)2.0Mty capacity Surface Miner (2 no.) 2)10 cum Pay Loader (2 no.) 3) 60 T Coal body(9 no.)
14	**Major HEMM Deployed for OB**		Nos. & Capacity	1)42 cum Rope Shovel (3 no.) with 240 T (33 no.) dumper. 2)10 cum Hyd. Shovel(5 no.) with 100 T dumper(43 no.)	Major HEMM Outsourced	Major HEMM Outsourced
15	Total Manpower		Nos.	1287	270	366
16	Overall Output per man shift (OMS)		Tonnes	11.26	54.18	39.89
17	Seam-wise weighted average grade of coal (non-coking/coking),GCV			G-6, 5576 Kcal/Kg		
18	Presence of Major Surface Constraints (nallas, road, power line, etc.)		(type)	1) Katna and Jamunanallas passes through the mine. 2) Seven villages including Rampur village 3)132 KV overhead line passing all along the Western side of the quarry.		
19	Coal Transport within the mine (In-pit belt conveying system or by Truck)			In pit belt conveying		
20	Any Railway Siding and distance (existing)			BURHAR SIDING is 18 km west of the mine.		
21	Proposed Railway siding			Rapid loading at Pit top.		
22	Name of any Specific Customer/Industry			Basket Linkage		

			Departmental Option	Outsourcing Option	Partial Outsourcing Option
D.	**ENVIRONMENTAL & OTHERS**				
1	**Civil Construction**				
	Residential houses	Nos.	711	150	203
	Housing satisfaction	%	55.24	55.56	55.46
2	**Water Demand**Total				
	Colony	MLD	1.27	0.729	0.780
	Industrial	MLD	0.612	0.135	0.181
		MLD	0.658	0.594	0.599
3	**Total Land to be acquired**	Ha	1915.59	1888.60	1897.48
	Government land	Ha	274.34	274.34	274.34
	Tenancy land	Ha	1528.31	1501.32	1510.20
	Forest land	Ha	112.94	112.94	112.94
4	**Total Land to be acquired within mine area (excavation area**)	Ha	1538.86	1538.86	1538.86
	Government land	Ha	236.76	236.76	236.76
	Tenancy land	Ha	1215.94	1215.94	1215.94
	Forest land	Ha	86.16	86.16	86.16
5	**Land to be acquired outside mine area (Beyond Excavation Area, such as approach road, Infrastructure, Colony,R&R etc.)**	Ha	349.91	322.92	331.80
	Government land	Ha	37.57	37.57	37.57
	Tenancy land	Ha	285.55	258.56	267.44
	Forest land	Ha	26.79	26.79	26.79
6	**Land to be acquired for external dumping**	Ha	26.82	26.82	26.82
	Government land	Ha	0.00	0.00	0.00
	Tenancy land	Ha	26.82	26.82	26.82
	Forest land	Ha	0.00	0.00	0.00
7	**Net Present Value of Forest Land (Rate)**	₹.Lakhs/Ha	22.00	22.00	22.00
	Total Area	Ha	112.94	112.94	112.94
	Total Value	₹.Lakhs	2484.75	2484.75	2484.75
8	**Resettlement & Rehabilitation**				
	No. of villages within mine boundary	Nos.	Seven		
	No. of land oustees	Nos.	3000		
	No. of PAFs to be rehabilitated	Nos.	1870		
9	**Total EMP Capital**	₹.Crores	239.86	222.13	222.63
	Social cost	₹.Crores	191.49	191.49	191.49
	Environment cost	₹.Crores	48.37	30.64	31.14
10	Average annual rainfall	mm	1200		
11	Make of Water(Peak)	Cum/day	379120		
12	Total installed pumping capacity	No./lps	5 nos./1125lps		
13	Drainage of the Area (Name of river/nala)		Jamunanallah, Katnanallah		
14	Any proposed diversion of nala or power line		1)Jamuna and Katnanallahs have to be diverted. 2)132 KV Power line needs to be diverted.		

				Departmental Option		Outsourcing Option	Partial Outsourcing Option
E.	**FINANCIAL**						
1	Total Capital Investment Existing Additional Total	 ₹.Crores ₹.Crores ₹.Crores		 40.78 3306.56 3347.34		 40.78 1104.42 1145.20	 40.78 1208.16 1248.93
2	Specific Investment	₹./ t		8341.32		2835.97	3095.30
3	Total Capital Investment on P&M	₹.Crores		2092.57		283.69	345.02
4	Specific Investment on P&M	₹./ t		5231.43		709.22	862.55
5	Capital requirement upto target year	₹.Crores		3306.56		1104.42	1208.16
6	Year of opening of Revenue account (from zero date)	Year		4th		3rd	3rd
7	Earnings per man shift (EMS)	₹		3042.16		3051.91	3017.65
8	Estimated Cost of Production At 100% production level At 85% production level	 ₹./ t ₹./ t		 2055.41 2331.39		 1226.09 1302.16	 1253.46 1342.01
9	Estimated average selling price (at 95% sales realization)	₹./ t		1920.34		1920.34	1920.34
10	Estimated Profit At 100% production level At 85% production level	 ₹./ t ₹./ t		 (-) 135.07 (-) 411.05		 694.24 618.18	 666.88 578.32
11	Financial Internal rate of return (FIRR) At 100% production level At 85% production level	 % %		 -0.96 -5.93		 28.40 23.40	 25.84 20.87
12	Desired Av. Selling Price to yield 12% FIRR at 85% production level	₹./ t		2906.54		-	-
13	Break-even point Production Production level	 Mty %		 4.38 109.45		 1.53 38.30	 1.72 42.94
14	Cost of Outsourcing(weighted) OB Coal Rehandling	 ₹./ cum ₹./ t ₹./ cum		 By Deptt. Eqpt. By Deptt. Eqpt. 45.60		 57.00 69.00 45.60	 57.00 By Deptt.Eqpt. 45.60
15	Mine Closure Cost (for corpus fund)		₹. 6.00 lakhs/Ha				
16	Expected Completion Capital	₹.Crores		4053.15		1372.43	1497.63

****

EXECUTIVE SUMMARY

1.1 BACKGROUND OF THE PROJECT REPORT

The proposed Rampur Batura OC has been projected in the Batura geological Blocks, located in the Western part of Sohagpur Coalfield, lies about 12 km North of Anuppur town and about 55 km southeast of Shahdol, the district headquarter.

Earlier Batura OC (2.0 Mty) was prepared in May 2008 and sanctioned by SECL Board in it's 172nd meeting held on 9.09.2008 for a capital of Rs. 203.82 crores. Later Batura OC (4.0 Mty) was prepared combining two adjoining Geological Blocks namely, Batura OC and Batura Extension geological block. Batura OC has been renamed as Rampur Batura OC as per decision taken in planning committee meeting held on 6.09.2012. The PR was placed before the 319th CIL Board meeting held on 12th August 2015. CIL board accorded its "ïn principle" approval. Further board also approved first year expenditure of Rs 84.23 Cr. for the project. Further PR was placed before the 330th CIL Board meeting held on 19th and 20th July'2016. In the meeting it was advised that Project Report for Rampur Batura Opencast Project for a rated capacity of 4.0Mty be reviewed. Accordingly revised and updated PR has been prepared. The points discussed during the meeting held in the office of D(T) P&P have been incorporated in the revised PR. Minutes of the meeting enclosed in the Annexure.

For the purpose of implementation, PR for Batura OC (2.0 Mty) may be treated as dovetailed with PR for Rampur Batura OC Project (4.0 Mty). In this PR all the activities and financial provisions of Batura OC Project (2.0Mty) are proposed to be dovetailed.

1.1.1 SALIENT FEATURES OF LAST APPROVED REPORT [BaturaOC,2.0 Mty, (Sept., 2008)]

Sl. No.	Particulars	Unit	Total Outsourcing Option with Surface Miner
1	Thickness (Excluding bands): i) Seam-III ii) Seam-L1 iii) Seam-II iv) Seam-I	 m m m m	 0.75-2.45 0.10-0.97 0.27-4.63 0.89-3.75
2	Overburden/parting thickness Top OB a) Between Seam-III & Band L1 b) Between band L1 & Seam-II c) Between Seam-II & Seam-I	 m m m	 15.72-26.67 0.70-11.87 12.73-17.81
3	Gradient (dip)	degree	1 – 5

Sl. No.	Particulars	Unit	Total Outsourcing Option with Surface Miner
4	Average Grade		C
5	Total Mineable Reserves a) Seam-III b) Seam-L1 c) Seam-II d) Seam-I	Mt. Mt. Mt. Mt. Mt.	33.44 1.05 1.69 15.16 15.54
6	Volume of OB	Mcum	**307.09**
7	Stripping Ratio (Av.)	cum/t	9.19
8	Target Output	Mt/Yr.	2.00
9	Peak OBR	Mcum/yr.	17.75
10	Method of Mining	Surface Miner & Shovel Dumper	
11	Project life	Year	20
12	a) Total capital investment b) Capital outlay/te of annual output	₹. crores ₹./t	203.82 1019.12
13	a) Capital requirement of P&M b) Per tonne of annual output	₹. crores ₹./t	63.68 318.39
14	Selling price (95% of notified selling price) of processed ROM Coal.	₹./ t	1176.00
15	Estimated cost of production a) at 100% level of production b) at 85% level of production	 ₹./t ₹./t	 747.98 783.16
16	Profit per tonne a) at 100% level b) at 85% level	 ₹./t ₹./t	 428.02 392.84
17	Foreign Exchange	Million US $	NIL
18	Break-even-point	(%) (Mty)	31.77 0.64
19	No. of personnel	Nos.	248
20	OMS	t	30.55
21	EMS	₹.	1010.51
22	Anticipated year of achieving target	Year	5th
23	IRR at 100% level of production	%	45.41
24	IRR at 85% level of production	%	36.59
25	Completion capital of the project	₹. Crs.	230.59

1.2 HISTORY OF THE BLOCK

Both the Geological Blocks namely, Batura OC Block (in which Batura OC, 2.0 Mty had been planned) and Batura Extension Block are virgin blocks. Mining has not yet been started in any of the Blocks. The nearest working mine is Sharda OC which is roughly 8 km. west of Rampur Batura OC. All the mining activities are restricted to the western side of the Son River whereas Batura Blocks lies on the eastern side of the river.

1.3 JUSTIFICATION FOR PREPARATION OF PR

Ever-increasing demand of coal is pressing hard for opening of new projects or expansion of old projects. The production of SECL in the year 2019-20 is projected at 239 Mte. PR for Rampur Batura OC would help SECL to meet the production target in 2019-20. Moreover, the projected quality of coal of proposed Rampur Batura OC is grade 'G-6'. This PR is being prepared to

I. To meet the demand of superior grade coal, it is essential to open new projects, as in the existing u/g mines there is gradual depletion of the coal reserves.

II. Quarriable reserves are available in said Block for opening the opencast mine upto seam-I.

Salient features of Present PR (4.0 Mty) (October,2017)

Sl. No.	Particulars	Unit	Thickness		
1	**Dominant Thickness of Seams Excluding Band**				
	Seam III	Metre	0.75-2.68		
	Seam L1	Metre	0.20-3.00		
	Seam II	Metre	0.27-4.66		
	Seam L2	Metre	0.10-1.75		
	Seam I	Metre	0.33-4.04		
2	**Top OB**	Metre	20.3		
	Parting between Seam III & Seam L1	Metre	14.45-26.67		
	Parting between Seam L1 Seam II	Metre	0.70-13.60		
	Parting between Seam II Seam L2	Metre	6.40-16.70		
	Parting between Seam L2 Seam I	Metre	0.28-5.70		
3	Gradient		1 -5 Deg.		
4	Average Grade of coal / GCV	Gr./kCal	G-6/5576		
5	Mineable Reserves	Mt	65.50		
6	Volume of OB	Mcum	626.07		
7	Target output	Mty	4.00		
8	Stripping Ratio (Av.)	Cum/t	9.56		
9	Project life	Year	20		
			Total Departmental	**Total Outsourcing**	**Partial Outsourcing**
10	Additional Capital	(₹. Crs.)	3306.56	1104.42	1208.16
11	Total Land involved	Ha	1915.59	1888.60	1897.48
12	Cost of Production at 100% capacity	(₹./t)	2055.41	1226.09	1253.46
13	Weighted average Selling price of Coal(Power Coal)	(₹./t)	1920.34	1920.34	1920.34
14A	Profit/Loss at at 100% capacity(Power coal)	(₹./t)	-135.07	694.24	666.88

Sl. No.	Particulars	Unit	Thickness		
14B	Profit/Loss at at 85% capacity(Power coal)	(₹./t)	-411.05	618.18	578.32
15 A	IRR at 100% capacity(Power coal)	(%)	Negative	28.40	25.84
15 B	IRR at 85% capacity(Power coal)	(%)	Negative	23.40	20.87
16A	Desired selling price to yield 12% IRR at 85% capacity(Power coal)	(₹./t)	2906.54	-	-

The PR has been formulated to win coal by Surface Miner/Pay loader/Dumper & OB by Shovel Dumper combination. Both Winning of coal & OB removal will be done by departmental HEMM. Coal from face will be loaded to reclaim feeder to discharge into inpit conveyor that will be convey coal to pit top. From pit top; coal will be transported to upcoming Batura Railway Siding by surface belt conveyor to dispatch coal by by rapid loading system to rail. Sometimes with favorable geo-mining conditions and improved productivity of the HEMM, the project may produce coal upto 1.40 times of the planned capacity. So, EMP should be prepared for 5.60 Mty, accordingly approval from the Competent Authority is to be sought.

The flexibility in the implementation stage may be exercised within the approved cost estimates to respond to improvements in technology and equipment which would result in improved profitability and productivity measures. Following points may be considered under the flexibility: -

a) Re-alignment of project boundaries for better working layout / dump etc.
b) Change in the specification of HEMM to higher capacity at the time of procurement of new equipment or replacement of the equipment.
c) To procure state-of-the-art safety equipment, whenever they are introduced, even if the same is not provided in approved Project Report.
d) Relocation of site for infrastructure facilities depending upon techno-economic reasons and availability of land / forest area etc.
e) Hiring of equipment for loading, transportation etc., at a competitive price, so as to cater to the needs of increased demand of coal and subsequent removal of higher OB and for augmentation of coal production.
f) For up gradation of new technology in mining method for improving performance and reduction in manpower, at a subsequent date after project completion.

g) In this PR it is proposed that coal would be mined by surface miner. However, in circumstances where Operational/Geotechnical difficulties persist small quantity of coal may be mined out by alternative technology such as ripping/drilling etc. Prior approval may be obtained for use of alternative technology citing the circumstances/operational difficulties.

Overall grade of coal is "grade C", which is easily marketable. **GCV of coal is 5576 Kcal/Kg**. As per the guidelines, a Project is economically viable when it achieves more than 12% IRR at 85% level of Production. Option I is having Internal Rate of Return less than 12% at 85% level of target production i.e. (-)ve, it is thus not economically viable. Option II is having an IRR of 23.40% at 85% level of production, and Option III is having an IRR of 20.87% at 85% level of production. The project is thus economically viable under Option II and Option III.

2.1 UTILITY OF MARKET FOR THE COAL FROM MINE / PROJECT

Liberalization of power sector by Government of India has generated wide spread interests for private and public sector investments in power generation.

As such, there is an appreciable increase in the number of upcoming new projects in both private and public sectors. Rampur Batura OC is a new project & grade of coal is grade 'C'.

Preparation of PR for Rampur Batura Opencast with enhance coal production is, therefore, proposed with a view to fulfill the above indicated growth in demand.

2.2 AVAILABLE LINKAGE OR FIRM FUEL SUPPLY AGREEMENT (FSA)

Rampur Batura OC is a new project & grade of coal is 'C', can be used for basket linkage.

3.1 LOCATION

The Batura Blocks are located in the western part of Sohagpur Coalfield, lies about 12 km north of Anuppur town and about 55 km southeast of Shahdol, the district headquarter. Chachai UG and Sharda OC are the nearest working collieries situated at a distance of 5-8 km on the west and southwest of the block. The block is situated on the eastern side of the Son river where only the seams have been proved in detail.

Other exploration blocks/mine workings in the area are located on the western side of the Son river.

The area is bounded approximately by

North latitudes 23° 12' 40" and 23° 14' 10"

East longitude 81° 40' 20" and 81° 43' 20"

The area is covered in the Survey of India Toposheet No.64 E/12 (RF 1:50,000).

3.2 ACCESSIBILITY AND COMMUNICATION

The area is well connected by rail and road. The Bilaspur- Katni branch line of S.E. Railway passes mostly through south Sohagpur Coalfield. The nearest railhead Anuppur is a Junction from where the Anuppur-Chirimiri & Anuppur-Bisrampur lines branch-off, and is about 20 km South of Batura Blocks.

4.1 Block Boundaries

The combined area of the two blocks Batura OC (8.651 sq.km.) and Batura Extension (7.30 sq.km.) is 15.951 sq.km. and it is bounded by -

North : Boundary of Dolerite dyke 1.

South : Incrop of Seam-I

East : Incrop of Seam I & the Boundary line of the hill alongwith the forest boundary line at the top & bottom portion.

West: A straight line of N-S direction joining Bh. CSBT-275 & 294.

4.2 GEOLOGICAL RESERVE

A total of 73.534 MT of proved reserves of coal have been estimated in Batura OC blocks .

These includes 48.436 Mt (65.87%) superior grade coal of (A, B, C) grade and 25.098 Mt (34.13%) coal of inferior grade (D, E, F).

Out of the total Net Proved Reserves of 73.534 Mt of coal 2.60% is of 'A' Grade, 17.50% is of 'B' Grade and the bulk of the reserves, i.e. 45.77% falls under 'C' Grade, 24.28% is of 'D' Grade, 8.42% is of 'E' Grade, 1.06% is of 'F' Grade. 0.37% is of 'G' Grade .

Summarised seam-wise and grade-wise reserves (Reserves in million tonnes)

Coal Seam	GRADE							Total
	A	B	C	D	E	F	G	
Seam-III (Bot.)	-	-	0.0106	0.027	0.0274	0.0629	0.1756	0.3035

Coal Seam	GRADE							Total
	A	B	C	D	E	F	G	
Seam-III				0.1573	1.0461	0.0115		1.2148
Seam-L1	0.7921	1.2685	1.4967	1.2637	0.4733	0.197	0.0382	5.5295
Seam-II	0.0228	4.4597	15.9215	9.7526	2.9408	0.2689	0.0213	33.3876
Seam- L2	0.4023	0.8791	1.0676	0.3869	0.0925	-	-	2.8284
Seam-I	0.6969	6.259	15.1592	6.2656	1.6113	0.2399	0.0383	30.2702
TOTAL	1.9141	12.8663	33.6556	17.8531	6.1914	0.7802	0.2734	73.534
%Reserve	2.60	17.50	45.77	24.28	8.42	1.06	0.37	

5.1 MINE BOUNDARIES

East - Boundary line of the hill all along with the forest at the top & bottom portion has incrop of Seam-I(Beyond eastern boundary no borehole has been done because of hills running North to South).

West- A straight line of N-S direction joining BH CSBT-275 & 294 (Beyond which SR increases to more than 20).

North-Boundary of Dolerite Dyke-I (Beyond which is down throw fault Bamhani chilpa of 400 m. Area is only regionally explored, detailed exploration is yet to be carried out. Borehole No. SBT-9 of GSI shows first occurrence of coal at a depth of 700 m approx.)

South- Incrop of seam I (There is no coal on further rise side as evident in GSI borehole No. SBT-5).

5.2 MINEABLE RESERVES

10% geological and 10% mining losses are considered for reserves estimation.

Sector & Mineable reserves

The total mineable reserves within the quarries have been estimated as 65.50 Mt with a corresponding OB volume of 626.07 Mcum. While, calculating mineable reserves, a geological loss of 10% and a mining loss of 10% have been considered. The estimation of mineable reserves is based on a minimum mineable thickness of 0.9 m. The mineable reserves have been estimated by iso-chore method from the seam extent plan of individual seams. Similarly, OB has been estimated based on iso-parting and Top OB plan. The sector wise mineable reserves, volume of OBR and stripping ratio in the quarry is as summarised in the following table: -

Sectorwise Mineable Reserves(in Mt), Volume of OBR(in Mm^3) and Stripping ratio(in m^3/t)

	OB						COAL						SR
	TOP OB	III-L1/II	L1-II	II-L2/I	II/L2-I	TOTAL	III	L1	II	L2	I	TOTAL	
SEC-1	7.38					7.38					0.23	0.23	31.76
SEC-2	11.38				4.41	15.79			0.64		0.38	1.02	15.44
SEC-3	13.01				12.83	25.84			1.95		0.63	2.57	10.04
SEC-4	19.28	0.87			15.49	35.64	0.04		2.52		0.82	3.38	10.54
SEC-5	21.22	3.74			17.73	42.69	0.25		2.59		1.30	4.14	10.32
SEC-6	20.42	8.47	4.74	3.77	8.72	46.11	0.30	0.04	2.38	0.01	1.89	4.63	9.96
SEC-7	17.57	9.91	5.94	5.02	7.69	46.13	0.24	0.20	2.51	0.10	2.04	5.09	9.06
SEC-8	18.89	7.34	5.02	7.52	6.72	45.49	0.13	0.25	2.64	0.16	1.99	5.18	8.78
SEC-9	21.19	6.98	4.18	8.96	5.79	47.09	0.03	0.25	2.59	0.30	2.02	5.19	9.07
SEC-10	21.76		8.13	8.86	6.30	45.05		0.18	2.36	0.15	2.09	4.77	9.44
SEC-11	18.65		7.67	8.70	6.27	41.30		0.21	2.18	0.17	2.23	4.78	8.63
SEC-12	17.81		6.63	9.07	5.83	39.34		0.08	2.15	0.36	2.20	4.79	8.21
SEC-13	17.02		5.04	7.62	6.62	36.30		0.03	2.05	0.35	2.20	4.63	7.83
SEC-14	17.28		2.70	4.45	7.03	31.46		0.16	1.89	0.15	1.84	4.04	7.79
SEC-15	18.22		3.65	4.40	5.33	31.60		0.08	1.72	0.15	1.48	3.43	9.20
SEC-16	15.89		6.70	4.36	5.23	32.17		0.06	1.50	0.18	1.31	3.05	10.55
SEC-17	10.55		6.02	3.22	5.04	24.83		0.03	0.92	0.01	1.08	2.03	12.25
SEC-18	7.53				10.83	18.36			0.52		0.79	1.32	13.96
SEC-19	5.16				5.82	10.98			0.40		0.52	0.92	11.93
SEC-20	0.95				1.56	2.51			0.13		0.16	0.29	8.64
	301.17	37.31	66.42	75.95	145.22	626.07	0.99	1.57	33.67	2.07	27.20	65.50	9.56

5.3 FUTURE EXPANSION POTENTIAL

All around the mine boundary it is proposed to be extracted upto the incrop of seam I which is the bottom most seam of the area. Thus, mine does not have the scope to expand further.

6.1 GEO-MINING CHARACTERISTICS

6.1.1 Seam Gradient - Variation, av. gradient of quarry floor 1 to 5 degree.

6.1.2 Geological Disturbances -

Batura OC Block – Batura OC Block has been affected by only 3 no. of faults. All the 3 no. of faults have E-W trend in the Northern part of the block.

Fault No.	Extent of Fault (Km.)	Trend	Throw		Evidences
			Direction	Amount (m)	
F1-F1	Throughout the Eastern part of the block	NNW-SSE	West	35m(approx.)	Through FRL value differences in borehole Nos. CSBT-394 & 325 and shifting of coal seam II incrop from the adjacent Batura U/G Block.
F2-F2	Throughout the north-eastern part of the block	NW-SE	South	3-10m	Through FRL value differences in borehole No.CSBT-002, 411 & 419 and CSBT-417, 413, 418, 416, 422 & 433 on the other side of the fault.
F3-F3	In the northern	NW-SE to	North	1-40m	Faulted for seam-I in BH-CSBT-321& part thickness in seam-II in BH CSBT-

Fault No.	Extent of Fault (Km.)	Trend	Throw		Evidences
			Direction	Amount (m)	
	part of the block	E-W			341, FRL value differences of boreholes CSBT-145, 86, 191,88,174,189,178,346,207

6.1.3 Presence of In-seam band seam-wise

In seam band has been found only in Seam – II, thickness varying from 0.05 m to 0.83 m

6.1.4 Details of sequence of coal seam and parting

The sequence of coal seams with their thickness and parting range, grade, geological coal within the block are as shown in table below:-

Seam	Surface Cover (m)	Area of Development (sq. km.) [As per GR]	Thickness Range (m)	Grade Range (Dominant Grade)	Borehole Intersection (As per GR in Nos.)	Borehole Density/ sq. Km.	Geological Reserves (Mt) [As per GR]
Seam-III T	4-20.25	-	0.11-0.85	D-G	17		-
Parting		-	0.36-1.35				
Seam-III M	6.23-23.40	-	0.30-1.41	C-F	10		-
Parting		-	0.27-2.22				
Seam-III B	1.85-28.00	0.2675	0.1-1.10	C-G	43		0.3035
Parting with L1		-	17.37-31.20				
Seam-III	6.0-14.84	0.6874	0.75-2.68	G-D(F)	9	13.09	1.2148
Parting		-	14.45-26.67				
Local Band L1	7.75-47.25	4.8320	0.20-3.00	G-A(C)	139	28.77	5.5295
Parting		-	0.70-13.60				
Seam-II	4.00-56.12	13.1706	0.27-4.66	G-A	216	16.40	33.3876
Parting		-	6.4-16.70				
Local Band L2	27.0-72.13	2.2452	0.10-1.75	E-A(B)	113	50.33	2.8284
Parting		-	0.28-5.7				
Seam-I	7.18-75.90	12.8113	0.33-4.04	G-A(C)	217	16.94	30.2702
TOTAL							**73.534**

6.2 MINE PARAMETERS

The **geological and mining characteristics** have been summarized in the following table: -

Sl. No.	Particulars	Unit	Thickness
1	**Dominant Thickness of Seams Excluding Band**		
	Seam III	Metre	0.75-2.68
	Seam L1	Metre	0.20-3.00
	Seam II	Metre	0.27-4.66
	Seam L2	Metre	0.10-1.75

Sl. No.	Particulars	Unit	Thickness
	Seam I	Metre	0.33-4.04
2	**Dominant Thickness of OB & Parting**		
	Top OB	Metre	20.3
	Seam III & Seam L1	Metre	14.45-26.67
	Seam L1 Seam II	Metre	0.70-13.60
	Seam II Seam L2	Metre	6.40-16.70
	Seam L2 Seam I	Metre	0.28-5.70
3	Gradient		1 – 5 Deg.
4	Average Grade of coal		'C', GCV-5576 KCal.
5	**Mineable Reserves**		
	Seam III	Mt	0.99
	Seam L1	Mt	1.57
	Seam II	Mt	33.67
	Seam L2	Mt	2.07
	Seam I	Mt	27.20
	TOTAL	**Mt**	**65.50**
6	**Volume of OB**		
	Top OB	Mcum	301.17
	Seam III & Seam L1/II	Mcum	37.31
	Seam L1 & Seam II	Mcum	66.42
	Seam II & Seam L2/I	Mcum	75.95
	Seam II/L2 & Seam I	Mcum	145.22
	TOTAL	**Mcum**	**626.07**
7	Target output	Mty	4.00
8	Stripping Ratio (Av.)	Cum/t	9.56
9	Project life	Year	20
10	Main Customers		Miscellaneous
11	Anticipated year of achieving target	Year	6th
12	Total Land involved	Ha	1915.59 for Option I, 1888.60 for Option II and 1897.48 for Option III.
III.	**Quarry Parameters**		
1	Maximum width along strike		
	- at surface	km	4.91
	- at floor	km	4.80
2	Minimum width along strike		
	- at surface	km	1.265
	- at floor	km	0.957
3	Maximum length along dip		
	- at surface	km	3.40
	- at floor	km	3.26
4	Maximum depth	m	80
5	Minimum depth	m	8
6	Maximum lift	m	3540
7	Area of excavation		
	- at surface	Ha	1538.86
	- at floor	Ha	1471.20

7.1 CONSTRAINTS ON MINE DEVELOPMENT

1. 132 KV overhead line passing all along the Western side of the quarry.
2. Katna nala (South–Eastern part) and Jamuna Nala (Western part) passes through the proposed quarry.
3. Two East –West traversing Dykes passes through the proposed quarry.
4. Densely populated Rampur village and six other villages are situated in the proposed Quarry.

7.2 MINING STRATEGY / MINING SEQUENCE

In the 1st year the acquisition of land and other development activities will be done. Initial box cut of quarry is proposed to be developed in the 2nd year of mine operation by grading properly the access trench and making its width 30 m wide.

The box cut is developed in such a manner so as to facilitate the proper drainage of water towards the sump.

This would also facilitate extension of coal and OB bench for full development of mine. After creation of sufficient decoaled area, internal backfilling of OB will be started in the 2nd year.

The coal production will continue from the 2nd year of mine life and the target coal production of 4.00 Mty will be achieved in the 6th year. The target OB removal will be achieved in the 6th year of mine operation.

7.3 DUMPING STRATEGY

In the initial years i.e. upto 3rd year, OB quantities will go to the dip side of the quarry (100 m beyond 5th year stage position). Internal dumping will be in 2nd year and 3rd year respectively. The parting OB in case of older seams may be transported through central haul road, while mining in the multi seam zone.

Initially, the soil/alluvium from top bench of OB will be stacked and stored separately. The spoil dump benches in the internally backfilled OB will be in the form of benches. With the sufficient advance of bottommost coal bench, the backfilled OB will be leveled with dozer. Dumper/Tipper will transport soil/alluvium OB from the top OB bench and will dump the soil directly on the leveled backfilled OB.

The slope stability study should be done. According to study report, the dump design like dump bench height, total dump height & slope etc. should be modified to avoid dump failure. In addition to that proper precautions should be taken to avoid sliding of internal OB bench. 8.0 Mcum OB will be externally dumped within quarry area from 2nd year to 3rd year for which 83 Ha land will be required within the quarry boundary area. Dump height will be 10 m.

This temporary external dump will be rehandled to internal dump subsequently. From 6th year to 9th year the external dump (dumped internally) will be rehandled back to internal dump. Site of external dump has been proposed within the quarry boundary area to save forest as well as tenancy land beyond quarry excavation area. Top soil will be removed and stored separately. This soil will be directly spread over the leveled graded backfilled spoil for reclamation of the quarried out land.In the approved PR of Batura OC(2.0Mty), provision of land 26.816 Ha land for external dump is envisaged. As Batura OC (2.0Mty) is about to start within a year and OB is to be dumped externally in the initial years the provision of additional 26.816Ha of land already notified under Section 11 of CBA for external dump has been included in this PR also.

8.1 DEPLOYMENT OF HEMM

The PR has been formulated to win coal by Surface Miner & OB by Shovel Dumper combination. For OB removal yearwise lead has been estimated and based on that average lead for OB is 3.00 Km. The average lead for Coal is estimated to be 2.00 Km.

The deployment of major HEMM in all the three options is as tabulated below:

	Major HEMM Deployed for Coal		**Option-I (Total Deptt.)**	**Option-II (Total O/S)**	**Option-III (Partial O/S)**
1	Surface miner	2Mty	2	-	2
	Dozer	410 HP	1	-	1
	Pay loader	10 cum.	2	-	2
	Truck coal body	60 T	9	-	9

			Option-I	Option-II	Option-III
2	Major HEMM Deployed for OB				
	Electric Rope shovel	42/10 cum	8	-	-
	Dumper	240/100T	76	-	-
	Drill	250/160 mm	8	-	-
	Dozer / Wheel Dozer	850/410/450 HP	9	1	1

8.2 CALENDAR PROGRAMME OF EXCAVATION

Considering the average width of quarry and annual advance of quarry floor, the calendar programme has been prepared and given in the following table: -

(Figures of Coal in Mt, OB in Mm^3 and Stripping ratio in M^3/t)

YEAR	TOTAL COAL	III	L1	II	L2	I	TOP OB NATURAL	TOP OB PLANNED	III-L1/II	L1-II	II-L2/I	II/L2-I	TOTAL OB NATURAL	TOTAL OB PLANNED	SR	REHANDLED OB
1	CONSTRUCTION YEAR															
2	0.50			0.17		0.33	10.34	10.84				1.16	11.50	12	24.00	
3	1.00			0.66		0.34	9.64	9.53				4.47	14.11	14	14.00	
4	2.00			1.51		0.49	10.10	14.03				9.97	20.07	24	12.00	
5	3.00	0.03		2.24		0.73	16.90	19.42	0.69			13.89	31.48	34	11.33	
6	4.00	0.21		2.59		1.20	20.92	16.99	3.16			17.35	41.43	37.5	9.38	2.00
7	4.00	0.25	0.03	2.15	0.01	1.56	18.25	15.60	6.54	3.23	2.57	9.56	40.15	37.5	9.38	2.00
8	4.00	0.22	0.11	2.01	0.05	1.61	15.22	15.16	7.61	4.45	3.69	6.59	37.56	37.5	9.38	2.00
9	4.00	0.16	0.17	2.00	0.09	1.58	14.08	15.76	7.02	4.38	4.61	5.73	35.82	37.5	9.38	2.00
10	4.00	0.09	0.20	2.04	0.13	1.54	14.70	16.99	5.65	3.84	5.88	5.14	35.21	37.5	9.38	
11	4.00	0.02	0.20	1.99	0.23	1.56	16.32	17.54	5.38	3.22	6.90	4.46	36.28	37.5	9.38	
12	4.00	0.01	0.16	1.98	0.15	1.70	17.80	17.88	1.26	5.97	7.30	5.09	37.42	37.5	9.38	
13	4.00		0.16	1.89	0.13	1.82	16.73	18.31		6.58	7.34	5.27	35.92	37.5	9.38	
14	4.00		0.14	1.81	0.2	1.85	15.32	18.93		6.08	7.39	5.1	33.89	37.5	9.38	
15	4.00		0.06	1.79	0.3	1.85	14.83	16.77		5.32	7.39	5.02	32.56	34.5	8.63	
16	4.00		0	1.78	0.3	1.9	14.74	17.9		4.32	6.54	5.74	31.34	34.5	8.63	
17	4.00		0.16	1.87	0.15	1.82	17.15	20.44		2.69	4.42	6.95	31.21	34.5	8.63	
18	4.00		0.1	2	0.18	1.72	21.16	18.05		4.94	5.21	6.3	37.61	34.5	8.63	
19	4.00		0.06	1.91	0.15	1.88	20.83	10.5		9.99	5.96	8.05	44.83	34.5	8.63	
20	3.00			1.28		1.72	16.14	10.53		1.41	0.75	19.38	37.68	32.07	10.69	
	65.50	0.99	1.57	33.67	2.07	27.20	301.17	301.17	37.31	66.42	75.95	145.22	626.07	626.07	**9.56**	8.00

9.0 PROJECTED COAL QUALITY

The average GCV of the seams considered together works out to 5576Kcal / Kg.

10.0 WATER MANAGEMENT

Five numbers of main pumps each of 225lps, 100 m head will be provided to meet the requirements. Some of the stages of the main pumps may be blanked when they have to operate at shallow depths. This has been provided to reduce the capital

investment and utilize the pumps up to the end of life. Provisions have been made considering the peak demand which is occasional, so no standby pumps have been provided. Further the pumps may be repaired and kept ready for use in rainy season. Main pumps will be provided near main sump or on pontoons as per requirement.

Two numbers of intermediate pumps each of 38 lps capacity, 60m head have also been provided for inter mediate pumping operation in the mine.

Two numbers of diesel engine operated pumps each of 80 lps capacity, 100m head have also been provided for operation in the initial period and then as standby for use in case of emergency.

All the main pumps will be provided with pressure gauges on delivery side and suction side for measuring the head developed so that corrective action will be taken for operating the pump at the duty point.

The main pumps have been provided considering life of the mine. The requirement of pumps has been shown for entire life of the mine, however procurement shall be made as per requirement.

During heavy rainfall, overburden may be washed away from edges of slopes and internal dumps, and flow into the sump. Pumping of clear water and slurry will be from upper and lower part of sump respectively. For pumping of slurry/sludge containing large solids particles, slurry pumps with one or two channels impeller with free flow passage varying from 40mm to 190 mm diameter will be provided. face pumps (4 nos.) will be provided for keeping the working places dry.

11.1 COAL HANDLING PLANT AND DESPATCH:

Since the coal will be extracted by surface miners, no crushing arrangement have been envisaged for this project.

11.1.0 INPIT CONVEYING SYSTEM

- Coal will be mined by surface miner as such no crushing arrangement is required.
- Coal mined by surface miner will be transported inpit by trucks/dumpers to coal receiving station, where reclaim feeder will be laid.
- Reclaim feeder will receive the coal and feed to main haul road belt conveyors.
- Around 4.0 Mty production will come from the Inpit.

- Installation of conveyor of Inpit will start from 2nd year onwards.
- In initial period of Inpit conveyors will be laid along the haul road directly from the surface after getting the proper gradient.
- In final stage of Inpit Conveying System there will be 8 nos. of conveyors IP1 to IP8 will be of 1400 mm wide and 800 tph capacity.
- In Inpit Conveying System 2 sets of 1400 mm wide & 800 tph have been provided in the main haul road, out of which one will be working and other will be stand bye.
- Inpit conveyor will be connected with the main CHP.
- Two nos. of short belt conveyors IP9 and IP10 of 1400 mm wide, 800 TPH will receive coal from reclaim feeder (both side of the haul road) in turn feed to either of two conveyors of main haul road.

11.2.0 COAL HANDLING PLANT (CHP)

Inside the mine (-) 100 mm size coal will be produced with the help of surface miner and feed it to reclaim feeder by trucks. Coal from the reclaim feeder feed it to short belt conveyor for onward transport and discharge to inpit conveyor. Coal from inpit of Rampur Batura OC will feed to main CHP's with the help of conveyors IP1and IP2 and discharge on to belt conveyor C2 or C3 of main CHP.

The conveyors C2/C3 will be of 1400 mm wide and of 1200 tph capacity. The belt conveyor C2/C3 will elevate coal and discharge on tripper conveyor C4/C5. The conveyors C4/C5 will be provided with a reversible traveling tripper installed on the overhead RCC bunker of 12,000 t capacity. The tripper conveyors C4/C5 will spread coal in the RCC bunker. These conveyors will be of 1400 mm wide and 1200 tph capacity.

The overhead bunker will be of twin slit type. At each slit two numbers (one working & one standby) plough feeders of 3000 tph capacity (av.) will be provided for reclaiming coal from the bunker at a regulated rate and discharge on reclaim cum loading belt conveyors C6/C7.

Ultrasonic type level switches will be provided on the carriage of the traveling tripper of the conveyors C4/C5 to monitor the high level of coal in the bunker. In case high level is reached in the bunker, it gives signals so that tripper can move to the next place for discharging coal in the bunker. Similarly low level switches will also be provided in bunker to stop the plough feeder provided at the bunker opening in case a pre-determined low level is

reached. Two numbers of partition walls will be provided in the bunker which will be helpful during maintenance and repair. The floor of the bunker will be provided with proper slopes for easy drainage of water. The slanting surface of the bunker will be provided with suitable liners for smooth flow of coal.

The conveyors C6 and C7 of 1600mm wide and 3000 tph capacity will be provided below the bunker to receive coal from the plough feeders. The conveyors C6/C7 will elevate coal and discharge into the 500 t capacity Load out system simultaneously.

Rapid Loading Systems consists of one number of load out system primarily consisting of one surge bin of 500 te capacity, one weigh bin of 100 te capacity and a traversing/telescoping chute . Coal will flow into the weigh bin from the surge bin through four numbers bin charging gates and will be loaded into rail wagons through the telescopic chute. The telescopic chute will be of traversing type and will be parked aside for allowing loco to pass and then will be brought to the central position for facilitating coal loading into the wagons.

The surge bins and the weigh bins will be fabricated of minimum 10 mm thick carbon steel plates and will be lined with minimum 12 mm thick chromium carbide wear liner. The chute will be of heavy duty design for coal application. The structure will be designed to be in compliance with the current Indian standards and specifications. The structural system will include stairs system, access floors as well as the floor where the system feed conveyors lands on the building etc. All structural steel design will be as per suitable IS. All structural connections will be designed to be field bolted. All structural framing connections shall utilize high tensile strength bolts. All bracings girt connections will be designed and fabricated for field bolting. Proper sheeting of the building shall be done and a roof over the structure will be provided.

Temperature monitoring devices will also be provided at various levels in the surge bins to monitor temperature of coal inside the surge bins and give audio-visual alarms in the control room for necessary action. These will operate through battery in case of power failure. Inspection trolley with cage will be provided above the surge bins for inspection of outer and inner surfaces of the surge bins.

A high wagon/collision sensor will be attached to the load out chute which will automatically close (if open) the control gate above the load out chute and retract the chute in up position to allow passage of a high wagon. Suitable calibration/testing

systems will be provided with the load out systems. In general a load out system will consist of the following (the list is not comprehensive rather a general overview):

a. One 500 metric tonne capacity surge bin
b. One 100 metric tonne capacity weigh bin
c. Four dual ended shear beam load cells of required capacity with mounting assemblies
d. One digital weigh indicator
e. One surge bin level monitoring system
f. One batch controller system with HMI located in the control room for controlling and monitoring the loading process
g. Four dustless double bladed surge bin discharge control gates
h. One double bladed, dustless weigh bin discharge gate
i. One traversing/telescopic load out chute with collision sensor and breakaway section.

A suitable self-contained hydraulic power unit consisting of the reservoir of required capacity and all necessary components will be provided to operate the system and provide sufficient energy reserve to perform failsafe operation of the system (close/open discharge gates, raising/lowering/traversing of the discharge chute).

The load out system is a computer controlled operator attended - automatic weighing and loading system capable of static loading accuracies within ±0.05%. The load out system will feature three modes of attended operation: automatic, semi-automatic and manual. The wagons will be moved by means of a creep controlled diesel engine/ electric engine while they are being loaded. Track logic system will be provided on the rail lines to identify the rail wagons and send signal to the central processing unit for operating the chute. During the period when there is no wagon loading the weigh bin will be filled in.

Control logics and associated I/O modules will be provided in the Main Load out PLC Control Cabinet to operate all load out I/O, including load out gates, hydraulic power unit and load out chute. This unit will interface with the load out application software. This system will communicate the surge bin level signal, plus the tonnes required to complete the loading of the rake, to the PLC of the reclaim system of the associated bunker i.e. the plough feeders and the reclaim conveyors, to enable proper control and to coordinate the reclaim rate with the loading rate of the load out chute. A modem with the necessary

software will be provided for remote support of the load out system and for providing system upgrades without a service man requiring to attend the site. Lightning arrestors will also be provided on the surge bins. All limit switches, pressure switches, temperature switches and all other electrical components and enclosures will have a IP65 or better rating.

Two train traffic light signals, each traffic light consisting of one red and one green light with mounting assembly will be provided. One train traffic control light system will be mounted prior to the entrance to the load out facility. The second train traffic control light will be mounted on the exit end of the load out structure. These lights will provide the train driver an indication of when it is safe to begin loading. Upon approach of train, signal will be set to red, signaling the train to stop prior to the load out station. When the system is set and ready to load, the control room operator will notify the train driver by switching the traffic signal to green, signaling the train driver to spot the first wagon under the loading position. Once the train is in position and the load out chute is positioned out over the rail wagon, the second train traffic light control will signal the train driver to begin the loading process.

2x150t capacity overhead steel hoppers will be installed to dispatch coal by trucks. For this purpose, a belt conveyor C8 of 1400 mm wide and 1200 tph capacity will be installed to receive coal from the discharge drum of tripper conveyor C4/C5 and then carry to discharge coal into the 2 x 150 t capacity hopper. Coal will be reclaimed from these hoppers with the help of 200 tph capacity vibratory feeders provided at the discharge opening of the hopper for loading into customers' trucks. Rod gates will be provided at the discharge opening to arrest the coal in case of repair and maintenance of the vibratory feeders. The hoppers will be lined with 10 mm thick manganese steel liners.

Coal dispatches through rail will be weighed in the pre-weigh hopper located below the load out system before loading into the wagons. Coal dispatches by trucks through road will be weighed on 100 t capacity road weigh bridge (1 no.).

11.3.0 RAILWAY SIDING

A railway line will be constructed up to Rampur Batura open cast project from Anuppur junction which is about 20 km. This will consist of permanent way, culverts, bridges, electrification, signaling, block stations etc. A railway siding consisting of one

load standage line (suitable for 58 box N wagons), one empty standage line (suitable for 58 box-N-wagons), engine escape line, one loading station, crossovers, turnouts, electrification, signaling etc. will be constructed at a suitable location near the project for loading of coal through a Load out system of 500te capacity.

Extension of track upto Rampur Batura opencast is proposed from the nearest Railway station i.e. either from Annupur or Burhar railway station which will be decided after feasibility studies of both the options. Distance upto Rampur Batura opencast from Burhar and Anuppur railway station will be approximately 18 km and 20 km respectively.

The above Railway siding would cater both Rampur Batura OC (4.0Mty) and proposed Batura West OC (1.5Mty). The 50% capital provision for Railway siding has been envisaged in this PR and 50% capital provision for Railway siding has been envisaged in the Batura West OC (1.5Mty).

12.1 WORKSHOP AND STORES

An E&M workshop, Excavation workshop and store have been proposed, in which repair and maintenance will be done for departmental & partial hiring option and An E&M workshop and store have been proposed, in which repair and maintenance will be done for outsourcing option.

13.1 POWER SUPPLY

It is proposed to establish main substation near quarry. The main substation will be fed through two numbers of 33 kV overhead feeders (ACSR, WOLF) drawn from CSEB substation located at Chachai. Three Options- Departmental, Outsourcing and Partial Outsourcing have been worked out.

Departmental : Two numbers of transformers each of **33/6.6 kV, 10000** kVA capacity will be installed to cater the loads of mine, HEMM, CHP, Workshop, pumping, colony & other service facilities for departmental option for which maximum power demand comes to around **10488** kVA.

Outsourcing & Partial Outsourcing: Two numbers of transformers each of **33/6.6 kV, 5000** kVA for both the options to cater the loads of mine, CHP, Workshop, pumping &

other service facilities for outsourcing as well as partial outsourcing option for which maximum power demand comes to around **3986** kVA & **4024 kVA** respectively.

14.1 COST INDEX & SPECIFICATION OF BUILDING

The preparation of cost estimates for civil infrastructures is based on prevailing cost index of the area in October 2017. The cost index value has been calculated from market rate of the area. The same was provided by the staff officer (Civil) of the area. Standard guidelines provided by B.P.E have been adopted for arriving at cost index value. Considering the prevalent rates of materials and labour in Sohagpur Area, the cost index works out to 3626 in October 2017 with reference to 100 base in Delhi as on 1.10.76.

14.2 ROAD AND CULVERTS

14.2.1 Colony Roads & Culverts

Depending upon the no. of quarters proposed for departmental ,outsourcing and partial outsourcing options, colony roads of different length has been provided. Single lane bituminous road with culverts, drains etc. as per norm has been considered. Tentative cost in respect of total road length including provision of culverts and tree guards etc. have been elaborated in Appendix- A.8.2.1.

14.2.2 Approach Roads & Culverts

Taking off from the nearby major road new approach and service road of length 5.0 km has been assessed for the project. This will serve the purpose of approach to the mine as well as other installations. This road will also serve the purpose of coal transport partly and as such 7.5m wide bituminous road has been considered. As per prevalent norms culverts have also been provided. The detail cost estimates have been elaborated in the Appendix-A.8.2.2.

14.2.3 Diversion of non-CIL roads

No major road falls within the quarry boundary.

15.1 SAFETY MEASURES AGAINST INUNDATION OF RAIN WATER

Katna Nala flows along the south–western part of the property. Proper embankment has to be constructed to prevent inundation from the nala after diversion.

Jamuna nala flows in the western part of the property. Proper embankment will also be required after it's diversion beyond the quarry boundary.

Western boundary has hilly terrain .Concrete lined garland drain of about 5 km in north side of the Quarry will be made to prevent rain water from entering inside the mine**.**

15.2 DUST SUPPRESSION

Major source of dust in opencast mine operation have been identified to be from haul roads, due to spillage from dumpers and abrasion by their wheels. Provision of adequate nos. of water sprinklers have been made for spraying of water on haul roads to prevent emission of dust. All along life, haul roads and other heavy duty roads likely to be negotiated by heavy vehicles and equipment have been proposed to be metalled and coated to facilitate control of emission of dust.

15.3 SLOPE STABILITY

SPOIL DUMP

The spoil will be stacked in the external and internal dump space at the natural angle of repose to avoid the sliding of OB bench. The OB dump will be terraced at the height of 30m.Total dump height will be 60 m. The barrier distance between internal dump and coal production bench will be 100 m to have smooth functioning of machineries and from safety point of view. The surface of OB dump will be leveled and graded. Plantation will be made on the slope of OB heap to avoid the sliding of spoil. Final re-grading of internal dumps is done in such a way that rain water is drained outside the mine through drains and culverts.

Proper monitoring system shall be used for internal dump stabilization to avoid sliding of OB dump.

16.0 Environment Management System

Monitoring Schedule

Environmental monitoring will be carried out following the monitoring schedule for Air, Water, and Noise levels as per Standards of MOEF (Vide GSR 742 (E) dated 25.9.2000)

Plantation Monitoring

The project authority at field level will continuously monitor the growth and survival/mortality rates of the plantations till the end of 3 years.

Once trees attain desired growth, no further monitoring will be required.

17.0 LAND REQUIREMENT

The project envisages 1915.59 Ha of land for quarry, industrial and residential complex and external dumps etc. for Departmental option, 1888.60 Ha for Outsourcing option and 1897.48 Ha for Coal Departmental and OB Outsourcing option.

In the approved PR of Batura OC (2.0Mty), provision for land has been made for External dump, surface infrastructures, and diversion of Katna nallah. The total area of the above said proposed land works out to be 70.27 Ha. This land has been notified under Section 11 of CBA Act. The PR for Batura OC (2.0Mty) has been proposed to be dovetailed with PR for Rampur Batura OC (4.0 Mty), hence the above said provision of land in Batura OC (2.0Mty) has been incorporated in PR for Rampur Batura OC (4.0Mty).

Land already acquired is 171.59 Ha.The break-up of the land is as follows:-

REQUIREMENT OF LAND IN Ha (OPTION-I)							
SL. NO.	**PARTICULARS**	**LAND ALREADY ACQUIRED**	**LAND TO BE ACQUIRED**				**TOTAL LAND REQUIREMENT**
			TENANCY / AGRICULTURE LAND	**FOREST LAND**	**GOVT. LAND**	**TOTAL**	
1	LAND FOR QUARRY	171.59	1121.61	86.16	159.50	1367.27	1538.86
2	SURFACE INDUSTRIAL DEVELOPMENT, COLONY,APPROACH ROAD, DIVERTED ROAD,MAGAZINE,NALLAH DIVERSION, EXTERNAL DUMP, ETC.	-	134.31	-	-	134.31	134.31
3	LAND FOR HOMESTEAD/FAMILY	-	68.08	-	-	68.08	68.08
4	MINING SAFETY ZONE	-	109.98	26.79	37.57	174.34	174.34
	TOTAL LAND	**171.59**	**1433.98**	**112.94**	**197.07**	**1744.00**	**1915.59**

REQUIREMENT OF LAND IN Ha (OPTION-II)							
SL. NO.	PARTICULARS	LAND ALREADY ACQUIRED	LAND TO BE ACQUIRED				TOTAL LAND REQUIREMENT
			TENANCY / AGRICULTURE LAND	FOREST LAND	GOVT. LAND	TOTAL	
1	LAND FOR QUARRY	171.59	1121.61	86.16	159.50	1367.27	1538.86
2	SURFACE INDUSTRIAL DEVELOPMENT, COLONY,APPROACH ROAD, DIVERTED ROAD,MAGAZINE,NALLAH DIVERSION, EXTERNAL DUMP, ETC.	-	107.32	-	-	107.32	107.32
3	LAND FOR HOMESTEAD/FAMILY	-	68.08	-	-	68.08	68.08
4	MINING SAFETY ZONE	-	109.98	26.79	37.57	174.34	174.34
	TOTAL LAND	**171.59**	**1406.99**	**112.94**	**197.07**	**1717.01**	**1888.60**

REQUIREMENT OF LAND IN Ha (OPTION-III)							
SL. NO.	PARTICULARS	LAND ALREADY ACQUIRED	LAND TO BE ACQUIRED				TOTAL LAND REQUIREMENT
			TENANCY / AGRICULTURE LAND	FOREST LAND	GOVT. LAND	TOTAL	
1	LAND FOR QUARRY	171.59	1121.61	86.16	159.50	1367.27	1538.86
2	SURFACE INDUSTRIAL DEVELOPMENT, COLONY,APPROACH ROAD, DIVERTED ROAD,MAGAZINE,NALLAH DIVERSION, EXTERNAL DUMP,ETC.	-	116.20	-	-	116.20	116.20
3	LAND FOR HOMESTEAD/FAMILY	-	68.08	-	-	68.08	68.08
4	MINING SAFETY ZONE	-	109.98	26.79	37.57	174.34	174.34
	TOTAL LAND	**171.59**	**1415.87**	**112.94**	**197.07**	**1725.89**	**1897.48**

17.1 STATUS OF LAND ACQUISITION

Rampur Batura OC mine is being planned in the geological blocks, where PR for Batura OC mine is being approved. Based on the approval of PR for Batura OC land acquisition is in progress. Till 1/04/2017 171.59 Ha of land is already being acquired and the process of acquisition is still in progress.

18.0 Closure Planning details of mine

The mine closure cost will cover the following activities for which a corpus escrow account @ Rs. 6.0 lakhs per Ha. for Opencast mine & @ Rs. 1.0 lakh per Ha for UG

mine of the project area shall be opened with the coal controller organization. In case of mines having acid mine drainage, post closure acid mine drainage management cost shall also be included in the total closure cost.

18.1 Mine Closure Cost for OC mine

As per the guidelines of the MoC, the cost of the mine closure is to be computed based on the basis of the project area involved in the project.

Departmental option:

In Rampur Batura OC, the total project area is 1847.51 Ha (exclusive of external R & R site). So, the closure cost is to be computed considering a total mining lease area of 1847.51 Ha. Considering the wholesale price index as 175.92 as on June 2017, the updated cost of the mine closure is estimated to be Rs. 8.144 lakhs per hectare (taking three decimal places) considering the admissible escalation over Rs. 6.00 lakh per Ha as on August 2009 when wholesale price index was 129.60.Total Final mine closure cost (@ Rs.8.144/Ha.):for 20 years will be Rs**. 24878** lakhs.

Outsourcing option:

In Rampur Batura OC, the total project area is 1820.52 Ha (exclusive of external R & R site). So, the closure cost is to be computed considering a total mining lease area of 1820.52 Ha. Considering the wholesale price index as 175.92 as on June 2017, the updated cost of the mine closure is estimated to be Rs. 8.144 lakhs per hectare (taking three decimal places) considering the admissible escalation over Rs. 6.00 lakh per Ha as on August 2009 when wholesale price index was 129.60.Total Final mine closure cost (@ Rs.8.486/Ha.):for 20 years will be Rs**. 24514** lakhs.

Partial Outsourcing option:

In Rampur Batura OC, the total project area is 1829.40 Ha (exclusive of external R & R site). So, the closure cost is to be computed considering a total mining lease area of 1829.40 Ha. Considering the wholesale price index as 175.92 as on June 2017, the updated cost of the mine closure is estimated to be Rs. 8.144 lakhs per hectare (taking three decimal places) considering the admissible escalation over Rs. 6.00 lakh per Ha as on August 2009 when wholesale price index was 129.60.Total Final mine closure cost (@ Rs.8.486/Ha.):for 20 years will be Rs**. 24634** lakhs.

19.0 MANPOWER ASSESSMENT

The manpower requirement for proposed Rampur Batura OC is 1287 in Departmental option, 270 in Outsourcing option and 366 in Coal Departmental OB outsourcing option. The manpower requirement for proposed project has been calculated on the basis of 3 shift operation for 330 days in a year. The breakup of the manpower requirement of this project has been summarised as follows:

Manpower Requirement

Sl. No.	Particulars	Departmental Option(Nos.)	Total Hiring Option (Nos.)	Partial Hiring Option (Nos.)
1.	Executives	77	27	28
2.	Non-executives:			
i)	Monthly rated staff	242	123	129
ii)	Daily rated staff	968	120	209
	Total	**1287**	**270**	**366**

20.1 Project Implementation Schedule

It is well known fact that for timely implementation of a project, it is essential that all the activities related with project construction are properly planned, closely monitored and effectively supervised.

All implementing departments should have their own implementation manuals which are followed for monitoring and construction of the project, so that, man, materials and money are made available to the project in time as spelt in the project report, with a view to prevent cost and time over-run. Responsibility, power for each executive is to be included in the implementation manual to prevent overlapping of operational areas. Sufficient administrative and financial power is to be defined for key executive to take timely and effective decisions for the implementation of the project.

Technically, zero date has been adopted as the date of approval and/or date of environmental clearance or the date of the land acquisition whichever is later. In case Batura OC(2.0Mty) production starts before approval of PR for Rampur Batura OC(4.0Mty), zero date will be the date of approval of Rampur Batura OC(4.0Mty).

20.2 CRITICAL ACTIVITY

Diversion of Katna Nallah, Jamuna Nallah and 132Kv overhead line is the critical activity of the project.

21.0 PROJECT ECONOMICS

In this Para financial evaluation of Departmental option and Outsourcing/Partial Outsourcing has been detailed. The additional capital required for the project in Departmental option, Outsourcing option and Coal Departmental and OB Outsourcing option works out to be **₹ 3306.56** crores, **₹ 1104.42** crores and **₹ 1208.16** crores respectively. The phasing of additional capital has been given in para 27.1. The summarised form of Appendix-A is given in Table below.

Summary of Capital Expenditure (Departmental Option and Outsourcing/Partial Outsourcing option)

(Revised & updated October,2017)

A/c Head	Particulars	Additional Capital Provisions (₹ Crs.)		
		Departmental	Total Hiring	Partial Hiring Option
01	Land	404.90	398.16	400.38
02	Civil Structure	220.18	27.81	62.60
03	Plant & Machinery	2092.57	283.68	345.02
04	Furniture & Fittings	0.53	0.27	0.40
05	Railway Siding	88.75	88.75	88.75
06	Vehicles	2.30	0.96	0.97
07	Prospecting & Boring	0.36	0.36	0.36
08	Mine Development	377.07	270.97	271.51
09	Revenue Expn. Capital.	277.12	50.61	58.98
10	Less Depreciation	157.25	17.19	20.83
	Total	**3306.56**	**1104.42**	**1208.15**

21.1 Capital investment and its phasing

(₹. In lakhs)

	Phasing of capital (₹. In lakhs)							Total capital
Year	1st	2nd	3rd	4th	5th	6th	7th	
Option-I	9927.53	89545.52	45571.17	74455.17	74364.97	36687.53	104.28	330656.18
Option-II	8877.20	18810.67	29568.49	18322.41	15337.58	19421.67	104.28	110442.31
Option-III	9952.20	22173.98	30326.10	19291.26	17959.47	21008.23	104.28	120815.53

21.2 METHOD OF ESTIMATION OF CAPITAL COST:

a) Land

Rate of Tenancy, Forest & Govt. land considered is as shown below:-

	Rate/Ha(₹ lakhs)
Tenancy Land	**25.00**
Forest Land	**22.00**
Govt. Land	**10.00**

b) Civil Construction (along with Cost Index)

The preparation of cost estimates for civil infrastructures is based on prevailing cost index of the area in October 2017. The cost index value has been calculated from market rate of the area. The same was provided by the staff officer (Civil) of the area. Standard guidelines provided by B.P.E have been adopted for arriving at cost index value. Considering the prevalent rates of materials and labour in Sohagpur Area, the cost index works out to 3626 in October 2017 with reference to 100 base in Delhi as on 1.10.76.

c) P&M

Price of P&M has been taken from the standard price list published by CMPDI, HQ in June 2017. Prices have been updated upto October 2017 as per escalation rate given in the price list.

21.3 COST OF PRODUCTION AT DIFFERENT LEVEL OF PRODUCTION

The cost of production for Total Departmental option, Total Outsourcing option and Partial Outsourcing option is as shown in the table below:-

COST OF PRODUCTION AT DIFFERENT LEVELS OF PRODUCTION					
Sl.No.	**Particulars**	**Unit**	**Option-I (Total Departmental)**	**Option-II (Total Outsourcing)**	**Option-III (Partial Outsourcing)**
1	Salaries and wages cost	₹./t	270.24	56.33	75.65
2	Stores cost	₹./t	739.39	132.11	181.94
3	Power cost	₹./t	142.25	43.97	44.19
4	MiscellaneousExpenditure	₹./t	136.76	39.45	45.21
5	Administrative Expenses	₹./t	88.00	88.00	88.00
6	Outsourcing Cost				
6.1	Coal	₹./t	-	69.00	-
6.2	OB	₹./t	-	544.82	544.82

COST OF PRODUCTION AT DIFFERENT LEVELS OF PRODUCTION					
Sl.No.	Particulars	Unit	Option-I (Total Departmental)	Option-II (Total Outsourcing)	Option-III (Partial Outsourcing)
6.3	Rehandled OB	₹./t	5.57	5.57	5.57
7	Interest on Loan capital	%	-	-	-
8	Interest on working capital	%	65.67	46.16	46.47
9	Depreciation	₹./t	569.54	163.26	184.00
11	Mine closure cost	₹./t	37.98	37.43	37.61
	TOTAL	**₹./t**	**2055.41**	**1226.09**	**1253.46**

21.4 SELLING PRICE

The weighted average GCV of coal is 5576 KCal/Kg. The project economics has been calculated based on the selling price of coal for power utility. The calculation of selling price of coal is as follows.

CALCULATION OF SELLING PRICE (₹./t)

S.no	Particulars	Power Utility
1.	Base price	1900.00
2.	5 % grade slippage	1805.00
3.	Cutting charges for -100 mm	87.00
4.	Rapid loading charges	29.00
	Total	**1921.00***

* In the PR commissioning of rapid loading system has been projected in the 4th year . Therefore average selling price for the life of the mine works out to be ₹1920.34.

21.5 OUTSOURCING COST

Year wise lead and rates for hiring of HEMM have been worked out based on the five yearly stages of the proposed mine.

The hiring rate for overburden is based on the HOE contract awarded on 27/09/2016 for removal of OB in Dhanpur OCM of Sohagpur Area. Hiring rates for mining out coal by surface miner is not available for Sohagpur area hence rates as per contract awarded in Kusmunda OC has been considered as base rate for coal

YEAR	COAL			OB		
	QTY	LEAD	RATE	QTY	LEAD	RATE
1	0	0	0	0	0	0
2	5	1.0	56	120	1.5	46.03
3	10	1.5	69	140	1.5	46.03
4	20	1.5	69	240	2.0	49.58
5	30	2.0	69	340	2.0	49.58

YEAR	COAL			OB		
	QTY	LEAD	RATE	QTY	LEAD	RATE
6	40	2.0	69	375	2.5	53.13
7	40	2.0	69	375	3.0	56.68
8	40	2.0	69	375	3.0	56.68
9	40	2.0	69	375	3.0	56.68
10	40	2.0	69	375	3.0	56.68
11	40	2.0	69	375	3.5	60.22
12	40	2.0	69	375	3.5	60.22
13	40	2.0	69	375	3.5	60.22
14	40	2.0	69	375	3.5	60.22
15	40	2.0	69	345	3.5	60.22
16	40	2.0	69	345	3.5	60.22
17	40	2.0	69	345	3.5	60.22
18	40	2.0	69	345	3.0	56.68
19	40	2.0	69	345	3.0	56.68
20	30	2.0	69	320.7	3.0	56.68
	655			6260.7		

The base rate for coal and OB both has been updated on the basis of difference of Diesel price. The HOE rates considered does not include GST component as CENVAT Credit is available against it. HOE rates considered in this PR is for planning purpose only and to work out the economic evaluation of the project.

21.6 FINANCIAL EVALUATION RESULTS:-

The financial evaluation results for Total Departmental Option,Total Outsourcing option and Partial Outsourcing option is as shown in the table below:-

Sl.No	Particulars	Unit	Option-I (Total Departmental)	Option-II (Total Outsourcing)	Option-III (Coal Deptt and OB Outsourcing)
1	a) Existing capital(Gross)	₹. Crores	40.78	40.78	40.78
	b) Additional capital investment	₹. Crores	3306.56	1104.42	1208.16
	c) Total Capital	₹./t	3347.34	1145.20	1248.93
	d) Capital outlay /t of annual output	₹./t	8341.32	2835.97	3095.30
2	a) Capital requirement of P&M	₹. crores	2092.57	283.69	345.02
	b) Per tonne of annual output	₹./t	5231.43	709.22	862.55
3	Selling price (95% of notified selling price) of processed ROM Coal.	₹./ t	1920.34	1920.34	1920.34
4	Estimated cost of production				
	a) at 100% level	₹./t	2055.41	1226.09	1253.46
	b) at 85% level	₹./t	2331.39	1302.16	1342.01
5	Profit per tonne a) at 100%	₹./t	-135.07	694.24	666.88

Sl.No	Particulars	Unit	Option-I (Total Departmental)	Option-II (Total Outsourcing)	Option-III (Coal Deptt and OB Outsourcing)
	level				
	b) at 85% level	₹./t	-411.05	618.18	578.32
	Break-even-point (%)		109.45	38.30	42.94
6	(Mty)		4.38	1.53	1.72
7	No. of personnel		1287	270	366
8	OMS	t	11.26	54.18	39.89
9	EMS	₹.	3042.16	3051.91	3017.65
10	Anticipated year of achieving target	Year	6th	6th	6th
11	IRR at 100% level of production	%	-0.96	28.40	25.84
12	IRR at 85% level of production	%	-5.93	23.40	20.87
13	Completion Cost	₹. crores	4053.15	1372.43	1497.63
14	NPV @ 12% at 100% level of production	₹. crores	-1416.61	935.05	839.94
15	NPV @ 12% at 85% level of production	₹. crores	-1809.71	620.17	512.43

22.0 SENSITIVITY ANALYSIS - Shown in Appendix-C.4.

23.0 CONCLUSION

The project has been planned in line with the present technology and forthcoming changes in neighbouring mines as well as in other parts of the country. The techno-economics have been worked out based on the prevalent norms of productivity, operating cost, spare consumption etc.

Following three options have been worked out in this PR.

1	OPTION I	Total Departmental Option	Mining of Coal and OB by Departmental HEMM
2	OPTION II	Total Outsourcing Option	Mining of Coal and OB by Outsourcing HEMM
3	OPTION III	Coal Departmental OB Outsourcing Option	Mining of Coal by Departmental HEMM and Excavation of OB by Outsourcing HEMM

In Total Departmental option (Option-I), the proposed project is yielding a loss of ₹. 135.07/t at 100% and ₹. 411.05/t at 85% level of production. The financial IRR of the project at 85% is (-) ve and as such it is not meeting the criteria of approval i.e. 12% IRR at 85% capacity level.

In Total Outsourcing option (Option-II), the proposed project is yielding a profit of ₹. 694.24/t at 100% and ₹.618.18/t at 85% level of production. The financial IRR of the

project at 85% is 23.40 % and as such it is meeting the criteria of approval i.e. 12% IRR at 85% capacity level.

In Coal Departmental OB Outsourcing option (Option-III), the proposed project is yielding a profit of ₹. 666.88/t at 100% and ₹.578.32/t at 85% level of production. The financial IRR of the project at 85% is 20.87 % and as such it is meeting the criteria of approval i.e. 12% IRR at 85% capacity level.

Considering the above, Option II or Option-III may be considered for approval by competent authority.

*****

CHAPTER – I
INTRODUCTION

1.1 BACKGROUND OF THE PROJECT REPORT

The proposed Rampur Batura OC has been projected in the Batura geological Blocks, located in the Western part of Sohagpur Coalfield, lies about 12 km North of Anuppur town and about 55 km southeast of Shahdol, the district headquarter.

Earlier Batura OC (2.0 Mty) was prepared in May 2008 and sanctioned by SECL Board in it's 172nd meeting held on 9.09.2008 for a capital of Rs. 203.82 crores. Later Batura OC (4.0 Mty) was prepared combining two adjoining Geological Blocks namely, Batura OC and Batura Extension geological block. Batura OC has been renamed as Rampur Batura OC as per decision taken in planning committee meeting held on 6.09.2012. The PR was placed before the 319th CIL Board meeting held on 12th August 2015. CIL board accorded its "in principle" approval. Further board also approved first year expenditure of Rs 84.23 Cr. for the project. Further PR was placed before the 330th CIL Board meeting held on 19th and 20th July'2016. In the meeting it was advised that Project Report for Rampur Batura Opencast Project for a rated capacity of 4.0Mty be reviewed. Accordingly revised and updated PR has been prepared. The points discussed during the meeting held in the office of D(T) P&P have been incorporated in the revised PR. Minutes of the meeting enclosed in the Annexure.

For the purpose of implementation, PR for Batura OC (2.0 Mty) may be treated as dovetailed with PR for Rampur Batura OC Project (4.0 Mty). In this PR all the activities and financial provisions of Batura OC Project (2.0Mty) are proposed to be dovetailed.

1.2 EXPLORATION STATUS

Batura OC Block - Initially the exploration was concentrated mainly in the shallower, Southern most part of Batura Block and a Geological Report was prepared in March 2003 covering an area of 3.91 sq. km. designated as Batura-I Block. However, continuation of exploration activities in the northern part of the erstwhile Batura Block indicated favourable opencast potentiality and accordingly detailed exploration was carried out in the block. The Geological Report covered an area of 8.651 sq. km. on the Eastern side of the National Highway No.78 which runs in a North-South direction through the property. The Geological report included an area of 2.42sq.km. which was designated earlier as Sector B in the Geological Report on Batura-I Block.

Batura Extension Block - The Geological report covers an area of 7.30 sq. km. on the Western side of the National Highway No.78 which runs in a North-South direction through the property. This block is towards the West of Batura OC Block. A detailed exploration has been carried out for preparing an opencast report and named as Batura Extension Block. The report includes an area of 1.49sq.km. which was designated earlier as Sector A in the Geological Report on Batura-I Block.

1.2.1 HISTORY OF THE BLOCKS

Both the Geological Blocks namely, Batura OC Block (on which Batura OC, 2.0 Mty has been planned) and Batura Extension Block are virgin blocks. Mining has not yet been started in either of the Blocks. The nearest working mine is Sharda OC which is roughly 8 km. West of the Batura extension block. All the mining activities are restricted to the Western side of the Son River whereas Batura Blocks lies on the eastern side of the river.

1.2.2 EXPLORATION DESIGN

GSI carried out regional drilling in Batura Blocks during the year 1993-94 and found it to be potential. Accordingly exploration was designed by CMPDI to establish the structural set up of the area to delineate the lay and disposition of the coal seams and to generate reliable data pertaining to coal quality by drilling boreholes at approximately 400m interval. However, for establishing the structure and for proving coal seam incrop, a few close spaced boreholes were also drilled.

1.2.3 PRESENT INVESTIGATION

Batura OC Block

S. No.	Activity	Duration		Quantum
		From	To	
1	Reconnaissance/Data Collection	March'2001	Feb'2007	8.651 sq.km.
2	Mobilisation	-	Feb'2007	
3	a) Topographical Survey	Feb'2002	Feb'2007	8.651 sq.km.
	b) Borehole Survey	Feb.'2001	Feb'2007	141 bhs.
4	Geological Mapping	-	-	-
5	Surface Geophysical Surveys			
	a) Magnetic Survey	Feb.2002	Dec. 2006	22.36 line km
6	Remote Sensing	Nil		
7	Drilling	Feb.'2001	Feb'2007	7696.30m
8	Geological Logging	Feb.'2001	Feb'2007	7696.30m

S. No.	Activity	Duration		Quantum
		From	To	
9	Sampling/Packing	Feb.'2001	Feb'2007	671m
10	Geophysical Logging	Nil		
11	Hydrogeological studies	Nil		
12	Coal Core Analysis	127 BHs	Details are given in Table 1.11B.	
13	Geotechnical Studies	Nil		
14	Gassiness Studies	Nil		
15	Another test	Nil		

Batura Extension Block

S. No.	Activity	Duration		Quantum
		From	To	
1	Reconnaissance/Data Collection	May 2001	June 2007	7.30 sq. km.
2	Mobilisation		June 2007	
3	a) Topographical Survey	Feb.2006	June 2007	7.30 sq. km.
	b) Borehole Survey	June 2001	June 2007	115
4	Surface Geophysical Surveys			
	a) Magnetic Survey	May 2007	May 2007	14.10 line km.
5	Drilling	May 2001	June 2007	6489.30
6	Geological Logging	May 2001	June 2007	6489.30
7	Sampling/Packing	May 2001	June 2007	603m
8	Geophysical Logging	NIL		
9	Hydrogeological studies	NIL		
10	Coal Core Analysis	100		
11	Geotechnical Studies	NIL		
12	Gassiness Studies	NIL		
13	Another test	NIL		

1.2.4 QUANTUM OF TOTAL EXPLORATION INPUTS

Agencywise, periodwise No. of boreholes drilled, Batura OC block, Sohagpur Coalfield.

Agency	Period		Drilling	
	From	To	No.of Bhs.	Meterage
a) CMPDI	Feb.'2001	June'2005	137	7413.30
	Jan.'2007	Feb'2007	4	283.00
Total CMPDI			141	7696.30
b) GSI			7	1077.40
TOTAL (CMPDI+GSI)			148	8773.70

Agencywise, periodwise No. of boreholes drilled, Batura Extension block, Sohagpur Coalfield.

Agency	Period		Drilling	
	From	To	No.of Bhs.	Meterage
a) CMPDI	May 2001	March 2002	48	2624.80
	Feb.2005	June 2006	50	2646.50

	May 2007	June 2007	17	1218.00
Total CMPDI			115	6489.30
b) GSI			5	965.55
TOTAL (CMPDI+GSI)			120	7454.85

1.2.5 SCOPE AND LIMITATIONS

Batura OC Block - The present report deals with the opencast potentiality of Seam-III, L1, II& I. The report overlaps the erstwhile Batura-I Block and entirely covers Sector B of Batura-I Block. A wide spread occurrence of soil is observed in the area. The geological information is largely based on sub-surface data generated through drilling. The rocks present in the block are not compact in nature and this is reflected at places by poor core recovery obtained during drilling. The report is based on 141 boreholes drilled by CMPDI. The boreholes drilled by GSI have not been considered due to non-availability of their detailed lithology.

The seams in general are not very thick. Therefore, in case of boreholes where the thickness of the seams is less than 0.90m, the coal seams have also been subjected to band-by-band analysis for moisture and ash percentage determination.

The area is traversed by three faults in the northern part of the block and the strata including coal seams exhibit variable and rolling dips. Therefore, presence of further minor faults cannot be entirely ruled out in the area.

Though all care has been taken to precisely delineate the incrop of the coal seams on the basis of boreholes data, there is possibility of minor variation as the exact pattern of local weathering is difficult to ascertain.

Inclination of the dyke has not been resolved by the magnetic survey and there are not sufficient borehole data to interpret the same. Therefore, dykes have been considered vertical although the data of borehole No.CSBT-202 suggest some inclination of the dyke (sub-vertical).

Batura Extension Block - The present report deals with the opencast potentiality of Seam-IIIB, L1, II, L2 & I. The report overlaps a part of Batura I Block. A wide spread occurrence of soil is observed in the area. The geological information is largely based on sub-surface data generated through drilling. The report is based on 115 boreholes drilled by CMPDI. The boreholes drilled by GSI have not been considered due to non-availability of their detailed lithology.

The seams in general are not very thick. Therefore, in case of boreholes where the thickness of the seams is less than 0.90 m, the coal seams have also been subjected to band-by-band analysis for moisture and ash percentage determination.

The area is traversed by three faults in the northern part of the block and the strata including coal seams exhibit variable dips. Therefore, presence of further minor faults cannot be entirely ruled out in the area.

Though all care has been taken to precisely delineate the incrop of the coal seams on the basis of boreholes data, there is possibility of minor variation as the exact pattern of local weathering is difficult to ascertain.

Inclination of the dykes has not been resolved by the magnetic survey and there is no sufficient borehole data to interpret the same. Therefore, dykes have been considered vertical.

1.3 MINING ACTIVITIES

1.3.1 PRESENT STATUS OF THE NEARBYE MINE/PROJECT

Name of the mine	Seams being worked & mine development	Method of work	Coal evacuation system and dispatch arrangement	Power supply arrangement	Civil work – Service & Residential	Land acquisition status	Existing capital and financial performance	Remarks
Sharda OC patch deposit, June 1989	Seam VI top has been considered for OC Mining	Shovel Dumper combination. Now Highwall mining has been started.	Coal is being transported to Sanjay Gandhi Power Station of CSEB by Trucks	3.3 KV sub station at Sharda	100 MQ and 5 type C quarters are provided in the scheme	Land already acquired	Gross block - 29.74 crores Production – Coal - 0.425 Mt (2009-10) OB – 1.87 Mcum OMS – 3.65 (2009-10) EMS – 1404.77	Scheme Approved by SECL on 1.07.1989 for capital of Rs. 18.7088 crores& production of 0.5 Mty

1.4 JUSTIFICATION OF PREPARATION OF PR

This project is identified for production contribution in the document namely " Road Map for Enhancement of Coal Production" prepared by Coal India limited.

1.5 SALIENT FEATURES OF PRESENT PR(UpdatedOct,2017).

Sl. No.	Particulars	Unit	Thickness
1	**Dominant Thickness of Seams Excluding Band**		
	Seam III	Metre	0.75-2.68
	Seam L1	Metre	0.20-3.00
	Seam II	Metre	0.27-4.66
	Seam L2	Metre	0.10-1.75
	Seam I	Metre	0.33-4.04

Sl. No.	Particulars	Unit	Thickness		
2	**Top OB**	Metre	20.3		
	Parting between Seam III & Seam L1	Metre	14.45-26.67		
	Parting between Seam L1 Seam II	Metre	0.70-13.60		
	Parting between Seam II Seam L2	Metre	6.40-16.70		
	Parting between Seam L2 Seam I	Metre	0.28-5.70		
3	Gradient	Deg.	1 -5		
4	Average Grade of coal / GCV	Gr./kCal	G-6/5576		
5	Mineable Reserves	Mt	65.50		
6	Volume of OB	Mcum	626.07		
7	Target output	Mty	4.00		
8	Stripping Ratio (Av.)	Cum/t	9.56		
9	Project life	Year	20		
			Total Departmental	**Total Outsourcing**	**Partial Outsourcing**
10	Additional Capital	(₹. Crs.)	3306.56	1104.42	1208.16
11	Total Land involved	Ha	1915.59	1888.60	1897.48
12	Cost of Production at 100% capacity	(₹./t)	2055.41	1226.09	1253.46
13	Weighted average Selling price of Coal	(₹./t)	1920.34	1920.34	1920.34
14A	Profit/Loss at at 100% capacity	(₹./t)	-135.07	694.24	666.88
14B	Profit/Loss at at 85% capacity	(₹./t)	-411.05	618.18	578.32
15 A	IRR at 100% capacity	(%)	Negative	28.40	25.84
15 B	IRR at 85% capacity	(%)	Negative	23.40	20.87
16A	Desired selling price to yield 12% IRR at 85% capacity	(₹./t)	2906.54	-	-

Sometimes with favourable geological conditions and improved productivity of the HEMM with better mining conditions project may produce upto **1.40 times** of the planned capacity. So, EMP should be prepared for 5.6Mty, accordingly approval from the Competent Authority is to be sought.

1.6 POINTS TO BE CONSIDERED UNDER "FLEXIBILITY" (OF TECHNOLOGY WITHIN APPROVED CAPITAL).

The flexibility in the implementation stage may be exercised within the approved cost estimates to respond to improvements in technology and equipment which would result in improved profitability and productivity measures. Following points may be considered under flexibility: -

1. Re-alignment of project boundaries for better working layout / dump etc.
2. Change in the specification of HEMM to higher capacity at the time of procurement of new equipment or replacement of the equipment.

3. To procure state-of-the-art safety equipment, whenever they are introduced, even if the same is not provided in approved Project Report.
4. Relocation of site for infrastructure facilities depending upon techno-economic reasons and availability of land / forest area etc.
5. Hiring of equipment for drilling, blasting, loading, transportation etc., at a competitive price, so as to cater to the needs of increased demand of coal and subsequent removal of higher OB and for augmentation of coal production.
6. For up gradation of new technology in mining method for improving performance and reduction in manpower, at a subsequent date after project completion.
7. In this PR it is proposed that coal would be mined by surface miner. However, in circumstances where Operational/Geotechnical difficulties persist small quantity of coal may be mined out by alternative technology such as ripping/drilling etc. Prior approval may be obtained for use of alternative technology citing the circumstances/operational difficulties.

1.7 DIFFICULTIES AND CONSTRAINTS IN MINING WITH ASSOCIATED RISK

1. KatnaNala (South–Eastern part) and JamunaNala (Western part) passes through the proposed quarry.
2. Two East –West traversing Dykes passes through the proposed quarry.
3. Densely populated Rampur village and six other villages are situated in the proposed Quarry.
4. 132 KV overhead line pasing all along the Western side of the quarry.

1.8 PROJECT OBJECTIVES AND TARGET BENEFICIARIES

The object of the project is to bridge the demand supply gap of coal demand. The opening of this project has been planned to a targeted capacity of 4.0 Mty. This additional production will be linked to various Thermal Power Stations, and among basket linkages for miscellaneous customers.

****

CHAPTER - II

MARKETABILITY & LINKAGE

2.1 Demand and Availability

Liberalization of power sector by Government of India has generated wide spread interests for private and public sector investments in power generation. As such, there is an appreciable increase in the number of upcoming new thermal power projects in both private and public sectors.. This has resulted in a sharp increase in demand for power grade coal. Due to rapid industrialization in the country there is also increase in the demand for high grade coal. Also Coal production of superior grade coal in CIC and Korba coalfields of SECL, will further decrease due to gradual depletion of coal reserves in the existing underground mines. Opening of Rampur Batura Opencast is, therefore, proposed with a view to fulfill the above indicated growth in demand.

The sector wise coal demand for SECL is summarized in Table No. 2.1. It may be seen from the table that, the total demand as projected for the year 2016-17 is 270.37 Mt. The projected production in the year 2016-17 is 150.00 Mt resulting into a shortfall of 120.37 Mt.

***TABLE No. 2.1: Demand and Availability for South Eastern Coalfields Ltd(Figures in Mt)**

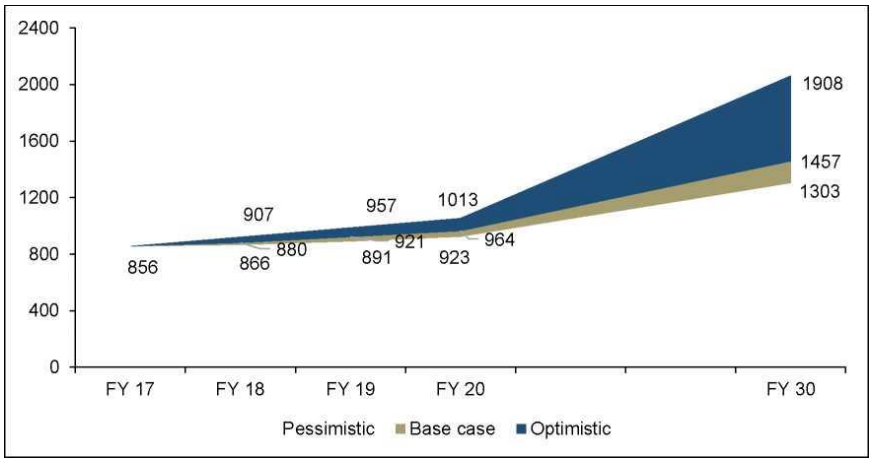
Sl. No.	Sector/Group	XII Plan (2014-15)	XII Plan (2015-16)	XII Plan (2016-17)
A.	**COKING**			
1.	Steel (Indigenous)	0.17	0.17	0.17
B.	**NON-COKING**			
1.	Power (Utilities)	209.25	209.25	209.25
2.	Power (Captive)	24.56	24.56	24.56
3.	Sponge Iron / CDI	8.68	8.68	8.68
4.	BRQ & Others / LTC / SSF	15.08	15.38	15.78
5.	Soft Coke	-	-	-
6	Cement	11.06	11.06	11.06
7	Fertilizer	0.85	0.85	0.85
8	Colliery consumption	0.02	0.02	0.02
	TotalDemand (SECL)	**269.67**	**269.97**	**270.37**
	Availability	**125.00**	**135.00**	**150.00**
	Balance	**(-) 144.67**	**(-) 134.97**	**(-) 120.37**

NOTE: * FIGURES ARE TENTATIVE

As per KPMG Draft 2030 vision document, submitted to Coal India limited ,in

the case of coal industry in India, trends portent that in the long run, the demand will decrease substantially. However the inflexion point is still unknown. The coal demand in India has increased roughly one third in the last five years. The increase in demand has been driven by both, power sector and non-regulated sector. Power sector remains the key consumer segment with roughly 70% of overall coal demand.

Overall coal demand is estimated to be 900 - 1000 MT by 2020 and 1300 - 1900 MT by 2030. The demand scenario is influenced by economic growth, energy efficiency and emergence of alternate coal uses. By 2030, of the overall coal demand, thermal coal demand is estimated to be 1150 - 1750 MT and balance, is coking coal demand. While this appears to be a very wide range, the nature of uncertainties in the ecosystem are also unfortunately, quite wide.



Projected Coal Demand In India by 2030

2.2 Linkage

The opening of this project has been planned to a targeted capacity of 4.0 Mty. This additional production will be linked to various Thermal Power Stations, and among basket linkages for miscellaneous customers. As such, there will be no problem to market the coal from this project.

****

CHAPTER-III

PROJECT SITE INFORMATION

3.1 Location

3.1.1 The Batura Blocks are located in the Western part of Sohagpur Coalfield, lies about 12 km north of Anuppur town and about 55 km South-East of Shahdol, the district headquarter. Chachai UG and Sharda OC are the nearest working collieries situated at a distance of 5-8 km on the West and SouthWest of the block. The block is situated on the Eastern side of the Son river where only the seams have been proved in detail. Other exploration blocks/mine workings in the area are located on the Western side of the Son river.

The area is bounded approximately by

North latitudes 23^0 12' 40" and 23^0 14' 10"

East longitude 810 40' 20" and 81^0 43' 20"

The area is covered in the Survey of India Toposheet No.64 E/12 (RF 1:50,000).

3.1.2 Area of the Project in sq. kms

The combined Blocks measure an area of 15.951 sq. km.

3.1.3 Limiting boundaries of the projectised area

East - Boundary line of the hill all along with the forest at the top & bottom portion has incrop of Seam-I(Beyond eastern boundary no borehole has been done because of hills running north to south).

West- A straight line of N-S direction joining BH CSBT-275 & 294 (Beyond which SR increases to more than 20).

North-Boundary of Dolerite Dyke-I (Beyond which is down throw fault Bamhanichilpa of 400 m. Area is only regionally explored, detailed exploration is yet to be carried out. Borehole No. SBT-9 of GSI shows first occurrence of coal at a depth of 700 m approx.)

South- Incrop of seam I (There is no coal on further rise side as evident in GSI borehole No. SBT-5).

3.2 ACCESSIBILITY AND COMMUNICATION

The area is well connected by rail and road. The Bilaspur- Katni branch line of S.E. Railway passes mostly through south Sohagpur Coalfield.

The nearest railhead Anuppur is a Junction from where the Anuppur-Chirimiri&Anuppur-Bisrampur lines branch-off, and is about 20 km. south of Batura Blocks. National Highway 78 pases from southern side of the quarry at a distance of 3.0km from quarry boundary.

3.3 CLIMATE AND RAINFALL DATA

Meteorological data from 1996 to 2016 has been collected from Umaria Meteorological Observatory, which is situated approximately 80 km. from the project and rainfall data for the period 1996 to 2016 has been collected from Central Water Commission Station, Manendragarh.

Data with respect to monthly maximum mean temperature, monthly minimum mean temperature, rainfall and no. of rainy days are given as shown in table below:-

Sl. No.	Particulars	Value	Month	Year
1.00	Temperature	(In ^{0}C)		
1.01	Minimum during 1996 to 2016	0.2	Jan	2011
1.02.1	Maximum during 1996 to 2016	46.9	May	1998
1.02.2	Hottest month during 1996 to 2016 as per month-wise average value	44.6	May	
2.00	Rainfall (mm)			
2.01	Minimum during 1985 to 2016 (other than zero mm value)	00	Dec.	2015
2.02	Maximum during 1996 to 2016	2239.2	Sept	2001
2.03	Annual total of Minimum during 1996 to 2016	781.1	-	2.14
2.04	Annual total of Maximum during 1996 to 2016	1774.5	-	2005
2.05	Average during 1996 to 2016	1076.8	-	-
3.00	Maximum rainy months	4 months	Jun, Jul, Aug, Sep.	-

The highest rainfall recorded in a month during the period was 951.0 mm. in July, 2001. The annual average rainfall of the region was about 1490.2 mm. Maximum rainfall recorded during the year 2001 was 2239.2 mm.

Generally, the rainy months are June, July, August, and September, which spread over to May and October with some rainfall.

Summer months are April to June, when the maximum temperature varies from 40.7^{0}C to 46.9^{0}C, & minimum temperature varies from 12^{0}C to 23.5^{0}C. July to September is the rainy season. Winter months are December to February when maximum temperature varies from 27.6^{0}C to 44.6^{0}C while it drops down to 0.4^{0}C to 7.5^{0}C.

Lowest average wind speed of 3.6 kmph recorded in December with the highest wind speed of 8.3 kmph in July. The relative humidity varies from 75 to 87% in monsoon and 18 to 60% in summer.

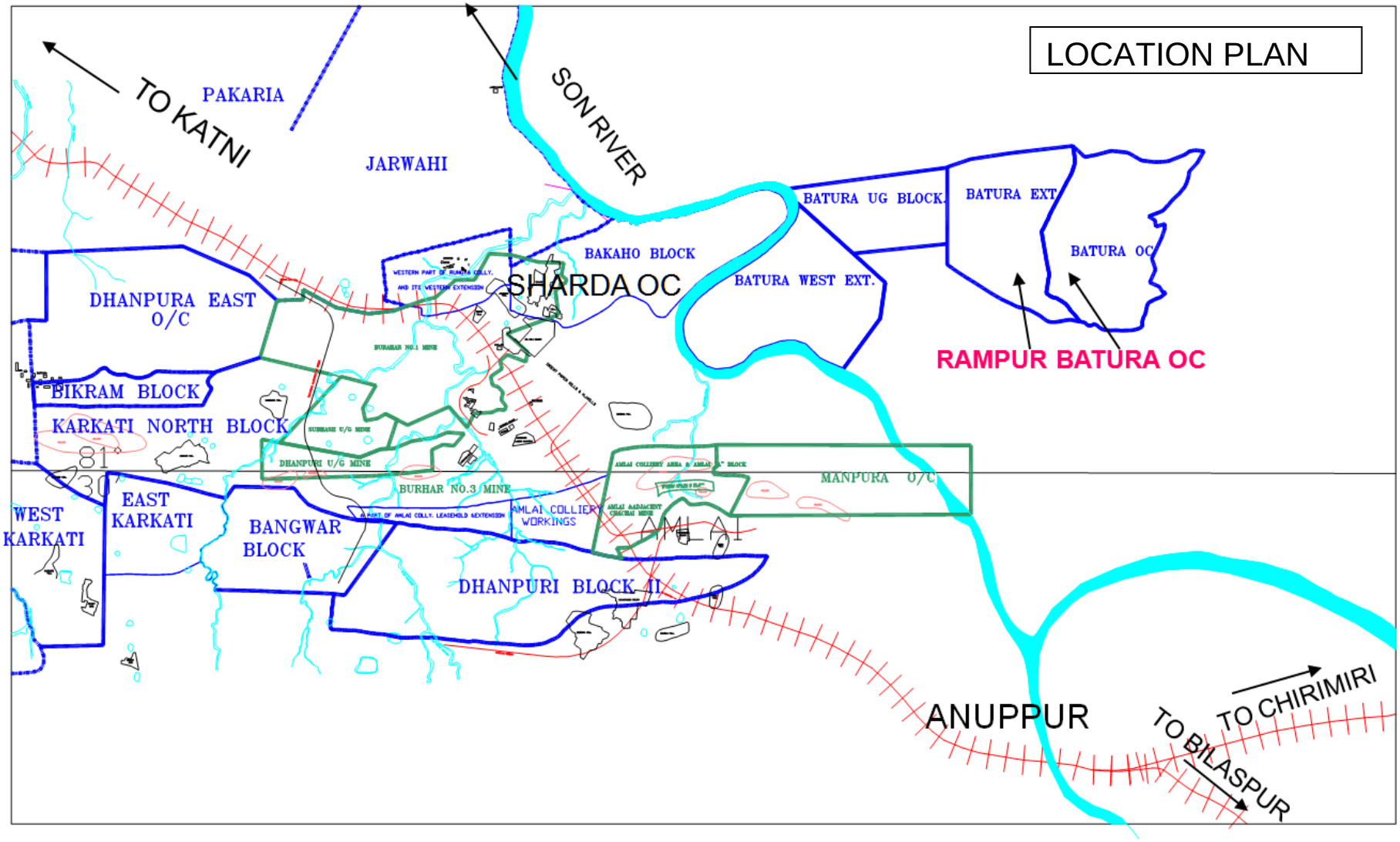
3.4 TOPOGRAPHY WITH DRAINAGE PATTERN OF AREA

The block are gently undulating and exhibits a gentle rolling topography. The general slope of the area is towards the south-west of the Block. The elevations in the block vary between from 461.57 m to 509.25 m above MSL. The highest elevation of 509.25m is in the Eastern part of the block near borehole No.CSBT-54 and the lowest surface value of 461.57 m is in the southern part near borehole No.CSBT-233 of the block. The Katna Nala delineating roughly the South-Eastern block boundary drains the area and finally discharges into Son River in the north-western part of the block. Besides smaller hillock capped by dolerites with roughly North-South trend is present in the eastern part of the block and also in the Northern part of the Block.

3.5 PRESENT LAND USE PATTERN

The area is mostly covered by paddy field. Rampur village situated near the middle of the two adjoining blocks. Other villages are Belia, Khanda, Ataria, Khairbana, Bichhia&Kodaili. Few KutchaJeepable roads connecting the Rampur village are spreaded in the block. Number of ponds are their within the block. Katnanala passes south–west Batura OC block. The area is free from any industrial activity and is also devoid of any monument of historical or archaeological importance. Jamunanala, a tributary of SonRiver passes almost N-S direction of the Batura ext. block.

****


LOCATION PLAN
TO KATNI
PAKARIA
JARWAHI
SON RIVER
BATURA UG BLOCK
BATURA EXT.
BATURA OC
BAKAHO BLOCK
SHARDA OC
BATURA WEST EXT.
DHANPURA EAST O/C
RAMPUR BATURA OC
BIKRAM BLOCK
KARKATI NORTH BLOCK
DHANPURI U/G MINE
BURHAR NO.3 MINE
MANPURA O/C
AMLAI COLLIERY WORKINGS
WEST KARKATI
EAST KARKATI
BANGWAR BLOCK
DHANPURI BLOCK II
ANUPPUR
TO CHIRIMIRI
TO BILASPUR

****

CHAPTER - IV
GEOLOGY AND DEPOSIT APPRAISAL

4.1 BACKGROUND/INTRODUCTION

4.1.1 Systematic regional exploration in parts of the coalfield was carried out by GSI who have estimated 4812.92 million tonnes of reserves in Sohagpur Coalfield as on 01.04.2008 in seams over 0.90m in thicknesss and upto a depth of 1200m from surface. This includes 1716.33 mt of proved, 2899.13mt of indicated and 197.46 mt of inferred coal reserves.

Accordingly, the exploration in Batura Block of GSI, Sohagpur Coalfield, district Shahdol, Madhya Pradesh, was taken up on 22.01.2001 as directed by CMPDI(HQ) vide letter No.CMPDI/D(O)/GEO/966 dt.20.12.2000, with the objective of knowing the lay and disposition of the coal seams, the existence of which had been established in the block by GSI.

Initially the exploration was concentrated mainly in the shallower, southern most part of Batura Block and a Geological Report was prepared in March 2003 covering an area of 3.91 sq. km. designated as Batura-I Block. The coal seams were assessed on the basis of norms applicable for underground mining in consultation with Project Planners. However, continuation of exploration activities in the northern part of the erstwhile Batura Block indicated favourable opencast potentiality and accordingly detailed exploration has been carried out in the block and a report has been prepared as Batura OC Block in March 2007. Subsequently, another report covering an area of 7.30 sq. km. on the west of Batura OC Block has been prepared as Batura Extension Block and submitted in March 2008.

As per the mine planner request vide their noting sheet dated 5.10.2010, both geological report - Batura OC and Batura Extension combined and assment is being made for coal seam deleniation in the combined property and prepared as Batura open cast project.

4.1.2 Block Boundaries

The combined area of the two blocks Batura OC (8.651 sq.km.) and Batura Extension (7.30 sq.km.) is 15.951 sq.km. and it is bounded by,

North : Boundary of Dolerite dyke 1.

South : Incrop of Seam-I

East : Incrop of Seam I & the Boundary line of the hill alongwith the forest boundary line at the top & bottom portion.

West : A straight line of N-S direction joining Bh. CSBT-275 & 294

4.1.3 It is a virgin block. The exploration is being considered upto Seam I.

4.2 EXPLORATION STATUS

4.2.1 Summary of Exploratory Boreholes :-

Financial yearwise break up of drilling in Batura OC and Batura Extension Block is given below:

Financial Year	Number of Boreholes		Meterage
	Completed	Under Progress	
FEB 2001-JUNE 2006	230	-	12512.1
JAN 2007-JUNE 2007	15	-	1122.0
TOTAL	**245**	**-**	**13634.1**

Thus, a total of 245 boreholes have been considered in this report.

4.2.2 Overall borehole density in the block is 15.34 per sq. km.

Seam	No. of seam intersection
III TOP	17
III MIDDLE	10
III BOTTOM	43
III	9
L 1	139
II	216
L 2	113
I	217

4.2.3 Status of analysis : Seam-wise, band-by-band, overall proximate analysis and other tests are tabulated below :-

Seam	Number of intersections	Band by band analysis	Overall proximate analysis on 60% RH & 40oC		Ultimate analysis	GCV K.cal./kg.	AFT	HGI	Ash analysis	Petro-graphic analysis
			Determined	Calculated		Determined				
III TOP	17	9	-	8	-	2	-	1	-	-
III MID	10	9	-	8	-	3	-	-	-	-
III BOT	43	19	4	14	-	6	-	-	-	-
III	9	9	3	4	-	7	-	2	2	-
L 1	139	97	24	71	4	93	2	-	-	-
II	216	215	130	83	19	213	18	20	6	5
L 2	113	47	15	31	8	46	6	2	1	2
I	217	203	114	85	16	119	14	19	5	6

4.2.4 Reliability of data and degree of confidence (based on statistical analysis)

1. In the absence of any surface exposure of the strata, the report is based entirely on the data obtained from 245 boreholes drilled by CMPDI falling within Batura Extension Block Block and Batura OC Block.

2. The area shows variable dip, only three faults have been interpreted in the block. However, the possibility of faults of smaller magnitude cannot be entirely ruled out in the area. Though all care has been taken to precisely delineate the incrop of seams on the basis of borehole data, there is a possibility of minor variation as the exact pattern of local weathering is not known.

3. The statistical analysis of borehole data has been carried out separately for different seams for estimating Mean and Standard Deviation of different parameters is given below:

Particulars	**Seam**								
		IIIT	**III M**	**III B**	**III**	**L 1**	**II**	**L 2**	**I**
	THICKNESS								
No.		8	8	20	8	99	214	78	213
Minimum		0.54	0.3	0.15	0.75	0.2	0.27	0.1	0.33
Maximum		0.85	1.41	1.79	2.68	3	4.66	1.75	4.04
	MOISTURE % (M%)								
No.		8	8	20	8	99	214	78	213
Minimum		2.2	2.4	2.1	2	1	1.1	1.3	0
Maximum		3.3	3.6	3.7	4.2	4	4.3	3.1	4.7
Mean		2.5	2.8	2.9	2.7	2.2		2.2	2.6

Particulars	Seam								
		IIIT	**III M**	**III B**	**III**	**L 1**	**II**	**L 2**	**I**
STD		0.4	0.4	0.5	0.6	0.5		0.4	0.9
	ASH% (A%)								
No.		8	8	20	8	99	214	78	213
Minimum		27.8	22.9	22.8	28.7	10.1	14.0	7.4	13.3
Maximum		45.2	39.4	49.8	48	46.8	52.7	38.1	51
Mean		39.6	33.4	35.2	37.1	24.1		21	24.2
STD		6.5	5.8	8.9	5.9	8.3		7.1	7.2
	UHV								
No.		8	8	20	8	99	214	78	213
Minimum		2341	3136	1682	2000	2096	1434	3434	1623
Maximum		4609	5248	5252	4359	7143	6547	7549	6830
Mean		3083	3909	3637	3405	5991		5700	5168
STD		849	747	1173	744	768		954	865

4.3 GEOLOGY AND STRUCTURE OF BLOCK AREA

4.3.1 Brief geological setting along with generalized sequence within the block/coalfield

The Gondwana Formations collectively represent about 6000-7000m of thick sediments, though a complete sequence from base to the top is not exposed at any one place.

The Amlai-Burhar sub-basin preserves a total of about 300m of Barakar strata. Of this nearly 160-200m of Basal Barakar Formation is devoid of workable coal horizons. The workable coal horizons are confined to the succeeding 100-140m of Barakar strata. It contains 9 correlatable carbonaceous horizons of which six have attained workable thickness in one or other part of the area.

The general stratigraphic succession for the entire coalfield revealed as a result of regional and detailed exploration is as follows:

Stratigraphic sequence of Sohagpur Coalfield

Age	Formation	Thickness(m)	Lithology
Recent/Sub-Recent	Alluvium & soil		
^^^^^^^^^^^^^^ Unconformity ^^^^^^^^^^^^^^^^^^^^^^^^			
Eocene-Upper Cretaceous	Deccan Trap		Effusive and intrusive rocks, mostly basalt & dolerite

Age	Formation	Thickness(m)	Lithology
^^^^^^^^^^^^^^ Unconformity ^^^^^^^^^^^^^^^^^^^^^^^^			
Upper Cretaceous	Lameta		Reddish & greyish sandstone & nodular limestones
^^^^^^^^^^^^^^ Unconformity ^^^^^^^^^^^^^^^^^^^^^^^^			
Upper Triassic	Supra Barakars (Mahadeva?)		Pink, buff and red sandstones and red shale
^^^^^^^^^^^^^^ Unconformity ^^^^^^^^^^^^^^^^^^^^^^^^			
Lower Permian	Barakar	+320m	Coarse to medium grained sand-stones,subordinate shales and coal seam, thin & moderately thick
Upper Carboniferous	Talchir	+430m	Diamictite, siltstone, sandstone & needle shales
^^^^^^^^^^^^^^ Unconformity ^^^^^^^^^^^^^^^^^^^^^^^^			
Precambrian			Porphyritic granite gneisses with & pigmatite veins.

4.3.2 Coal bearing formations

Barakar Formation

The Barakar Formation shows characteristic vertical variation in the arrangement of lithofacies and this permits its subdivision into three distinct litho stratigraphic units. The strata grouped within the Lower member conformably overlies the Talchir Formation. The Lower part of this member comprises grayish white, feldspathic multi-storeyed sandstone units with minor amount of shale and is usually devoid of any workable coal seam.

The sandstones are compact and moderately sorted with feldspar clasts and disseminations of garnet. This part of the Lower member shows a variation in thickness from 80m to 150m.

The overlying 200m to 300m thick strata define the upper part of the lower member. It includes several workable coal seams which are developed in Malga-Bijuri-Kotma-Dhanpuri area. The sandstone of this part is dominantly feldspathic and is thick bedded. Channelling is quite frequent and this has caused frequent scouring of the coal seams giving rise to multi-storeyed sandstone units.

Succeeding this coal bearing unit is a 200m thick sequence of ferruginous sandstones, shale and laminated siltstones which present a sharp lithological contrast with the underlying coal-bearing sequence. Outcrops ascribed to this unit occur down dip of Dhanpuri area.

The upper member shows the reappearance of coal seams, which are however of inferior quality. The sandstones of the upper member are fine grained with micaceous siltstone and ferruginous shale bands. The thickness of this member is 300m to 500m.

4.3.3 Sequence of coal seams and partings within the block area

Sequence and brief description of Coal Seams in the block.

Seam	Surface Cover (m)	Area of Development (sq. km.) [As per GR]	Thickness Range (m)	Grade Range (Dominant Grade)	Borehole Intersection (As per GR)	Borehole Density/ sq. Km.	Geological Reserves (Mt) [As per **GR]**
Seam-III T	4-20.25	-	0.11-0.85	D-G	17		-
Parting		-	0.36-1.35				
Seam-III M	6.23-23.40	-	0.30-1.41	C-F	10		-
Parting		-	0.27-2.22				
Seam-III B	1.85-28.00	0.2675	0.1-1.10	C-G	43		0.3035
Parting with L1		-	17.37-31.20				
Seam-III	6.0-14.84	0.6874	0.75-2.68	G-D(F)	9	13.09	1.2148
Parting		-	14.45-26.67				
Local Band L1	7.75-47.25	4.8320	0.20-3.00	G-A(C)	139	28.77	5.5295
Parting		-	0.70-13.60				
Seam-II	4.00-56.12	13.1706	0.27-4.66	G-A	216	16.40	33.3876
Parting		-	6.4-16.70				
Local Band L2	27.0-72.13	2.2452	0.10-1.75	E-A(B)	113	50.33	2.8284
Parting		-	0.28-5.7				
Seam-I	7.18-75.90	12.8113	0.33-4.04	G-A(C)	217	16.94	30.2702
Total							**73.534**

4.3.4 Structural setting within the project area

The featureless rolling topography and soil cover in and around Batura have completely masked the surface manifestation of the structural elements. The entire structural setup of the area, therefore, has been worked out in sub-surface data obtained through drill holes. Structurally the area is simple.

4.3.5 Dip and Strike

The block exhibits variable strike & dip. The strata including coal seams show a broad E-W trend in the southern part and NNW-SSE trend in the western part of the Block.

However, in the Northern part of the block the strike swings to almost N-S direction.The strata, in general, shows northerly dips with gradient 1 in 20 to 60 (1^0 to 3^0).

The dip of the strata varies from 1^0 to 3^0. All the coal seams i.e. Seam-II, III & L1 are incropping within the block. The incrop position of the seams have been interpreted considering the surface contours, floor contours, cross-section and detrital mantle cover as recorded in the boreholes. At places this cover could not be identified precisely due to poor core recovery in the weathered zone/ detrital mantle region.

4.3.6 Description of faults

Batura West Extension Block has been affected by only two Nos. of faults. Both the faults have either NNW-SSE or NW-SE trend and fall in north eastern part of the block. The direction and magnitude of the fault deciphered in the block is given in the following table.

Fault No.	Extent of Fault (Km.)	Trend	Throw		Evidences
			Direction	Amount (m)	
F_1-F_1	Throughout the Eastern part of the block	NNW-SSE	West	35m(approx.)	Through FRL value differences in borehole Nos. CSBT-394 & 325 and shifting of coal seam II incrop from the adjacent Batura U/G Block.
F_2-F_2	Throughout the north-eastern part of the block	NW-SE	South	3-10m	Through FRL value differences in borehole No.CSBT-002, 411 & 419 and CSBT-417, 413, 418, 416, 422 & 433 on the other side of the fault.
F_3-F_3	In the northern part of the block	NW-SE to E-W	North	1-40m	Faulted for seam-I in BH-CSBT-321& part thickness in seam-II in BH CSBT-341, FRL value differences of boreholes CSBT-145,86,191,88,174,189,178,346,207

4.3.7 Intrusives

The Barakar measures of Sohagpur Coalfield are traversed by large number of basic dykes and sills. The most prominent sill is noted in the eastern part of the coalfield. Westwards, the sill continues almost uninterruptedly over a strike lengths of about 70km across the river Son & outcrop attains a width of over 4km at places.

The northern limit of this sill is apparently marked by the east-west trending Bhamni-Chilpa fault with downthrow towards north. Another prominent dolerite body occurs to the north of the Son river and this extends over a length of over 50km.

Dykes of dolerite are quite common both in the eastern and western parts of the field. They vary in length from a few metres to over 5 km and in width from 2m to about 25m. Most of the dykes trend ENE-WSW to East-West. In a number of cases, the dykes are found to be aligned along prominent fault planes.

4.4 DESCRIPTION OF INDIVIDUAL COAL SEAMS

4.4.1 SEAM-I

A. Status of mining

Seam-I is not being mined in any of the adjacent blocks nor in this block.

B. Details of boreholes intersection

	I. Intersections	**Nos.**
i)	No. of full seam intersections in boreholes	217
ii)	No. of outcrop proving boreholes with part thickness	1
iii)	No.of boreholes with part thickness due to faulting	Nil
iv)	No.of boreholes where seam is totally omitted due to fault	2
v)	No.of boreholes where seam is not encountered due to non-development (thinning out) of coal seams	17
vi)	No.of boreholes not deepened to encounter the seam	5
vii)	No. of boreholes beyond incrop	3
	TOTAL	**245**

II. <u>Depth of intersection (Roof)</u>

i) Shallowest : 7.18m (CSBT-218)

ii) Deepest : 75.90m (CSBT-353)

III. <u>Minimum & Maximum FRLs</u>

i) Minimum : 394.32m (CSBT-353 & CSBT-241)

ii)Maximum : 467.114m (CSBT-218)

C. Stratigraphic Position

Seam-I is the bottom most workable coal seam in the Barakar Formation within the block.

D. Parting

The parting above and below the seam consists predominantly of arenaceous facies represented by sandstones of various grain-size. Though in most of the cases the immediate lithology just above the coal seam has been seen represented by Shale/Carb

shale, but the immediate floor of the seam is of argillaceous facies represented by Carb shale/Shale/Sandy Shale. The parting variation of the seam with Seam-II just above it, is 12.73m (CSBT-74) to 17.81m (CSBT-87). The strata below the seam is devoid of any coal seam except few local bands.

E. Thickness

It is observed that the minimum thickness of 0.10m is intersected in borehole No.CSBT-340 in the central part of the block, though the maximum thickness of 4.04m is intersected in borehole No.CSBT-70 in central part of the block. The seam deteriorates to carbshale in the northern and northeastern parts of the block around borehole No.CSBT-199 & 200 where the thickness of the seam has been reduced to 0.70m and 2.50m respectively. The seam has attained thickness more than 0.90m almost in the entire spread of the block.

F. Splitting

The seam does not split in the block. One to two mostly thin and impersistent bands occur above and below the seam.

G. Outcrop/Incrop

The seam does not crop out anywhere in the block. In the southern part of the block, the seam incrops almost E-W and in the East the incrop swings to almost N-S direction. The seam deteriorates to carbshale and incrops in the eastern parts of the block north of fault F_2-F_2 near borehole No.CSBT-320. The incrop position demarcated on the plans are below the weathered zone.

H. Roof & Floor

The immediate roof of Seam-I predominantly consists of shale apart from coarse grained sandstone in the southeastern part and medium grained sandstone in the westcentral part of the block. In the southern part the immediate roof is sandy shale/carbshale. Whereas the immediate floor of the seam consists predominantly of shale/sandy shale, apart from Carbshale/ medium grained sandstone in the south and southwestern part of the block. However, the roof of the seam upto 3m consists predominantly of medium grained sandstone with occasional shale/sandy shale, though

the floor of the seam upto 1m predominantly consists of shale/sandy shale with occasional fine grained sandstone.

I. Dirt Bands

Both grey shale and carbonaceous shale bands are present within the seam but generally the Seam-I is devoid of dirt band.

J. Proximate Analysis

Seam-I coal as it appears from band-by-band analysis and seam overall data, shows variation in grade between A to G.The grade G is confined to a negligible portion in the west central part of the block around borehole No.CSBT-134 and around borehole No.CSBT-92 in northeastern part, whereas grade A is also limited to a very small part around borehole No.CSBT-20 in the northern part of the block. However, in the major part of the block, grade varies between C to D. Out of 35 Nos. of boreholes intersected the seam band-by-band analysis of 30 Nos. of boreholes are available and considered for quality assessment. The boreholes in which the seam has been thinned out (less than 0.50m thickness and of B & C grade coal), are excluded from the purview of quality assessment. The moisture and ash percentage in the block varies between 1.1 (CSBT-341) to 4.7 (CSBT-140) and 13.3 (CSBT-47) to 51.0(CSBT-199) respectively. For determination of ash, moisture and grade variation, data of I_{10} samples have been considered.

Range of proximate analysis & grade of Seam-I, Batura OC block, Sohagpur Coalfield.

Parameters	Range		
	Bcs Sample	**I_{10} Sample**	**I_{100} Sample**
Full Seam			
Boreholes considered :	213	213	213
Thickness (m)/Range (m) Mean STD.DEV	0.33 – 4.04 (CSBT-35) (CSBT-70) 1.92 0.75	0.33 – 4.04 (CSBT-35) (CSBT-70) 1.92 0.75	0.33 – 4.04 (CSBT-35) (CSBT-70) 1.92 0.75
Proximate analysis in 60% RH & 40^0 C			
M% Mean STD.Dev..	1.1 - 4.7 (CSBT-341) (CSBT-140) 2.6 0.8	1.1 - 4.7 (CSBT-341) (CSBT-140) 2.6 0.8	1.1 - 4.7 (CSBT-341) (CSBT-140) 2.6 0.8
Ash% Mean STD.DEV	13.3 - 51.0 (CSBT-47) (CSBT-199) 24.2 5.9	13.3 - 51.0 (CSBT-47) (CSBT-199) 2.4.2 5.9	13.3 - 51.0 (CSBT-47) (CSBT-199) 24.2 5.9
VM% Mean STD.DEV	9.5 - 28.3 (CSBT-80) (CSBT-157) 21.6 7.3	9.5 - 28.3 (CSBT-80) (CSBT-157) 21.6 7.3	9.5 - 28.3 (CSBT-80) (CSBT-157) 21.6 7.3

Parameters	Range		
	Bcs Sample	**I_{10} Sample**	**I_{100} Sample**
FC% Mean STD.DEV	36.3 - 61.4 (CSBT-179) (CSBT-47) 49.9 4.7	36.3 - 61.4 (CSBT-179) (CSBT-47) 49.9 4.7	32.4 - 61.4 (CSBT-203) (CSBT-47) 49.9 4.7
UHV (Kcal/kg) Mean STD.DEV	1623 - 6830 (CSBT-199) (CSBT-159) 5168 865	1623 - 6830 (CSBT-199) (CSBT-159) 5147 873	1623 - 6830 (CSBT-199) (CSBT-159) 4926 966
Grade Avg. Grade	G-A C	G-A C	G-A D

K. Gross Calorific Value (K.cal/kg)

Range of Gross CV, Seam-I, Batura OC Block, Sohagpur Coalfield.

Boreholes considered	Thickness Range (m)	Range of Gross CV (K.cal/kg)		
		Bcs	**I_{10}**	**I_{100}**
213	0.33-4.04	4270 – 8451 (CSBT-184) (CSBT-47)	4270 – 8451 (CSBT-184) (CSBT-47)	4270 – 8451 (CSBT-184) (CSBT-47)

L. Ultimate Analysis

Range of Ultimate Analysis for Seam-I, Batura OC block, Sohagpur Coalfield.

Parameters	Range of content %
	Bcs Sample (No. of Samples-6)
Ultimate analysis (dmmf basis)	
C%	82.43 - 88.81 (CSBT-113) (CSBT-159)
H%	4.24 - 5.20 (CSBT-219)(CSBT-289)
N%	1.31 - 1.84 (CSBT-141)(CSBT-117)
S%	0.51 - 3.48 (CSBT-136)(CSBT-88)
UVM%	10.0 - 37.0 (CSBT-80)(CSBT-198)

Since the Hydrogen % on dmmf basis falls below 5%, the coals are sub-hydrous in nature.

M. Ash Fusion Range

Ash Fusion Temperature Range of Seam-I, Batura OC block, Sohagpur Coalfield.

Borehole considered	Thickness range (m)	Ash fusion range ^{o}C(under mildly reducing atmosphere)		
		IDT	HT	FT
14	0.64-3.33	1130- >1450	1250 - >1450	1270 - >1450

N. Hardgrove Grindability Index(HGI)

HGI of 13 boreholes has been carried out by CFRI.

No. of boreholes	Seam Thickness Range		Nature of Sample	Range	
	Minimum	Maximum		Minimum	Maximum
13	1.11	3.30	Bcs	49	65
2	1.11	3.30	I_{10}	52	58
5	2.10	3.08	I_{100}	45	57

O. Longflame Characteristics

For ascertaining the long flame nature of seam its volatile matter and GCV both on unit coal basis and moisture content at 60% RH & 40 ^{0}C on mineral matter free basis has been calculated and tallied with the following laid down parameters.

Group	On Unit coal basis.		Moisture present at 60% RH & 40^{0}C
	VM%	GCV K.Cal/ kg.	
B4	Over 32	8060 - 8440	3 - 7
B5	Over 32	7500 - 8060	7 - 14

The above three parameters calculated for Seam I are given in the table below :

Long Flame Characteristics of Coal Seam-I, Batura OC Block, Sohagpur Coalfield.

Borehole No.	Moisture% (at 60% RH & 40^{0}C on MMF basis)	On Unit Coal Basis	
		UVM%	GCV (K.Cal/Kg.)
CSBT-8	3.2	32.8	8129
CSBT-10	3.5	32.4	8272
CSBT-11	3.5	32.1	8180
CSBT-19	3.0	32.2	8089
CSBT-23	5.8	32.9	8105
CSBT-62	3.7	35.2	8081
CSBT-96	3.5	32.8	8396
CSBT-128	3.1	32.2	8293
CSBT-131	3.1	34.4	8082
CSBT-150	4.3	32.2	8196
CSBT-160	3.1	32.5	8152
CSBT -62	3.7	35.2	8081
CSBT-129	3.3	33.8	8058

It is observed from the data that the coal of Seam I mostly falls in B4 group.

P. Ash Analysis

B.H.No.	Nature of sample	Constituents %									
		SiO_2	Al_2O_3	Fe_2O_3	SO_3	CaO	MgO	TiO_2	P_2O_5	Mn_3O_4	Undetermined & Alkalies (by difference)
CSBT-8	I_{100}	61.30	25.71	4.78	0.34	2.46	1.85	2.50	0.16	0.05	0.85
CSBT-11	I_{100}	63.12	24.36	4.35	0.29	2.35	1.93	2.50	0.11	0.05	0.94
CSBT-22	Bcs	63.45	21.53	5.36	0.55	2.91	2.17	3.00	0.11	0.08	0.84
CSBT-204	Bcs	64.88	18.72	5.93	0.07	3.24	1.61	1.50	0.02	-	4.03
CSBT-275	Bcs	65.40	16.39	4.78	0.09	3.24	0.96	2.00	0.03	-	7.11

Q. Sulphur distribution

Sulphur Distribution of Seam I
Batura OC Block, Sohagpur Coalfield

Sl.No.	Type of Sample	Bh. No.	From	To	Total sulphur	On 60% RH & 40°C		
						Pyretic sulphur	Sulphate Sulphur	Organic Sulphur
1	Bcs	CSBT-86	60.00	62.55	1.40	0.43	0.24	0.73
2	Bcs	CSBT-88	49.60	51.70	2.44	1.29	0.63	0.52

4.4.2 LOCAL BAND L-2

A. Status of mining

Local Band L-2 is not being mined in any of the adjacent blocks nor in this block.

B. Details of boreholes intersection

	I. Intersections	**Nos.**
i)	No. of full seam intersections in boreholes	113
ii)	No. of outcrop proving boreholes with part thickness	NIL
iii)	No.of boreholes with part thickness due to faulting	NIL
iv)	No.of boreholes where seam is totally omitted due to fault	1
v)	No.of boreholes where seam is not encountered due to non-development (thinning out) of coal seams	46
vi)	No.of boreholes not deepened to encounter the seam	4
vii)	No.of boreholes beyond incrop	NIL
	TOTAL	164

II. Depth of intersection (Roof)

i) Shallowest : 27.00m (CSBT-180)

ii) Deepest : 72.13m (CSBT-136)

III. <u>Minimum & Maximum FRLs</u>

i) Minimum : 401.20m (CSBT-275)

ii)Maximum : 455.06m (CSBT-160)

C. Stratigraphic Position

Local Band L-2 lies above Seam I and is workable in patches in the Barakar Formation within the block.

D. Parting

The parting above the Local Band L-2 consists predominantly of arenaceous facies represented by sandstones of various grades and the parting below this band with Seam I consists of shale, sandy shale & fine grained sandstone.

E. Thickness

It is observed that the minimum thickness of 0.10m is intersected in borehole No.CSBT-156 in the central eastern part of the block, though the maximum thickness of 1.75m is intersected in borehole No.CSBT-184 in northeastern part of the block. The band has not developed in southern & south western part the block & in the northern part of the block. Around borehole CSBT-70 the band has not developed. The band has got workable thickness in patches.

F. Splitting

The band does not split in the block.

G. Outcrop/Incrop

The band does not crop out anywhere in the block. Due to non development in the southern part of the block the band does not incrop.

H. Roof & Floor

The roof of Local Band L-2 consists predominantly of coarse grained sandstone and the floor is mostly sandy shale & at places shale.

I. Dirt Bands

The band in general is devoid of dirt bands but in very few boreholes mostly carb.shale bands are present.

J. Proximate Analysis

Local Band L2, as it appears from band by band analysis and seam overall data, shows variation in grade between A to E. Grade E is confined to a negligible portion around CSBT-104 where as Grade A is developed in patches at many places around borehole No.CSBT-120,149,191,98,88,192,86 & 36. Grade A is developed around borehole CSBT-157, in the north west around borehole CSBT-157 & in the north west around borehole Nos. CSBT-113 & 346.

Range of proximate analysis & grade of Local Band L-2, Batura OC block, Sohagpur Coalfield.

Parameters	Range		
	Bcs Sample	**I_{10} Sample**	**I_{100} Sample**
Full Seam			
Boreholes considered :	78	78	`78
Thickness (m)/Range (m) Mean STD.DEV	0.10-1.75 (CSBT-156) (CSBT-184) 0.79 0.41	0.10-1.75 (CSBT-156) (CSBT-184) 0.79 0.41	0.10-1.75 (CSBT-156) (CSBT-184) 0.79 0.41
Proximate analysis in 60% RH & 40^0 C			
M% Mean STD.Dev..	1.3 –3.1 (CSBT-349) (CSBT-170) 2.2 0.4	1.3 –3.1 (CSBT-349) (CSBT-170) 2.2 0.4	1.3 –3.1 (CSBT-349) (CSBT-170) 2.2 0.4
Ash% Mean STD.DEV	7.4-38.1 (CSBT-191) (CSBT-104) 20.7 6.7	7.4-38.1 (CSBT-191) (CSBT-104) 21.0 7.1	7.4-38.1 (CSBT-191) (CSBT-104) 22.1 7.6
VM% Mean STD.DEV	17.5 – 26.8 (CSBT-349) (CSBT-170) 22.7 2.3	17.5 – 26.8 (CSBT-349) (CSBT-170) 22.4 2.3	17.2 - 26.8 (CSBT-346) (CSBT-170) 22.2 2.6
FC% Mean STD.DEV	44.8 -61.1 (CSBT-165) (CSBT-157) 52.8 5.4	39.6 -61.1 (CSBT-69) (CSBT-157) 52.7 6.1	39.6 -61.1 (CSBT-69) (CSBT-157) 52.2 5.8
UHV (Kcal/kg) Mean STD.DEV	3434 - 7549 (CSBT-104) (CSBT-191) 5731 903	3434 - 7549 (CSBT-104) (CSBT-191) 5700 954	3053 - 7549 (CSBT-86) (CSBT-191) 5547 1028
Grade Avg. Grade	E-A B	E-A B	F-A C

K. Gross Calorific Value (K.cal/kg)

Range of Gross CV, Local Band L-2, Batura OC Block, Sohagpur Coalfield.

Boreholes considered	Thickness Range (m)	Range of Gross CV (K.cal/kg)

		Bcs	I_{10}	I_{100}
78	0.10-1.75	4758 – 7509 (CSBT-104) (CSBT-191)	4758 – 7509 (CSBT-104) (CSBT-191)	44939 – 7509 (CSBT- 86) (CSBT-191)

L. Ultimate Analysis

Range of Ultimate Analysis for Local Band L-2, Batura OC block, Sohagpur Coalfield.

Parameters	Range of content %
	Bcs Sample (No. of Samples-8)
Ultimate analysis (dmmf basis)	
C%	78.88 - 88.76 (CSBT-107) (CSBT-113)
H%	4.22- 4.96 (CSBT-159)(CSBT-289)
N%	1.40 - 1.87 (CSBT-107)(CSBT-289)
S%	0.38 - 1.53 (CSBT-113)(CSBT-88)
UVM%	20.4 - 32.1 (CSBT-349)(CSBT-170)

M. Ash Fusion Range

Ash Fusion Temperature Range of Local Band L-2, Batura OC block, Sohagpur Coalfield.

Borehole considered	Thickness range (m)	Ash fusion range ^{o}C(under mildly reducing atmosphere)		
		IDT	HT	FT
6	1.05-1.22	1150->1450	1360->1450	1380-1450

N. Hardgrove Grindability Index(HGI)

HGI of 15 boreholes has been carried out by CFRI.

Hardgrove Grindability Index of Local Band L-2, Batura OC block, Sohagpur Coalfield

No. of boreholes	Seam Thickness Range		Nature of Sample	Range	
	Minimum	Maximum		Minimum	Maximum
2	1.10	1.22	I_{10}	54	57

O. Longflame Characteristics

For ascertaining the long flame nature of seam its volatile matter and GCV both on unit coal basis and moisture content at 60% RH & 40 ^{0}C on mineral matter free basis has been calculated and tallied with the following laid down parameters.

Group	On Unit coal basis.		Moisture present at 60% RH & 40^{0}C
	VM%	GCV K.Cal/ kg.	
B4	Over 32	8060 - 8440	3 - 7
B5	Over 32	7500 - 8060	7 - 14

The above three parameters calculated for Local Band L2 is given in the table below :

Long Flame Characteristics of Coal Local Band L-2,

Batura OC Block, Sohagpur Coalfield.

Borehole No.	Moisture% (at 60% RH & 40^{0}C on MMF basis)	On Unit Coal Basis	
		UVM%	GCV (K.Cal/Kg.)
CSBT-170	3.1	32.1	8140

It is observed from the data that the coal of Seam I mostly falls in B4 group.

P. Ash Analysis

Ash Analysis of Local Band L-2,
Batura OC Block, Sohagpur Coalfield.

B.H.No.	Nature of sample	Constituent %								
		SiO_2	Fe_2O_3	Al_2O_3	SO_3	CaO	MgO	TiO_2	P_2O_5	Undetermined & Alkalies (by difference)
CSBT-275	Bcs	66.86	3.78	15.10	0.12	4.36	0.48	2.00	0.07	7.23

Q. Distribution of Sulphur

Distribution of Sulphur of Local Band L-2,
Batura OC Block, Sohagpur Coalfield

Sl.No.	Type of Sample	Bh. No.	Thickness		Total sulphur	On 60% RH & 40^{o}C		
			From	To		Pyretic sulphur	Sulphate Sulphur	Organic Sulphur
1	Bcs	CSBT-86	56.75	57.70	1.90	0.87	0.69	0.34
2	Bcs	CSBT-88	46.19	47.29	1.30	0.63	0.26	0.41

4.4.3 Seam-II

A. Status of mining

The entire block is devoid of any mining activities. However, in the Bakaho block located approx. 8 km. in the western side of the block across the river Son, mining in Sohagpur area is in operation.

B. Details of boreholes intersection

	I. Intersections	**Nos.**
i)	No. of full seam intersections in boreholes	211
ii)	No. of outcrop proving boreholes with part thickness	4
iii)	No.of boreholes with part thickness due to faulting	1
iv)	No.of boreholes where seam is totally omitted due to fault	1
v)	No.of boreholes where seam is not encountered due to non-development (thinning out) of coal seams	7
vi)	No.of boreholes not deepened to encounter the seam	Nil
vii)	No.of boreholes beyond incrop	21
	TOTAL	**245**

II <u>Depth of intersection (Roof)</u>

i) Shallowest : 4.00m (CSBT-233)

ii) Deepest : 56.12m (CSBT-353)

III. <u>Minimum & Maximum FRLs</u>

i) Minimum : 408.75m (CSBT-275)

ii)Maximum : 474.03m (CSBT-18)

C. Stratigraphic Position

Seam-II is the second workable coal seam from the bottom within the Barakar Formation in the block.

D. Parting

In the major part of the block, Seam-II is the topmost workable coal horzon except in few boreholes where Seam-III have been intersected. The parting of Seam-II with Seam-I below predominantly consists of arenaceous facies represnted by medium to coarse grained sandstone. However, the parting above Seam-II though consists of medium to coarse grained sandstone with occassional fine grained sandstone but one to two coal bands interbedded with argillaceous facies are also found between Seam-III & Seam-II boundary. The average parting variation between Seam-I & II is 15-16m. The seam occurs at a depth of 4.00m (CSBT-233) from the surface in the southeastern part of the block and at a maximum depth of 56.12m (CSBT-353) in the northeastern part of the block.

E. Thickness

It is observed that the minimum thickness of 0.27m is intersected in borehole No.CSBT-144 but the maximum thickness of 4.66m is obtained in bh. no.CSBT-159 in the southcentral part of the block boundary.

F. Splitting

The seam does not split in the block.

G. Outcrop/Incrop

The seam outcrop has been located in the Katna Nala between borehole Nos. CSBT-30 & 31. Otherwise it sub-crops all along in the southern part trending E-W along CSBT-221, 32, 223, 226, 138, 35, 101, 260, 233, 244 & 300. The position of incrop is below the weathered mantle. It also incrops in the northwestern part of the block above Fault F_2-F_2.

H. Roof & Floor

The immediate roof of Seam-II consists predominantly of sandy shale and fine/ medium grained sandstone. Though the occurrence of shale in small patches have been found in the southern part. However, roof of the seam upto 3m consists predominantly of medium to coarse grained sandstone except in few boreholes where shale/sandy shale are found with one to two coal bands.

I. Dirt Bands

Both grey shale and carbonaceous shale bands are present within the seam.

J. Proximate Analysis

The grade varies between G-A in the major part of the block, though the grade varies between B-D in the block. Grade B coal is confined in different isolated patches located in the southern and western part of the block. However, grade-E coal is

restricted to a negligible part around bh.nos.CSBT-179 & 182 in the northern part of the block.. The UHV and GCV of the seam varies from 1434 to 6547 and 3392 to 8228 respectively for I_{10}.

Range of proximate analysis & grade of Seam-II, Batura OC block, Sohagpur Coalfield.

Parameters	Range		
	Bcs Sample	I_{10} Sample	I_{100} Sample
Full Seam			
Boreholes considered :	214	214	214
Thickness (m)/Range (m)	0.27 - 4.66 (CSBT-144) (CSBT-159)	0.27 - 4.66 (CSBT-144) (CSBT-159)	0.27 - 4.66 (CSBT-144) (CSBT-159)
Proximate analysis on 60% RH & 40^0 C			
M%	1.1 - 4.3 (CSBT-71) (CSBT-106)	1.1 - 4.3 (CSBT-71) (CSBT-106)	1.1 - 4.3 (CSBT-71) (CSBT-106)
Ash%	14.0 – 52.7 (CSBT-42) (CSBT-341)	14.0 – 52.7 (CSBT-42) (CSBT-341)	14.0 –63.4 (CSBT-42) (CSBT-174)
VM%	5.6 - 29.6 (CSBT-254) (CSBT-11)	5.6 - 29.6 (CSBT-254) (CSBT-11)	4.7 – 28.1 (CSBT-254) (CSBT-72)
FC%	36.5 - 66.4 (CSBT-164) (CSBT-18)	36.5 - 66.4 ((CSBT-164) (CSBT-18)	27.9 - 62.1 (CSBT-203) (CSBT-190)
UHV (Kcal/kg)	1434 - 6547 (CSBT-341) (CSBT-42)	1434 - 6547 (CSBT-341) (CSBT-42)	1434 - 6547 (CSBT-341) (CSBT-42)
Grade	G-A	G-A	Ungraded - A

K. Gross Calorific Value((K.cal./kg.)

Range of Gross CV, Seam-II, Batura OC block, Sohagpur Coalfield.

Boreholes considered	Thickness Range (m)	Range of Gross CV (K.cal/kg) on dmmf basis		
		Bcs	I_{10}	I_{100}
214	0.27 - 4.66	3392 - 8228 (CSBT-347) (CSBT-198)	3392 - 8228 (CSBT-347) (CSBT-198)	3392 - 8228 (CSBT-347) (CSBT-198)

L. Ultimate Analysis

Range of Ultimate Analysis for Seam-II, Batura OC block, Sohagpur Coalfield.

Parameters	Range of content %
Ultimate Analysis on Bcs/Ex-band sample (dmmf basis)	
C%	77.49 - 92.30 (CSBT-169) (CSBT-196)
H%	3.96 - 5.19 (CSBT-181) (CSBT-22)
N%	1.32 - 1.85 (CSBT-141) (CSBT-196)
S%	0.42 - 1.10 (CSBT-275) (CSBT-25)

M. Ash Fusion Temperature Range

Ash Fusion Temperature Range for Seam-II, Batura OC block, Sohagpur Coalfield.

Borehole considered	Thickness range (m)	Ash fusion range ^{o}C(under mildly reducing atmosphere)		
		IDT	HT	FT
18	1.10-4.66	1140->1450	1340->1450	1350-1450

N. Hardgrove Grindability Index (HGI)

HGI of 20 boreholes has been carried out by CFRI.

No. of boreholes	Nature of Sample	Range	
		Minimum	Maximum
11	Bcs	41	65
12	I_{100}	46	68

O. Longflame Characteristics

For ascertaining the longflame nature of seam its volatile matter and GCV both on unit coal basis and moisutre content at 60% RH & 40^{0}C on mineral matter free basis has been calculated and tallied with the following laid down parameters.

Group	On Unit coal basis.		Moisture present at 60% RH & 40^{0}C on MMF basis.
	VM%	GCV K.Cal/ kg.	
B4	Over 32	8060 - 8440	3 to 7
B5	Over 32	7500 - 8060	7 to 14

The above three parameters calculated for Seam-II are given in the table below.

Long Flame Characteristics of Coal Seam-II, Batura OC Block, Sohagpur Coalfield.

Borehole No.	Moisture% (at 60% RH & 40^{0}C on MMF basis)	On Unit Coal Basis	
		UVM%	GCV (K.Cal/Kg.)
CSBT-5	3.9	35.7	8203
CSBT-21	4.9	36.0	8157
CSBT-22	3.4	35.3	8213
CSBT-23	3.6	34.1	8138
CSBT-36	4.2	33.9	8134

Borehole No.	Moisture% (at 60% RH & 40^{0}C on MMF basis)	On Unit Coal Basis	
		UVM%	GCV (K.Cal/Kg.)
CSBT-37	4.1	34.4	8151
CSBT-44	4.5	33.8	8090
CSBT-62	3.7	33.6	8141
CSBT-63	3.7	32.1	8066
CSBT-72	3.8	34.6	8202
CSBT-87	5.2	34.0	8211
CSBT-99	3.4	35.3	8163
CSBT-100	3.8	33.7	8182
CSBT-101	3.7	32.7	8168
CSBT-102	5.2	32.5	8142
CSBT-106	4.3	34.9	8144
CSBT-108	3.6	33.6	8158
CSBT-129	3.6	35.4	8185
CSBT-134	3.8	33.2	8068
CSBT-140	4.0	34.7	8158
CSBT-141	4.1	34.9	8158
CSBT-160	3.2	34.5	8187
CSBT-260	4.2	33.8	8285

It is observed from the data that the coal of Seam-II mostly falls in B4 group.

P. Ash Analysis

B.H.No.	Nature of sample	Constituents %								
		SiO_2	Fe_2O_3	Al_2O_3	TiO_2	CaO	MgO	P_2O_5	SO_3	Undetermined & Alkalies (by difference)
CSBT-8	I_{100}	64.33	5.00	22.25	2.50	2.91	2.01	0.05	0.16	0.76
CSBT-11	I_{100}	62.62	5.57	21.78	3.00	2.46	2.49	0.15	0.24	1.64
CSBT-22	I_{100}	63.37	5.64	21.22	2.00	2.68	1.93	0.09	0.22	2.79
CSBT-204	Bcs	65.54	13.00	7.50	2.50	5.71	1.61	0.01	0.09	4.04
CSBT-219	I_{100}	64.27	18.61	6.07	2.00	3.92	3.62	0.02	0.13	1.36
CSBT-275	Bcs	64.34	16.70	6.71	2.00	4.59	2.90	0.04	0.34	2.38

4.4.4 Local Band L1

A. Status of mining

The entire block is devoid of any mining activity.

B. Details of boreholes intersection

	I. Intersections	**Nos.**
i)	No. of full seam intersections in boreholes	139
ii)	No. of outcrop proving boreholes with part thickness	Nil
iii)	No.of boreholes with part thickness due to faulting	Nil
iv)	No.of boreholes where seam is turned into clay	Nil
v)	No.of boreholes where seam is not developed/beyond incrop	106
	TOTAL	**245**

II. <u>Depth of intersection (Roof)</u>

i) Shallowest : 7.75m (CSBT-147)

ii) Deepest : 47.25 (CSBT-350)

III. <u>Minimum & Maximum FRLs</u>

i) Minimum : 437.35m (CSBT-146)

ii)Maximum : 474.58m (CSBT-78)

C. Stratigraphic Position

Local Band L1 lies above Seam II and below Seam III within the Barakar Formation in the block.

D. Parting

The parting of L1 with Seam-II varies from 0.70m in borehole No.CSBT-132 to 13.61m in borehole No.CSBT-67. However, the average parting variation is 4m to 5m.

E. Thickness

The thickness of the Local Band L1 varies from 0.10m in borehole No.CSBT-112 to 3.00m in borehole No. CSBT-186 , below fault F1-F1 In general the average thickness varies from 0.35m to 0.65m. The band is not developed in isolated patches at few places in the block.

F. Splitting

The Local Band L1 does not split in the block.

G. Outcrop/Incrop

This band does not crop out in the block and incrops in the southern part of the block.

H. Roof & Floor

The immediate roof is mostly sandstone with sandy shale/shale developed in patches at places. The immediate floor is mostly sandstone/ sandyshale & shale. However, the roof of the band upto 3m consists predominantly of sandstone and the floor upto 1m is also predominantly sandstone/sandyshale & shale.

I. Dirt Bands

This band is devoid of dirt bands except in two to three boreholes where the band is carbshale/shale.

J. Proximate Analysis

From the band-by-band and seam overall data the variation in grade is between G to A. The general grade is C. However, grade F and G are developed in small patches.

Range of proximate analysis & grade of Local Band L1, Batura OC block, Sohagpur Coalfield.

Parameters	Range		
	Bcs Sample	**I_{10} Sample**	**I_{100} Sample**
Full Seam			
Boreholes considered :	99	99	99
Thickness (m)/Range (m) Mean STD.DEV	0.20 – 3.00 (CSBT-58) (CSBT-186) 0.78 0.47	0.20 – 3.00 (CSBT-58) (CSBT-186) 0.78 0.47	0.20 – 3.00 (CSBT-58) (CSBT-186) 0.78 0.48
Proximate analysis in 60% RH & 40^0 C			
M% Mean STD.Dev..	1.1 - 4.0 (CSBT-341) (CSBT-106) 2..2 0.5	1.1 - 4.0 (CSBT-341) (CSBT-106) 2.2 0.5	1.1 - 4.0 (CSBT-341) (CSBT-106) 2.2 0.5
Ash% Mean STD.DEV	10.1 – 46.8 (CSBT-108) (CSBT-104) 24.1 8.3	10.1 – 46.8 (CSBT-108) (CSBT-104) 24.1 8.3	10.1 – 46.8 (CSBT-108) (CSBT-104) 24.1 8.3
VM% Mean STD.DEV	6.6 - 30.5 (CSBT-104) (CSBT-126) 22.1 4.8	6.6 - 30.5 (CSBT-104) (CSBT-126) 22.1 4.8	6.6 - 30.5 (CSBT-104) (CSBT-126) 22.1 4.8
FC% Mean STD.DEV	39.2 -63.6 (CSBT-291) (CSBT-341) 50.6 7.1	39.2 -63.6 (CSBT-291) (CSBT-341) 50.6 7.1	39.2 -63.6 (CSBT-291) (CSBT-341) 50.6 7.1

Parameters	Range		
	Bcs Sample	**I_{10} Sample**	**I_{100} Sample**
UHV (Kcal/kg) Mean STD.DEV	2096 - 7143 (CSBT-104) (CSBT-108) 5257 1126	2096 - 7143 (CSBT-104) (CSBT-108) 5257 1126	2096 - 7143 (CSBT-104) (CSBT-108) 5257 1126
Grade Avg. Grade	G-A C	G-A C	G-A C

Although the thickness of the seam in major part of the area is less than 0.90m but more than 0.50m, it is considered for reserve calculation of the seam for grade A to C, which is also the general grade of the seam.

K. Gross Calorific Value((K.cal./kg.)

Range of Gross CV, Seam-L1, Batura OC block, Sohagpur Coalfield.

Boreholes considered	Thickness Range (m)	Range of Gross CV (K.cal/kg) on dmmf basis		
		Bcs	**I_{10}**	**I_{100}**
99	0.20 – 3.00	4000 - 7310 (CSBT-104) (CSBT-148)	4000 - 7310 (CSBT-104) (CSBT-148)	4000 - 7310 (CSBT-104) (CSBT-148)

L. Hardgrove Grindability Index (HGI)

HGI of only one borehole No.CSBT-154 has been carried out by CFRI which is 66.

M. Ultimate Analysis

Range of Ultimate Analysis for Local Band L-1, Batura OC block, Sohagpur Coalfield.

Parameters	Range of content %
Ultimate Analysis on Bcs/Ex-band sample (dmmf basis)(No. of samples 4	
C%	83.15 - 86.92 (CSBT-289) (CSBT-174)
H%	4.73 - 5.49 (CSBT-117) (CSBT-181)
N%	1.45 - 1.89 (CSBT-117) (CSBT-289)
S%	0.43 - 0.77 (CSBT-174) (CSBT-289)

N. Ash Fusion Temperature Range

Range of Ultimate Analysis for Local Band L-1, Batura OC block, Sohagpur Coalfield

Borehole considered	Thickness range (m)	Ash fusion range ºC(under mildly reducing atmosphere)		
		IDT	HT	FT
2	1.20-1.58	1180->1400	1350->1400	1380-1400

4.4.5 Seam-III

A. Status of mining

The seam is not being mined anywhere in the block.

B. Details of boreholes intersection

	I. Intersections	Nos.
i)	No. of full seam intersections in boreholes	9
ii)	No. of outcrop proving boreholes with part thickness	Nil
iii)	No.of boreholes with part thickness due to faulting	Nil
iv)	No.of boreholes where seam is turned into clay	Nil
v)	No.of boreholes with part thickness due to incrop	7
	TOTAL	**16**

C. Stratigraphic Position

Seam-III is the first seam from the surface, within the Barakar Formation in the block.

D. Parting

Minimum parting with respect to Local Band L1 is 14.45m in borehole No.CSBT-78 and maximum parting is 26.67m in borehole No.CSBT-144

E. Thickness

The maximum thickness of the seam in borehole No.CSBT-210 where it has intersected is 2.68m. The minimum thickness is 0.75m in CSBT-19

F. Splitting

Seam III is combined is splitted into Top, Middle and Bottom and the splitted sections of the seams are without any dirt bands

G. Outcrop/Incrop

The seam incrops in the block.

H. Dirt Bands

Seam-III in borehole No. CSBT-19 has two non-combustible dirt bands of 0.24m thickness. However, splitted sections of the seam are of without any dirt band.

I. Proximate Analysis

The I_{10} samples show the grade variation between G to D. The UHV varies from 2000 (CSBT-90) to 4359 (CSBT-87).

Range of proximate analysis & grade of Seam III, Batura OC block, Sohagpur Coalfield.

Parameters	Range		
	Bcs Sample	**I_{10} Sample**	**I_{100} Sample**
Full Seam			
Boreholes considered :	8	8	8
Thickness (m)/Range (m) Mean STD.DEV	0.75 - 2.68 (CSBT-90) (CSBT-210) 1.73 0.82	0.75 - 2.68 (CSBT-90) (CSBT-210)	0.75 - 2.68 (CSBT-90) (CSBT-210)
Proximate analysis in 60% RH & 40^0 C			
M% Mean STD.Dev..	2.0 - 4.2 (CSBT-90) (CSBT-87) 2.7 0.6	2.0 - 4.2 (CSBT-90) (CSBT-87) 2.7 0.6	1.5 - 4.2 (CSBT-213) (CSBT-87) 2.5 0.8
Ash% Mean STD.DEV	28.7 - 48.0 (CSBT-87) (CSBT-90 37.1 5.9	28.7 - 48.0 (CSBT-87) (CSBT-90 37.1 5.9	28.7 – 62.6 (CSBT-87) (CSBT-213) 42.5 11.0
VM% Mean STD.DEV	6.3 - 22.8 (CSBT-90) (CSBT-87) 14.5 11.7	6.3 - 22.8 (CSBT-90) (CSBT-87) 14.5 11.7	6.3 - 22.8 (CSBT-90) (CSBT-87) 14.5 11.7
FC% Mean STD.DEV	43.7 - 44.3 (CSBT-90) (CSBT-87) 44.0 0.4	43.7 - 57.6 (CSBT-90) (CSBT-8) 48.5 7.9	43.7 - 44.3 (CSBT-90) (CSBT-87) 44.0 0.4
UHV (Kcal/kg) Mean STD.DEV	2000 - 4359 (CSBT-90) (CSBT-87) 3405 744	2000 - 4359 (CSBT-90) (CSBT-87)) 3405 744	1475 - 4359 (CSBT-8) (CSBT-87) 3063 1021
Grade Avg. Grade	G-D F	G-D F	G-D F

J. Gross Calorific Value((K.cal./kg.)

Range of Gross CV, Seam-III, Batura OC block, Sohagpur Coalfield.

Boreholes considered	Thickness Range (m)	Range of Gross CV (K.cal/kg) on dmmf basis		
		Bcs	I_{10}	I_{100}
8	0.75 - 2.68	3830 - 5400 (CSBT-90) (CSBT-87)	3830 - 5400 (CSBT-90) (CSBT-87)	2450 - 5400 (CSBT-213) (CSBT-87)

K. Hardgrove Grindability Index (HGI)

The HGI of Seam-III has been carried out by CFRI for borehole Nos.CSBT-87 and 106. The HGI for both the boreholes is 46.

L. Ash Analysis

B.H.No.	Nature of sample	Constituents %								
		SiO_2	Fe_2O_3	Al_2O_3	TiO_2	CaO	MgO	P_2O_5	SO_3	Undetermined & Alkalies (by difference)
CSBT-8	I_{100}	65.14	5.00	19.67	2.50	2.80	1.93	0.08	0.08	2.72
CSBT-72	I_{100}	63.18	7.28	21.00	2.50	2.68	2.17	0.12	0.07	0.92

4.4.6 SEAM III (TOP)

This is the top most split of Seam III and is intersected in only 17 Nos. of boreholes and out of which only 8 No. of boreholes is having a thickness of more than 0.50m with a maximum thickness of 0.85 m in borehole CSBT-187

	I. Intersections	Nos.
i)	No. of full seam intersections in boreholes	17
ii)	No.of boreholes with part thickness due to incrop	1
	TOTAL	18

A. Thickness

The maximum thickness of the seam is 0.85m intersected in borehole No.CSBT-187 and minimum thickness of the seam is 0.11m in CSBT-104. This unworkable seam is located in three patches of the block i.e. in the north east patch, eastern patch and northwestern patch of the block. The grade of this unworkable seam varies from D to G. As the seam is totally unworkable, it is not considered for reserve calculation.

4.4.7 SEAM III MIDDLE

This is the middle portion of the split of Seam III. It is intersected in 10 No. of boreholes. The maximum thickness of the seam is 1.41m in CSBT-62 and the minimum

thickness is of 0.30m in CSBT-54. This seam is unworkable as it is developed in a very small patch in the eastern part of the block of less than 0.90m in thickness. The grade of this unworkable seam is C-F. Hence this seam is not considered for reserve calculation.

4.4.8 SEAM III BOTTOM

A. Status of Mining

The seam is not being mined anywhere in the block.

B. Details of borehole intersections

	I. Intersections	**Nos.**
i)	No. of full seam intersections in boreholes	43
ii)	No. of outcrop proving boreholes with part thickness	NIL
iii)	No.of boreholes with part thickness due to faulting	NIL
iv)	No.of boreholes where seam is turned into clay	NIL
v)	No.of boreholes with part thickness due to incrop	4
	TOTAL	47

C. Stratigraphic position

It is the bottom most split of Seam III. It is developed in three patches of the block i.e. in western part of the block a small patch in the eastern part and also in the north eastern part of the block.

D. Parting

Minimum parting with respect to local band L-1 is 17.37m of borehole No.CSBT-213 (only borehole in the block where all the three splits are combined) in the eastern part of the block and maximum parting is 31.20m in CSBT-332 in the western part of the block.

E. Thickness

The maximum thickness of the seam in borehole No.CSBT-332 is 1.10m in the western part of the block and the minimum thickness is 0.10m in borehole Nos.CSBT-104, 211 and 251 in the south western part of the developed patch of Seam III bottom. A

very small patch of thickness greater than 0.50m is developed in the western part of the block and also in the eastern part of the block. Grade of coal is C-G. Average grade is

F. Hence reserve estimation is done for Seam III Bottom for the small patch of thickness more than 0.50m irrespective of grade upto G as desired by mine planners.

F. Outcrop/Incrop

The incrop portion is very clearly shown in the floor contour plan for Seam III Bottom.

G. Dirt Bands

Seam-III bottom is without any dirt band.

H. Proximate Analysis

The isochore lines drawn on I_{10} samples shows the grade variation between G to C. The UHV varies from 1682 (CSBT-332) to 5252 (CSBT-129). The seam folio plan is given in Fig.12.

Range of proximate analysis & grade of Seam III(Bot.), Batura oc, Sohagpur Coalfield.

Parameters	Range		
	Bcs Sample	I_{10} Sample	I_{100} Sample
Full Seam			
Boreholes considered :	20	20	20
Thickness (m)/Range (m) Mean STD.DEV	0.15-1.79 (CSBT-107,235&246)(CSBT-106) 0.76 0.42	0.15-1.79 (CSBT-107,235&246)(CSBT-106) 0.76 0.42	0.15-1.79 (CSBT-107,235&246)(CSBT-106) 0.76 0.42
Proximate analysis in 60% RH & 40^0 C			
M% Mean STD.Dev..	2.1 –3.7 (CSBT-350) (CSBT-106) 2.9 0.5	2.1 –3.7 (CSBT-350) (CSBT-106) 2.9 0.5	2.1 –3.7 (CSBT-350) (CSBT-106) 2.9 0.5
Ash% Mean STD.DEV	22.8-49.8 (CSBT-129) (CSBT-332) 35.2 8.9	22.8-49.8 (CSBT-129) (CSBT-332) 35.2 8.9	22.8-49.8 (CSBT-129) (CSBT-332) 35.2 8.9
VM% Mean STD.DEV	13.8 –21.3 (CSBT-332) (CSBT-106) 18.4 3.3	13.8 –21.3 (CSBT-332) (CSBT-106) 18.4 3.3	13.8 –21.3 (CSBT-332) (CSBT-106) 18.4 3.3
FC% Mean STD.DEV	33.9-51.0 (CSBT-332) (CSBT-350) 43.4 7.1	33.9-51.0 (CSBT-332) (CSBT-350) 43.4 7.1	33.9-51.0 (CSBT-332) (CSBT-350) 43.4 7.1
UHV (Kcal/kg) Mean STD.DEV	1682 - 5252 (CSBT-332) (CSBT-129) 3637 1173	1682 - 5252 (CSBT-332) (CSBT-129) 3637 1173	1682 - 5252 (CSBT-332) (CSBT-129) 3637 1173
Grade Avg. Grade	G-C E	G-C E	G-C E

I. Gross Calorific Value((K.cal./kg.)

Range of Gross CV, Seam-III(Bot.), Batura OC block, Sohagpur Coalfield.

Boreholes considered	Thickness Range (m)	Range of Gross CV (K.cal/kg) on dmmf basis		
		Bcs	I_{10}	I_{100}
8	0.15 – 1.79	3592-5884 (CSBT-204) (CSBT-129)	3592-5884 (CSBT-204) (CSBT-129)	3592-5884 (CSBT-204) (CSBT-129)

4.5 Geo-technical and hydro-geological information

4.5.1 Introduction

Drill core samples encountered in borehole no CSBT-132 of Batura OC Block (adjacent Block of Batura Exten.), Sohagpur Coalfield, were received by Mining Laboratory of CMPDI for determination of various physico-mechanical properties. The cores received were from surface to a depth of 59m and diameter of the cores was about 47 mm.

4.5.2 Experimental Design & Tests Undertaken

Depending upon the availability of suitable length of core samples for preparation of test specimen, most of the lithological units of the borehole have been tested for the following properties.

1) Bulk density
2) Protodyakonov strength index (PSI)
3) Unconfined compressive strength
4) Tensile strength
5) Shear strength
6) Young's modulus
7) Triaxial strength
   a) Angle of internal friction
   b) Cohesion

Test results in respect of bulk density, protodyakonov strength index, unconfined compressive strength, tensile strength, shear strength and Triaxial test results are given in tables below 2 Mohr's diagram drawn from triaxial test results are also enclosed for reference.

Test Results on Physico-Mechanical Properties of Drill Core Samples of Borehole No. CSBT-132 of Batura OC Block(adjacent block of Batura Extn.), Sohagpur Coalfield.

Sample No.	Rock type	Depth (m)	Density (gm/cc)	P S I	Compresive strength (MPa)	Tensile strength (MPa)	Shear strength (MPa)	Young's Modulus (GPa)
					Mean, std. deviation & no. of specimen tested			
1	Soil sandy	0.00-3.60						
2	CGD SST	3.60-5.00	2.24		15.67 11.46 2	1.94 0.63 5	2.58 0.46 3	3.57 - 1
3	--Do--	5.00-8.10	2.24		14.48 6.40 5	1.67 0.47 5	2.70 0.81 5	3.19 0.70 2
4	SH	8.10-8.48	2.34	2.63				
5	COAL	8.48-9.38	1.56	3.01				
6	Shally COAL	9.38-9.44.	1.55					
7	COAL	9.44-9.55	1.56					
8	Carb SH	9.55-9.94	2.33	3.60.				
9	COAL	9.94-10.86	1.45	2.35				
10	Sandy SH	10.86-11.00	2.47					
11	FGD SST	11.00-11.73	2.47	2.26				
12	MGD SST	11.73-13.50	2.35		18.99 5.95 5	5.05 0.84 5	4.70 - 1	3.05 1.11 2
13	Sandy SH	13.50-13.76	2.44			8.04 0.23 3		
14	MGD SST	13.76-14.00	2.39		22.43 - 1	4.58 0.42 3		
15	CGD SST	14.00-15.92	2.23		20.54 2.90 5	2.82 0.66 5	4.52 0.77 4	2.24 0.49 2
16	MGD SST	15.92-16.79	2.31		27.33 3.67 5	4.29 0.52 5		2.94 0.33 3
1	2	3	4	5	6	7	8	9

Sample No.	Rock type	Depth (m)	Density (gm/cc)	P S I	Compresive strength (MPa)	Tensile strength (MPa)	Shear strength (MPa)	Young's Modulus (GPa)
					Mean, std. deviation & no. of specimen tested			
17	CGD SST	16.79-20.00	2.17		18.90 5.74 5	3.63 0.94 5	5.42 0.53 5	4.98 0.79 2
18	CGD SST	20.00-23.00	2.23		20.32 5.47 5	2.46 0.45 5	4.75 0.66 5	3.08 0.62 3
19	MGD SST	23.00-25.14	2.25		22.75 6.05 5	2.98 0.43 5	5.13 1.11 5	4.67 0.65 3
20	CGD SST	25.14-26.00	2.18		15.75 1.27 4	2.43 0.39 5		2.43 0.45 3
21	MGD SST	26.00-27.70	2.25		24.07 4.35 5	3.08 0.29 5	4.60 0.89 5	4.25 0.36 2
22	CGD SST	27.70-29.00	2.20		21.09 5.86 5	3.10 0.59 5	6.09 1.26 2	3.52 0.93 2
23	CGD SST	29.00-32.00	2.15		12.55 2.18 5	1.76 0.20 5	4.10 0.74 5	1.87 0.16 2
24	-DO-	32.00-32.96	2.23		9.61 1.18 5	2.06 0.20 5		1.77 1.08 2
25	FGD SST	32.96-33.41	2.25		21.69 1.39 3	3.35 0.25 4		3.04 0.30 2
26	MGD SST	33.41-33.56	2.23			2.75 0.10 4		
27	CGD SST	33.56-34.05	2.38		13.91 0.83 3	2.34 0.60 2		1.48 0.68 2
28	COAL	34.05-34.72	1.30	1.16				
29	SH	34.72-35.00	2.30		53.05 - 1	7.05 - 1		
30	Sandy SH	35.00-35.42	2.34		30.58 - 1	6.12 0.71 5		
31	Shally COAL	35.42-35.69	1.35	1.70				

Sample No.	Rock type	Depth (m)	Density (gm/cc)	P S I	Compresive strength (MPa)	Tensile strength (MPa)	Shear strength (MPa)	Young's Modulus (GPa)
					Mean, std. deviation & no. of specimen tested			
32	SH	35.69-35.94	2.26		34.15 - 1	4.44 - 1		
	2	3	4	5	6	7	8	9
33	Shally COAL	35.94-35.99	1.47					
34	COAL	35.99-36.87	1.45	1.82				
35	Shally COAL	36.87-37.21	1.82	2.11				
36	COAL	37.21-37.43	1.35	1.92				
37	Shally SST	37.43-37.50	2.37					
38	Shally COAL	37.50-37.80	1.83					
39	COAL	37.80-38.35	1.33					
40	Sandy SH	38.35-38.51	2.50					
41	MGD SST	38.51-40.48	2.21		25.08 4.89 5	3.27 0.32 5	5.99 0.79 5	4.46 0.94 2
42	CGD SST	40.48-41.00	2.19		13.71 3.23 2	1.97 0.17 5		2.31 0.52 2
43	MGD to CGD SST	41.00-42.90	2.32		21.89 4.15 5	3.52 0.13 5	3.84 0.51 4	4.60 0.23 2
44	CGD SST	42.90-44.00	2.22		15.38 4.17 3	1.97 0.38 5		3.21 0.53 2
45	CGD SST	44.00-47.00	2.16		17.90 2.44 5	1.92 0.21 5	4.05 0.84 5	2.69 1.04 2
46	CGD SST	47.00-49.88	2.18		13.08 3.22 5	2.10 0.31 5	3.35 0.92 5	2.13 0.92 3
47	COAL	49.88-50.08	1.20					
48	SH	50.08-50.16	2.32					
49	COAL	50.16-50.25	1.59					

Sample No.	Rock type	Depth (m)	Density (gm/cc)	P S I	Compresive strength (MPa)	Tensile strength (MPa)	Shear strength (MPa)	Young's Modulus (GPa)
					Mean, std. deviation & no. of specimen tested			
50	Carb SH	50.25-50.38	1.27					
51	Sandy SH	50.38-50.83	2.41			5.01 2.41 3		
1	2	3	4	5	6	7	8	9
52	MGD SST	50.83-50.97	2.29		14.37 - 1			1.28 - 1
53	Sandy SH	50.97-51.18	2.33			5.55 1.51 2		
54	MGD SST	51.18-51.44	2.22		26.59 - 1	2.68 0.12 2		
55	Sandy SH	51.44-51.73	2.35		29.86 8.38 2			3.06 0.61 2
56	MGD SST	51.73-51.85	2.29					
57	Sandy SH	51.85-52.26	2.33	2.75				
58	MGD SST	52.26-52.43	2.22					
59	Sandy SH	52.43-52.66	2.27		25.83 - 1			2.59 - 1
60	MGD SST	52.66-52.80	2.22		16.44 - 1			
61	Sandy SH	52.80-53.00	2.12		16.17 - 1	5.57 0.74 2		
62	Carb SH	53.00-53.25	1.51					
63	Shally COAL	53.25-53.55	1.13					
64	COAL	53.55-53.69	1.27					
65	SH	53.69-54.08	1.54	1.95		3.40 - 1		
66	Shally COAL	54.08-54.18	1.26					

Sample No.	Rock type	Depth (m)	Density (gm/cc)	P S I	Compresive strength (MPa)	Tensile strength (MPa)	Shear strength (MPa)	Young's Modulus (GPa)
					Mean, std. deviation & no. of specimen tested			
67	COAL	54.18-55.31	1.25	1.36				
68	SH	55.31-56.33	2.46	2.32	35.70 3.27 3	5.48 0.31 2		5.17 0.59 2
69	COAL	56.33-56.63	1.60					
70	Sandy SH	56.63-57.23	2.48		45.47 8.82 3	5.63 0.87 3		5.12 0.47 2
71	FGD SST	57.23-59.00	2.26		21.88 2.30 5	2.07 0.27 5	3.93 0.53 4	4.21 0.48 2

Triaxial Test Results on Drill Core Samples of Borehole No. CSBT-132, Batura OC Block(Adjacent block of Extension) , Sohagpur Coalfield

Sample No	Rock Type	Depth (m)	Compressive Strength (Mpa) Mean, Std Deviation & No. of specimens tested			Angle of internal friction "f" (degree)	Cohesion "C" (MPa)
			At 0 MPa Confining	At 5 MPa Confining	At 10 MPa Confining		
2	CGD SST	3.60-5.00	15.67 11.46 2	41.72 3.00 2	55.58 7.47 2	36	3
3	CGD SST	5.00-8.10	14.48 6.40 5	36.33 10.21 2	48.50 8.51 2	32	3
12	MGD SST	11.73-13.50	18.99 5.95 5	50.51 0.30 2	57.92 6.04 2	38	3.4
15	CGD SST	14.00-15.92	20.54 2.90 5	43.09 3.63 2	53.93 8.38 2	30.5	4
17	CGD SST	16.79-20.00	18.90 5.74 5	49.48 15.87 2	57.24 6.05 2	41.5	3.7
18	CGD SST	20.00-23.00	20.32 5.47 5	42.92 1.17 2	51.90 1.23 2	33.5	4.1
19	MGD SST	23.00-25.14	22.75 6.05 5	56.06 2.34 2	75.18 4.92 2	30	4

Sample No	Rock Type	Depth (m)	Compressive Strength (Mpa) Mean, Std Deviation & No. of specimens tested			Angle of internal friction "f" (degree)	Cohesion "C" (MPa)
			At 0 MPa Confining	At 5 MPa Confining	At 10 MPa Confining		
21	MGD SST	26.00-27.70	24.07 4.35 5	43.84 2.87 2	56.02 1.01 2	30.5	5
22	CGD SST	27.70-29.00	21.09 5.86 5	44.12 1.26 2	55.63 2.62 2	32.5	4
23	CGD SST	29.00-32.00	12.55 2.18 5	41.17 2.12 2	57.51 4.65 2	27.5	2.4
41	MGD SST	38.51-40.48	25.08 4.89 5	55.35 0.96 2	78.44 1.05 2	36.5	4.7
1	2	3	4	5	6	7	8
43	MGD to CGD SST	41.00-42.90	21.89 4.15 5	56.32 1.74 2	72.04 2.04 2	39	3
44	CGD SST	42.90-44.00	15.38 4.17 3	39.47 - 1	55.92 - 1	29	3.5
45	CGD SST	44.00-47.00	17.90 2.44 5	47.67 1.51 2	59.77 1.06 2	37	3
46	CGD SST	47.00-49.88	13.08 3.22 5	46.07 1.58 2	60.87 1.59 2	38.5	2.5
71	FGD SST	57.23-59.00	21.88 2.29 5	48.54 9.09 2	65.70 5.64 2	29	4.4

4.5.3 Hydro-geological details:

Hydro-geological studies have not been done in the block.

4.6 GEOLOGICAL RESERVES

4.6.1 BRIEF METHODOLOGY ADOPTED FOR RESERVE ESTIMATION

Estimation of quarriable reserves has been made on the following considerations:

- The thickness of the seams considered for quarriable reserves includes all combustible and non-combustible bands upto 0.10m in thickness.
- All bands of more than 0.10m thickness irrespective of their lithology have been excluded from seam thickness for arriving at effective seam thickness in the case of quarriable proposition.
- All the unworkable coal bands/coal sections occurring above/below the delineated roof/floor of the seam sections and also those occurring within the seam partings have been added to the overburden.
- The cumulative thickness of all bands excluded from the seam thickness has been added to the seam burden.
- For estimation of quarriable reserves, thickness ranges of 0.50 to 0.90m, 0.90 to 1.20m, 1.20 to 1.50m, 1.50 to 2.00m, 2.00 to 2.5m and 2.5m to 3.00m and so on, have been considered.
- The minimum thickness considered for reserve estimation has been taken as 0.50m as desired by Mine Planners, as well as the possibility of exploiting thinner coal sections by introduction of advanced technology in opencast mining.

4.6.1.1 CATEGORISATION OF RESERVES

The entire reserves of Seam II, III & Local Band L1 have been placed under 'Proved' category as per Indian Standard Procedure.

To obtain net in-situ geological reserves, a total deduction of 10% has been made from the estimated gross reserves to compensate for loss on account of faults and other unforeseen geological conditions.

4.6.1.2 METHODOLOGY FOR OVERBURDEN ESTIMATION

The following procedure has been adopted for the estimation of overburden in Batura West Block.

- A total excavation (iso depth) plan has been prepared at 5m interval after intersecting the surface contour with the floor contour of Seam II to arrive at the total depth of excavation. Isochores on I10 basis of the total coal of the seams considered for opencast mining viz. Seams III,II and L1 were intersected with each other to arrive at the thickness of the total coal present. Isochores of the total coal, thus drawn, in the respective area of occurrence of the seam(s), were intersected with the iso-depth lines to arrive at the thickness and volume of total overburden in the area. Different coal:OB cut-off ratio lines were accordingly arrived at. The iso-depth lines at 5m interval and the coal to OB cut-off ratio lines were transferred onto the seam folio plans.
- The volume of overburden has been estimated by the volumetric method, i.e. **Volume (mm^3) = Area (sq. km.) x thickness (m)** considered.
- The volume of overburden has been estimated, depth wise and Coal : OB cut-off ratio-wise.
- To arrive at stripping ratio, the total volume of overburden within the block area sectors has been divided by the corresponding coal reserves.

4.6.1.3 Net GEOLOGICAL RESERVES WITHIN THE BLOCK AREA

Summarised seam-wise and grade-wise reserves

(Reserves in million tonnes)

Coal Seam	GRADE							Total
	A	B	C	D	E	F	G	
Seam-III (Bot.)	-	-	0.0106	0.027	0.0274	0.0629	0.1756	0.3035
Seam-III				0.1573	1.0461	0.0115		1.2148
Seam-L1	0.7921	1.2685	1.4967	1.2637	0.4733	0.197	0.0382	5.5295
Seam-II	0.0228	4.4597	15.9215	9.7526	2.9408	0.2689	0.0213	33.3876
Seam- L2	0.4023	0.8791	1.0676	0.3869	0.0925	-	-	2.8284
Seam-I	0.6969	6.259	15.1592	6.2656	1.6113	0.2399	0.0383	30.2702
TOTAL	1.9141	12.8663	33.6556	17.8531	6.1914	0.7802	0.2734	73.534

4.6.4 GEOLOGICAL LOSSES / SURFACE CONSTRAINTS

4.6.4.1 COAL RESERVES UNDER SURFACE CONSTRAINTS

The distribution of opencast reserves in the block under various surface constraints is given in table.

Individual Seam-wise Coal Reserves under Surface Constraints
(Reserves in million tonnes)

COAL SEAM	GRADE							TOTAL
	A	B	C	D	E	F	G	
Seam-III(Bot.)								
BLOCKED AREA								
(i)ROAD & ITS BARRIER					0.0028	0.0013		0.0041
(ii)NALA & ITS BARRIER						0.0001	0.1294	0.1295
(iii)VILLAGE & ITS BARRIER			0.0072	0.026	0.0244	0.0121		0.0697
TOTAL BLOCKED(i+ii+iii)			**0.0072**	**0.026**	**0.0272**	**0.0135**	**0.1294**	**0.2033**
Seam-III								
BLOCKED AREA								
VILLAGE & ITS BARRIER				0.0124	0.4108	0.0032		0.4264
TOTAL BLOCKED				**0.0124**	**0.4108**	**0.0032**		**0.4264**
Local Band L 1								
BLOCKED AREA								
(i)HTL & ITS BARRIER			0.0018	0.0166				0.0184
(ii)FOREST	0.0565	0.0721	0.0151					0.1437
(iii)ROAD & ITS BARRIER	0.0001	0.003	0.0127					0.0158
(iv)NALA & ITS BARRIER	0.0001	0.0704	0.2567	0.2383	0.1369	0.035		0.7374
(v)VILLAGE & ITS BARRIER	0.0232	0.2213	0.1099	0.0168				0.3712
TOTAL BLOCKED(i+ii+iii+iv+v)	**0.0799**	**0.3668**	**0.3962**	**0.2717**	**0.1369**	**0.035**		**1.2865**
Seam-II								
BLOCKED AREA								
(i)HTL & ITS BARRIER		0.0025	0.196					0.1985
(ii) FOREST BARRIER		0.2815	0.8423	0.0196	0.0013			1.1447
(iii)ROAD & ITS BARRIER	0.0114	0.1047	0.3241	0.18				0.6202
(iv)NALA & ITS BARRIER	0.0021	0.0477	0.5671	1.079	0.7649	0.0335		2.4943
(v) VILLAGE & ITS BARRIER		0.3831	0.9473	0.4067	0.2055	0.0007		1.9433
TOTAL BLOCKED(i+ii+iii+iv+v)	**0.0135**	**0.8195**	**2.8768**	**1.6853**	**0.9717**	**0.0342**		**6.401**
Seam-L 2								
BLOCKED AREA								
(i)ROAD & ITS BARRIER	0.0034	0.0114	0.0021					0.0169
(ii) VILLAGE & ITS BARRIER	0.0014	0.0015	0.0601	0.0525				0.1155
TOTAL BLOCKED(i+ii)	**0.0048**	**0.0129**	**0.0622**	**0.0525**				**0.1324**
Seam-I								
BLOCKED AREA								
(i)HTL & ITS BARRIER			0.0447	0.0437				0.0883
(ii) FOREST BARRIER		0.4054	0.4613	0.308	0.02	0.0214	0.0105	1.2266
(iii)ROAD & ITS BARRIER	0.0002	0.2079	0.4161	0.0948	0.0113			0.7303

COAL SEAM	GRADE							TOTAL
	A	B	C	D	E	F	G	
(iv)NALA & ITS BARRIER	0.1601	0.8206	0.3344	0.3622	0.1141	0.0038		1.7952
(v) VILLAGE & ITS BARRIER		0.2024	1.0133	0.6952	0.1786	0.0648	0.0147	2.169
TOTAL BLOCKED(i+ii+iii+iv+v)	**0.1603**	**1.6363**	**2.2698**	**1.5039**	**0.324**	**0.09**	**0.0252**	**6.0094**

Total Coal Reserves under Surface Constraints

(Reserves in million tonnes)

PARTICULARS	GRADE							TOTAL
	A	B	C	D	E	F	G	
(i)HTL & ITS BARRIER		0.0025	0.2425	0.0603				0.3052
(ii) FOREST BARRIER	0.0565	0.759	1.3187	0.3276	0.0213	0.0214	0.0105	2.515
(iii)ROAD & ITS BARRIER	0.0151	0.327	0.755	0.2748	0.0141	0.0013		1.3873
(iv)NALA & ITS BARRIER	0.1623	0.9387	1.1582	1.6795	1.0159	0.0724	0.1294	5.1564
(v) VILLAGE & ITS BARRIER	0.0246	0.8083	2.1378	1.2096	0.8193	0.0808	0.0147	5.0951
TOTAL BLOCKED (i+ii+iii+iv+v)	0.2585	2.8355	5.6122	3.5518	1.8706	0.1759	0.1546	14.459

4.7 RECOMMENDATION

4.7.1. Drilling of a few boreholes above fault F2-F2 in the up thrown block area are recommended for further studies to confirm the availability of Seams III, L1 & II.

Few boreholes may be taken up for structural proving and to confirm the structural interpretation of the block area.

Though the incrop has been proved on the basis of boreholes drilled, few boreholes may be taken up, if suggested by the Planners in view of the variable/rolling nature of the dips.

4.7.2 The chemical analytical results of the workable coal seams III,II indicate to posses B4 group and Local Band (L1) B5 group Long flame characteristics respectively.

Since the coal from this block contain very high Liptinite (>10%) in the range 11.40% to 17.10% and reflectance ranges from 0.45% to 0.53% these coals are considered to be most suitable for coal to oil liquefaction process.

****

CHAPTER-V

MINE BOUNDARY, RESERVES AND MINE LIFE

5.1 INTRODUCTION

Mine boundary has been delineated on the basis of block boundary of Geological Reports of Batura OC &Batura Ext. The Geological Reports were prepared by CMPDI and submitted in March 2007 & March 2008 respectively.

5.2 PIT FORMULATION STRATEGY

The quarry has been formed on the incrop of Seam I. Beyond incrop zone of Seam-I is devoid of coal. It is evident from GSI borehole no. SBT-5.The quarry has been planned to start mining from bottom most seam present for mining i.e. Seam – I.

5.3 MINE BOUNDARIES

Reasons for selecting/omitting seams/sections.

Horizontal Mine Boundary (with justifications)

East - Boundary line of the hill along with the forest boundary line at the top & bottom portion has incrop of Seam-I (Beyond which no borehole has been done because of hills running north to south).

West- A straight line of N-S direction joining bh. CSBT-275 & 294 (beyond which SR increases to more than 20).

North-Boundary of Dolerite Dyke-I (beyond which is down throw fault Bamhanichilpa of 400 m). Borehole No. SBT-9 of GSI shows first occurrence of coal at a depth of 700 m approx.)

South- Incrop of seam I (There is no coal on further rise side as evident in GSI borehole no. - SBT-5).

Vertical Mine Boundary .

Bottom most seam considered for mining -Seam –I is the bottom most seam of the Region and Block.

5.4 MINEABLE RESERVES

10% geological and 10% mining losses are considered for reserves estimation.

Seam wise details of Mineable Reserves is as shown below:-

Name of seam	Thickness variation 'm'	Mineable Reserves, Mt
III	0.75 – 2.45	0.99
L-1	0.35 – 0.60	1.57
II	2.00 – 2.30	33.67
L2	0.50 – 0.75	2.07
I	1.35 – 1.75	27.20
Total		**65.50**

5.4.1 Sector & section wise mineable reserves

The calendar programme has been drawn by dividing the whole mine into **twenty sectors** .

5.4.2 Mineable Reserves

Seamwise –Sector wise details of Mineable reserves in Mt and OB in Mm^3 is as shown below:-

	OB						COAL					
	TOP OB	**III-L1/II**	**L1-II**	**II-L2/I**	**II/L2-I**	**TOTAL**	**III**	**L1**	**II**	**L2**	**I**	TOTAL
SEC-1	7.38					7.38					0.23	0.23
SEC-2	11.38				4.41	15.79			0.64		0.38	1.02
SEC-3	13.01				12.83	25.84			1.95		0.63	2.57
SEC-4	19.28	0.87			15.49	35.64	0.04		2.52		0.82	3.38
SEC-5	21.22	3.74			17.73	42.69	0.25		2.59		1.30	4.14
SEC-6	20.42	8.47	4.74	3.77	8.72	46.11	0.30	0.04	2.38	0.01	1.89	4.63
SEC-7	17.57	9.91	5.94	5.02	7.69	46.13	0.24	0.20	2.51	0.10	2.04	5.09
SEC-8	18.89	7.34	5.02	7.52	6.72	45.49	0.13	0.25	2.64	0.16	1.99	5.18
SEC-9	21.19	6.98	4.18	8.96	5.79	47.09	0.03	0.25	2.59	0.30	2.02	5.19
SEC-10	21.76		8.13	8.86	6.30	45.05		0.18	2.36	0.15	2.09	4.77
SEC-11	18.65		7.67	8.70	6.27	41.30		0.21	2.18	0.17	2.23	4.78
SEC-12	17.81		6.63	9.07	5.83	39.34		0.08	2.15	0.36	2.20	4.79
SEC-13	17.02		5.04	7.62	6.62	36.30		0.03	2.05	0.35	2.20	4.63
SEC-14	17.28		2.70	4.45	7.03	31.46		0.16	1.89	0.15	1.84	4.04
SEC-15	18.22		3.65	4.40	5.33	31.60		0.08	1.72	0.15	1.48	3.43
SEC-16	15.89		6.70	4.36	5.23	32.17		0.06	1.50	0.18	1.31	3.05
SEC-17	10.55		6.02	3.22	5.04	24.83		0.03	0.92	0.01	1.08	2.03
SEC-18	7.53				10.83	18.36			0.52		0.79	1.32
SEC-19	5.16				5.82	10.98			0.40		0.52	0.92
SEC-20	0.95				1.56	2.51			0.13		0.16	0.29
	301.17	**37.31**	**66.42**	**75.95**	**145.22**	**626.07**	**0.99**	**1.57**	**33.67**	**2.07**	**27.20**	**65.50**

5.5 TARGET OUTPUT & MINE LIFE

The mine is proposed for nominal production 4.00 Mty and peak production of 5.60 Mty is considered as 1.40 times more than normal production.

Zero Date

The zero date will be the date of land acquisition (physical possession), PR and EMP approval and other necessary clearance whichever is later.

In case Batura OC(2.0Mty) production starts before approval of PR for Rampur Batura OC(4.0Mty), zero date will be the date of approval of Rampur Batura OC(4.0Mty).

Mine Life

The mine life for nominal production is 20 years. The break-up is as under:

- Construction period - 1 year
- Production build-up period - 4 years
- Production period - 14 years
- Tapering period - 1 year
- Total period - 20 years

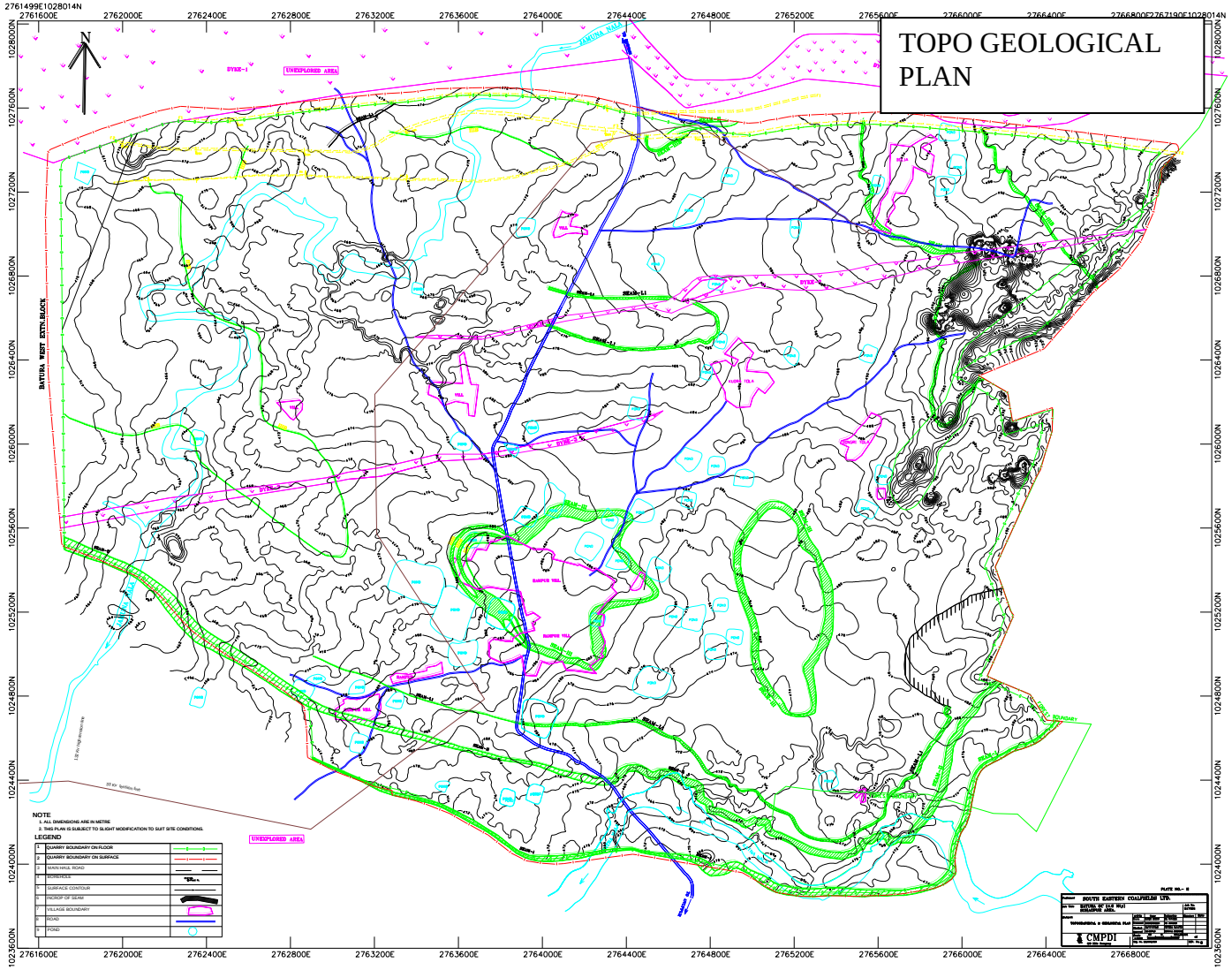
5.6 FUTURE EXPANSION POTENTIAL

There is no scope of further expansion of the project.

5.7 INCREMENTAL MINEABLE RESERVES AND INCREMENTAL STRIPPING RATIOS:-

Seam wise reserves, TOP OB& OB of inseam parting and stripping ratios of the quarriable area has been as tabulated below:-

Name of seam	OB (cum)	Thickness (m)	Coal (Tonnes)	Thick-ness (m)	Incremental Stripping Ratio	Accum SR	Insitu reserve		Reserve with losses		Stripping Ratio
							OB(mm^3)	COAL(Mt)	OB(mm^3)	COAL(Mt)	
III	300833664	20.3	1241975	1.44	242.2	242.2	300.83	1.24	300.96	0.99	**299.12**
L1	56392306	5.9	1930286	1.2	29.2	112.6	56.39	1.93	56.53	1.57	**139.11**
II	64262982	4.6	41572718	2.12	1.5	9.4	64.26	41.57	67.09	33.67	**11.71**
L2	88409453	12.3	2562856	1.13	34.5	10.8	88.41	2.56	88.58	2.07	**13.39**
I	110625125	8	33587014	1.93	3.3	7.7	110.63	33.59	112.91	27.20	**9.55**
TOTAL	620523529	51.2	80894849	7.82			**620.52**	**80.89**	626.07	65.50	**9.56**


TOPO GEOLOGICAL PLAN
N
BATURA WEST EXTN.BLOCK
UNEXPLORED AREA
NOTE
1. ALL DIMENSIONS ARE IN METRE
2. THIS PLAN IS SUBJECT TO SLIGHT MODIFICATION TO SUIT SITE CONDITIONS.
LEGEND
CMPDI

****

CHAPTER-VI

METHOD OF MINING

6.1 GENERAL

Conventional Shovel-Dumper system of mining will be followed for OB and Surface Miner for Coal.

6.2 GEO-MINING CHARACTERISTICS

6.2.1 Seam Gradient - Variation, average gradient of quarry floor

Batura OC Block - The block exhibits rolling strike. The strata including coal seams show a broad E-W to NNW-SSE trend in the Western part of the Block. However, in the Eastern part of the block the strike takes a swing to N-S and NNE-SSW direction.

The strata, in general, show northerly dip but in the Eastern part of the block the dip is towards West. In the western part of the block, the dip is towards North-East, though in the Northern and central part it exhibits North-Easterly and North-Westerly dip.

Batura Extension Block - The block exhibits variable strike & dip. The strata including coal seams show a broad E-W trend in the southern part of the Block. However, in the major Northern part of the block the strike swings to almost N-S direction.

The strata, in general, towards Southern part of the block show Northerly dip but in the major Northern part of the block the dip is towards West. The dip of the strata varies from 1^0 to 5^0

6.2.2 Geological Disturbances –

Batura OC Block – Batura OC Block has been affected by only 3 no. of faults. All the 3 no. of faults have E-W trend in the Northern part of the block.

Fault No.	Extent of Fault (Km.)	Trend	Throw		Evidences
			Direction	Amount (m)	
F1-F1	Throughout the Eastern part of the block	NNW-SSE	West	35m(approx.)	Through FRL value differences in borehole Nos. CSBT-394 & 325 and shifting of coal seam II incrop from the adjacent Batura U/G Block.
F2-F2	Throughout the north-eastern part of the block	NW-SE	South	3-10m	Through FRL value differences in borehole No.CSBT-002, 411 & 419 and CSBT-417, 413, 418, 416, 422 & 433 on the other side of the fault.

Fault No.	Extent of Fault (Km.)	Trend	Throw		Evidences
			Direction	Amount (m)	
F3-F3	In the northern part of the block	NW-SE to E-W	North	1-40m	Faulted for seam-I in BH-CSBT-321& part thickness in seam-II in BH CSBT-341, FRL value differences of boreholes CSBT-145,86,191,88,174,189,178,346,207

6.2.3 Presence of In-seam band seam-wise (numbers and thickness of each band, total band thickness)

S. No.	Seam	No. of Bands	Total Thickness
1	III	NIL	
2	L1	NIL	
3	II	1-7	0.05-0.83
4	L2	NIL	
5	I	NIL	

6.2.4 Details of sequence of coal seam and parting

Name of seam/parting	Thickness of coal/parting with range (m)
Seam-III	0.75-2.68
Parting	14.45-26.67
Seam – L1	0.20 – 3.00
Parting	0.70-13.60
Seam II	0.27-4.66
Parting	6.40-16.70
Seam – L2	0.10-1.75
Parting	0.28-5.70
Seam - I	0.33-4.04

6.3 MINE PARAMETERS

Subject	Minimum(Km)	Maximum(Km)
Dimensions of the quarry along strike (on floor)	0.91	4.91
Depth of quarry	8	80
Dip rise length (on floor) (Km)	3.40	
Final Quarry Floor area (Ha)	1471.20	
Final Quarry Surface area (Ha)	1538.86	
Mineable reserves (Mt)	65.50	
Total OB (Mcum)	626.07	
Average Stripping Ratio (cum/tonne)	9.56	

6.4 CHOICE OF TECHNOLOGY

The selection of mining method for Rampur Batura Opencast Project (4.0.Mty) has been based on the following factors :-

(i) Depth of workings has been planned upto a maximum depth of 80 m. The minimum depth of the workings is 8m.

(ii) Presence of Multiple horizons and thin seams.

(iii) The mine has to be designed for high rate of production of coal. (4.0Mt coal and 37.5 Mm^3 of OB).

(iv) The average gradient of the seams varies between 1º to 5º.

Based on the above factors, shovel dumper combination for OB removal and surface miner for coal extraction is being proposed.Coal mined by surface miner will be transported inpit by trucks/dumpers to coal receiving station, where reclaim feeder will be laid. Reclaim feeder will receive the coal and feed to main haul road belt conveyors with the help of short belt conveyor. At the surface a CHP with coal storage in bunker and rapid loading system (Load out system) with 500te overhead surge bin capacity has been provided for dispatch of coal to the consumers by rails.

6.5 EQUIPMENT SELECTION

Equipment size and reach, bucket size, break out capacity and other considerations make for even a longer list. Among the considerations in selecting the equipment are:-

* Geological conditions;
* Dip or gradient;
* Thickness of plies;
* Strength of plies;
* Expected coal loss and out-of-seam dilution;
* Matching with trucks;
* Production rates;
* Blasting or ripping requirements;
* Market specifications for coal quality; and
* Utilising existing equipment.

In this PR three options have been worked out considering the deployment of equipment , which have been elaborated in the following paras:

In Option I Excavation and dumping of OB will be under taken departmentally by deploying 42 cum/ 10 cum capacity Electric Rope shovels and 240T/100T Rear Dumpers. HEMM have been provided as per the work load of coal and OBR in different horizons indicated in chapter 8, subheading 8.4.Overburden will need to be prepared for excavation by carrying out drilling and blasting operations. For OB preparation, 250 mm / 160mm RBH drills are proposed. Dozing arrangements in the OB & coal benches and dump yards will be met by deploying 850/ 410 HP dozers.Coal will be won by surface miner in combination with 10.0m^3 F.E.L and 60T(coal body) rear dumper, for coal loading and transport up to unloading station.

In Option II Excavation and dumping of OB will be under taken contractually by deploying Hydraulic shovels and Dumpers. Coal will be won by surface miner in combination with payloader and rear dumper, for coal loading and transport up to unloading station.

In Option III Excavation and dumping of OB will be under taken contractually by deploying shovels and Dumpers. Drilling will be done contractually.

Coal will be won departmentally by surface miner in combination with 10.0m^3F.E.L and 60T(coal body) rear dumper, for coal loading and transport up to unloading station.

6.6 MINING SYSTEM & SYSTEM PARAMETERS

Top Overburden and the parting in between all Seams would be excavated in a series of generally horizontal slices (benches). The salient features of mining system are as follows:-

- Height and width of bench in coal and OB will depend on the size of equipment. The provision of coal mine regulations and related circulars shall be strictly followed for designing bench parameters in coal and OB.
- Seam gradient – 1 to 5 degrees.
- Total dump height – 60 m (Each bench of 30 m)
- Bench slope –Coal/OB - 70 degrees , Spoil - 37 degrees.

****

CHAPTER-VII

MINING & DUMPING STRATEGY

7.1 CONSTRAINTS ON MINE DEVELOPMENT

Following are the constraints:

1. 132 KV overhead line passing all along the Western side of the quarry.
2. Katnanala (South–Eastern part) and JamunaNala (Western part) passes through the proposed quarry.
3. Two east –west traversing Dykes passes through the proposed quarry.
4. Densely populated Rampur village is situated in the middle of proposed Quarry. Other villages are Belia, Khanda, Ataria, Khairbana&Bichhia.

7.2 MINING STRATEGY / MINING SEQUENCE

Access trench of the mine will be driven along the incrop of seam I. The access trench will touch seam–I near borehole no. – CSBT 218 at a depth of approx. 8 m. The box-cut is developed in such a manner so as tofacilitate the proper drainage of water towards the sump. This would also facilitate extension of coal and OB bench for full development of mine. The mine will advance towards dip direction exposing the floor of Seam–I as per sectors drawn in final stage quarry plan. At places where Seam Iis not developed, Seam II will be the bottom most seam as shown in the final stage quarry plan. The mine will be worked from South to North side along the dip of the mine. The central haul road with gradient of 1 in 16 will traverse in almost middle of the property from South to North.

Coal mined by surface miner will be transported inpit by trucks/dumpers to coal receiving station, where reclaim feeder will be laid. Reclaim feeder will receive the coal and feed to main haul road belt conveyors with the help of short belt conveyor. At the surface a CHP with coal storage in bunker and rapid loading system (Load out system) with 500te overhead surge bin capacity has been provided for dispatch of coal to the consumers by rails. Details of coal transport is dealt in Chapter XI.

7.3 TECHNICAL CONSIDERATION FOR DEPLOYMENT OF SURFACE MINER

For efficient and smooth functioning of surface miner as well as to achieve the desired level of production, the following should be considered:-

1. The length of cut along strike should be as long as possible. Ideally, the length should have been 800-1000 m. But, the minimum cut length should be provided 300 m.

2. Width of working coal bench should be minimum 50 m.

3. Provision of water spraying arrangement at the coal face should be made along the strike on exposed slope of coal benches to deal with spontaneous heating and if any. However, surface miner cut benches eliminate coal bench fire.

7.4 TOP SOIL MANAGEMENT

Initially, the soil/alluvium from top bench of OB will be stacked and stored separately on the dip side of the mine. The stock piling of topsoil will be as follows:

1. Top soil removed shall be stock-piled only when it is impractical to promptly redistribute such materials on re graded areas.

2. Stock-piled Top soil shall be selectively placed on a stable area, not disturbed, and protected from wind and water erosion, unnecessary compaction, and contaminants which lessen the capability of the materials to support vegetation when redistributed.

3. After the final grading the topsoil would be redistributed in a manner that achieves an approximate uniform stable thickness consistent with the post mining land uses, contours, and surface water drainage system.

7.5 DUMPING STRATEGY

The proposed sequence of mining is ideally suited for achieving the objective of placing maximum possible waste in the internal dumps. Initial OB of about 8.00mm^3 will be dumped on the dip side of the quarry. By adopting the proposed sequence of mining, as the quarry advances, their will be no external dump and the OB will be accommodated within the pit itself.

The total volume of overburden has been estimated as 626.07Mcum, excluding 8.00 Mcum rehandling. The stage plans and final stage dump plan showing location and capacity of dumps has been given in the drawings related to the project.

Other salient features are :-

1. Internal dumping will start in 2nd year and will continue till end of 3rd year.
2. Internal rehandling of OB and its backfilling will be from 6th year to 9th year (8 Mcum) at the rate of 2 Mcum/year. External dumping will be done on the dip side of the Blocks itself (100 m beyond 5th year dump position). The dump will be then rehandled back.

7.6 SEQUENCE OF DUMPING OPERATIONS & STAGE-WISE DETAILS

S.No	Stages (Year)	OB Dumping (MCum)		
		Internal Dump (Mm^3)	External Dump/dump on dip side of quarry(Mm^3)	Re-handling of dip side dump (Mm^3)
1	After 5th	76.00	8.00	0.00
2	After 10th	263.50	0.00	8.00
3	After 15th	456.00	0.00	0.00
4	After 20th	626.07	0.00	0.00
Total	**Life-20Yrs**	**626.07**	**8.00**	**8.00**

Sl.No.	Particulars of working	Total
A	**Final year stage**	
1.	Coal mined (Mt)	65.50
2.	OBR (Mm^3)	626.07
3.	Stripping ratio ((Mm^3)/t)	9.56
4.	Excavated quarry area (Ha)	1538.86
5.	Internal dump (Mm^3)	626.07
6.	External dump (Mm^3). Dumped on dip side of Quarry, and later on Rehandled.	8.00

7.7 DUMPINGARRANGEMENTS

The following design criteria have been considered for waste dumps.

(i) OB in internal dumps will also be stacked in 30 m high benches.

(ii) A berm width of 30 m has been provided for transport etc.

(iii) Dump slope for each deck to be at natural repose (37º).

(iv) Dozers to be deployed for shaping the dumps overall slope to 18º.

(v) Internal dump will also be raised to a height 60 m above ground level.

(vi) Final reclamation will be achieved using the equipment provided for the purpose.

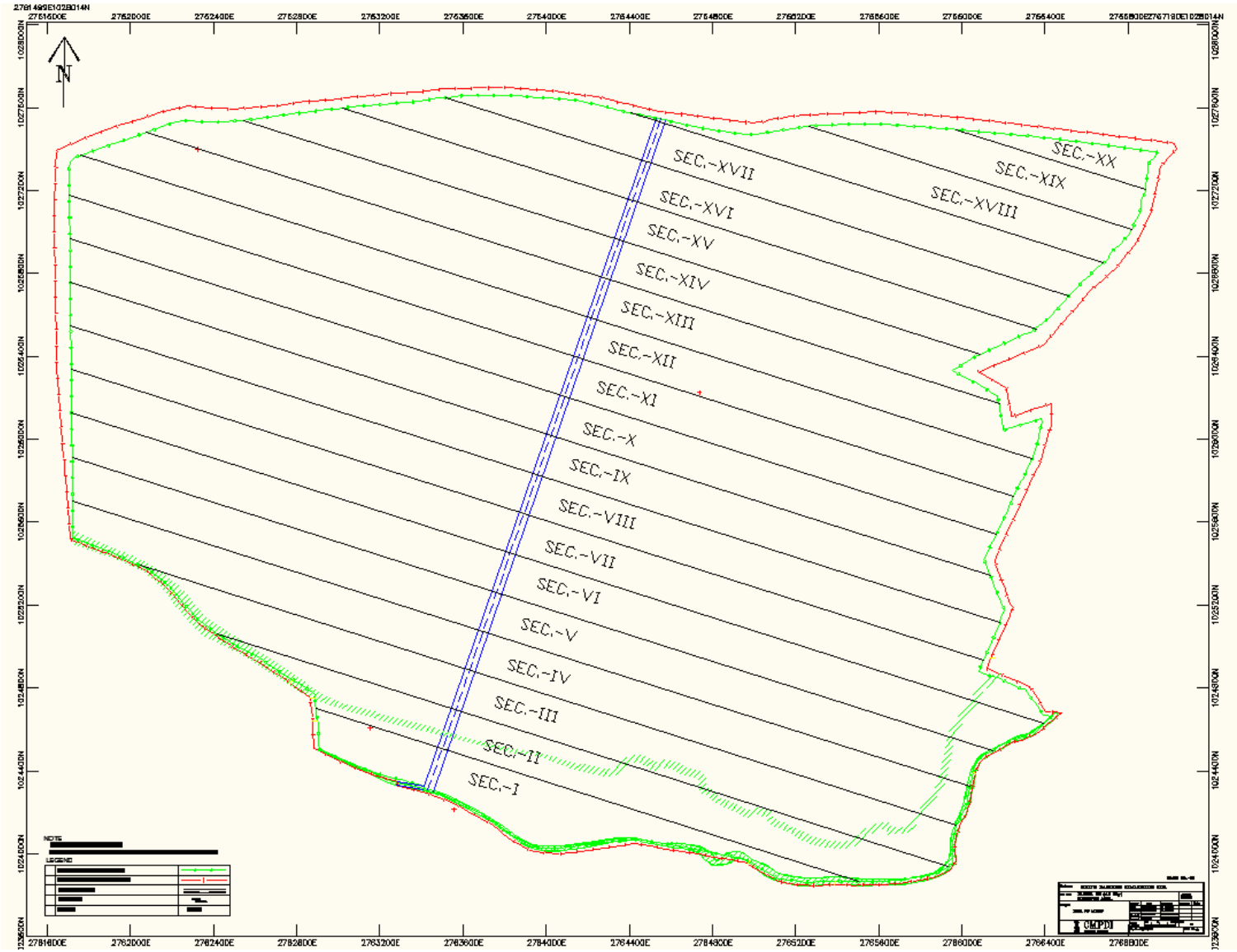
Once, the internal dumping starts reaching maximum height, the spoil will be graded and landscaped in harmony with surrounding topography. Dumper/Tipper will transport soil/alluvium OB from the top OB bench and will dump the soil directly on the leveled backfilled OB. and biological reclamation carried out in stages. The final void at the end of mining operations in the mine can be converted into a water reservoir.

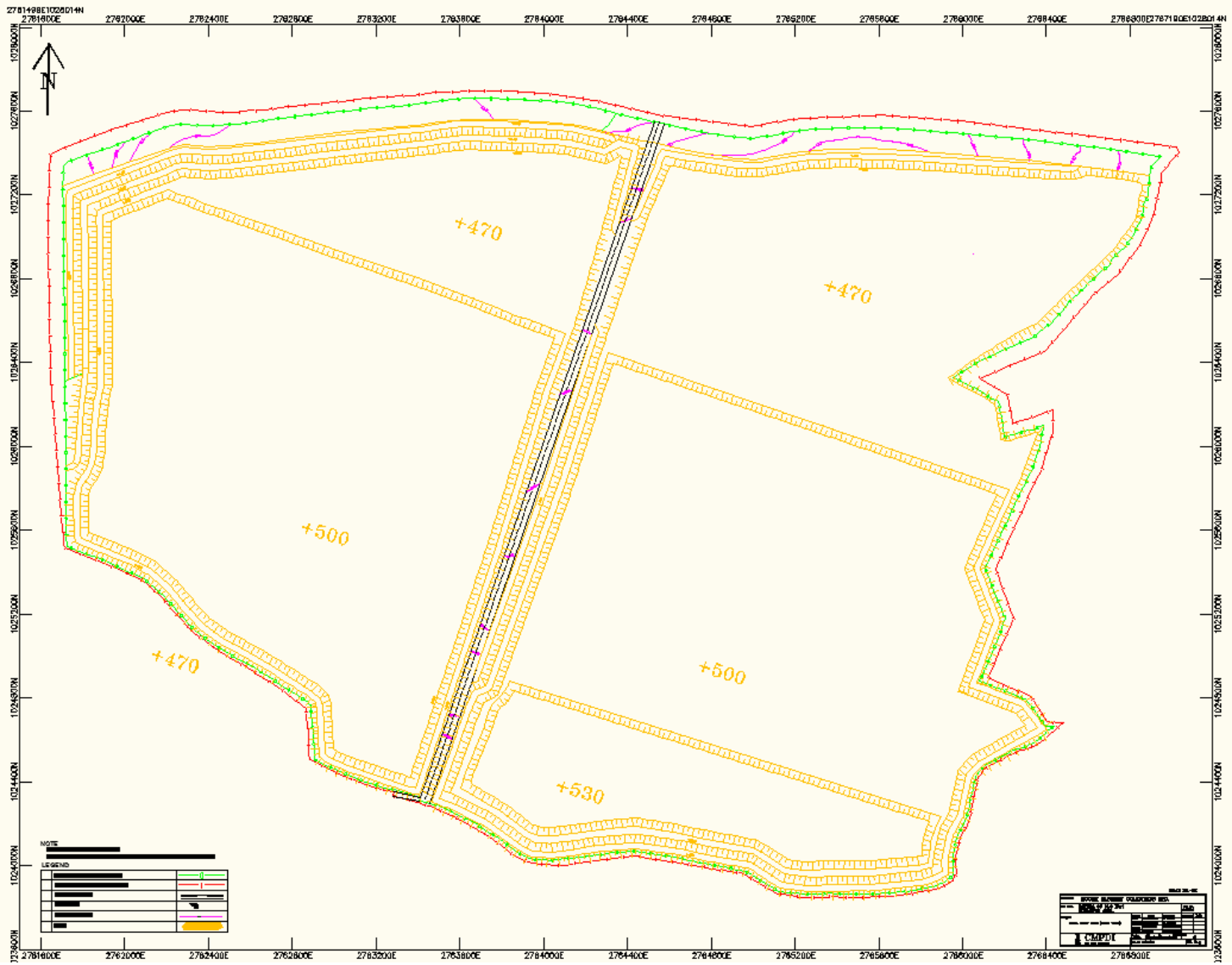
7.8 INITIAL DUMPING STRATEGY

In this Project Report, the initial OB of 8 Mm^3 (before sufficient backfilling space has been created) has been proposed to be dumped inside the quarry (100 m beyond 5^{th} year dump position) on 83.0 Ha of land. The height of dump proposed to be dumped inside will be 10 m.

In the approved PR of Batura OC(2.0Mty), provision of land 26.816 Ha land for external dump is envisaged. As Batura OC (2.0Mty) is about to start within a year and OB is to be dumped externally in the initial years the provision of additional 26.816Ha of land already notified under Section 11 of CBA for external dump has been included in this PR also.

FINAL STAGE
PIT LAYOUT





FINAL STAGE
DUMP LAYOUT

****

CHAPTER - VIII

MINING SCHEDULE & EQUIPMENT PHASING

8.1 DESIGN CRITERIA

The mine has been planned for 330 days of working.Three shift working will be practiced.Duration of shift hours will be eight.

Excavation category assumed

i) Coal - III

ii) Alluvial OB- Cat. I/II: Assumed

iii) Hard OB - 50% cat.III + 50% cat.IV

Insitu volume weight t/cum

i) Coal - 1.40 to 1.70 t/cum

ii) Overburden - 2.40 t / cum

Strength parameters of coal and rock if any - compressive, tensile, shear strength, young modules etc.

Rock Type	Compressive strength (MPa)	Tensile strength (MPa)	Shear strength (MPa)	Young's modulus (GPa)
Rock	0.83-53.05	0.10-8.04	0.46-6.09	0.16-5.17

8.2.1 Annual productivity of shovels considering 330 working days

S.N.	Particulars of HEMM	Unit	Productivity per cum
I	**For OBR**		
1	42 m^3 Elect. Rope Shovel + 240 T Rear Dumper	Mcum	8.86
2	10 m^3 Elect. Rope Shovel + 100 T Rear Dumper	Mcum	2.27
II	**For Coal**		
1	Surface miner	MT	2.0
2	10 m^3FEL + 60 T Rear Dumper (Coal body dump truck)	MT	2.60

8.2.2 Annual productivity of dumper(Mm3/Mt) considering 330 working days

Lead in Km		Annual working days	1.5	2.0	2.5	3.0	3.5	4.0
1	100T Rear Dumpers +10cum Electric Rope Shovels (Mm^3)	330	0.3815	0.3386	0.3095	0.2807	0.2586	0.2409
2	240T Rear Dumpers +42cum ERS (Mm^3)	330	1.0696	0.9415	0.8562	0.7727	0.7087	0.6584

Lead in Km		Annual working days	1.5	2.0	2.5	3.0	3.5	4.0
3	10 m^3 FEL + 60 T Rear Dumper (Coal body dump truck) (Mm^3)	330	0.4999	0.4410	0.4022	0.3631	0.3332	0.3097

8.2.3 LEAD FOR OB AND COAL

Weighted lead for OB is 3.0kms and for coal is 2.0kms.

8.3 CALENDAR PROGRAMME OF EXCAVATION

The mine will be advanced towards dip direction exposing the floor of Seam - I along the sectors shown in the final stage quarry plan. The targeted level of the production for coal and OB will be achieved in the 6th year including first year of construction period. The peak natural volume of OB at targeted level of production has been estimated as 44.83 Mcum/year and the planned maximum OB is 37.5 Mcum/year. Considering the average width of quarry and 100m annual advance of quarry floor, the calendar programme has been prepared as given in the following table: -

Coal (in Mt), Volume of OBR(in Mm^3) and Stripping ratio(in m^3/t)

YEAR	TOTAL COAL	III	L1	II	L2	I	TOP OB NATURAL	TOP OB PLANNED	III-L1/II	L1-II	II-L2/I	II/L2-I	TOTAL OB NATURAL	TOTAL OB PLANNED	SR	REHANDLED OB
1	CONSTRUCTION YEAR															
2	0.50			0.17		0.33	10.34	10.84				1.16	11.50	12	24.00	
3	1.00			0.66		0.34	9.64	9.53				4.47	14.11	14	14.00	
4	2.00			1.51		0.49	10.10	14.03				9.97	20.07	24	12.00	
5	3.00	0.03		2.24		0.73	16.90	19.42	0.69			13.89	31.48	34	11.33	
6	4.00	0.21		2.59		1.20	20.92	16.99	3.16			17.35	41.43	37.5	9.38	2.00
7	4.00	0.25	0.03	2.15	0.01	1.56	18.25	15.60	6.54	3.23	2.57	9.56	40.15	37.5	9.38	2.00
8	4.00	0.22	0.11	2.01	0.05	1.61	15.22	15.16	7.61	4.45	3.69	6.59	37.56	37.5	9.38	2.00
9	4.00	0.16	0.17	2.00	0.09	1.58	14.08	15.76	7.02	4.38	4.61	5.73	35.82	37.5	9.38	2.00
10	4.00	0.09	0.20	2.04	0.13	1.54	14.70	16.99	5.65	3.84	5.88	5.14	35.21	37.5	9.38	
11	4.00	0.02	0.20	1.99	0.23	1.56	16.32	17.54	5.38	3.22	6.90	4.46	36.28	37.5	9.38	
12	4.00	0.01	0.16	1.98	0.15	1.70	17.80	17.88	1.26	5.97	7.30	5.09	37.42	37.5	9.38	
13	4.00		0.16	1.89	0.13	1.82	16.73	18.31		6.58	7.34	5.27	35.92	37.5	9.38	
14	4.00		0.14	1.81	0.2	1.85	15.32	18.93		6.08	7.39	5.1	33.89	37.5	9.38	
15	4.00		0.06	1.79	0.3	1.85	14.83	16.77		5.32	7.39	5.02	32.56	34.5	8.63	
16	4.00		0	1.78	0.3	1.9	14.74	17.9		4.32	6.54	5.74	31.34	34.5	8.63	
17	4.00		0.16	1.87	0.15	1.82	17.15	20.44		2.69	4.42	6.95	31.21	34.5	8.63	
18	4.00		0.1	2	0.18	1.72	21.16	18.05		4.94	5.21	6.3	37.61	34.5	8.63	
19	4.00		0.06	1.91	0.15	1.88	20.83	10.5		9.99	5.96	8.05	44.83	34.5	8.63	
20	3.00			1.28		1.72	16.14	10.53		1.41	0.75	19.38	37.68	32.07	10.69	
	65.50	0.99	1.57	33.67	2.07	27.20	301.17	301.17	37.31	66.42	75.95	145.22	626.07	626.07	**9.56**	8.00

8.4 HEMM DEPLOYMENT

HEMM have been provided as per the work load of coal and OBR in different horizons indicated in calendar programme of excavation.

In Option I Excavation and dumping of OB will be under taken departmentally by deploying 42 cum/ 10 cum capacity Electric Rope shovels and 240T/100T Rear Dumpers. HEMM have been provided as per the work load of coal and OBR in different horizons indicated in chapter 8, subheading 8.4.Overburden will need to be prepared for excavation by carrying out drilling and blasting operations. For OB preparation, 250 mm / 160mm RBH drills are proposed. Dozing arrangements in the OB & coal benches and dump yards will be met by deploying 850/ 410 HP dozers. Coal will be won by surface miner in combination with 10.0m^3 F.E.L and 60T(coal body) rear dumper, for coal loading and transport up to unloading station.

On common category, grader of 280 HP. Water sprinklers and some frequently required equipments are provided for smooth operation of the mine.

In Option II Excavation and dumping of OB will be under taken contractually by deploying Hydraulic shovels and Dumpers. Coal will be won by surface miner in combination with payloader and rear dumper, for coal loading and transport up to unloading station. In this option only necessary HEMM are provided for miscellaneous purposes. This includes water sprinklers, dozers, grader, diesel hydraulic backhoe. Details of the equipment to be provided is mentioned in Appendix 3.1.

In Option III Excavation and dumping of OB will be under taken contractually by deploying shovels and Dumpers. Drilling will be done contractually.

Coal will be won departmentally by surface miner in combination with 10.0m^3 F.E.L and 60T (coal body) rear dumper, for coal loading and transport up to unloading station.

The estimated capital expenditure on major HEMM is given in Appendix-A.3.

Year wise deployment of various equipments for Total Departmental option. Total Outsourcing option and Partial Outsourcing option is shown in the following table. If required the deployment of 10m^3 payloader with 60T coal coal body dump truck can be modified into lower capacity payloader with matching coal body dump truck.

Statement showing the Deployment of HEMM

Sl. No.	Particulars	Unit	Size/ Capacity	FOR TOTAL DEPARTMENTAL OPTION						TOTAL OUTSOURCING OPTION		COAL DEPARTMENTAL OB OUTSOURCING					
				Additional Provision	YEAR					Additional Provision	YEAR	Additional Provision	YEAR				
					2nd	3rd	4th	5th	6th		2nd		2nd	3rd	4th	5th	6th
				Coal(Mt)	0.50	1.00	2.00	3.00	4.00	Coal(Mt)	0.50	Coal(Mt)	0.50	1.00	2.00	3.00	4.00
				OB(Mcum)	12.0	14.0	24.0	34.0	37.5	OB(Mcum)	12.0	OB(Mcum)	12.0	14.0	24.0	34.0	37.5
A.	**OVERBURDEN**			**OVERBURDEN**						**OVERBURDEN**		**OVERBURDEN**					
1	Electric Rope Shovel	Cum	42	**3**	1		2	3		**BY HIRING OF HEMM**		**BY HIRING OF HEMM**					
2	Electric Rope Shovel	Cum	10	**5**	2	3		4	5								
3	Rear Dumper	T	240	**33**	9		22	33									
4	Rear Dumper	T	100	**43**	18	25		31	43								
5	Elect.RBH Drill	mm	250	**3**	1		2	3									
6	Elect.RBH Drill	mm	160	**5**	2	3		4	5								
7	Dozer with Ripper	HP	850	**3**	1		2	3									
8	Dozer	HP	410	**5**	2	3		4	5								
9	Wheel Dozer	HP	450	**1**	1												
B.	**COAL**			**COAL**						**COAL**		**COAL**					
1	Surface Miner	Mt	2-3Mt	**2**	1			2		**BY HIRING OF HEMM**		**2**	1			2	
2	FE Loader	Cum	10	**2**	1			2				**2**	1			2	
3	Truck (Coal Body)	T	60	**9**	2	3	5	7	9			**9**	2	3	5	7	9
4	Water Sprinkler	KL	28	**1**	1							**1**	1				
5	Diesel Bouser	KL	10	**1**	1							**1**	1				
6	Dozer	HP	410	**1**	1							**1**	1				
C.	**RECLAMATION**			**RECLAMATION**						**RECLAMATION**		**RECLAMATION**					
1	Dozer	HP	410	**2**	1			2		**1**	1	**1**	1				
2	Water Sprinkler	KL	28	**2**	1			2		**1**	1	**1**	1				
D.	**COMMON**			**COMMON**						**COMMON**		**COMMON**					
1	Grader	HP	280	**2**	1			2		**1**	1	**1**	1				
2	Diesel Hyd. Backhoe	Cum	1.3-1.5	**1**	1					**1**	1	**1**	1				
3	Tyre handler	T	6.0	**1**	1												
4	Crane	T	40-60	**1**	1												
5	Crane	T	8-10	**1**	1					**1**	1	**1**	1				
6	Fork lifter	T	5	**1**	1												
7	Diesel Bouser	KL	10	**1**	1					**1**	1	**1**					
8	F.E.L	Cum	2.0-3.0							**1**	1	**1**	1				

8.5 DRILLING & BLASTING

Total coal will be extracted by Surface Miner.In case of Shovel-dumper combination, OB will be loosened by drilling and blasting. The actual pattern for drilling and blasting will be decided after field trials. For secondary blasting 10% of additional explosives will be required for OB. SMS system of blasting should be used wherever possible. The pattern for drilling of blast holes will depend upon the height of the bench and may be designed as follows: -

Height of bench	=	H
Burden (B)	-	H/2
Spacing (S)	-	B*1.25

The suggested drilling pattern is for average mining conditions. These may suitably be modified during actual mining operations as per the site conditions.

The explosives consumption has been envisaged as 0.30 - 0.35 kg/cum of excavation.

****

CHAPTER - IX

COAL QUALITY

9.1 INTRODUCTION

On the basis of moisture and ash percentage different litho units are defined as under: -

Coal : Ash + Moisture upto 40%.

Shaly Coal : Ash + Moisture from 40% to 55%.

Carbonaceous Shale/combustible Dirt band : Ash + Moisture from 55% to 75%.

Obvious dirt bands : Ash + Moisture more than 75%.

Initially, the band by band analysis of the coal cores were obtained and subsequently special tests and the proximate analysis at 60% RH and 40^0C were advised for Bcs, I_{30}, I_{10}, I_{100} and I_p basis which are defined as under: -

Bcs Sample: only coal and shaly coal.

I_{30} Sample: including combustible bands upto a thickness of 30cm. This type of analysis has been asked only for assessing under ground reserves. Dirt bands upto 5 cm irrespective of litho logy have been included in the seam for quality assessment. Carbonaceous shale bands having thickness more than 30cm have been excluded from the seam thickness.

I_{10} Sample: including both combustible and non-combustible bands upto 0.10m thickness. This analysis has been carried out for the seams having quarriable potentiality.

I_{100} Sample : 'Bcs' sample + carbonaceous shale (ash + moisture upto 75%) bands upto 1m in thickness + grey shale (ash + moisture >75%) bands upto 1m in thickness and excluding all other obvious bands such as sandy shale, shaly sandstone, sandstone etc. irrespective of their thickness.

I_p Sample: I_{100} Sample + carbonaceous and grey shale bands irrespective of their thickness and excluding all other obvious bands as in I_{100} Sample.

9.2 QUALITY ANALYSIS

Presence of in seam band seam wise (Numbers and thickness of each band, total band thickness)

Name of the seam	**Name of Block**	**Thick-ness range of seam (m)**	**Carbonaceous shale band**			**Non-Combustible bands**			**Total bands**		
			No. of bands/ No. of BHs	Thick. range (m)	% dirt bands	No. of bands/ No. of BHs	Thickness range (m)	% dirt bands	No. of bands/ No. of BHs	Thick-ness range (m)	% dirt bands
SEAM - I	Batura OC	1.35 - 1.75	Devoid of dirt bands								
	Batura Ext.										
SEAM - L2	Batura OC	0.50 – 0.75	Devoid of dirt bands								
	Batura Ext.										
SEAM II	Batura OC	2.00 – 2.30	1-3/71	0.06-0.70	-	1-3/17	0.05-1.21	-			
	Batura Ext.		1-7/41	0.10-2.30	-	1-4/40	0.10-0.97	-			
SEAM LI	Batura OC	0.35 – 0.60	Devoid of dirt bands								
	Batura Ext.										
SEAM III	Batura OC	0.75 – 2.45	Devoid of dirt bands								
	Batura Ext.										

9.3 PROJECTED COAL QUALITY

The average GCV of the seams considered together works out to 5576Kcal / Kg (G-6 band).

****

CHAPTER-X

WATER MANAGEMENT (PUMPING AND DRAINAGE)

10.1 GENERAL

Rampur Batura block is situated on the eastern side of the Son River where the coal seams have been proved in detail. Other exploration blocks/mine workings in the area are located on the western side of the Son River. The block is gently undulating and exhibits a gentle rolling topography. The general slope of the area is towards the south of the block. The Katna nala delineating roughly the southern block boundary drains the area and finally discharges into Son River in north western part of the block.

Garland drains will be provided around the mine to keep the runoff water away from the quarry. Fresh drains will be made as mine advances. The drains will be connected to the natural drainage of the area. The drains will be cleaned periodically to avoid overflow of the same. Embankments will be provided around the mine wherever necessary to protect the mine from flooding.

No hydro-geological studies have been conducted earlier hence provision for hydro-geological studies have been made. The pumping provisions will change accordingly at a later date if necessary after obtaining the results of hydro geological studies.

Efforts will be made to lay the benches and haul roads in such a way that water will gravitate towards the main sump located at the deep most point available at the current workings. The slope of the floor of benches will be made in such a way that water flows down to the sump to keep the benches dry.

10.2 SOURCE OF WATER

In general the sources of water inside the quarry are as given below:

- Direct rainfall in the open excavated area.
- Inflow of water from back filled area due to rain fall on it.
- Inflow of water from area beyond excavation due to rainfall on it.

- Seepage of water from strata water/Ground Water.

10.2.1 Direct rainfall in open excavated area

The rain water falling directly in the open excavated area will flow down and collected in the sump. It is assumed that 65% of water falling in this area will be collected in the sump.

10.2.2 Inflow from back filled area

A part of rainwater falling on the Internal dumping area will flow down into the mine. As the internal dump will be relatively loose so run off coefficient into the mine has been considered as 0.1.

10.2.3 Inflow from area beyond excavation

A part of the rain water falling in the area beyond excavation will find its way into the mine. Garland drains will be provided around the mine to arrest the out side water so it is assumed that 10% of rain falling in this area will flow down into the mine and collected in the sump.

10.2.4 Seepage from strata/Ground water

There will be some seepage from Strata/Ground water. This seepage during dry season say November-June is expected to be low. During monsoon and post monsoon period i.e. July-October the seepage will be more. This is assumed as 10% of make of water in the mine.

10.3 MAKE OF WATER

10.3.1 General considerations:

I. The general parameters considered for calculating the pumping requirements and make of water are as given below:
II. Geographical location of the opencast workings.
III. Life of the mine
IV. Surface features of the area surrounding the opencast workings.
V. Total annual rainfall, maximum rainfall in a day.

VI. Catchments area- Exposed area, area beyond excavation, internal dumps area etc.

VII. Depth of quarry- Initial, final etc.

VIII. Run-off characteristics of the area.

IX. Inflow/Seepage from underground water into the mine.

X. Sump location and capacity

XI. Desired location on surface where the mine water can be discharged, surface drainage system.

XII. Dewatering time for the water collected due to maximum rainfall in a day.

XIII. Standby capacity required.

XIV. Hydraulic gradient of strata water

XV. Size of pipe, piping layout etc.

XVI. PH value of water.

10.3.2 Basic data

The basic data considered for calculating make of water and pumping capacity is as given below:

S.No	Contents	Unit	Value
1	Yearly rainfall (average)		
2	Maximum rainfall in a day (From probability curve)	mm	177
3	Monsoon season (July to Oct)		
4	Life of quarry • Depth of operation • Initial • Final	years m m	20 8 80
5	**Quarry open excavation area** • 5th year • 10th year • 15th year • 20th year	HA HA HA HA	80.18 160.14 159.12 140.81
6	**Quarry back filled area**	HA	

	• 5th year • 10th year • 15th year • 20th year	HA HA HA	90.63 344.93 679.57 976.09
7	**Area beyond excavation** (5% of excavated area) • 5th year • 10th year • 15th year • 20th year	HA HA HA HA	8.54 25.25 41.93 55.85
8	**Run-off-co-efficient for inflow ofwater into the mine** • Open excavation • Area beyond excavation • Internal dump area		0.65 0.10 0.10
9	Seepage/Inflow of water into the mine due to strata water		10% of water accumulated in the mine due to rainfall
10	Time required to de-water the water Collected outside the sump in the Mine due to maximum rainfall in a Day	hours	18
11	Time required de-watering the water collected in the mine due to maximum rain fall in a day	hours	100
12	Standby capacity		As required
13	Pumping losses	%	10

The assessment of maximum rainfall in a day during the life of the project has been made by drawing a probability curve (fig. 10.1) based on calculated/ theoretical values and observed values of the maximum rainfall in a day, life of the project etc.

(i) Probability based on observed values

The maximum rainfall in a day at Sohagpur area for the period 1995-2010 has been arranged in the descending order and the probability of the same has been calculated and tabulated below:

Observation No (N)	Year	Highest Rainfall in one day (mm)	%P= (N-0.3)*100/(M+0.4)
1	2003	201.17	4.27
2	2009	154.94	10.37
3	2007	140.21	16.46
4	2008	125.73	22.56
5	1999	115.06	28.66
6	1995	86.87	34.76
7	2005	83.82	40.85
8	2010	83.82	46.95
9	1996	82.55	53.05
10	1997	78.74	59.15
11	2001	72.35	65.24
12	2000	62.23	71.34
13	1998	59.69	77.44
14	2004	55.88	83.54
15	2006	54.61	89.63
16	2002	34.54	95.73

Where N = Observation Number
M = Total number of observations

(ii) Probability based on calculated/theoretical values

The probability of calculated/theoretical rain fall based on the observed data is shown below:

Observation No.(N)	Highest Rainfall in one day (mm)hn	K=hn/ham	K-1	(K-1)^2
1	201.17	2.16	1.16	1.35
2	154.94	1.66	0.66	0.44
3	140.21	1.5	0.5	0.25
4	125.73	1.35	0.35	0.12
5	115.06	1.23	0.23	0.05
6	86.87	0.93	-0.07	0
7	83.82	0.9	-0.1	0.01
8	83.82	0.9	-0.1	0.01
9	82.55	0.89	-0.11	0.01

10	78.74	0.84	-0.16	0.03
11	72.39	0.78	-0.22	0.05
12	62.23	0.67	-0.33	0.11
13	59.69	0.64	-0.36	0.13
14	55.88	0.6	-0.4	0.16
15	54.61	0.59	-0.41	0.17
16	34.54	0.37	-0.63	0.4
Sigma hn=	1492.25		∑(K-1)^2=	3.29

Where as
n = Observation Number
m = Total number of observations i.e. 16
Ham = Mean value of recorded maximum rain fall
$=\Sigma h_n/m = 1492.25/16 = 93.27$
Cv = Co-efficient of variation = $\sqrt{\{\sum (k-1)^2 / (m-1)\}} = 0.4683$
Cs = Asymmetrical ratio =3Cv = 1.4050
h = Calculated rainfall

The values of f(Cs) the "Deviation of ordinates of Binomial curve of probability from "RIBKIN CHART" at the Cs value as calculated above have been selected for different probabilities. By using f (Cs) value the maximum rainfall and its probability has been calculated as given in the table below.

Probability (Percentage)	f(Cs)= ∅ (Noted from Ribkin Chart)	Ms= ∅ x Cv	Ks=Ms+1	h=Ksxham
0.1	5.09	2.55	3.55	315.24
1	3.27	1.62	2.63	235.96
5	1.94	0.95	1.95	178.14
10	1.34	0.66	1.66	152.02
20	0.71	0.34	1.34	124.04
25	0.49	0.24	1.24	114.72
30	0.31	0.15	1.15	107.26
40	0.02	0.00	1.00	94.20
50	-0.02	-0.11	0.89	92.33
60	-0.44	-0.22	0.78	73.68
70	-0.64	-0.30	0.69	65.29
80	-0.83	-0.40	0.60	56.89
90	-1.04	-0.51	0.49	47.57
95	-1.17	-0.56	0.44	41.97
99	-1.32	-0.63	0.37	35.44

A rainfall probability curve (Fig. 10.1) has been drawn taking into consideration the calculated values and observed values. The maximum daily rainfall at probabilities of 10% and 5% which corresponds to 10 years and 20 years (life of the project) respectively has been found out from the above curve and they are approximately 152 mm and 177mm.

10.3.4 Calculations:

S.N.	Description				
		5th year	10th year	15th year	20th year
1	Inflow due to direct rainfall in exposed area (cum)	92247	184241	183068	162002
2	Inflow due to direct rainfall on internal dump area(cum)	16042	61053	120284	172768
3	Inflow due to direct rainfall on area beyond excavation (cum.)	1512	4470	7422	9885
4	Seepage from ground water (cum.)	10980	24976	31077	34465
5	Total water collected in a day (cum.)	120780	274740	341852	379120
6	Sump cap. Provided 10% probability (cum)	101992	232003	288675	320146
7	Water lying out side the sump (cum)	18788	42737	53177	58974
8	Pumping cap (lps) to dewater the water lying outside sump in 18 hrs. including 10% pump losses	290	660	821	910
9	Pumping cap.(lps) to dewater entire water including 10% pump losses in 100 hrs.	336	763	950	1053
10	No of 225 lps cap pump required to dewater the water lying Outside sump in 18hrs.	**1**	**3**	**4**	**4**
11	No of 225lps cap pumps required to dewater entire water In 100 hrs.	**1**	**3**	**4**	**5**

10.4 SUMP

In the quarry, sump will be provided at the deep most point of the mine. The sumps will be shifted as the mine advances. The lay out of quarries provides suitable gradient along the floor of the benches to facilitate self drainage of water into the sump.

During heavy monsoon period, the work in the lower most benches may be drowned as it will not be possible to pump out the entire make of water in the wettest day. Therefore, it is proposed to drown a part of the lower most bench which will work as a sump to accommodate the required quantity of water which will be equivalent to the water accumulated due to a rainfall of 177 mm in a day (at 10% probability).

Water from the main sump/intermediate sump as per requirement will be pumped to surface which will pass through sedimentation ponds before finally discharged into natural drainage system. Sumps will be cleaned periodically to avoid silting and muck accumulation.

10.5 PUMPS

In the initial period of operation of the quarries i.e. during access trench cutting, box cutting the face pumps (diesel) will be used to meet the initial requirements and will be used till they are suitable for depth of operation. Face pumps will be used to keep the working places dry.

Five numbers of main pumps each of 225lps, 100 m head will be provided to meet the requirements. Some of the stages of the main pumps may be blanked when they have to operate at shallow depths. This has been provided to reduce the capital investment and utilize the pumps up to the end of life. Provisions have been made considering the peak demand which is occasional, so no standby pumps have been provided. Further the pumps may be repaired and kept ready for use in rainy season. Main pumps will be provided near main sump or on pontoons as per requirement.

Two numbers of diesel engine operated pumps each of 80 lps capacity, 100m head have also been provided for operation in the initial period and then as standby for use in case of emergency.

All the main pumps will be provided with pressure gauges on delivery side and suction side for measuring the head developed so that corrective action will be taken for operating the pump at the duty point.

The main pumps have been provided considering life of the mine. The requirement of pumps has been shown for entire life of the mine, however procurement shall be made as per requirement.

During heavy rainfall, overburden may be washed away from edges of slopes and internal dumps, and flow into the sump. Pumping of clear water and slurry will be from upper and lower part of sump respectively. For pumping of slurry/sludge containing large solids particles, slurry pumps with one or two channels impeller with free flow passage varying from 50mm to 219 mm diameter will be provided. Diesel engine operated face pumps (2 no.) will be provided for keeping the working places dry.

10.6 PIPING

ERW pipes of 355.6 mm outer diameter will be used for carrying the discharge from three numbers of 225 lps capacity pumps. Similarly, ERW pipes of 219 mm outside diameter will be provided for carrying the discharge from 80 lps capacity diesel engine operated pumps. Initially, the delivery pipes from each pumping station are proposed to be taken out through haul road and then through access trench and through side batters of quarry at a later date. Provisions for cross-ways are made on the floor of the side batters for crossing the haul road so that dumper transportation is not affected. These pipes are evenly brought to the surface from where water will be discharged to the sedimentation ponds and then water will be discharged to natural drainage system. Provision will be provided at pump house for connecting the delivery of the pumps to at least two numbers of delivery ranges. Flow meters will be provided in each 355.6.4 mm dia. Pipe for measuring the discharges.

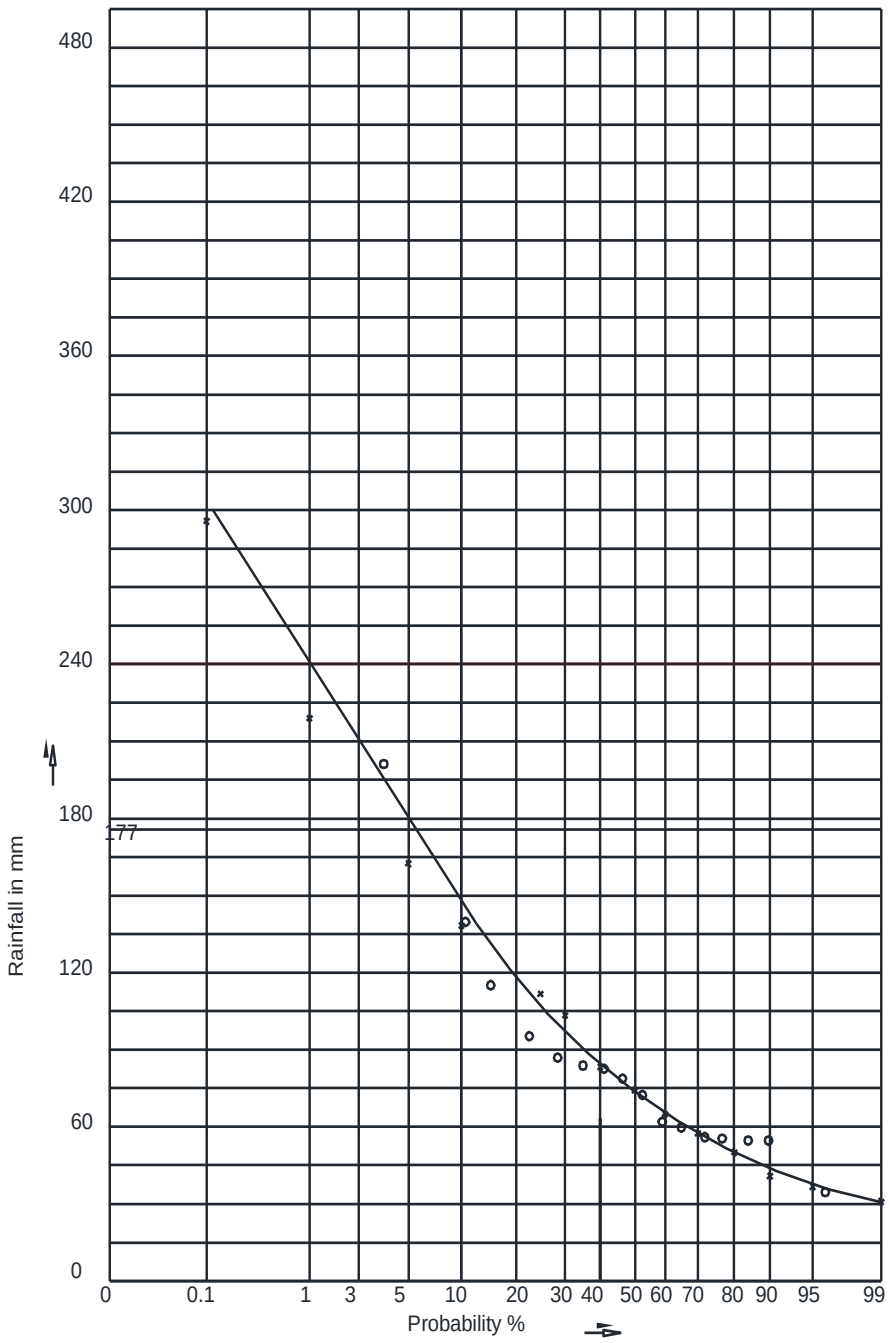
10.7 CAPITAL INVESTMENT

The details of the proposed pumps, pipes and pipe fittings along with estimated cost and brief specifications are shown in Appendix A.3.4.

RAMPUR BATURA OCP

RAINFALL - PROBABILITY GRAPH

(Fig. 10.1)



****

CHAPTER-XI

COAL HANDLING PLANT AND DESPATCH

11.1.0 INTRODUCTION:

There are number of closely overlying workable seams in the proposed quarry area. Due to the above reason in-pit conveyor system has been proposed. It is proposed to produce (-) 100 mm coal by using surface miners and then transport the same up to CHP by using Inpit conveyor system. It is proposed to dispatch (-) 100mm size coal to distant consumers by rail. To meet the above requirement a CHP with coal storage in bunker and rapid loading system (Load out system) with 500te overhead surge bin capacity has been provided for dispatch of coal to the consumers by rails. Road dispatch facility has also been provided to meet the requirements of local customers. Capacity of this CHP is 6.0 mty,in which about 2.0mty of (-) 100 mm size coal comes from Proposed Batura West OC by cross country conveyors which is about 4.0 km and feed it to main CHP of Rampur BaturaOC.From Rampur Batura OCP 4.0mty of (-) 100mm size coal will be mined.

11.2.0 BASIC DATA:

1. Target out put — 6.0 mty
2. Life of the mine — 20years
3. Quality of coal — Grade C
4. Mine operation — 3 shifts/day
5. CHP operation — 3 shifts/day
6. Customer — Power houses & Misc.
7. Mode of transport to CHP — By hired Trucks
8. Dispatch of coal
   - to distant consumers — through rail
   - to local consumers — by trucks
9. Storage facility — 1) Over head RCC Bunker of 12000 t for Rampur Batura OC.

	2)Over head RCC Bunker of 6000 t for BaturaWest OC.
	3) Load out system of 500t.
10.Loading arrangement	Rapid loading system@3600 tph.
11.Weighing arrangement of coal	
- To distant consumers	Pre-weigh hopper below 500 teload out System and in motion weigh bridge
- To local consumers	Road weigh bridges
12.End product for dispatch	(-) 100 mm

11.3.0 INPIT CONVEYING SYSTEM

i) Coal will be mined by surface miner as such no crushing arrangement is required
ii) Coal mined by surface miner will be transported inpit by trucks/dumpers to coal receiving station, where reclaim feeder will be laid.
iii) Reclaim feeder will receive the coal and feed to main haul road belt conveyors with the help of short belt conveyor.
iv) Around 4.0 MTY production will come from the Inpit.
v) Installation of conveyor of Inpit will start from 2nd year onwards.
vi) In initial period of Inpit conveyors will be laid along the haul road directly from the surface after getting the proper gradient.
vii) In final stage of Inpit Conveying System there will be 8 nos.of conveyors IP1 to IP8 will be of 1400 mm wide and 800 tph capacity.
viii) In Inpit Conveying System 2 sets of 1400 mm wide & 800 tph have been provided in the main haul road, out of which one will be working and other will be stand bye.
ix) Inpit conveyor will be connected with the main CHP.
x) Two nos. of short belt conveyors IP9 and IP10 of 1400 mm wide , 800 TPH will receive coal from reclaim feeder (both side of the haul road) in turn feed to either of two conveyor of main haul road.

11.4.0 COAL HANDLING PLANT (CHP)

Inside the mine (-) 100 mm size coal will be produced with the help of surface miner and feed it to reclaim feeder by trucks. Coal from the reclaim feeder feed it to short belt conveyor for onward transport and discharge to inpit conveyor. Coal from inpit of Rampur Batura OCP will feed to main CHP's with the help of conveyors IP1andIP2 and discharge on to belt conveyor C2 or C3 of main CHP.

The conveyors C2/C3 will be of 1400 mm wide and of 1200 tph capacity. The belt conveyor C2/C3 will elevate coal and discharge on tripper conveyor C4/C5. The conveyors

C4/C5 will be provided with a reversible traveling tripper installed on the overhead RCC bunker of 12,000 t capacity. The tripper conveyors C4/C5 will spread coal in the RCC bunker. These conveyors will be of 1400 mm wide and 1200 tph capacity.

The overhead bunker will be of twin slit type. At each slit two numbers (one working & one standby) plough feeders of 3000 tph capacity (av.) will be provided for reclaiming coal from the bunker at a regulated rate and discharge on reclaim cum loading belt conveyors C6/C7.

Ultrasonic type level switches will be provided on the carriage of the traveling tripper of the conveyors C4/C5 to monitor the high level of coal in the bunker. In case high level is reached in the bunker, it gives signals so that tripper can move to the next place for discharging coal in the bunker. Similarly low level switches will also be provided in bunker to stop the plough feeder provided at the bunker opening in case a pre-determined low level is reached. Two numbers of partition walls will be provided in the bunker which will be helpful during maintenance and repair. The floor of the bunker will be provided with proper slopes for easy drainage of water. The slanting surface of the bunker will be provided with suitable liners for smooth flow of coal.

The conveyors C6 and C7 of 1600mm wide and 3000 tph capacity will be provided below the bunker to receive coal from the plough feeders. The conveyors C6/C7 will elevate coal and discharge into the 500 t capacity Load out system simultaneously.

11.4.1System Description for Batura West OC

i) Coal will be produced inside the mine by surface miners. This coal will be transported from face to receiving hoppers approx. 4 km by tippers /dumpers if required coal can be stocked near receiving hoppers and this can re-handled with the help of dozer/pay loader.

ii) The tippers /dumpers will discharge coal in the two nos. of receiving hoppers of 40 te cap each they will discharge coal on belt conveyors of BW1 and BW2 (1200mm wide) and they will discharge coal into the 6000 t capacity O.H.RCC Bunker simultaneously.

iii) The conveyors BW3 and BW4 of (1600mm wide) and 3000 tph capacity will be provided below the bunker to receive coal from the vibratory feeders (800 tph capacity) and they will discharge coal on belt conveyors of the C6/C7 will elevate coal and discharge into the 500 t capacity Load out system simultaneously.

iv) Two road weigh bridge 100T capacity have been proposed at CHP for weighment of coal before discharging into receiving hoppers.

11.4.2 Rapid loading system

Rapid Loading Systems onenumber of load out system primarily consisting of one surge bin of 500 te capacity, one weigh bin of 100 te capacity and a traversing/telescoping chute . Coal will flow into the weigh bin from the surge bin through four numbers bin charging gates and will be loaded into rail wagons through the telescopic chute. The telescopic chute will be of traversing type and will be parked aside for allowing loco to pass and then will be brought to the central position for facilitating coal loading into the wagons.

The surge bins and the weigh bins will be fabricated of minimum 10 mm thick carbon steel plates and will be lined with minimum 12 mm thick chromium carbide wear liner. The chute will be of heavy duty design for coal application. The structure will be designed to be in compliance with the current Indian standards and specifications. The structural system will include stairs system, access floors as well as the floor where the system feed conveyors lands on the building etc. All structural steel design will be as per suitable IS. All structural connections will be designed to be field bolted. All structural framing connections shall utilize high tensile strength bolts. All bracings girt connections will be designed and fabricated for field bolting. Proper sheeting of the building shall be done and a roof over the structure will be provided.

Temperature monitoring devices will also be provided at various levels in the surge bins to monitor temperature of coal inside the surge bins and give audio-visual alarms in the control room for necessary action. These will operate through battery in case of power failure. Inspection trolley with cage will be provided above the surge bins for inspection of outer and inner surfaces of the surge bins.

A high wagon/collision sensor will be attached to the load out chute which will automatically close (if open) the control gate above the load out chute and retract the chute in up position to allow passage of a high wagon. Suitable calibration/testing systems will be provided with the load out systems. In general a load out system will consist of the following (the list is not comprehensive rather a general overview):

a. One 500 metric tonne capacity surge bin
b. One 100 metric tonne capacity weigh bin
c. Four dual ended shear beam load cells of required capacity with mounting assemblies
d. One digital weigh indicator

e. One surge bin level monitoring system
f. One batch controller system with HMI located in the control room for controlling and monitoring the loading process
g. Four dustless double bladed surge bin discharge control gates
h. One double bladed, dustless weigh bin discharge gate
i. One traversing/telescopic load out chute with collision sensor and breakaway section

A suitable self-contained hydraulic power unit consisting of the reservoir of required capacity and all necessary components will be provided to operate the system and provide sufficient energy reserve to perform failsafe operation of the system (close/open discharge gates, raising/lowering/traversing of the discharge chute).

The load out system is a computer controlled operator attended - automatic weighing and loading system capable of static loading accuracies within ±0.05%. The load out system will feature three modes of attended operation: automatic, semi-automatic and manual. The wagons will be moved by means of a creep controlled diesel engine/ electric engine while they are being loaded. Track logic system will be provided on the rail lines to identify the rail wagons and send signal to the central processing unit for operating the chute. During the period when there is no wagon loading the weigh bin will be filled in.

Control logics and associated I/O modules will be provided in the Main Load out PLC Control Cabinet to operate all load out I/O, including load out gates, hydraulic power unit and load out chute. This unit will interface with the load out application software. This system will communicate the surge bin level signal, plus the tonnes required to complete the loading of the rake ("Tons to Go"), to the PLC of the reclaim system of the associated bunker i.e. the plough feeders and the reclaim conveyors, to enable proper control and to coordinate the reclaim rate with the loading rate of the load out chute. A modem with the necessary software will be provided for remote support of the load out system and for providing system upgrades without a service man requiring to attend the site. Lightning arrestors will also be provided on the surge bins. All limit switches, pressure switches, temperature switches and all other electrical components and enclosures will have a IP65 or better rating.

Two train traffic light signals, each traffic light consisting of one red and one green light with mounting assembly will be provided. One train traffic control light system will be mounted prior to the entrance to the load out facility. The second train traffic control light will be mounted on the exit end of the load out structure. These lights will provide the train

driver an indication of when it is safe to begin loading. Upon approach of train, signal will be set to red, signaling the train to stop prior to the load out station. When the system is set and ready to load, the control room operator will notify the train driver by switching the traffic signal to green, signaling the train driver to spot the first wagon under the loading position. Once the train is in position and the load out chute is positioned out over the rail wagon, the second train traffic light control will signal the train driver to begin the loading process.

2x150t capacity overhead steel hoppers will be installed to dispatch coal by trucks. For this purpose, a belt conveyor C8 of 1400 mm wide and 1200 tph capacity will be installed to receive coal from the discharge drum of tripper conveyor C4/C5 and then carry to discharge coal into the 2 x 150 t capacity hopper. Coal will be reclaimed from these hoppers with the help of 200 tph capacity vibratory feeders provided at the discharge opening of the hopper for loading into customers' trucks. Rod gates will be provided at the discharge opening to arrest the coal in case of repair and maintenance of the vibratory feeders. The hoppers will be lined with 10 mm thick manganese steel liners.

Coal dispatches through rail will be weighed in the pre-weigh hopper located below the load out system before loading into the wagons. Coal dispatches by trucks through road will be weighed on 100 t capacity road weigh bridge (1 no.).

11.4.3 SAMPLING:

Automatic sampling system will be provided near load out system 500 te. Sample collector will collect coal from the belt conveyor C6 and C7 discharging into the load out system.

11.4.4 DUST SUPPRESSION ARRANGEMENT:

Dust suppression arrangement has been provided to suppress dust at all transfer points, truck receiving station, over the RCC bunkers, below the load out system, below truck loading hoppers etc. The dust suppression arrangement will be by spraying plain water in atomized/mist form to have better dust suppression. Necessary full cone type nozzles, valves, pipes, pumps, sump, pump house etc. will be provided.

11.4.5 FIRE FIGHTING ARRANGEMENT:

Fire fighting arrangement as per statutory requirements will be provided. Fire detection and alarm system will be provided. Fire extinguishers, sand buckets will be

provided in control room, substation/MCC rooms, compressor room, hydraulic power pack room, pump house, drive houses etc. to put-off minor nature of fires.

11.4.6 GROUND STOCK ARRANGEMENT:

The self flowing capacity of coal provided in RCC bunker which is equivalent to one day's production and one rake capacity. This capacity is sufficient. In case of necessity, when there is no dispatch and the bunker 12000 te and another load out system 500 te capacity are full, trucks can discharge coal at a suitable location near CHP to form ground stock which can be liquidated as and when required.

11.4.7 CHUTES:

Closed chutes will be provided at all the transfer points to avoid dust nuisance and for proper flow of material. The chutes will be properly lined.

11.4.8 LIFTING TACKLES:

Electric hoist blocks suitable for mounting on mono rails will be provided at the drive houses of belt conveyors, maintenance bay of plough feeders to lift the equipment during erection, repairing and maintenance. Traveling type pulley blocks suitable for mounting on mono rails will be provided at transfer points, sampler house, pump house, compressor room etc. to lift the equipment . Fixed type pulley blocks of suitable capacity will be provided in the towers of the counter weights provided for H-loop take up of the belt conveyors. Passenger lift of 1 t. capacity will be provided near 500 te load out system for transport of material and men in the load out system complex. An inspection trolley with cage will be provided over 500 te load out system for inspection of outer and inner surfaces of load out system.

11.4.9 HARD STAND:

Three numbers of hard stands will be provided one each near 500 te load out system and drive house of conveyor C6 and C7 for maintenance of equipment.

11.5.0 CONDITION MONITORING:

Suitable condition monitoring system to monitor the condition of motor winding and bearing temperatures of the HT motors, oil and bearing temperatures of the gear boxes will be provided.

11.6.0BELT VULCANIZING:

Belt vulcanizing units suitable for vulcanizing of steel cord/N-N belting will be provided. Belt handling device will also be provided to pull the belting during erection and jointing of belting.

11.7.0

Heat sensors will be provided at various levels in the load out system 500 te to monitor the temperature inside the load out system 500 te to take proper steps in case of emergency.

11.8.0

The control room near the weigh bridge will be of modular construction and located very near to the weighbridge and on right hand side of the road for communication with the driver. The control room will be air conditioned. Proper illumination, earthling system, lightning protection system will be provided near the weigh bridge. The weigh bridges are of pit less electronics type. The weigh bridges will be provided with required electronics, printout facilities. The print out facility will facilitate in keeping records of weighment.

11.9.0 POWER SUPPLY/ILLUMINATION:

11.9.1 POWER SUPPLY ARRANGEMENT:

Two numbers of 6.6 kV overhead lines with ACSR/AAAC conductors (wolf) from the project substation will be drawn up to the chp substation 1 located near the main bunker and terminated on a four pole structure.

All the equipment in the chp will operate at 6.6 kv/415v/230v, 50 Hz supply. For this purpose three numbers of substations as given below will be provided.

- CHP substation I: near overhead bunker (12000 te& 6000 te cap.)
- CHP substation II: Near overhead load out system (500 te cap)
- CHP substation III: Near truck receiving station.

CHP substation II and III will receive power from CHP substation I. At each substation required 6.6 kv switch boards, power transformers, lighting transformers, 415V MCC, lighting switch boards, auxiliary power distribution boards etc. will be provided.

All the required protections for over current, short circuit, earth fault and earth leakage will be provided.

415V MCC, lighting switch boards, auxiliary power distribution boards etc. will be provided.

All the required protections for over current, short circuit, earth fault and earth leakage will be provided.

11.9.2 ILLUMINATION:

The conveyor gantries, transfer houses, drive houses, various floors in load out system 500 te/bunker/truck loading hoppers, will be illuminated by 70W HPSV lamps with well glass fittings. For illumination of chp outdoor yard high masts 15/30 m with 400 w metal halide lamps will be provided at suitable location. The service buildings such as MCC room, transfer room, control room and other buildings will be illuminated with help of fluorescent tube lights. Service roads will be illuminated by means of 250W HPSV lamps in street light fittings mounted on poles.

11.9.3 CENTRAL CONTROL SYSTEM:

All the equipment working in the coal flow other than load out system (500 te cap.) will be operated and controlled sequentially from central place. For this purpose one control room will be provided over the substation located near the bunker (12000 te& 6000 te cap.). All the equipment in coal flow will be controlled from the control room. The other equipment which is not in the coal flow will also be controlled from the control room. A second control room will be provided below load out system (500 te cap.) for control the equipment operating at bunker. The control system will be of PLC type. Local control switches will be provided to facilitate for repair and maintenance of the equipment. PLC system will be provided along with mimic panel, enunciator panel in the control room.

11.9.4

Required earthing system, lightning protection system, safety equipment, communication equipment will be provided. The substations will be pressurized and control room will be air conditioned.

11.10.0 MANPOWER REQUIREMENT

The detail manpower requirement for operation and maintenance of CHP are shown in Appendix B.

11.11.0 CAPITAL REQUIREMENT

I. The capital requirement with year wise phasing & brief specification of the equipment is shown in Appendix A.3.5.

II. The above CHP would cater both Rampur Batura OC (4.0Mty) and proposed Batura West OC (1.5Mty). 75% of the total capital provision for this CHP has been envisaged in this PR. 25% of the total capital has been apportioned in PR for Batura west OC(1.5Mty).

RAILWAY SIDING

11.12.0 INTRODUCTION

A railway line will be constructed up to Rampur Batura open cast project from Anuppur junction which is about 20 km. This will consist of permanent way, culverts, bridges, electrification, signaling, block stations etc. A railway siding consisting of one load standage line (suitable for 58 box N wagons), one empty standage line (suitable for 58 box-N-wagons), engine escape line, one loading station, crossovers, turnouts, electrification, signaling etc. will be constructed at a suitable location near the project for loading of coal through a bunker of 500te capacity.

Extension of track upto Rampur Batura opencast may be done from the nearest Railway station i.e. either from Annupur or Burhar railway station which will be decided after feasibility studies of both the options. Distance upto Rampur Batura opencast from Burhar and Anuppur railway station will be approximately 18 km and 20 km respectively.

To operate the Rampur Batura opencast project (4.0 Mty) and Rampur Batura west extension (1.50 Mty), NH-78 has to be diverted for which a new bridge over Son river will be required. It will be better to construct a road cum Rail Bridge, if track extension is feasible from Burhar railway station.

As coal flow will be towards Katni via Burhar Railway station, rack has to move 45 km extra in every round if railway track to Rampur Batura OC is extended from Anuppur Railway station. Therefore it is proposed to extend railway track from Burhar Railway station, however the extension may be done as per the detailed feasibility study.

11.12.1 WEIGHMENT

Weighment of coal will be done by pre-weigh hopper installed below the bunker of 500te.

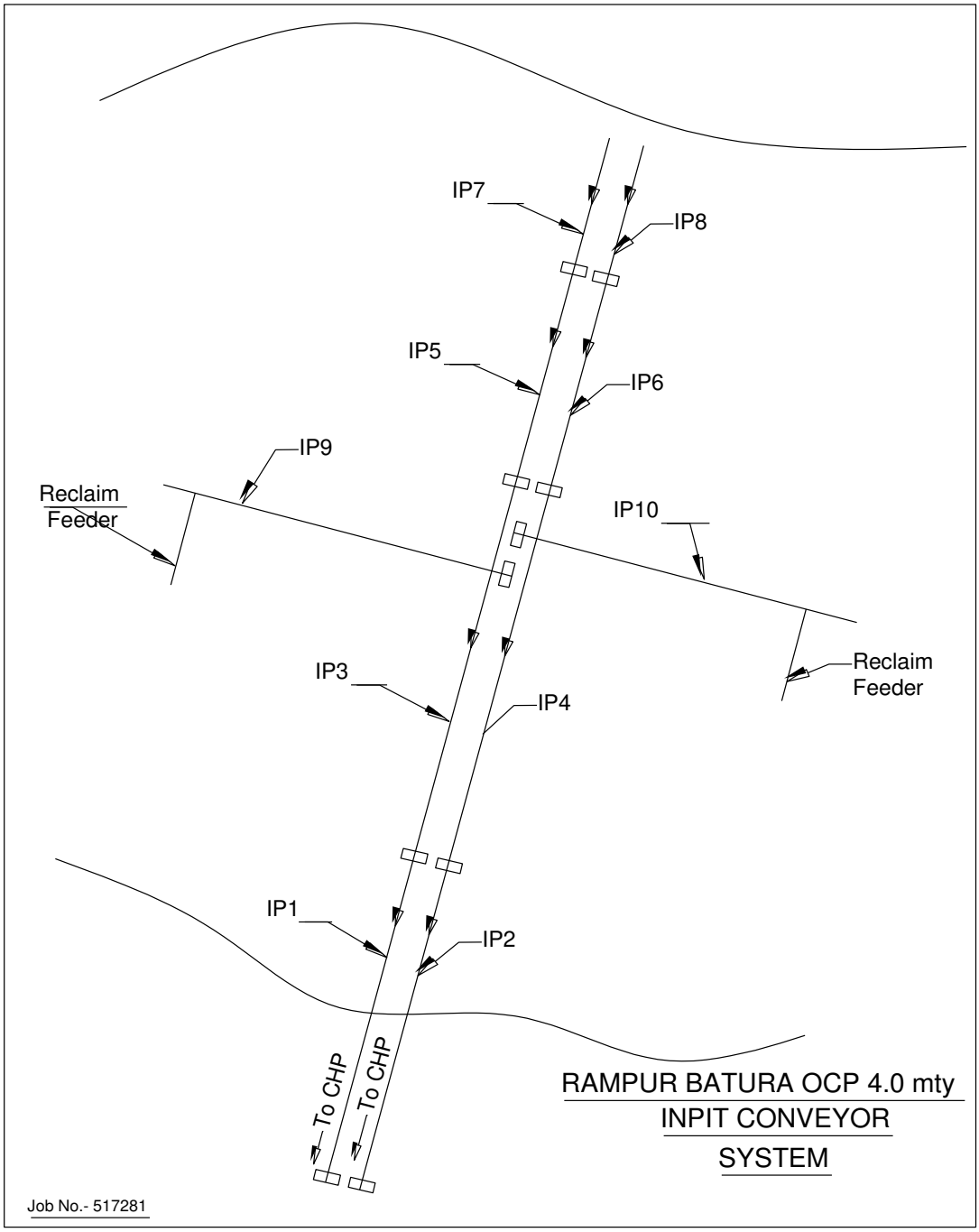
11.12.2 MAINTENANCE AND ILLUMINATION

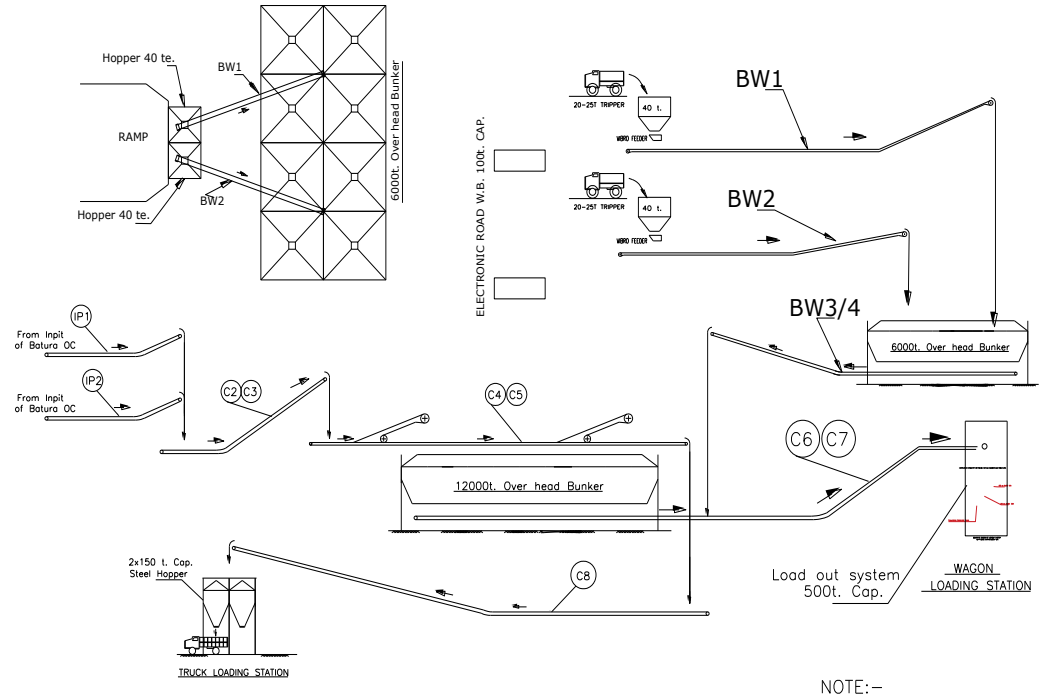
A maintenance shed has been provided near the siding for maintenance of diesel locomotive engine. It is proposed to outsource the maintenance of diesel engine. So no provision of equipment has been made for maintenance, however an E.O.T.

crane has been provided in the shed. Proper illumination arrangement will be provided near the siding and loco shed for easy operation at site.

11.12.3 CAPITAL REQUIREMENT

The above Railway siding would cater both Rampur Batura OC (4.0Mty) and proposed Batura West OC (1.5Mty). 50% of the total capital provision for Railway siding has been envisaged in this PR. Remaining 50% has been apportioned in Batura West OC PR (1.5Mty).


IP7
IP8
IP5
IP6
IP9
Reclaim
Feeder
IP10
Reclaim
Feeder
IP3
IP4
IP1
IP2
To CHP
To CHP
RAMPUR BATURA OCP 4.0 mty
INPIT CONVEYOR
SYSTEM
Job No.- 517281



NOTE:–

1. The flow diagram is indicative and may change during detail design.
2. For details of equipment refer appendix A3.5
3. Wagons will be moved by means of a deisel locomotive engine.

Fig. 11.1

FLOW DIAGRAM OF COMBINED CHP FOR RAMPUR BATURA, BATURA WEST OCP & BATURA HIGHWALL

Job No. 517287

BASIC DATA

1. Target production	6.0 mty.
2. Life of the mine:	20 Years
3. Quality of coal :	Grade "G5&G7"
4. Customer :	Power house & Misc.
5. End Product size	(-) 100mm
6. Despatch :	By Rail/ By road
7. Weighment:	Pre. weigh hopper for rail
	100t. Electranic weigh bridge for road despatch

LIST OF EQUIPMENT/ CONVEYORS for Batura west

SL.NO	PARTICULARS	QTY.	REMARKS
1.	BELT CONV.BW1/BW2 1200 mm WIDE, 170m LONG 2.0m/s SPEED, 400 tph. CAPACITY, 2x55 kW.	2	
2.	BELT CONV.BW3/BW4 1600 mm WIDE, 95m LONG 4.3m/s SPEED, 3000 tph. CAPACITY, 1x300 kW.	2	
3.	ELECTRONIC ROAD W.B. 100t. CAP.	2	At CHP
4.	MOTORISED HOIST CAPACITY 5 t.	2	
5.	MOTORISED HOIST CAPACITY 3 t.	2	
6.	Dust suppression system	LS	At Transfer points Drive house,Transfer house, Load out system, S/S etc.
7.	Fire fighting equipment	LS	

****

CHAPTER –XII

WORKSHOP AND STORES

(DEPARTMENTAL)

12.1. INTRODUCTION

In this project report it is envisaged to produce coal, over burden, coal handling operation, mine dewatering, power supply will be by departmental. Due to this reason a workshop has been provided to cater the needs of daily maintenance, schedule maintenance, lubrication, routine inspection, minor repair and replacement of parts/sub-assemblies of equipments such as pumps,CHP equipment, electrical equipment etc. deployed in the project.

The workshop facilities will be divided into unit excavation workshop, unit E&M workshop and unit store. The workshop in general works in two shifts; however a section of the workshop will work round the clock. In addition a unit store for storage of spare parts, engines transmissions, consumables, POL, scraps etc. will also been provided.

12.2 SCOPE OF WORKSHOP

12.2.1 **Unit excavation workshop**: - This workshop will undertake the following jobs:-

- Daily maintenance, routing lubrication, bi-weekly washing of equipment & inspection.
- Incidental minor repairs of assemblies, sub-assemblies of HEMM like dumpers, dozers, shovels, cranes, water tankers, diesel browsers etc.
- Schedule maintenance
- Medium repair and replacement of assemblies and sub-assemblies
- Mobile repair and maintenance facilities.
- Battery charging facilities.

12.2.2 Unit E&M workshop: This workshop will undertake the following jobs.

- Minor repairing, medium repairs, replacement of components, assemblies and sub-assemblies of CHP equipment, pumps, other E&M equipments., LMVS
- Washing of LMVS, assemblies and sub-assemblies of as other equipment
- Periodical lubrication
- Minor and Medium repair of switch gears, motors, self starters and other electrical equipment, motor rewinding
- Battery charging facilities
- Fabricating jobs.

12.2.3 Unit Store: - A unit store will be proposed to undertake the storage of spares, tyres, assemblies, float engines, cables, belting, pipes, other equipment, consumable, POL etc. Required stands, cabinet, bin s and material handling equipment were also provided.

12.3.0 FACILITIES

12.3.1 Unit excavation workshop: - The following facilities are provided for undertaking the jobs as mentioned above.

I. Dumper repair shop
II. Dozer repair shop
III. Heavy repair shop
IV. Washing station along with effluent treatment plant
V. Hydraulic repair shop
VI. Other facilities
VII. Fuel station

12.3.2 Unit E&M workshop: - The following facilities are provided for undertaking the jobs as mentioned under scope.

I. Machine shop
II. Electrical repair shop
III. Structural shop
IV. LMV shop
V. LMV platform for LMVS/equipment

VI. Substation
VII. Pump house

12.3.3 Unit store: The following facilities will be provided as mentioned under scope.

I. Racks
II. Cabinets
III. Bins
IV. Cardex system
V. Fork lift truck
VI. Cranes
VII. Weighing machine

12.3.4 Common facilities: - The following common facilities are provided.

I. Cycle/Car stand
II. Security post
III. First aid centre
IV. Power supply arrangement
V. Illumination arrangement.
VI. Office
VII. Fire fighting
VIII. Canteen
IX. Tyre shed and tyre Dismantle shop
X. Toilets
XI. Drainage
XII. Pavement.

12.4 MANPOWER:

Details of manpower required for manning workshop and stores are given in Appendix-B.

12.5 CAPITAL RQUIREMENT

The details of plant and machinery provided estimated costs along with phasing are given in Appendix- A.3.3.3.1, A.3.3.3.2 and A.3.3.3.

WORKSHOP AND STORES

(OUTSOURCING)

12.1. INTRODUCTION

In this project report it is envisaged to produce coal, over burden, coal handling operation, mine dewatering, power supply will be by departmental. Due to this reason a workshop has been provided to cater the needs of daily maintenance, schedule maintenance, lubrication, routine inspection, minor repair and replacement of parts/sub-assemblies of equipments such as pumps,CHP equipment, electrical equipment etc. deployed in the project.

The workshop facilities will be divided into unit excavation workshop, unit E&M workshop and unit store. The workshop in general works in two shifts; however a section of the workshop will work round the clock. In addition a unit store for storage of spare parts, engines transmissions, consumables, POL, scraps etc. will also been provided.

12.2 SCOPE OF WORKSHOP

12.2.1 Unit E&M workshop: This workshop will undertake the following jobs.

- Minor repairing, medium repairs, replacement of components, assemblies and sub-assemblies of CHP equipment, pumps, other E&M equipment's., LMVS
- Washing of LMVS, assemblies and sub-assemblies of as other equipment
- Periodical lubrication
- Minor and Medium repair of switch gears, motors, self-starters and other electrical equipment, motor rewinding
- Battery charging facilities
- Fabricating jobs.

12.2.2 Unit Store: - A unit store will be proposed to undertake the storage of spares, tyres, assemblies, float engines, cables, belting, pipes, other equipment, consumable, POL etc. Required stands, cabinet, bin s and material handling equipment were also provided.

12.3.0 FACILITIES

12.3.1 Unit E&M workshop: - The following facilities are provided for undertaking the jobs as mentioned under scope.

I. Machine shop
II. Electrical repair shop
III. Structural shop
IV. LMV shop
V. LMV platform for LMVS/equipment
VI. Substation
VII. Pump house

12.3.2 Unit store: The following facilities will be provided as mentioned under scope.

I. Racks
II. Cabinets
III. Bins
IV. Cardex system
V. Fork lift truck
VI. Cranes
VII. Weighing ma chine

12.3.3 Common facilities: - The following common facilities are provided.

I. Cycle/Car stand
II. Security post
III. First aid centre
IV. Power supply arrangement
V. Illumination arrangement.
VI. Office
VII. Fire fighting
VIII. Canteen
IX. Tyre shed and tyre Dismantle shop
X. Toilets

XI. Drainage

XII. Pavement.

12.4 MANPOWER:

Details of manpower required for manning workshop and stores are given in Appendix-B.

12.5 CAPITAL REQUIREMENT:

The details of plant and machinery provided estimated costs along with phasing are given in Appendix- A.3.3.3.1and A.3.3.3.2.

WORKSHOP AND STORES
(COAL DEPARTMENTAL & OB OUTSOURCING)

12.1. INTRODUCTION

In this project report it is envisaged to produce coal, coal handling operation, mine dewatering, power supply will be by departmental. Due to this reason a workshop has been provided to cater the needs of daily maintenance, schedule maintenance, lubrication, routine inspection, minor repair and replacement of parts/sub-assemblies of equipments such as pumps, CHP equipment, electrical equipment etc. deployed in the project.

The workshop facilities will be Common (Excavation & E&M) workshop, and unit store. The workshop in general works in two shifts; however a section of the workshop will work round the clock. In addition a unit store for storage of spare parts, engines transmissions, consumables, POL, scraps etc. will also been provided.

12.2 SCOPE OF WORKSHOP

12.2.1 Unit Common (Excavation & E&M) workshop: - This workshop will undertake the following jobs:-

- Daily maintenance, routing lubrication, bi-weekly washing of equipment & inspection.
- Incidental minor repairs of assemblies, sub-assemblies of HEMM like dumpers, dozers, shovels, cranes, water tankers, diesel browsers etc.
- Schedule maintenance
- Medium repair and replacement of assemblies and sub-assemblies
- Mobile repair and maintenance facilities.
- Battery charging facilities.
- Minor repairing, medium repairs, replacement of components, assemblies and sub-assemblies of CHP equipment, pumps, other E&M equipment., LMVS
- Washing of LMVS, assemblies and sub-assemblies of as other equipment
- Periodical lubrication
- Minor and Medium repair of switch gears, motors, self-starters and other electrical equipment, motor rewinding
- Fabricating jobs.

12.2.2 Unit Store: - A unit store will be proposed to undertake the storage of spares, tyres, assemblies, float engines, cables, belting, pipes, other equipment, consumable, POL etc. Required stands, cabinet, bin s and material handling equipment were also provided.

12.3 FACILITIES

12.3.1 Unit Common (Excavation & E&M) workshop: - The following facilities are provided for undertaking the jobs as mentioned above.

i Dumper & Dozer repair shop
ii Heavy repair shop
iii Hydraulic repair shop
iv Radiator & Other repair shop
v Machine shop
vi Electrical repair shop
vii Structural shop
viii Engine repair shop
ix Substation
x Pump house
xi Washing station along with effluent treatment plant
xii Fuel station
xiii Tyre Shed

12.3.2 Unit store: The following facilities will be provided as mentioned under scope.

i Racks
ii Cabinets
iii Bins
iv Cardex system
v Fork lift truck
vi Cranes
vii Weighing machine

12.3.3 Common facilities: - The following common facilities are provided.

i. Cycle/Car stand
ii. Security post

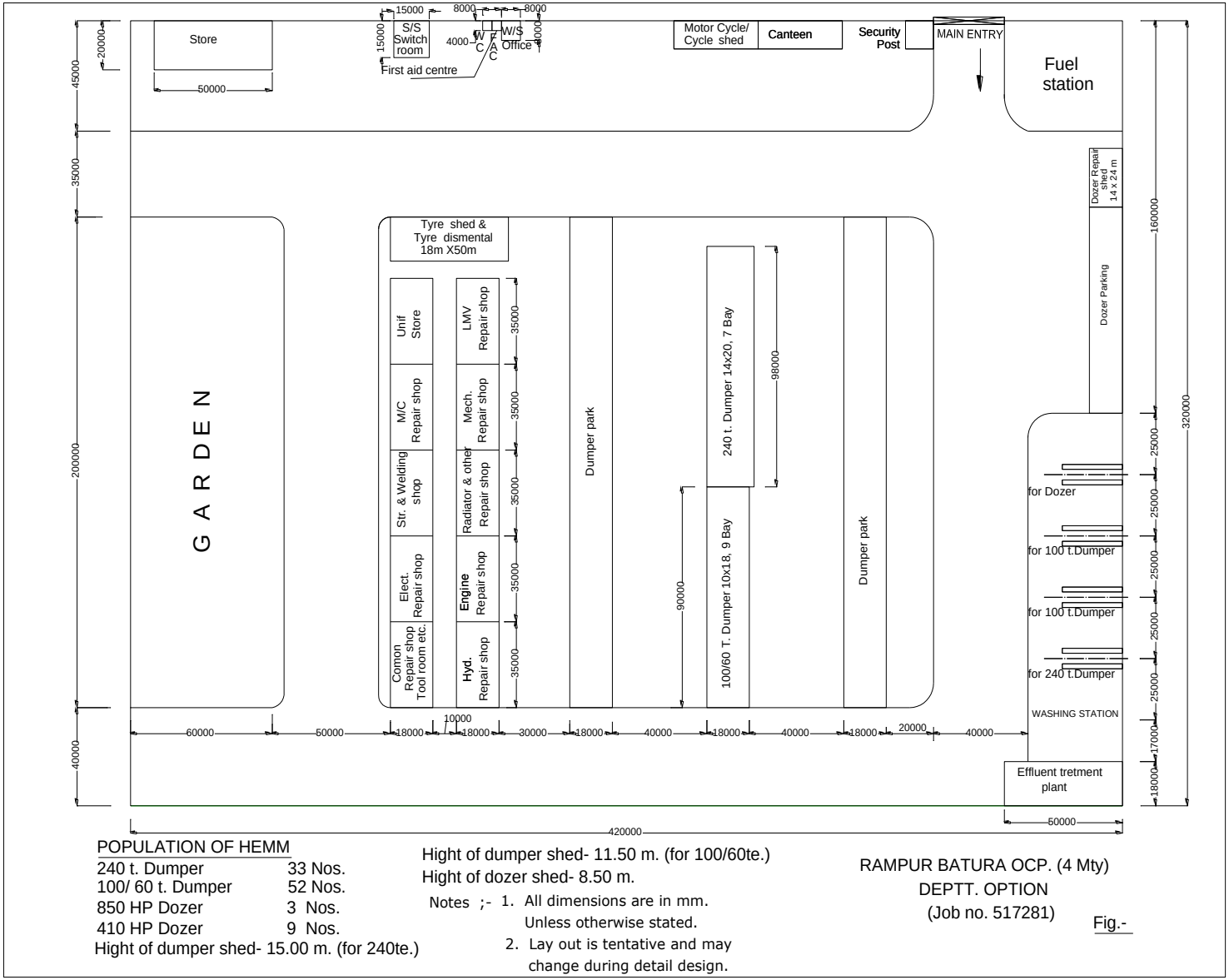
iii. First aid centre
iv. Power supply arrangement
v. Illumination arrangement.
vi. Office
vii. Fire fighting
viii. Canteen
ix. Tyre shed and tyre Dismantle shop
x. Toilets
xi. Drainage
xii. Pavement.

12.4 MANPOWER:

Details of manpower required for manning workshop and stores are given in Appendix-B.

12.5 CAPITAL RQUIREMENT

The details of plant and machinery provided estimated costs along with phasing are given in Appendix- A.3.3.1 and A.3.3.2.



POPULATION OF HEMM

240 t. Dumper	33 Nos.
100/ 60 t. Dumper	52 Nos.
850 HP Dozer	3 Nos.
410 HP Dozer	9 Nos.

Hight of dumper shed- 15.00 m. (for 240te.)

Hight of dumper shed- 11.50 m. (for 100/60te.)

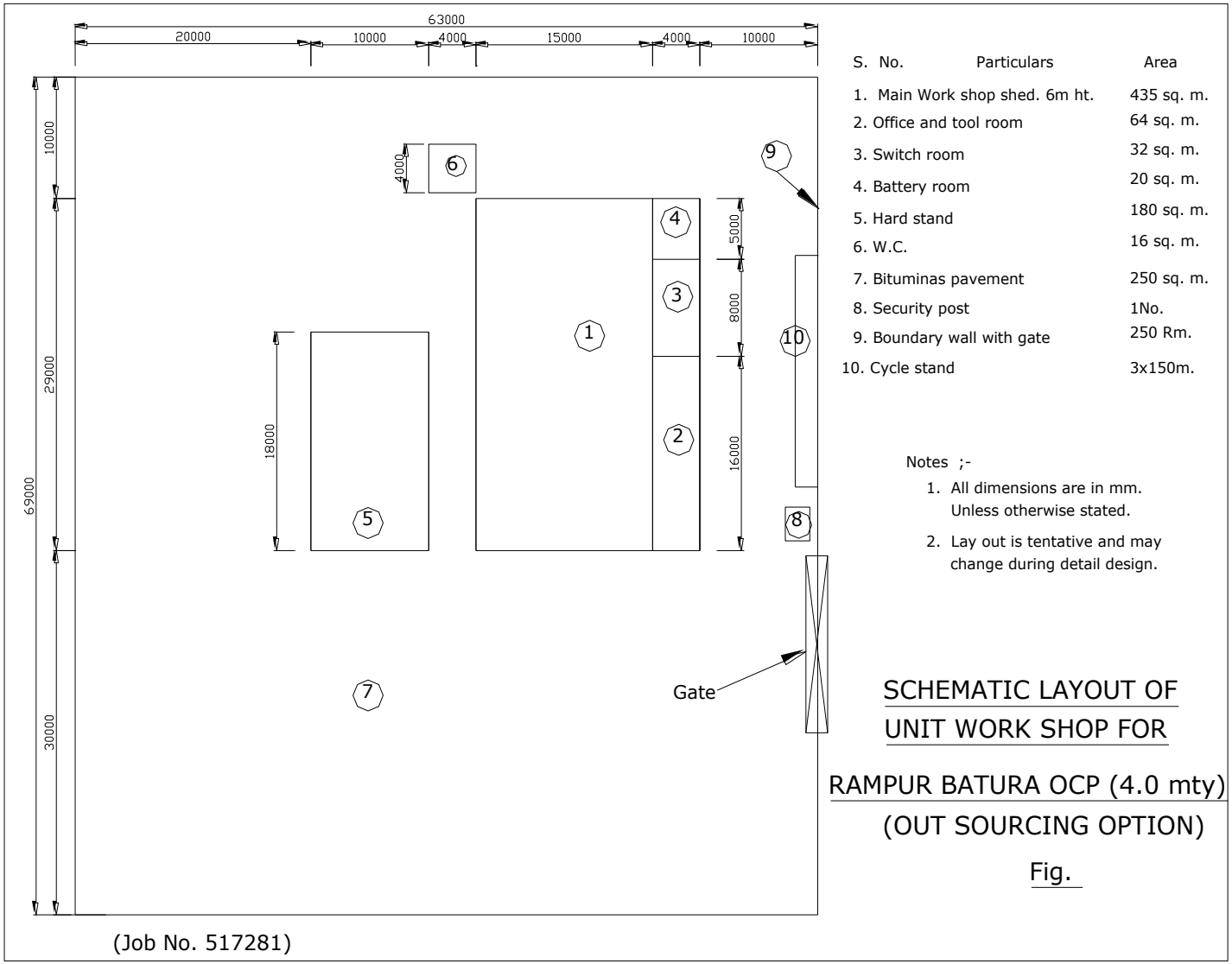
Hight of dozer shed- 8.50 m.

Notes ;- 1. All dimensions are in mm. Unless otherwise stated.

2. Lay out is tentative and may change during detail design.

RAMPUR BATURA OCP. (4 Mty)
DEPTT. OPTION
(Job no. 517281)

Fig.-



S. No.	Particulars	Area
1.	Main Work shop shed. 6m ht.	435 sq. m.
2.	Office and tool room	64 sq. m.
3.	Switch room	32 sq. m.
4.	Battery room	20 sq. m.
5.	Hard stand	180 sq. m.
6.	W.C.	16 sq. m.
7.	Bituminas pavement	250 sq. m.
8.	Security post	1No.
9.	Boundary wall with gate	250 Rm.
10.	Cycle stand	3x150m.

Notes ;-

1. All dimensions are in mm. Unless otherwise stated.
2. Lay out is tentative and may change during detail design.

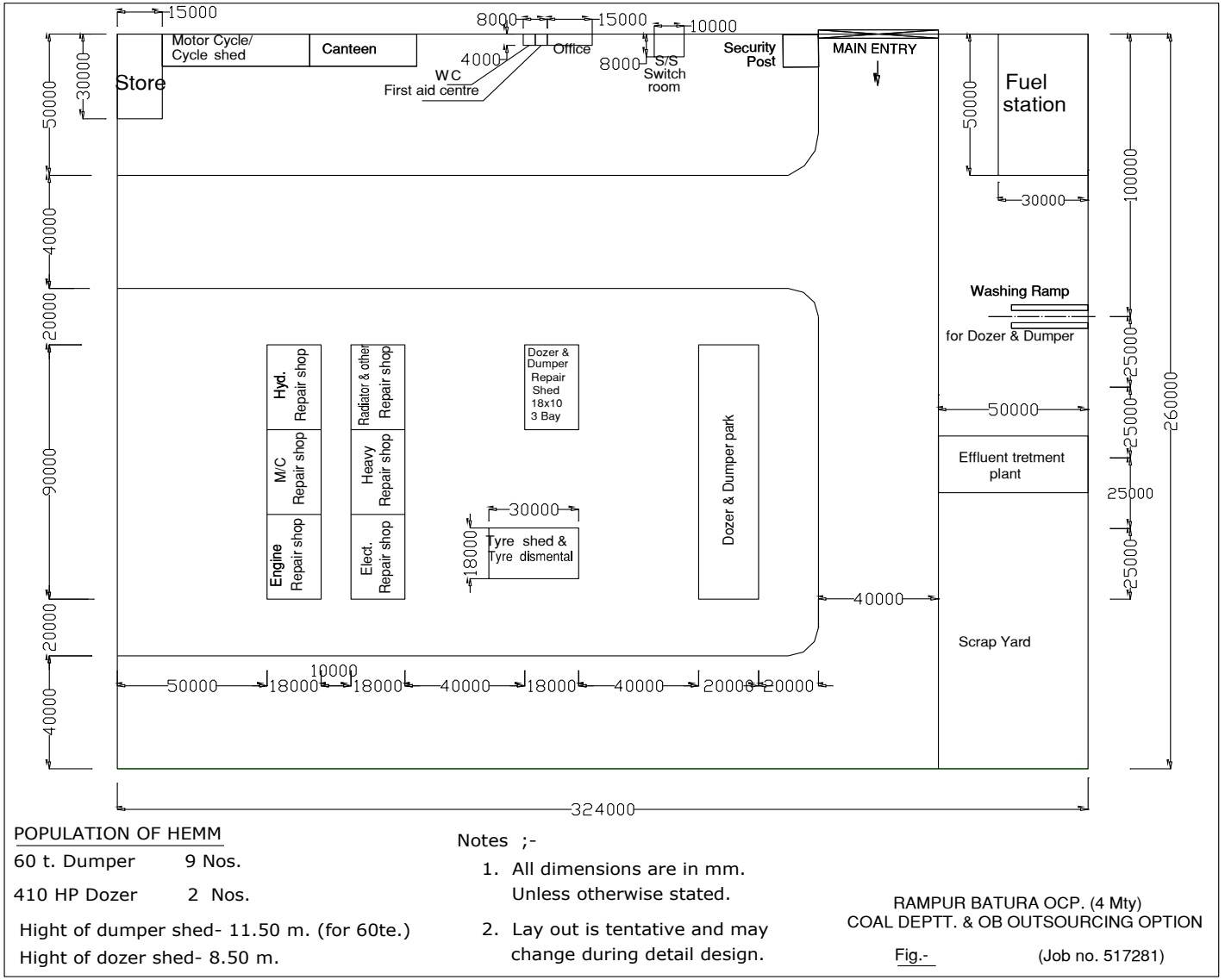
SCHEMATIC LAYOUT OF UNIT WORK SHOP FOR

RAMPUR BATURA OCP (4.0 mty)

(OUT SOURCING OPTION)

Fig.

(Job No. 517281)



POPULATION OF HEMM

60 t. Dumper 9 Nos.

410 HP Dozer 2 Nos.

Hight of dumper shed- 11.50 m. (for 60te.)

Hight of dozer shed- 8.50 m.

Notes ;-

1. All dimensions are in mm. Unless otherwise stated.
2. Lay out is tentative and may change during detail design.

RAMPUR BATURA OCP. (4 Mty)
COAL DEPTT. & OB OUTSOURCING OPTION

Fig.- (Job no. 517281)

****

CHAPTER - XIII
POWER SUPPLY, ILLUMINATION AND COMMUNICATION

13.1 Power Supply

13.1.1 Source of Power

Rampur Batura Opencast project is located in the Sohagpur Area of SECL. This project will receive power at 33 kV by means of two numbers independent overhead lines drawn on single rail pole from CSEB substation located at Chachai. The distance of the opencast project from CSEB substation is approximately 5 km. This transmission line will feed power to Rampur Batura West OCP &BaturaHighwall also.

13.1.2 Proposed Stage

13.1.2.1 Main Substation

It is proposed to establish main substation near quarry. The main substation will be fed through two numbers of 33 kV overhead feeders (ACSR, WOLF) drawn from CSEB substation located at Chachai. Three Options- Departmental, Outsourcing and Partial Outsourcing have been worked out.

Departmental : Two numbers of transformers each of **33/6.6 kV, 10000** kVA capacity will be installed to cater the loads of mine, HEMM, CHP, Workshop, pumping, colony & other service facilities for departmental option for which maximum power demand comes to around **10488** kVA.

Outsourcing & Partial Outsourcing: Two numbers of transformers each of **33/6.6 kV, 5000** kVA for both the options to cater the loads of mine, CHP, Workshop, pumping & other service facilities for outsourcing as well as partial outsourcing option for which maximum power demand comes to around **3986** kVA &**4024 kVA** respectively.

The power balance of the above electrical loads are given in Table- 13.1(a) (for Deptt. Option) .For outsourcing & partial outsourcing options, the power balance is given at Table 13.2(a) & 13.3(a) respectively.

The schematic power distribution of main substation is shown in Fig 13.1, 13.2 & 13.3 respectively. The major functional components for all three options substations are as follows.

(i) Outdoor Installations for main Substations

a) 33 kV Isolators

b) 33 kV Bus Section

c) 33 kV Vaccum Circuit Breakers

d) 33 kV/6.6 kV, 10000 kVA transformers -2 nos. (Departmental)
33 kV/6.6 kV, 5000 kVA transformers -2 nos (Outsourcing &Partial)

e) 33 kV Current transformers and potential transformers

f) 33 kV Lightning arrestors

g) 33/0.230 kV (L-L), 100 kVA lighting transformer

h) 33 /0.433 kV, 160 kVA station transformer

(ii) Indoor Installations

a) 33 kV Remote Control Panel for 33 kV circuit breakers.

b) 6.6 kV Switch Board

c) 415 V Switch board

d) 230 V (L-L) lighting Switch Board

e) 6.6 kV Capacitor Banks

(iii) 6.6 kV Indoor Type Switch Board

For Departmental Option:

In the Main substation, one number 25 panel 6.6 kV indoor type switch board will be installed for secondary control of the main transformers, control of power supply to the quarry and other load centers of the project. The capacitor bank controlling panel will incorporate automatic power factor controlling equipment.

The 6.6 kV indoor type switch board will comprise 25 numbers of vacuum circuit breakers for following functions:

Incoming feeder control	2 nos.
Sectionaliser	1 no.
Capacitor Bank control	2 nos.
Quarry feeder control	3 nos.
Quarry Lighting feeder control	2 nos.
HEMM	4 nos.
Quarry Pump feeder control	3 nos.
Primary control of 250 kVA,6.6/0.433 kV transformer(Workshop)	2 nos.

CHP feeder control	2 nos.
Reserve	2 nos.
Colony loads	2 nos.
Total	25 nos.

For Outsourcing & Partial Outsourcing Option:

In the Main substation, one number 19 panel 6.6 kV indoor type switch board will be installed for secondary control of the main transformers, control of power supply to the quarry and other load centers of the project. The capacitor bank controlling panel will incorporate automatic power factor controlling equipment.

The 6.6 kV indoor type switch board will comprise 19 numbers of vacuum circuit breakers for following functions:

Incoming feeder control	2 nos.
Sectionaliser	1 no.
Capacitor Bank control	2 nos.
Quarry feeder control	2 nos.
Quarry Lighting feeder control	2 nos.
Quarry Pump feeder control	2 nos.
Primary control of 250 kVA,6.6/0.433kV transformer(Workshop)	2 nos.
CHP feeder control	2 nos.
Reserve	2 nos.
Colony loads	2 nos.
Total	19 nos.

(iv) 160 kVA, 33/0.433 kV Transformer and 415V Switch Board

It is proposed to install one number 160 kVA, 33/0.433 kV station transformer for the substation at the outdoor yard. A 415 V indoor type switch board with required no of MCB's/MCCB's will be installed in the substation building. It will receive power directly from the 33 kV busbar.

(v) 100 kVA, 33 kV/ 0.230 kV (L-L) lighting transformer and Lighting Main Distribution Board

It is proposed to install one no. 100 kVA, 33 kV/ 0.230kV (L-L) lighting transformer in the substation building for meeting the lighting loads on the surface. It will feed power to the distribution boards consisting of required nos. of 2/3 pole MCB's/MCCB's.

(vi) Connected Load and Maximum Demand

In the 1st option all mining operations (OB removal and coal extraction) are to be carried out departmentally. Electrically operated equipment like HEMMS, pumps, workshop, CHP, surface and quarry lighting and residential colony have been proposed in the project for which power will be required. The connected load & maximum demand of the main substation has been assessed as **22940 kW & 10488 kVA** with a corrected power factor of 0.98 (lagging).

In the 2nd option all mining operations (OB removal and coal extraction) are to be carried outthrough outsourcing. Electrically operated equipment like, pumps, workshop, CHP, surface and quarry lighting and residential colony have been proposed in the project for which power will be required. The connected load & maximum demand of the main substation has been assessed as **7390 kW & 3986 kVA** with a corrected power factor of 0.98 (lagging).

In the 3rd option OB removal is to be carried out through outsourcing and coal extraction departmentaliy i.e. partial outsourcing. Electrically operated equipment like pumps, workshop, CHP, surface and quarry lighting and residential colony have been proposed in the project for which power will be required. The connected load & maximum demand of the main substation has been assessed as **7490 kW & 4024 kVA** with a corrected power factor of 0.98 (lagging).

(vii) Protection of Substation, Control and Signaling, Interlocking and earthing(for all three options)

Vacuum Circuit Breakers conforming to IS: 2516 (current)(OR the relevant updated IS, if any) will be used for incoming feeder control and primary control of the 10000 kVA transformers. The secondary of 10000 kVA transformers will be grounded through suitably rated resistor for restricted earth neutral system and will be provided with relays for protection from earth fault. Similarly for 5000 kVA 33/6.6 kV transformers of other options.

The operating voltage of the spring charging motor and the tripping device of the circuit breaker will be fed through the in-built rectifier provided in the circuit breaker.

The Circuit Breakers in conjunction with current transformer offer protection of thetransformers against over current, short circuit and earth fault.

The live parts of the circuit breakers will be properly shrouded as per relevant safety rules. Remote control of 33 kV circuit breakers will be performed by the control panel located in the control room of the substation.

The following system of signaling will be used in the substation:-

- Signaling to inform personnel about automatic tripping of circuit breaker due to fault.

- Warning signal about occurrence of abnormality in any particular device.

- Signal to show actuation of automatic and protective relays (flags and pointer on relays)

Similar control, protection and signaling devices will be incorporated in the 6.6 kV indoor panels also.

viii) Protection against Lightning (for all three options)

Station class Lightning arrestors conforming to IS: 3070 and IS: 4004 will be provided on 33 kV side in the substation yard for protection against lightning and will be connected to separate earth pits.

For the protection of the substation building from lightning, spikes will be provided on the roof of the building and will be connected by means of G.I. flats. Earth pits of sufficient quantity will be provided around the building and will be connected to form a grid to which the grid connecting the spikes will be connected through down conductors.

Shield wires will be provided over the outdoor yard equipment and will be connected to separate earth pits for protection against direct lightning strokes.

ix) Interlocking System (for all three options)

The air break isolators associated with 33kV circuit breaker will be interlocked with the circuit breakers to avoid mal-operation.

The 6.6 kV sectionaliser circuit breakers in the 6.6 kV switchboard panel will have electrical inter-lock with the incoming 6.6 kV circuit breakers to avoid parallel operation of transformers. Primary and Secondary control circuit breakers will be connected for inter tripping, i.e the secondary control circuit breaker will trip automatically when the primary circuit breaker trips.

x) Earthing (for all three options)

In order to maintain the earth resistance of the substation below 1 ohm, sufficient number of earth pits will be provided in the substation premises. All these earth pits will be interconnected. Substation earthing will conform to IS: 3043 (latest updated, if any). The neutral of the 10000 kVA transformers will be earthed through resistance and 100 kVA station transformer will be solidly earthed with independent earth pit. The earthing of field equipment will be through the armouring of the cable. Separate earth pits shall be provided for lightning arresters and lightning protection system in the substation. The earthing electrodes will be of safe electrodes.

xi) Safety and Fire Fighting (for all three options)

For safety of the electrical system “The Central Electricity Authority Regulation-2010” and other Safety regulations/IS will be complied with.

The boundary of the substation outdoor yards will be suitably fenced by wire-net fencing which will be suitably earthed by independent earth pit. Soak pits will be provided for collection of the oil leaked from the transformer to avoid any damage due to fire. Rubbles will be spread in the yard and the ground in the outdoor yard will be treated for anti-grass. Baffle wall shall be provided in between power transformers. Nitrogen Injection System shall be provided for automatic fire fighting for 10000 kVA , 33/6.6 kV Transformer in Departmental Option as well as for other options 5000 kVA, 33/6.6 kV.

Fire hydrant system shall be provided in the outdoor yard for fire fighting. In the control room heat and smoke sensors along with audio-visual fire alarm system shall be provided. A separate diesel pump of suitable rating shall be deployed exclusively for fire fighting system. Additionally following fire fighting facilities will be provided -

- sand buckets
- Dry Powder type and Portable foam type chemical fire extinguishers
- CO_2 fire extinguishers

The following items will also be provided:-

- Electrician rubber gloves for HT working
- Standard discharging rod
- Danger Notice plate

- First - Aid box complete with necessary contents
- Electric shock treatment chart
- Trolley mounted ladder (FRLS type)
- Safety belt etc.
- Anti climbing device on the termination poles of 33 kV incoming line.

xii)Maintenance and Testing Tools and Tackles for all three options

The following tools and tackles will be used:

- Insulation tester (500 V, 5 kV) and intrinsically safe megger.
- Earth resistance tester
- Clip Volt Ampere meter (Tong Tester)
- AVO meter
- Transformer oil tester
- Cable jointer kit
- Portable Ammeter, voltmeter, etc
- High voltage cable testing apparatus
- Hand operated crimping tool

13.1.2.2 Energy Consumption:-

The energy consumption has been calculated considering active power, annual number of working hours of equipment/ installation wise. The details of the year wise energy consumption including colony loads are given in Table 13.1(b), 13.2(b) & 13.2(c). The specific energy consumption will be approximately**12.11, 3.68 & 3.70kWh per ton** of coal produced at the targeted production of 4 Mt/yr respectively for all three options.

13.1.2.3 System Voltage

The supply voltage and operating voltage used in the project are as follows:

Sl. No.	Equipment	Voltage
1	Incoming supply voltage	33 kV
2	Supply voltage to Main Pumps	6.6 kV

Sl. No.	Equipment	Voltage
3	Supply voltage to workshop	415 V
4	Supply voltage to CHP	6.6 kV
5	Supply voltage to intermediate Pumps	430V
6	Supply voltage to colony	415 kV
7	Quarry lighting	230 V (L-L)
8	Supply voltage to HEMM	6.6 kV

Restricted Earthed Neutral System has been envisaged for 6.6 kV side and quarry distribution.

13.1.2.4 Power Factor Improvement

In order to maintain a high system power factor of around 0.98 even during maximum demand hours, two sets of 6.6 kV capacitors each of 2 X 3100 kVAR capacity for departmental option, 2 X 1250 kVAr for Outsourcing option & 2 X 1000 kVAr for partial outsourcing option have been provided in the 6.6 kV switch board of substation . The capacitor banks will have the facility to connect and disconnect required number of units depending upon the loading pattern of sub-station. The capacitor bank will be provided with automatic control facility to be incorporated in the respective control panel

13.1.2.5 Quarry Power Supply Distribution

Six nos. 6.6 kV overhead feeders (for pumps and quarry lighting) with ACSR 'WOLF' conductors will be drawn to quarry from main substation. At required locations power will be tapped by providing pole mounted air break switches to feed power to corresponding equipment. For supplying power to main pumps operating at 6.6 kV required number of 6.6 kV switch boards have been provided to be installed at required pumping stations in the quarry. For power supply to intermediate pumps, provision of unitised substations of 6.6kV/433V, 400 kVA each have been provided for all three options.

13.2 Quarry Illumination

General illumination will be by CFL Lamps of 85/100 W mounted on suitable support fixed along quarry periphery. The permanent type of illumination in haul road, and inside the quarry will also be done by 65/85 W CFL lamps. These lights are to be supplied from 230 V (L-L) systems. Haul roads will be illuminated by required no. of 85W CFL light fittings.

Energy efficient lighting of latest technology and better, robust & compact design having long durability like LED or CFL or T5 lamps fitting shall be used in Mine area and Office building. The light fitting should be chosen, considering the working conditions of Mine and also the lumen output Capacity equivalent to those of 250 W HPSV,150 W HPSV or 40/36 W fluorescent lamps fittings.

Provision of mobile lighting masts/towers has also been made in this report for illumination in the working zones of quarry.

13.3 Power Balance and Annual Energy Consumption, year wise Energy Consumption

The details of power balance for main substation is given at Table-13.1(a), 13.2(a) & 13.3(a) respectively for all three options. The annual energy consumption and year wise energy consumption are shown in Table 13.1(b), 13.2(b) & 13.3(b) respectively.

13.4 Salient Electrical Features and Cost Estimate

The total capital investment of Electrical P&M including incoming supply and communication equipment have been estimated and the details along with phased capital and brief specifications are shown at Appendix A.3.2.1 and Appendix A.3.2.2 for all three options. The summary of estimated capital for electrical P& M & communication along with phasing is shown at Appendix A.3.2. for all three options separately.

Provisions for the Diversion of 132 kV line along with HT & LT rural feeders have been made and budget has been envisaged in the appendix A.3.2.1.

13.5 Communication

For effective management of different production, service units and for ensuring safety, the following communication facilities have been envisaged for Rampur Batura Opencast Project (4 Mty)

- Administrative Communication
- Data Communication System

The following different types of administrative and Data communication systems have been envisaged:

13.5.1 IP Enabled Exchange

There shall be an IP enabled exchange with a capacity of 400 lines upgradeable to 1000 lines. The exchange shall be housed at the Office for providing effective and transparent communication between any two end locations like the various production units, quarry workings, workshops, main site offices, stores, CHP and residential colony. However, mobile communication along the road and quarry using TETRA mobile sets is being proposed. The EPABX will preferably employ PCM-TDM technique with a non-blocking structure. The EPABX shall have all the latest features like E1 port, LAN/ WAN port, etc. EPABX shall be interfaced with BSNL lines for extending external communication having STD & ISD facility. Self diagnostic facility shall be provided for EPABX extensions. Sufficient number of junction lines are to be provided for terminating BSNL, Tie and Trunk lines.

13.5.1.1 TECHNICAL SPECIFICAITON OF EPABX

The exchange shall be microprocessor based stored programme control and PCM-TDM switching with state of art technology.Exchange shall be suitable to be operated with DP and DTMF telephones.The line cards slots/channels in the main cabinet must be universal type, so that any type of line can be used in any line slot/channel and there shall be no limitation in slot position. Exchange shall have both voice and data switching capacity. Krone type MDF having capacity equivalent to ultimate capacity of the exchange with GD tubes for high voltage protection and poly switches for current protection on all extensions and trunks.System software shall have auto-diagnostic program to detect the faults and localize them.

The exchange should support multi-media application as per latest trend. It should be possible to connect PC's, host computers etc. without modern through Digital/ ISDN line. Exchange shall be DOT/TRC approved with ISDN facility.

13.5.1.2 NETWORKING FACILITY

Exchanges are required to operate in any one of the following and shall be suitable for both.

i) BSNL junction
ii) Exchange should also be able to inter-face directly with OFC/DECT systems, if required.

System should be capable to network with the following types of lines:

a. Loop disconnect tie lines.
b. Ring down hot line.
c. Direct inward dialing trunk and outward dialing trunk (2W/4W E&M Trunks).
d. ISDN line.

13.5.1.3 FEATURES

a. Flexible numbering scheme
b. Privacy of calls
c. DTMF DID facility junctions.
d. Conferencing
e. Automatic call back on busy extn.
f. Call transfer and Call pick up.
g. Last umber radial.

13.5.2 External BSNL Telephone communication

20 telephone lines have been provided for BSNL communication and access to public communication grid. These telephone sets would be located in the residences and offices of key personnel of the project, sub-station, railway siding, CHP, workshop, etc. Besides fixed line BSNL telephones, 20 nos. of BSNL cell one Mobile connection with sets may also be provided to important personnel of the project.

13.5.3 LAN and Internet

It is proposed to deploy electronic data processing facilities for production planning, control and project management etc. The system envisages to play a key role in establishment of highly effective Data Base Management System (DBMS) and Management Information System (MIS) etc.The type of computer would be small business computer with broad facilities and also have specific facilities to carry out :

- Pay rolls
- Financial accounting
- Inventory control
- Material Management

- HEMM utilization, breakdown analysis, idle time analysis etc.
- Production, dispatch schedule and variances.
- Accident records etc.
- Resource utilization and MIS.

Before initiating action for installation and implementation of the above EDP system, a detailed system study would have to be carried out, with clearly defined system objectives for identifying the data processing needs and management information system needs of the project. Based on the results and findings of the study, the system configuration and specification have to be decided.

A Local Area Network with 20 PCs is proposed for this project. The PCs will be connected to a 48 port L2 switch. The proposed network structure will be that of a workgroup. Suitable OS and other application software will be provided. Suitable printers, plotters CD writer shall be provided. A server with Windows 10/ Windows 7 shall also be provided. Internet facility shall also be provided through 128 Kbps leased internet from the nearest BSNL node.

13.5.4 48 port L2 switch

The L2 Switch shall be 48 port 10/100 having a gigabit uplink port and shall have sufficient backplane and throughput along with QoS features for both voice and data connectivity.

13.5.4.1 Technical Specification

- Configuration : 48 Nos. 10/100 Auto sensing Ports + 1 gigabit uplink port.
- The switch should support QoS classification of incoming packets for QoS Flows based on Layer 2, Layer 3 and Layer 4 fields.
- Standard Compliance – support IEEE 802.3x (flow control), IEEE 802.1p), IEEE 802.1 Q (V-LAN Trunking), IEEE 8021d (Spanning tree Protocol)
- Management – Have built-in SNMP, Web based and Command Line Interface for Management, SNMP v1/v2/v3, RMON.

13.5.5 L3/L4 Switches

The L3/L4 switch shall gave 24/48 nos 10/100 ports and gigabit port for connecting to the distantly located L2 switches. The switch shall have sufficient backplane and throughput along with QoS features for both voice and data.

13.5.5.1 Technical Specification

- 24/48, 10/100 base autosensing ports + Expansion module slot for Gigabit module for connecting to L2 switchs.
- Standard Compliance – support IEEE 802.3x (flow control), IEEE 802.1p, (prioritisation), IEEE 802.1 Q (V-LAN Trunking), IEEE 802.1d (Spanning tree
  Protocol)
- Management – Have built-in SNMP, Web based and Command Line Interface for Management, SNMP v1/v2/v3, RMON.

13.5.6 MOBILE COMMUNICATION

Instead of simplex type mobile sets, the TETRA-based system is proposed for mobile communication in the entire operational area of the Project including all important locations. The TETRA- based system has facility to incorporate GPS based Automatic Vehicle Location System (AVLS) and is very advantageous compared to the normal VHF network. The system based on TETRA (Terrestrial Trunk Radio) is cost-effective, reliable, extremely spectrum efficient and has higher quality reception for voice, data and multimedia. The system comprises of a central multi-channel controller and various numbers of mobile and hand-held sets.

The TETRA based network combines all the features and benefits of conventional walkie-talkie and GSM mobile network like Digital PMR, Voice and Data, Digital Cellular Phone, Alphanumeric Pager, Mobile Data Unit and encryption etc.

13.5.7 Wireless Radio System

Point to Multipoint Radio system is proposed for connecting some important location, where cabling will be not possible. This will integrated with LAN & Exchange to serve the data and voice communication.

13.5.8 BSNL 2 Mbps Leased Line

A BSNL 2 Mbps Leased Line is proposed for communication with the area HQ. This leased line shall be used both for voice and data communication with the Area HQ. A multi service voice and data router shall be used in this network. The router will be equipped with 2 nos. of WAN port and one no. of LAN port .

TABLE -13.1(a)
Power Balance of Electrical Load Rampur Batura OCP, 4 Mty
(DEPARTMENTAL OPTION)

Sl,no.	Equipment Details	Voltage V	Qty.	Unit Load (kW)	Total Load (kW)	Demand Factor	Power Factor Cos(Phi)	TAN (PHI)	Active Power (kW)	Reactive Power (kVAR)	Apparaent Power (kVA)
A	**Overburden**										
1	Elect. Rope Shovel 42 Cu.M	6600	3	3250	9750	0.50	0.80	0.75	4875	3656	6094
2	Elect Rope Shovel 10 cu m.	6600	5	560	2800	0.50	0.80	0.75	1400	1050	1750
3	RBH Drill 250 mm	6600	3	350	1050	0.50	0.70	1.02	525	536	750
B	**Coal**										
C	**Common**										
1	Workshop	415	-	-	500	0.50	0.70	1.02	250	255	357
2	CHP	6600			4200	0.60	0.70	1.02	2520	2571	3600
3	Main Pumps,	6600	5	370	1850	0.70	0.80	0.75	1295	971	1619
4	Slurry Pumps	415	2	55	110	0.70	0.80	0.75	77	58	96
5	Priming Pumps	415	4	7.5	30	0.70	0.80	0.75	21	16	26
6	Illumination (Surface)	230 (L-L)	-	-	250	0.90	0.90	0.48	225	109	250
7	Illumination (Quarry)	230 (L-L)	-	-	150	0.90	0.90	0.48	135	65	150
8	Colony and water Supply	415	-		1000	0.90	0.90	0.48	900	436	1000
	TOTAL				**22940**		0.78	0.81	12848	10360	16505
	Considering Diversity factor of 1.25						0.78	0.81	10278	8288	13204
	Total after improvement of p.f. to 0.98						0.98	0.20	10278	2087	10488
	kVAR capacity of capacitor bank to improve p.f. upto 0.98									**6201**	
	Rating of selected capacitor bank		**2 X3100kVAR**							**6200**	
	Projected Total						0.98		10278	2088	**10488**
	Transformer selected	**2 X 10000 kVA, 33 kV/6.6 kV**									

Table 13.1(b)
Estimated year wise energy consumption of Rampur Batura OCP, 4Mty, Deptt. Option

Sl,no.	Equipment Details	TOTAL CONNECTED LOAD (kW)	DEMAND FACTOR	TOTAL WORKING HRS./ YEAR	2nd YEAR		3 rd YEAR		4th YEAR		5 th YEAR		6th YEAR onwards	
					TOTAL LOAD (kW)	POWER CONSN. (kWh)	TOTAL LOAD (kW)	POWER CONSN. (kWh)	TOTAL LOAD (kW)	POWER CONSN. (kWh)	TOTAL LOAD (kW)	POWER CONSN. (kWh)	TOTAL LOAD (kW)	POWER CONSN. (kWh)
A	**Over Burden**													
1	Elect. Rope Shovel 42 Cu.M	9750	0.5	4410	3250	7166250	3250	7166250	6500	14332500	9750	21498750	9750	21498750
2	Elect. Hyd. Shovel 10 cu.m.	2800	0.5	4410	1120	2469600	1680	3704400	1680	3704400	2240	4939200	2800	6174000
3	RBH Drill 250 mm	1050	0.5	2880	350	504000	350	504000	700	1008000	1050	1512000	1050	1512000
	Sub Total					10859850		12454650		20124900		29389950		30984750
B	Coal													
	Sub Total					0		0		0		0		0
C	Common													
1	Workshop	500	0.50	1650	100	82500	200	165000	250	206250	350	288750	500	412500
2	CHP	4200	0.60	3960	1500	3564000	2500	5940000	3500	8316000	4200	9979200	4200	9979200
3	Main Pumps,	1850	0.70	1500	370	95312	740	190624	1110	285936	1480	381248	1850	508935
4	Slurry Pumps	110	0.70	1000	55	38500	55	38500	55	38500	110	77000	110	77000
5	Priming Pumps	30	0.70	1000	15	10500	22.5	15750	30.0	21000	30	21000	30	21000
6	Illumination (Surface)	250	0.90	3650	100	328500	150	492750	200	657000	250	821250	250	821250
7	Illumination (Quarry)	150	0.90	3650	100	328500	100	328500	150	492750	150	492750	150	492750
8	Colony and water Supply	1000	0.90	3650	400	1314000	600	1971000	800	2628000	1000	3285000	1000	3285000
	Sub Total					5761812		9142124		12645436		15346198		15597635
D	Line losses 4% of above all					664866		863871		1310813		1789446		1863295
E	Total of items A to D					17286528		22460645		34081149		46525594		**48445680**
	Specific Energy Consumption (kWh/T) for targetted production of 4.0 Mty													**12.11**
	Specific Energy Cost (Rs/T) for targetted production of 4.0 Mty (Rs 11.0/Unit)													**133.23**

TABLE - 13.2(a)
Power Balance of Electrical Loads of Rampur Batura OCP (4 Mty)
Outsourcing Option

Sl,no.	Equipment Details	Voltage V	Qty.	Unit Load (kW)	Total Load (kW)	Demand Factor	Power Factor Cos(Phi)	TAN (PHI)	Active Power (kW)	Reactive Power (kVAR)	Apparaent Power (kVA)
1	Workshop	415	-	-	300	0.50	0.70	1.02	150	153	214
2	CHP	6600			4200	0.60	0.70	1.02	2520	2571	3600
3	Main Pumps,225 llps,100 m head,350 kW	6600	5	370	1850	0.70	0.80	0.75	1295	971	1619
4	Slurry Pumps	415	2	55	110	0.70	0.80	0.75	77	58	96
5	Priming Pumps	415	4	7.5	30	0.70	0.80	0.75	21	16	26
6	Illumination (Surface)	230 (L-L)	-	-	250	0.90	0.90	0.48	225	109	250
7	Illumination (Quarry)	230 (L-L)	-	-	150	0.90	0.90	0.48	135	65	150
8	Colony and water Supply	415	-	0	500	0.90	0.90	0.48	450	218	500
	TOTAL				**7390**		0.76	0.85	4873	4161	6408
	Considering Diversity factor of 1.25						0.76	0.85	3898	3329	5126
	Total after improvement of p.f. to 0.98						0.98	0.20	3898	792	3978
	kVAR capacity of capacitor bank to improve p.f. upto 0.98									**2537**	
	Rating of selected capacitor bank		2 X1250 kVAR							2500	
	Projected Total						0.98		3898	829	**3986**
	Transformer selected		2 X 5000 kVA, 33 kV/6.6 kV								

Table 13.2(b)

Year wise energy consumption of Rampur Batura OCP (4 Mty)

Outsourcing option

Sl,no.	Equipment Details	TOTAL CONNECTED LOAD (kW)	DEMAND FACTOR	TOTAL WORKING HRS./ YEAR	2nd YEAR		3rd YEAR		IVth YEAR		Vth YEAR		VIth YEAR & Onwards	
					TOTAL LOAD (kW)	POWER CONSN. (kWh)	TOTAL LOAD (kW)	POWER CONSN. (kWh)	TOTAL LOAD (kW)	POWER CONSN. (kWh)	TOTAL LOAD (kW)	POWER CONSN. (kWh)	TOTAL LOAD (kW)	POWER CONSN. (kWh)
A	**Over Burden**	-				0		0		0		0		0
B	**Coal**					0		0		0		0		0
C	**Common**													
1	Workshop	300	0.5	1650	50.0	41250	100.0	82500	200.0	165000	300.0	247500	300.0	247500
2	CHP	4200	0.6	3960	1500.0	3564000	2500.0	5940000	3500.0	8316000	4200.0	9979200	4200.0	9979200
3	Main Pumps,225 llps,100 m head,350 kW	1850	0.7	1500	370.0	173530	740.0	347060	1110.0	520590	1480.0	694120	1850.0	867650
4	Slurry Pumps	110	0.7	1000	55.0	38500	55.0	38500	55.0	38500	110.0	77000	110.0	77000
5	Priming Pumps	30	0.7	1000	15.0	10500	22.5	15750	30.0	21000	30.0	21000	30.0	21000
6	Illumination (Surface)	250	0.90	3650	100.0	328500	150.0	492750	200.0	657000	250.0	821250	250.0	821250
7	Illumination (Quarry)	150	0.90	3650	100.0	328500	100.0	328500	150.0	492750	150.0	492750	150.0	492750
8	Colony and water Supply	500	0.90	3650	200.0	657000	400.0	1314000	500.0	1642500	500.0	1642500	500.0	1642500
	Sub Total(Common)	7390				5141780		8559060		11853340		13975320		14148850
	Adding line losses @ 4%					5347451		8901422		12327474		14534333		14714804
	Specific Energy Consumption (kWh/T) for targetted production of 4.0 Mty													**3.678701**
	Specific Energy Cost (Rs/T) for targetted production of 4.0 Mty (Rs 11.0/Unit)													**40.46571**

TABLE - 13.3a
Power Balance of Electrical Loads of Rampur Batura OCP (4 Mty)
Partial Outsourcing Option

Sl,no.	Equipment Details	Voltage V	Qty.	Unit Load (kW)	Total Load (kW)	Demand Factor	Power Factor Cos(Phi)	TAN (PHI)	Active Power (kW)	Reactive Power (kVAR)	Apparaent Power (kVA)
1	Workshop	415	-	-	400	0.50	0.70	1.02	200	204	286
2	CHP	6600			4200	0.60	0.80	0.75	2520	1890	3150
3	Main Pumps,225 llps,100 m head,350 kW	6600	5	370	1850	0.70	0.80	0.75	1295	971	1619
4	Slurry Pumps	415	2	55	110	0.70	0.80	0.75	77	58	96
5	Priming Pumps	415	4	7.5	30	0.70	0.80	0.75	21	16	26
7	Illumination (Surface)	230 (L-L)	-	-	250	0.90	0.90	0.48	225	109	250
8	Illumination (Quarry)	230 (L-L)	-	-	150	0.90	0.90	0.48	135	65	150
9	Colony and water Supply	415	-		500	0.90	0.90	0.48	450	218	500
	TOTAL				**7490**		0.81	0.72	4923	3531	6058
	Considering Diversity factor of 1.25						0.81	0.72	3938	2825	4847
	Total after improvement of p.f. to 0.98						0.98	0.20	3938	800	4019
	kVAR capacity of capacitor bank to improve p.f. upto 0.98									**2025**	
	Rating of selected capacitor bank		2 X1000 kVAR							2000	
	Projected Total						0.98		3938	825	**4024**
	Transformer selected		2 X 5000 kVA, 33 kV/6.6 kV								

Table-13.3b

Year wise energy consumption of Rampur Batura OCP (4 Mty)

Partial Outsourcing option

Sl,no.	Equipment Details	TOTAL CONNECTED LOAD (kW)	DEMAND FACTOR	TOTAL WORKING HRS./ YEAR	II nd YEAR		3rd YEAR		IVth YEAR		Vth YEAR		VIth YEAR & onwards	
					TOTAL LOAD (kW)	POWER CONSN. (kWh)	TOTAL LOAD (kW)	POWER CONSN. (kWh)	TOTAL LOAD (kW)	POWER CONSN. (kWh)	TOTAL LOAD (kW)	POWER CONSN. (kWh)	TOTAL LOAD (kW)	POWER CONSN. (kWh)
A	**Over Burden**					0		0		0		0		0
B	**Coal**					0		0		0		0		0
C	**Common**													
1	Workshop	400	0.5	1650	50.0	41250	100.0	82500	200.0	165000	300.0	247500	400.0	330000
2	CHP	4200	0.6	3960	1500.0	3564000	2500.0	5940000	3500.0	8316000	4200.0	9979200	4200.0	9979200
3	Main Pumps,225 llps,100 m head,350 kW	1850	0.7	1500	370.0	173530	740.0	347060	1110.0	520590	1480.0	694120	1850.0	867650
4	Slurry Pumps	110	0.7	1000	55.0	38500	55.0	38500	55.0	38500	110.0	77000	110.0	77000
5	Priming Pumps	30	0.7	1000	15.0	10500	22.5	15750	30.0	21000	30.0	21000	30.0	21000
6	Illumination (Surface)	250	0.90	3650	100.0	328500	150.0	492750	200.0	657000	250.0	821250	250.0	821250
7	Illumination (Quarry)	150	0.90	3650	100.0	328500	100.0	328500	150.0	492750	150.0	492750	150.0	492750
8	Colony and water Supply	500	0.90	3650	200.0	657000	400.0	1314000	500.0	1642500	500.0	1642500	500.0	1642500
	Sub Total(Common)	7490				5141780		8559060		11853340		13975320		14231350
	Adding line losses @ 4%					5347451		8901422		12327474		14534333		14800604

Specific Energy Consumption (kWh/T) for targetted production of 4.0 Mty **3.700151**

Specific Energy Cost (Rs/T) for targetted production of 4.0 Mty (Rs 11.0/Unit) **40.70166**

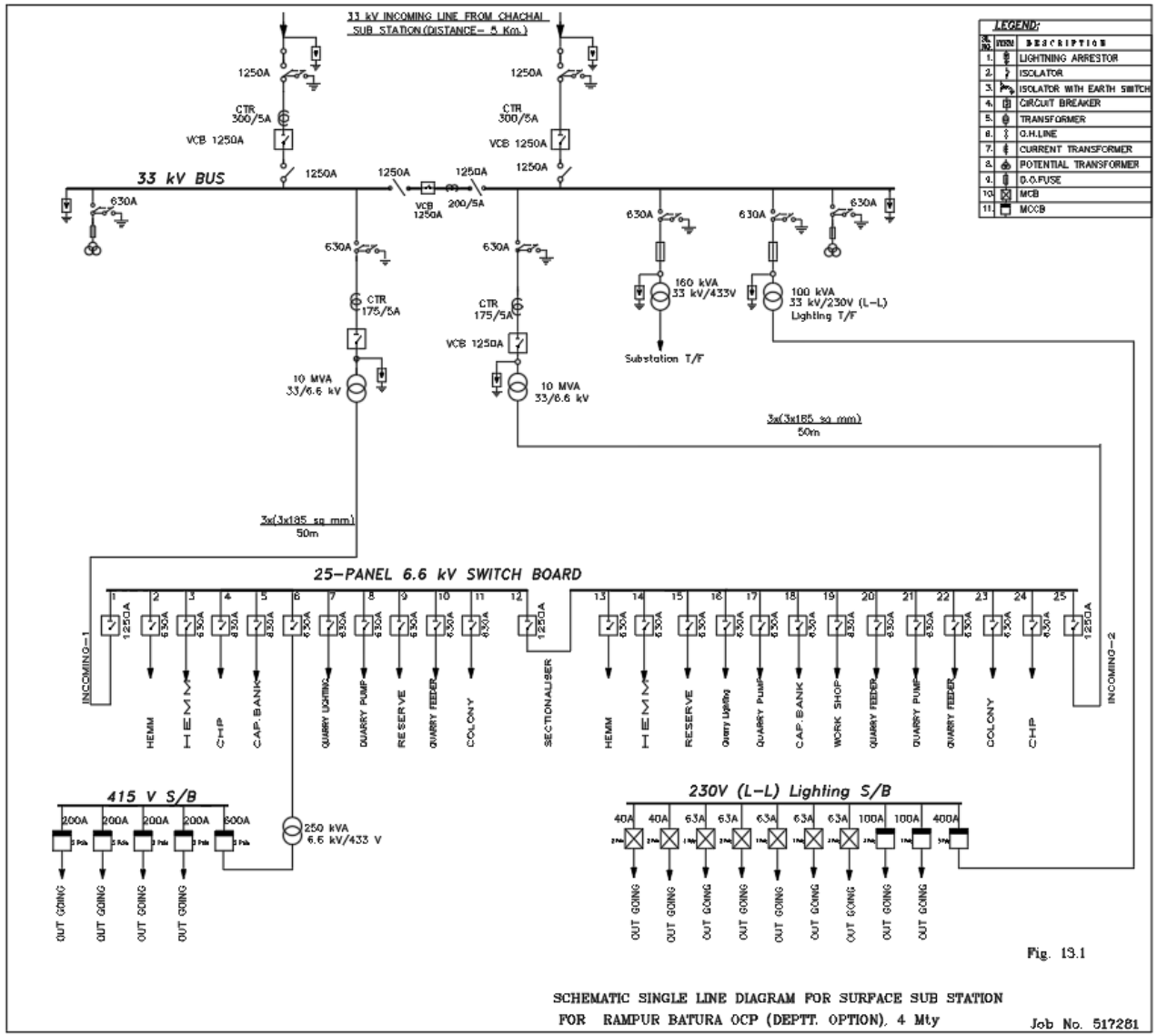


Fig. 13.1

SCHEMATIC SINGLE LINE DIAGRAM FOR SURFACE SUB STATION FOR RAMPUR BATURA OCP (DEPTT. OPTION), 4 Mty

Job No. 517281

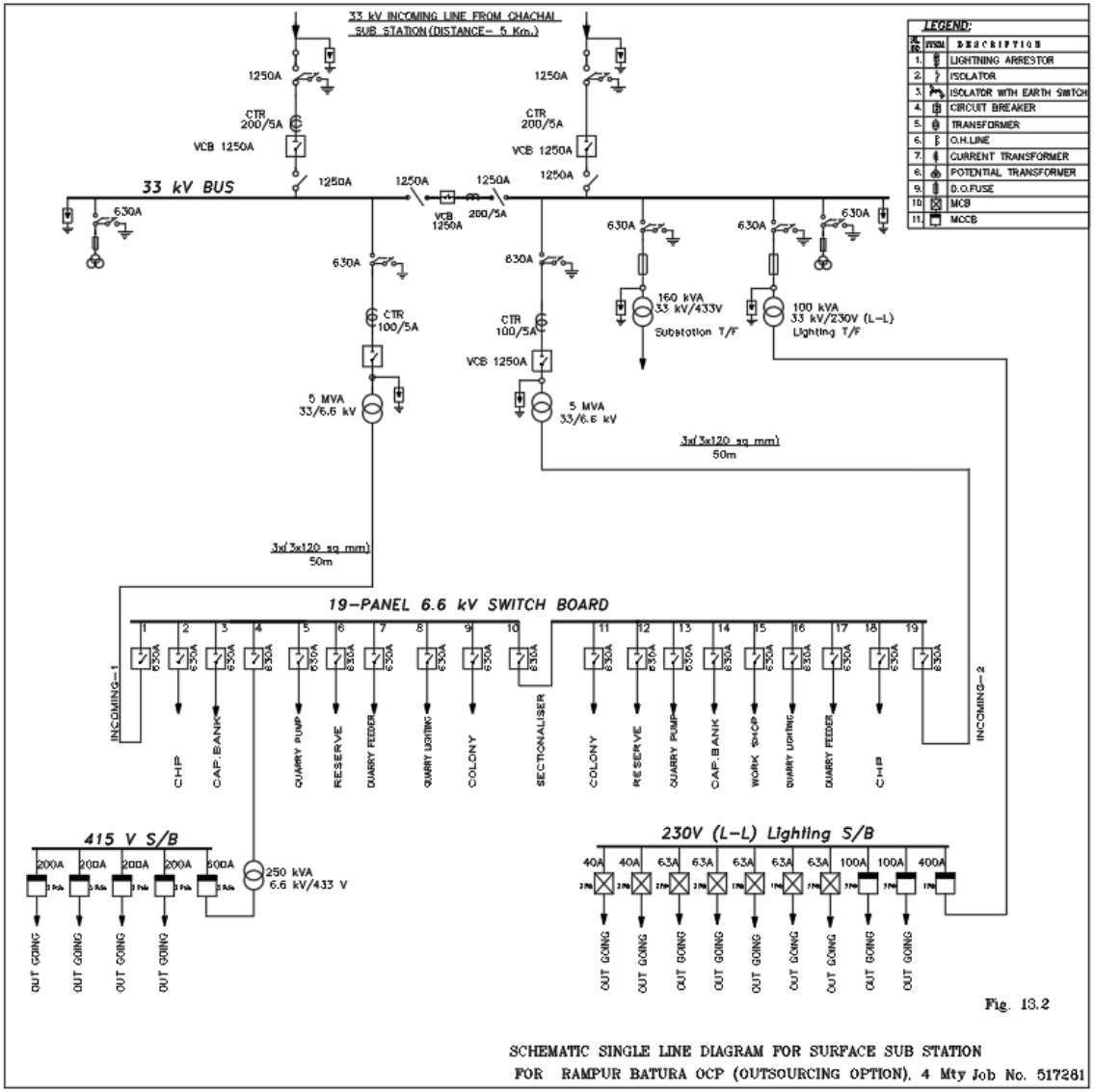
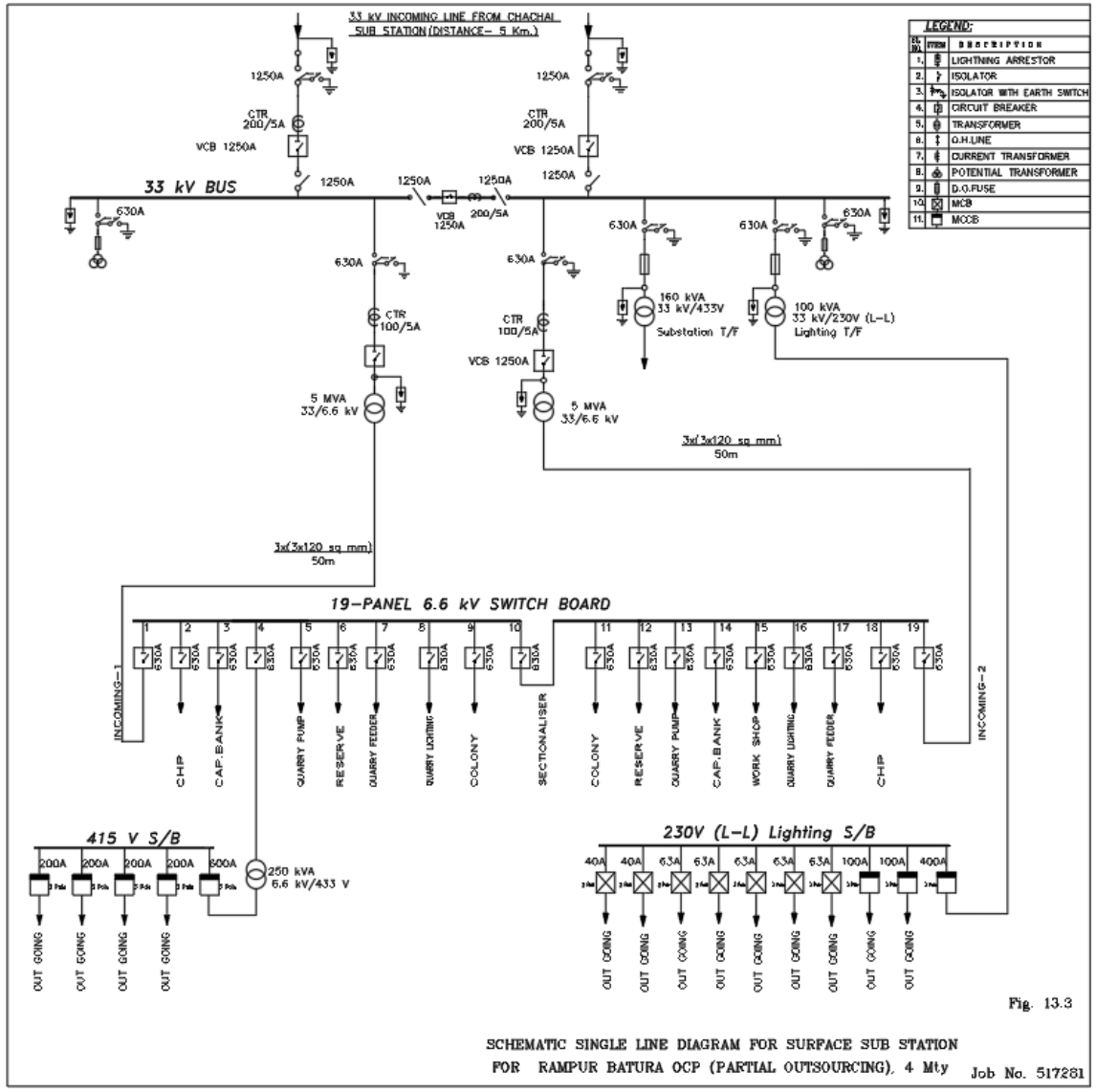


Fig. 13.2

SCHEMATIC SINGLE LINE DIAGRAM FOR SURFACE SUB STATION FOR RAMPUR BATURA OCP (OUTSOURCING OPTION), 4 Mty Job No. 517281


33 kV INCOMING LINE FROM CHACHAI SUB STATION (DISTANCE- 5 Km.)
LEGEND:
1. LIGHTNING ARRESTOR
2. ISOLATOR
3. ISOLATOR WITH EARTH SWITCH
4. CIRCUIT BREAKER
5. TRANSFORMER
6. O.H.LINE
7. CURRENT TRANSFORMER
8. POTENTIAL TRANSFORMER
9. D.O.FUSE
10. MCB
11. MCCB
33 kV BUS
1250A
CTR 200/5A
VCB 1250A
630A
CTR 100/5A
5 MVA 33/6.6 kV
160 kVA 33 kV/433V Substation T/F
100 kVA 33 kV/230V (L-L) Lighting T/F
3x(3x120 sq mm) 50m
19-PANEL 6.6 kV SWITCH BOARD
INCOMING-1
INCOMING-2
CHIP
CAP.BANK
QUARRY PUMP
RESERVE
QUARRY FEEDER
QUARRY LIGHTING
COLONY
SECTIONALISER
WORK SHOP
415 V S/B
250 kVA 6.6 kV/433 V
230V (L-L) Lighting S/B
OUT GOING
Fig. 13.3
SCHEMATIC SINGLE LINE DIAGRAM FOR SURFACE SUB STATION
FOR RAMPUR BATURA OCP (PARTIAL OUTSOURCING), 4 Mty
Job No. 517281

Chapter – XIV

CIVIL CONSTRUCTION

14.1 GENERAL:

Rampur Batura open cast project is situated in Sohagpur area of SECL. The location and general topography of the proposed block has been elaborated elsewhere in this report.

14.1.1 Life & Type of Specification:

The planned life of the proposed block is 20 years and as per B.P.E guidelines permanent specifications have been envisaged for all civil structures. All civil structures should preferably be constructed over non-coal bearing area. Residential colony and service infrastructures should preferably be located at distant locations preferably on non coal-bearing area.

14.1.2 Nature of soil:

In general poor soil is available in this area. As such necessary provision wherever required has been made.

14.1.3 External Services:

Coal will be transported by road from the mine. For truck loading CHP with silo has been considered which has been dealt separately by E&M department.

14.2 COST INDEX & SPECIFICATION OF BUILDING:

The preparation of cost estimates for civil infrastructures is based on prevailing cost index of the area in September'2017. The cost index value has been calculated from market rate of the area. The same was provided by the staff officer (Civil) of the area. Standard guidelines provided by B.P.E have been adopted for arriving at cost index value. Considering the prevalent rates of materials and labour in Sohagpur Area, the cost index works out to 3626 in September 2017 with reference to 100 base in Delhi as on 1.10.76. The detailed calculation for Cost Index is shown in Appendix A.2.3. All civil construction has predominantly been envisaged to be of permanent specification.

14.3 SERVICE BUILDINGS:

14.3.1 Provision of Service/Welfare Building:

Considering the requirement of the project and its operational criteria, assessment of service and welfare buildings have been finalised with the planners with due consideration of departmental option, outsourcing option and partial outsourcing option. The same has been provided in this report. Since in mine is located in isolated area which has still not developed provisions has been made considering all the essential requirement and covers broadly service buildings like Project office, Store shed, Workshop, Substation, welfare buildings like canteen, hospital, worker's institute officers' club, staff club, officers' rest house, community hall, garage, scooter & cycle shed etc. and Statutory buildings like magazine, lavatories , C.D.S control room etc.

14.3.2 Site of Service Building:

All the proposed service buildings will be located near/ surrounding mine activity area on the basis of operational requirement and preferably on stable ground with due consideration of land availability and minimum blockage of coal.

14.3.3 Salient features of important service buildings:

To meet the daily requirement workshop complex area has been assessed by E&M department with required facilities which have been elaborated elsewhere. The detail provision along with their cost estimates have been indicated in Appendix-A.2.1.

The salient features of some of the important service buildings are as follows:-

14.3.3.1 Workshop:

This workshop will provide support services for regular activity of the mine. Workshop layout has been provided by E&M department considering requirements as per deployment of departmental machineries. The proposed workshop should be located at a suitable place near the operation activities and with due consideration of non coal bearing area / minimum coal blockage.

Workshop structure has been envisaged predominantly with structural steel construction i.e. structural frame with columns, bracing, trusses, purlins, louvers etc. Roofing is suggested with 0.5mm iron profile sheeting and side covering with 0.5mm iron profile sheeting.

For natural lighting within the sheds thick translucent sheets of area up to 10% of covered area is to be provided in a staggered fashion. Other detailing within the sheds will have to be finalised during detailed design with due considerations of equipments and supporting services.

14.3.3.2 Store:

For the storage of essential materials required for different operational requirement, requisite area has been earmarked for store. The store structure has been envisaged predominantly to be structural steel construction i.e. structural frame with columns, bracing, trusses, purlins, louvers etc. For natural lighting translucent sheets of area up to 10% of covered area is to be provided in a staggered fashion. Detailing within the store has to be finalised during detailed design considering the utilities.

14.3.3.3 Sub Station:

As per requirement of power supply, 33/3.3 KV Substation with outdoor structures have been provided which includes substation building to accommodate various electrical equipments. The Substation buildings will be R.C.C framed structure with well ventilation. Cable ducts are to be covered with steel chequered plates. Foundation for heavy equipment is part of substation flooring and the same are to be finalised with equipment load during detailed design.

For other structures following type of construction have been envisaged.

1.	Project office: -	RCC framed structure
2.	Hospital:	-do-
3.	Magazine: -	- do -
4.	Canteen, training centre: -	- do -
5.	Garage, Scooter & Cycle shed : -	Steel structure with CGI roofing
6.	Under ground reservoir: -	RCC structure
7.	Security post : -	Brick masonry structure
8.	Overhead tank : -	RCC structure
10.	School, Community hall :-	RCC framed structure.

14.3.4 Cost Estimate:

The details of cost estimate, as per prevalent cost index, against service buildings have been elaborated in appendix A.2.1.

14.4 RESIDENTIAL BUILDINGS:

14.4.1 Provision of Houses:

In departmental option, outsourcing option and partial outsourcing option manpower has been planned by the planner. As per B.P.E. guidelines, quarters with around 55% satisfaction have been provided for different manpower planned for the two options for this project. For optimum utilisation of land all quarters should be of minimum G+3 or higher multi-storey configuration.

14.4.2 Type of Construction:

Permanent specification for brick masonry framed structure in poor soil has been considered. All type quarters will preferably be (G+3) i.e., four storied/ multi storied in order to reduce the land requirement. Garage provision has been provided for 50% of 'C' type quarters. 20% of quarters have been considered to be provided as hostel type accommodation.

14.4.3 Site of Township:

The location of the township will be decided as per land availability and non coal bearing area.

14.4.4 Rain Water Harvesting

The concept of rain water harvesting involves 'tapping the rain water where it falls'. A major portion of rain water that falls on the earth's surface runs off into streams and rivers and finally into the sea.

The technique of rain water harvesting involves collecting the rain from localized catchments surfaces such as roofs, plain/sloping surfaces etc., either for direct use or to augment the ground water resources depending on conditions.

Among various techniques of water harvesting, roof rain water harvesting is one of the appropriate options for augmenting ground water recharge/ storage.

In a typical domestic roof top rain water harvesting system, rain water from the roof is collected in storage vessel or tank for use during periods of scarcity. Such systems are usually designed to support the drinking water and cooking needs during the scarcity time and comprise a roof, a storage tank and guttering to transport water from the roof to the storage tank. In addition, a flush system to divert the dirty water,

which contains debris, collected on the roof during non-rainy period and a filter unit to remove debris and contaminants before water enters the storage tank are also provided. The roof top rain water can also be used for recharging of the ground water through recharge pits or putting into the dried bore wells/ open dug wells.

14.4.5 Unit cost and Cost Estimate:

The details of cost estimate, as per unit cost with prevalent cost index, against residential buildings have been elaborated in appendix A.2.2.

14.5 ROAD AND CULVERTS:

14.5.1 Colony Roads & Culverts:

Depending upon the no. of quarters proposed for departmental ,outsourcing and partial outsourcing options, colony roads of different length has been provided. Single lane bituminous road with culverts, drains etc. as per norm has been considered. Tentative cost in respect of total road length including provision of culverts and tree guards etc. have been elaborated in Appendix- A.8.2.1.

14.5.2 Approach Roads & Culverts:

Taking off from the nearby major road new approach and service road of length 5.0 km has been assessed for the project. This will serve the purpose of approach to the mine as well as other installations. This road will also serve the purpose of coal transport partly and as such 7.5m wide bituminous road has been considered. As per prevalent norms culverts have also been provided. The detail cost estimates have been elaborated in the Appendix-A.8.2.2.

14.5.3 Diversion of Non CIL Roads:

No major road falls within the quarry boundary.

14.5.4 Haul road:

In the departmental option, the mine has been planned with deployment of 240 Te and 100 Te dumpers. Suitable haul road having 41m width and culverts as per norm has been planned. The total length of 4.0 Km haul road has been envisaged.

In the outsourcing option and partial outsourcing, haul road of length of 4.0 km with culverts as per norm has been envisaged. The service road will be of 23m wide.

The detail cost estimates along with tentative specifications have been elaborated in the Appendix A.8.2.3.

Summary of capital requirement against different roads has been elaborated in appendix A.8.2.

14.6 WATER SUPPLY AND SEWERAGE DISPOSAL ARRANGEMENT:

14.6.1 Colony water supply and sewage:

Based on conventional norm for water supply, the total water demand for this Project has been worked out. For domestic requirement 135 litres of water per head for a family comprising of 5 members and for non-resident persons 45 litres per head has been adopted. Detailed calculation of water demand has also been provided.

The water demand has been envisaged to be met from Bore wells. Water from deep bore well will be collected to ground reservoir at different suitable locations near colony site. From ground reservoir water will be pumped to overhead reservoirs and the same will be distributed to the desired locations through gravity.

In this report, provision has been made for Sewerage treatment plant. The sewerage from individual houses collected through conventional sewerage disposal system, will ultimately be connected to sewerage treatment plant .

14.6.2 Industrial water supply & sewage:

Total industrial water requirement for the mine has been worked out based on the conventional norm. Water for dust suppression, fire fighting and water sprinkling on mine transport road has been considered.

This water demand has been envisaged to be met from quarry water. Quarry water will be pumped and delivered to ground reservoir at different suitable locations near industrial site. From ground reservoir water will be distributed to the desired locations through pumping.

Industrial sewerage will be collected at a centrally located settling tank and after settlement of industrial waste the supernatant liquid is to be disposed of in nearest natural water course.

Provision has been made for Effluent treatment plant for treating the total effluent generated.

14.6.3 Capital Requirement:

Capital requirement against colony water supply and industrial water supply has been elaborated in appendix A.8.3.

Capital requirement against colony sewerage and industrial sewerage has been elaborated in appendix A.8.3a.

14.7 SURFACE REORGANISATION AND REHABILITATION, IF ANY:

This aspect has been dealt separately in the Mining write-up portion.

14.8 CONSTRUCTION MANPOWER:

For all the options essential manpower to run regular mining activity has been considered by the planner.

****

CHAPTER-XV
SAFETY AND CONSERVATION

15.1 DEGREE OF GASSINESS

Since it is an opencast mine, degree of gassiness is of no relevance at present.

15.2 SAFETY MEASURES AGAINST INUNDATION OF RAIN WATER

Katna Nala flows along the south – western part of the property. Proper embankment has to be constructed to prevent inundation from the nala after diversion. Jamuna nala flows in the western part of the property. Proper embankment will also be required after it's diversion beyond the quarry boundary.

Western boundary has hilly terrain .Concrete lined garland drain of about 5 km in north side of the Quarry is provisioned to prevent rain water from entering inside the mine.

15.3 DUST SUPPRESSION

Major source of dust in opencast mine operation have been identified to be from haul roads, due to spillage from dumpers and abrasion by their wheels. Provision of adequate nos. of water sprinklers will be provided for spraying of water on haul roads to prevent emission of dust. All along life, haul roads and other heavy duty roads likely to be negotiated by heavy vehicles and equipment have been proposed to be metalled and coated to facilitate control of emission of dust. Fixed type of water sprinklers will be provided along the main haul road.

The drills to be engaged is to be equipped with dust arrester so that dust emission is minimum. As the blasting is not continuous one and while blasting, persons will be removed to the safe zone, chances of exposure to dust due to blasting are less. At CHP, sufficient arrangements have to be provided to suppress coal dust at vulnerable points.

15.4 SLOPE STABILITY

SPOIL DUMP

The spoil will be stacked in the internal dump space at the natural angle of repose to avoid the sliding of OB bench. The OB dump will be terraced at the height of 60m.

The barrier distance between internal dump and coal production bench will be 100 m to have smooth functioning of machineries. The surface of OB dump will be leveled and graded. Plantation will be made on the slope of OB heap to avoid the sliding of spoil. Clay in OB if found, should be covered by other OB and pressed to avoid sliding of OB dump otherwise it should be separately stacked.

15.5 HAUL ROAD MAINTENANCE

Haul road for dumper / tipper has been designed double lane with shoulders on both side for movement of dumper and ancillary equipment. Sharp turnings have been avoided to reduce the chance of any mishap. The access trench is graded to 6% slope. The ramp from one bench to another bench is graded at 1 in 10 slopes.

15.6 BLASTING

For blasting crews, the blasting shelter has to be provided. To reduce the chance of fly rock and misfire, the perfect blasting pattern is to be developed by trial. In view of the safety of the villages / public / mine infrastructure against blasting hazards like fly rocks, ground vibrations etc. proper safe distance has been kept from the mine working. However, when the mine working reaches near to the village boundaries/mine infrastructure, controlled blasting will be adopted along with other necessary precautions laid down by the DGMS. Misfire if any, should be handled cautiously

15.7 CONSERVATION OF COAL

The coal recovery is 60% and 80 to 85% by Bord & Pillar Method and Longwall Method of underground mining respectively. On the other hand, coal recovery is almost 100% by opencast mining method. And so wastage of natural resource is almost nil in opencast mining method.

The OB bench cut working will be kept sufficiently advanced in respect to the coal bench working to avoid mixing of OB into the coal during blasting. At the same time, the coal bench surface will be cleaned with scoops to avoid dilution and contamination of coal.

15.8 ADDITIONAL PERMISSION / RELAXATIONS REQUIRED FROM DGMS

SAFETY ASPECTS FOR OUTSOURCING / HIRING OF HEMM / EQUIPMENT

Outside agency deploying HEMM or any equipment in the mine for excavation of coal shall plan their activities in confirmation with the prevailing statutory provisions as per Mines Act 1952 and CMR 1957 applicable for safety in opencast mines.

However, all statutory rules, regulations, applicable laws etc. and statutory requirement related to Govt. licenses, workers compensation, insurance, etc., including minimum wage act for workers employed by the outside agency shall have to be adhered to. Rules if any imposed by local / state / central authorities should also be complied by leaser of HEMM / equipment and then shall have to supply various protective equipment viz., helmet, shoes etc. to the workmen at their cost.

All the regulations and schedules of Coal Mines Regulations 1957 relating to opencast mining have to be adhered to and implemented in order to maintain day to day safety precautions as per stature.

Special precaution should be taken while deploying workers in the mine. Before employing any worker to the mine proper vocation training should be imparted and recommendations of VIII Safety Conference should be strictly followed. Terms and conditions shall be fixed by management for deployment of workers by outside agency. Some of the major aspects are as follows: -

A) For Persons:

I. No persons shall be deployed unless he is trained at VTC.

II. Records in Form-B, Form-D shall be maintained.

III. Records of Vocational Training Certificate and driving license of operators shall be kept by HEMM outsourcing agency and shall be made readily available for inspection by management.

IV. Salaries shall be distributed in front of management representative.

V. No person shall be employed unless person holds VTC certificate and management is informed. A record of it shall be maintained.

VI. Adequate supervision shall be maintained by qualified competent persons.

VII. Outside agency shall follow safety guidelines and safety instructions from project authorities.

B) For Machineries as recommended by DGMS Cir. (Tech.) 1 of 1999:

I. All the machineries to be deployed in mines should be checked before deployment by competent authority.

II. Regular checking of m/c deployed by outside agency shall be done. No unfit machine shall be deployed before the defect is rectified.

III. A proper record of repair and maintenance along with inspection done by management and defect pointed out shall be maintained and signed by authorized person.

IV. The trucks deployed outside agency shall be provided with audio visual alarms, proper light for use at night and period when natural light is not sufficient. Also audiovisual alarms for reversing on trucks shall be provided.

Other precautions for machines

I. RTO certificate photocopies of all vehicles shall be submitted to management.

II. Daily welding, monitoring, inspection shall be done by the agency's mechanic as directed by management.

III. Machine manufacturers should be asked to give risk analysis details in respect of machines deployed by outside agencies.

IV. Suitable type of the fire extinguishers shall be provided in every machine.

C) General:

I. No person / vehicle shall be deployed at any place other than authorized place.

II. All workers should obey lawful instruction of mine management.

III. Risk Management Plan of tipper / pay loader shall be made and implemented.

IV. All drivers shall obey systematic traffics rules prepared by management.

V. 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 with the Mines Act 1952.

VI. Outside Agency shall operate transport system in such a way so as to minimize pollution in the mine.

RECOMMENDATIONS OF THE TENTH CONFERENCE ON SAFETY IN MINES HELD ON 26th AND 27th NOVEMBER 2007 AT NEW DELHI.

1.0 Review of status of implementation of recommendation of the 9th Conference on Safety in Mines

1.1 All front line supervisory officials like Sirdars / Mates, Overmen / Foremen, Surveyors, 5 Supervisors / Chargemen / Foremen as well as persons supervising other surface operations should be imparted structured training in safety management, for at least two weeks, once in every five years, covering about 20% strength every year.

1.2 The recommendations of DGMS (Tech) Circular No. 18 of 1975 shall be implemented forthwith. (Protection of workings against Noise & Vibration in Working Environment).

1.3 Audiometry should be introduced, as a part of mandatory medical examination, for persons seeking employment in mines and for persons engaged in operations / areas where noise level exceeds 90 dB (A).

1.4 (a) Before the valid gate pass is issued for entry of trucks and other vehicles not belonging to management into the mine, the mine engineer should check the road worthiness of such vehicles.

(b) In order to check entry of unauthorized vehicles in mine premises, each mine should establish properly manned check gate(s) at the entrance(s) where record of entry and exit of each such vehicle should be maintained.

1.5 Persons engaged in surface operations and, in particular, the contractors' workers, who incidentally are often inexperienced and least informed about job-safety matters, need closer and more competent supervision. To minimize accidents due to surface operations it would be ensured that:

(a) All persons engaged at any work within the mine premises through the contractors have received relevant training and other job related briefings and that the drivers of vehicles belonging to contractors entering the mine premises have additionally been explained the salient provisions of "traffic rules."
(b) Each mining company should draw up appropriate training schedules and modalities in this regard and implement the same.
(c) In case of smaller mines, such arrangement may be made by association of mine operators.

1.6 Occupational Health Surveillance in Mining Industry

1.6.1 All chest radiographs of Initial and Periodical Medical Examinations in private mines shall be classified for detection, diagnosis and documentation of pneumoconiosis in accordance with ILO classification for pneumoconiosis.

1.6.2 The PME Medical Officer in every PME center of private mines shall be trained in occupational health and use of ILO classification for pneumoconiosis.

1.6.3 Each mining company operating mechanized mines shall set up an Occupational Diseases Board consisting of one occupational Health Physician, one radiologist and one general physician.

1.7 Increasing effectiveness of worker's participation in safety management

1.7.1 All private mechanized mines and mines using heavy earth moving machinery for exploitation of minerals, where 100 (hundred) or more number of workers are employed, should appoint Workmen's Inspectors.

1.7.2 In large mines sectional / departmental safety committees under the main safety committee may be constituted for specific area of operation.

2.0 Contractor work vis-à-vis Safety

2.1 Employer's responsibilities

(a) Suitable clauses (in consistence with risk of the work allotted) shall be included in tender document (including NITs) starting how the risk arising to men and material from the mining operation / operations to be done by the contractors shall be managed.

(b) Ensure that contractors are familiar with the relevant parts of the statute, health and safety management system and are provided with copies of such documents prior to commencing work.

(c) Ensure that contractor's arrangements for health and safety management are consistent with those for the mine owner. All the rules, regulations and bye-laws as applicable to the mine owner are also applicable to the contractor. Details of the contractors' workmen should be maintained in the owner's Form-B Register. Whereas, C, D & E Registers for contractor men may be maintained independently by the owner. All the above Registers shall be kept in the mine office of the manager.

(d) Ensure that contracts should preferable be of longer period (three years), so that, there is adequate scope of management of safety by the contractor.

(e) Ensure that contractor's provide the machinery, operator and other staff with written safe work procedures for the work to be carried out, stating clearly the risk involved and how it is to be managed.

(f) Monitor all activities of the contractors to ensure that contractors are complying with all the requirements of statute and the system related to safety. If found non-

complaint of safety laws directing the contractor to take action to comply with the requirements, and for further non-compliance, the contractor may be suitable penalized. Clause to this affect may be a part of the agreement between the employer and the contractor.

(g) Where a risk to health or safety of a person arises because of a non-compliance directing the contractor to cease work until the non-compliance is corrected.

2.2 Contractor's responsibilities

a) Prepare written Safe Operating Procedure (SOP) for the work to be carried out, including an assessment of risk, wherever possible and safe methods to deal with it / them.

b) Provide a copy of the SOP to the person designated by the mine owner who shall be supervising the contractor's work.

c) Keep an up-to-date SOP and provide a copy of changes to a person designated by the mine owner.

d) Ensure that all work is carried out in accordance with the Statute and SOP and for the purpose he may deploy adequate qualified and competent personnel for the purpose of carrying out the job in a safe manner.

e) For work of a specified scope / nature, develop and provide to the mine owner a site specific code of practice.

f) Ensure that all sub-contractors hired by him comply with the same requirement as the contractor himself and shall be liable for ensuring compliance all safety laws by the sub or sub-sub contractors.

g) All persons deployed by the contractor for working in a mine must undergo vocational training, initial medical examination, PME. They should be issued cards stating the name of the contractor and the work and its validity period, indicating status of VT & IME.

h) Every person deployed by the contractor in a mine must wear safety gadgets to be provided by the contractor. If contractor is unable to provide, owner / agent / manager of the mine shall provide the same.

i) The contractor shall submit to DGMS returns indicating – Name of his firm, Registration number, Name and address of person heading the firm, Nature of work, type of deployment of work persons. Number of work persons deployed,

how many work persons hold VT Certificate, how many work persons undergone IME and type of medical coverage given to the work persons. The return shall be submitted quarterly (by 10th of April, July, October and January) for contracts of more than one year. However, for contracts of less than one year, returns shall be submitted monthly.

2.3 Employee's Responsibilities

a) An employee must, while at work, take reasonable care for the health and safety of people who are at the employee's place of work and who may be affected by the employee's act or omissions at work.

b) An employee must, while at work, co-operate with his or her employer or other persons as far as is necessary to enable compliance with any requirement under the act of the regulations that is imposed in the interest of health, safety and welfare of the employee or any other person.

3.0 Occupational Health Surveillance and Notified Diseases

3.1 Noise mapping should be made mandatory of various work places in the mine premises based on the various machines being used in concerned mines along with personal noise dosimetry of individual workmen exposed to noise level above 85 dBA.

3.2 Vibration studies of various mining machinery required to be done before their introduction in mining operations as per ISO standards.

3.3 Ergonomical assessment of all latest machines, before their introduction into mining operation as per ISO standards. Ergonomical assessment should include: -

- Assessment of work process
- Assessment of working aids / tools
- Assessment of working posture

3.4 Portability tests of drinking water supplied to the mine employees, to be made mandatory once in a year irrespective of its source, preferably after Rainy seasons, the sample of water should be collected from the points of consumption.

3.5 Initial medical examination shall be made mandatory for all mining employees whether permanent, temporary or contractual, before they are engaged in any mining job.

3.6 The frequency of periodic medical examinations should be brought down from existing five years to three years for the mining employees above 45 years of age. This should be implemented in three years.

3.7 Standards of medical examinations for both initial and periodic should be modified as mentioned below in order to ensure early diagnosis of more diseases caused or get aggravated due to employment in mines.

a) In addition to measurement of blood pressure, detailed cardiovascular assessment of employees should be done. This should include 12 leads electrocardiogram and complete lipid profile.

b) Detailed neurological examinations including testing of all major superficial and deep reflexes and assessment of peripheral circulation to diagnose vibrational syndromes.

c) In addition to routine, urine, fasting and post-parandial blood sugar should be included for early diagnosis of diabetes mellitus.

d) Serum Urea and Creatinine should be included for assessment of Renal Function.

e) Hematological tests like Total count, Differential count, Percentage of Hemoglobin and Erythrocyte Sedimentation Rate should be included to diagnose Blood Dyscrasias.

3.8 Special tests should be included in the PME for employees exposed to specific health hazard: -

a) For persons exposed to lead, PME should include blood lead analysis and delta aminolevulinic acid in urine, at least once in a year.

b) Employees engaged in driving / HEMM operation jobs should undergo eye refraction test at least once in a year.

3.9 It is proposed to include following diseases in the list of Notified diseases under section 25 (1) of Mines Act, 1952 : -

a) All other types of Pneumoconiosis excluding coal workers pneumoconiosis, Silicosis and Asbestosis. This includes Siderosis and Berillyosis.

b) Noise included hearing loss.

3.10 For smaller mines where PME facilities are not existing, medical examinations can be done through other competent agencies.

4.0 "Safety Management System" : Strategies for Implementation and Path Forward

4.1 Every mine should employ a sound risk analysis process, should conduct a risk assessment, and should develop a safety management plan to address the significant hazards identified by the analysis / assessment.

4.2 The managements of every mining company should adopt the process of safety management system and commit itself for proper formulation and implementation of the same in totality. Necessary resources should be allocated for implementation of the control measures identified by the risk assessment process.

4.3 Necessary training of all employees of mining companies should be organized with the help of experts, both national and international, for optimal adoption of the safety management system.

****

CHAPTER-XVI

ENVIRONMENT MANAGEMENT

16.1 Existing Environment Quality:

Batura OC and Batura Extension block is virgin and comprises mostly (i.e. 1494.82 Ha, 79.30 %for departmental option, 1467.00 Ha, 78.98 % for outsourcing option)& 1415.87 Ha,74.62% for Coal Departmental and OB Outsourcing option of agricultural land. The block area is free from industrial and mining activities which generally contribute to environment pollution and degradation. The core & Buffer zone environmental data for Batura OC in respect of air quality, water quality, noise level, flora fauna, socio economic data etc. will be generated before preparation of Environmental Management Plan

16.1.1 Ambient Air quality in core and buffer zone:

CMPDI on behalf of SECL carried out environmental base line data generation by Govt. approved labs at different locations in the Batura OC block. The air quality data generated in respect of SPM, RPM, SO_2, & NO_x corresponding to different locations are shown in the following table16.1 (a) & 16.1(b). The locations were selected on the basis of wind pattern of the area. This data will enable to obtain a comprehensive idea of air quality in and around the mining area. The data under different category are within the permissible limit of CPCB.

Table16.1 (a)

Sl. No.	Location	Distance (km) (w.r.t. periphery of core zone)	Direction	Reasons for selection
1.0	Bichia Village **(A1)**	0.8	North- East	To assess upwind wind areas of the proposed project activity.
2.0	Batura village **(A2)**	-	North- East	To assess the base line environmental in cross-wind areas of the project activity.
3.0	Rampur Village **(A3)**	-	Core Zone	To assess the base line environmental status in the core zone
4.0	Kodaili village**(A4)**	1.8	North- East	To assess the base line environmental status in the downwind areas of the proposed project.
5.0	Khamrudh village **(A5)**	-	North- East	To assess the base line environmental status in the downwind areas of the proposed project.
6.0	Kalahari Village **(A6)**	-	North- East	To assess the base line environmental status & to know the increase of the pollutant at the cross-wind areas of the project activity.

Table 16.1(b)

Summarized Air Quality Data

Period: Oct. to Dec. 15 **(Values are inμgm/m^3)**

			SPM		RPM		SO2		NOx	
Monitoring Location	**No. of Samples Drawn.**	**Category* (R,I, S)**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Core zone										
1)SA$_1$	144	I	36	99	78	222	15	60	<5.0	21
Buffer Zone										
2)SA$_2$	144	R	33	98	71	214	12	55	<5.0	19.4
3)SA$_3$	144	R	33	98	71	227	11	53	<5.0	19.2
4)SA$_4$	144	R	45	105	92	237	11	51	<5.0	20.3
5)SA$_5$	144	R	36	111	85	218	11	68	<5.0	18
6)SA$_6$	144	R	31	97	79	214	13	54	<5.0	19.8

***R = Residential; I = Industrial;**
In general, all SPM, RPM SO_2 and NO_x values are found to be well within the prescribed limits of CPCB for Residential and rural area.

16.1.2 Water Quality

Water quality status of surface and ground water collected in the following locations are shown in table 16.2(a) to 16.2(c).

Table-16.2(a)

Sl. No	Location	Direction (w.r.t. centre of core zone)	Distance (km)	Reasons for selection
01	Nallah Water, Kalahari,**(SW_1)**	North-East	3.5	To assess existing water quality
02	River Water,Bichia ,**(SW_2)**	North-East	-	To assess existing water quality
03	Bichhia Village Hand Pump **(GW_1)**	West	0.5	To assess the ground water quality in the village area.
04	Rampur Village Hand Pump **(GW_2)**	Core-Zone	-	To assess the ground water qualityin the village area..

The above locations/stations have been considered from base line data of Batura OC block, which is adjacent to this project. The base line data was generated by CMPDI through govt. approved organization. This will enable to obtain a comprehensive idea of water quality in and around the mining area.

Table 16.2(b) -Summarized Surface Water Quality Data– from 20.09.15- 20.12. 2015

Sl.No.	Parameters	Values Kalahari, Nalla	Values Bichia River	Limit As Per IS:2296:1982 Norms,(Tolerance Limit for Inland Surface Waters, Class-C)
1	pH	7.4	7.3	6.5 – 8.5
2	Total dissolved Solids	390	175	1500
3	Chloride as Cl	36.7	9.43	600
4	Sulphates as SO_4	4.0	12.0	400
5	Nitrate as N	<1.0	4.7	50
6	Iron as Fe	0.621	0.056	5.0
7	Zinc as Zn	0.005	0.01	15.0

Summarized Surface Water Quality Data

Sl.No.	Parameters	Range of recorded Concentration(Results expressed in mg/l except pH)		
		Min	Max	Limit as per IS; 2296 Class 'C'
1	pH	7.0	8.0	6.5 - 8.5
2	Total dissolved Solids	128	1240	1500
3	Chloride as Cl	9.43	687.3 *	600
4	Sulphates as SO4	4	67.27	400
5	Nitrate as N	<1	8.2	50
6	Iron as Fe	0.024	1.07	5.0
7	Zinc as Zn	0.002	0.124	15.0

*Result of Batura river water

Summarized Ground Water Quality Data- Table 16.2(c)-Location;Bichhia Village Hand Pump **(GW_1)** Rampur Village Hand Pump **(GW_2)**

Sl. No.	Parameters	Range of Recorded Results (in mg/l except pH)		
		GW1	GW2	Desirable/ Permissible Limits. As per IS:10500
1	pH	7.4	6.9	6.5 - 8.5
2	Total dissolved solids	1170	384	500 / 2000
3	Total Alkalinity as $CaCO_3$	80	54	200 / 600
4	Total Hardness as $CaCO_3$	306	280	300 / 600
5	Chloride as Cl	377	234	250 / 1000
6	Sulphates as SO_4	360	289	200 / 400
7	Nitrate as N	30.9	28	45 / 100
8	Iron as Fe	0.17	3.1	0.3 / 1.0
9	Zinc as Zn	1.14	0.1	5.0 / 15.0

Ground water quality in the two locations found to be conforming to drinking water standard as per IS 10500.

16.1.3 Noise level

The summarized noise data as per base line data of Batura OC block, at different locations as shown in table 16.3 for different categories of area is given in table 16.4. The locations were selected on the basis of wind pattern of the area.The noise level standard is given in table 16.5 for reference.

Table 16.3-Period: Oct. to Dec.2015

Sl. No.	Location	Distance (km) (w.r.t. periphery of core zone)	Direction	Reasons for selection
1	Bichia Village (L1)	-	Core zone	To assess noise levels in the proposed mining area.
2	Batura village (L2)	3.0	North	To assess the noise levels in the village area in Upwind direction.
3	Rampur Village (L3)	1.5	South	To assess the noise levels in the village area in Downwind direction.
4	Kodaili village(L4)	-	North-West	To assess the noise levels in the village area.
5	Khamrudhvillage(L5)	2.0	North-East	To assess the noise levels in the village area.
6	Kalahari Village (L6)	1.5	South-West	To assess the noise levels in the village area.

Table 16.4

Summarized Noise Data Sept to Dec.15

Sl. No.	Location	Minimum dB(A)		Maximum dB(A)		Average dB(A)	
		Day	Night	Day	Night	Day	Night
1.	Bichia Village (L1)	46.2	45	58	50.3	52.1	47.65
2.	Batura village (L2)	47	45.8	54.8	50.8	50.1	43.1
3.	Rampur Village (L3)	47.2	46.1	58.4	50.6	52.8	50.6
4.	Kodaili village(L4)	46.6	45.7	54.2	49.7	50.4	47.7
5.	Khamrudh village(L5)	46.7	45.4	59.1	50.1	53.15	47.75
6.	Kalahari Village(L6)	46.7	45.7	55.1	49.6	50.9	47.65

Table- 16.5

Noise Levels Standard

Sl. NO.	CATEGORY OF AREA	LIMITS IN dB(A)	
		Day time (6.00 am to 10.00 pm)	Night time (10.00 pm to 6.00 am)
1	Industrial Area	75	70
2	Commercial Area	65	55
3	Residential Area	55	45

The noise levels recorded at all the locations during the season were within the permissible limits.

16.1.4 Flora and Fauna

The summarized list of Flora and Fauna as available for Batura OC block has been used for this project and shown in table 16.6 & 16.7.The complete list of Flora and Faunaof this new expansion project would be generated during preparation of its EIA/EMP.

Table- 16.6-List of Flora

Sl. No	Particulars	Names		
		Local	English	Botanical
1	Agricultural crops **– Core zone**	Nil		
	Agricultural crops**- Buffer zone**			
		Bhendi		*Abelmoschusesculentus*
		Rai	Mustard	*Brassica rapa* L.
		Sun flower	Sun flower	*Helianthus annus*
		Kela	Banana	*Musa sp*
		Rice	Rice	*Oryze sativa*
		Muulii	Raddish	*Raphanus sativus* L.
2	Commercial crops **– Core zone**	Nil		
	Commercial crops **– Buffer zone**			
		Rai	Musterd	*Brassica juncea*
		Kela		*Musa paradisiacal etc.*
3	Plantation	Australianbabul		*Acacia auriculiformis,* A. Cunn. ex Benth
		Black wattle		*Acacia melanoxylon*, R. Br
		Dhawda		*Anogeissuslatifolia,* Wall
		Apta		*Bauhinia purpurea, L.*

Sl. No	Particulars	Names		
		Local	**English**	**Botanical**
		Bottlebrush		*Callistemon citrinus*
		Bahawa (Amaltas)		*Cassia fistula, L*
4	Natural vegetation/ forest type-			
i)a	Tree – **Core zone**	Babul		*Acacia arabica*, Willd
		Black wattle	-	*Acacia melanoxylon*, R. Br
		Khair		*Acacia catechu*
i)b	Tree – **Buffer zone**	As above		
		Beli		*Aeglemarmelos,* Corr.
		Marukh	-	*Ailan*thus excelsa, *L.,*
		Kadam		*Anthocephalus indicus*
		Madmanti	-	*Artobotrysodoratissimus* Linn
		Sal		*Shorea robusta* Roth
		Saja	-	Terrminaliatomentoasa
ii)a	Herbs and Surubs – **Core zone**	Apang	-	*Achyranthes a*spe*ra,* L
		Tam		*Aristida depressa,* Retz.
		Gadahpurna		*Boerhaavia diffusa,* L.
		Bans-keora		
		Ratanpurus	-	*Hybanthusenneaspermus*
ii)b	Herbs and Surubs – **Buffer zone**	As above		
		Washerwoman		*Alternantherasessilis,* L.
		Raamadaanaa		*Amarantus* sp.
		Wild chilli		*Croton* sp*arsiflorus*, Mor
		Guma		*Leucasa*spe*ra*, Spr.
		Ban tulsa		*Ocimumcanum,* L
iii)a	Climbers – **Core zone**	Erra-gurja		*Abrus precatorius,* L
		-	-	*Hemidesmusindicus*, R. Br
iii)b	Climbers – **Buffer zone**	All above		
		Hadjora		*Cissusquadrangularis*, L
		Kanphuti		*Crdiospermumhelicacabum*, L.
		Gurmara		*Gymnema sylvestre,* R,Br
		Gurch		*Tinospora cardifolia*
iv)a	Bamboos – **Core zone**	Nil		
iv)b	Bamboos – **Buffer zone**	Nil		
v)a	Grasses – **Core zone**	Nil		
v)b	Grasses – **Buffer zone**	Nil		
vi)a	Epiphytes and	*Tinospora*		*Cuscuta,* L.

Sl. No	Particulars	Names		
		Local	**English**	**Botanical**
	parasites – **Core zone**	*cardifolia*		
		Tinospora cardifolia		*Vanda* sp.
vi)b	Epiphytes and parasites – **Buffer zone**	Same as above		
5	Grass lands:- **Core& Buffer Zone**	Grass land of worth mentioned is there in the area. Animals, both domestic and wild, graze/ browse in forests and waste lands. During fallow periods, they graze on agricultural lands also.		
6	Endangered species:- **Core & Buffer Zone**	None		
7	Endemic species:- **Core & Buffer Zone**			
	i)	Agricultural crops		
	ii)	Commercial crops		
	iii)	Natural vegetation		

Table- 16.7- List of Fauna

SL. No.	Particulars / Local names	English names	Zoological names	Satus in W.L protection Act. 1972)	
				Schedule	**Part**
1	**Endangered species**				
	Billi	Jungle cat	*Felis* sp	I	II
	Bandar	Grey langur	Grey langur	II	I
	Siyar	Golden jackal	*Canis aureus*	II	II
	Neola	Indian ongoose	*Herpestes Edwardsi*	II	II
	-	Sanda	*Uromastix* sp	II	I
2	**Endemic species**	All			
3	**Migratory species**	None			
4	**Details of aquatic fauna, if applicable**				
	Daulla		*Channapunefatus*	Not known	
	Catfish (Mangur)		*Clariasbatrachus*	Do	
	Thaila		*Catlacatla*	Do	

16.1.5 Socio-economic Status

There are seven villages viz. Rampur, Khanda, Belia, Ataria, Khairbana,Bichia and Kodailivillage in the block. The population predominantly comprises agriculture labour and marginal workers.

16.2 Environment Impact

16.2.1 Air Quality:

Impact assessment on air quality has been shown in table 16.8.

Table 16.8

Sl No.	Parameters	Impact Assessment	
1.00	Meteorological condition	Coal dumps are susceptible to fire, and Spontaneous combustion may occur therein; hence there may be a likely change in ambient temperature, wind speed and direction to somewhat extent.	
2.00	Ambient air quality	**Type**	**Impact**
2.01		Direct	Minimal increase in dust & noxious emission to the air owing to transport vehicles, Blasting, coal & dump handling causing to slight increase in the ambient SPM levels.
2.02		Indirect	Surface coal transport & dump handling & Workshop will generate indirect impact in the long run
2.03		Short term	Drilling and Blasting may be attributed to slight increase in the ambient SPM levels
2.04		Long term	Surface coal transport, dump handling & Workshop will produce long term impact upon the air quality

16.2.2 Water Quality

Impact assessment on water is shown in table 16.9 below.

Table 16.9

Sl. No.	Parameters	Impacts Assessment
1.00	**Hydro-geological-Ground water**	
1.01	Topography	Topography and drainage by developing micro basins

Sl. No.	Parameters	Impacts Assessment
	&drainage	
1.02	Aquifer geometry	Changes in aquifer geometry, water level in the vicinity of the mine and disturb ground water flow direction. This can also create secondary fractures and higher permeability zones within the aquifer. After the mining activity, the aquifer restores its original water level and mined out area acts as a good reservoir.
1.03	Water levels	The project is an opencast mine, the impact of mining on local water levels will be limited to a maximum of 360m.
2.00	**Water Quality- Physico-Chemical and Bacteriological ones**	
2.01	Ground Water Quality	Acceptable; No abnormality. Except at one station chloride is found above the desired level
2.02	Surface Water Quality	Do, Except at one station chloride is found above the desired level.

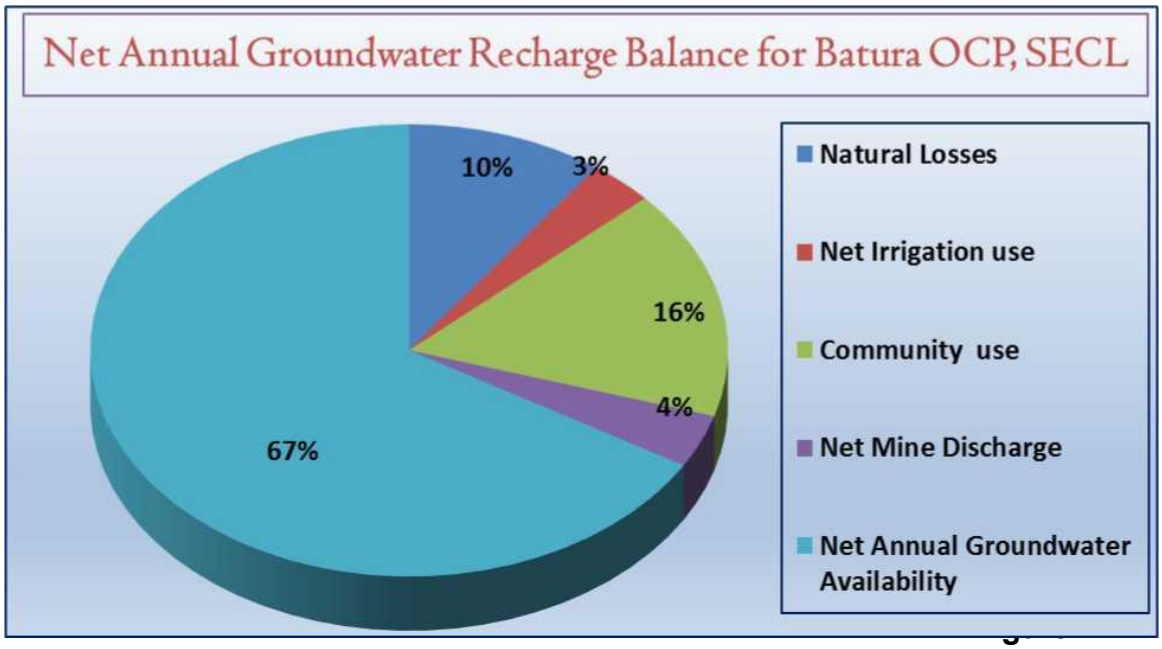
16.2.3 Ground Water Resource

Probable Impact of Mining on Local Water Regime:

The ground water recharge was estimated by Rainfall-Infiltration method. The net annual groundwater recharge and draft for the study were estimated as 47.98 and 12.53 M.Cum respectively.

Thus, the balance available annual groundwater recharge has been projected as 35.45 M.Cum. The detailed annual groundwater recharge balance estimates are shown in Table - and in the pie diagram below:-

Natural Losses	Net Irrigation use	Community use	Net Mine Discharge	Net Annual Groundwater Availability
5.33	**1.74**	**8.77**	**2.02**	**35.45**



16.2.4 Noise Impact

Noise impact assessment has been shown in the following table 16. 10

Table -16.10

Sl. No.	Parameters	Impacts Assessment
1.00	Increase in Noise Levels at drilling and blasting	May have impact upon the workers and the nearby habitants. The impact of noise more than permissible dosage may cause Annoyance and irritation, Mental and Physical fatigue, Interference in normal activities, Health hazards resulting from impaired hearing. In extreme cases, cardio-vascular diseases etc., Task interference, Interference with communication i.e., masking.
2.00	Increase in Noise Levels at Operation of HEMMs like shovel, dumper, dozer, excavator etc.	Same as above
3.00	Increase in Noise Levels at Operation of equipment in CHP, workshop etc	Same as above
4.00	Increase in Noise Levels due to transport system	Same as above

16.2.5 Flora and Fauna

Impact assessment on flora & fauna has been shown below in Table 16.11.

Table 16.11

Sl. No.	Parameters	Impact Assessment
1.00	**Negative**	
1.01	Vegetation Cover	Except the area such as used for quarry excavation, erection & development of plants, service & allied structures, colony, roads, diversions, culverts, etc, no other area is going to affected directly or indirectly by mining activities . Hence, impact on flora and fauna will not be of appreciable level.
1.02	Forests degradation	Forests are going to be affected to a small extent by coal &OB transportation air pollution which may affect photosynthesis and transpiration in plants by plugging their leaves pores. SO_2 causes Necrosis disease in plants. Hence, major impact on flora and fauna.
1.03	Ecological change	The project being an opencast, there is no major change expected in ecological parameters on which survival of flora and fauna depends directly or indirectly, and hence, no major impact on flora and fauna.
1.04	Hydro-geological aspects	Owing to opencast project, water level and draw down are likely to be affected to a nominal value; ground water and surface water on which the flora and fauna of the area directly or indirectly depend upon are not going to be affected to an appreciable level.
2.00	**Positive**	
2.01	Plantation work and forest & wild life conservation	Plantation work and forest & wild life conservation in a scientific way by project authorities in mine area will increase aestheticism of the area.

16.2.6 Land Use

Impact assessment on land use has been shown below in Table 16.12.

Table 16.12

Sl. No.	Parameters	Impact Assessment	
		Within mining area	**Outside mining area**
1.0	Topography	In the quarry area, the dump area and the mining equipment area, there will be a marked change in topography.	No appreciable damage is envisaged.
2.0	Change in Landscape and Land use pattern than pre-mining scenario such as visual impact-loss of aesthetic beauty, ugly scar on land; deforestation-loss of surface soil and vegetation cover	Total scenario of land- scape land use pattern will undergo a stark change.	Landscape and land use pattern will change where erection and development of plants, service /allied services buildings are established.
3.0	Change in Surface Drainage.	There will be a stark change in surface drainage; rather new pattern of drainage will be developed.	Surface drainage is likely to change where nala (Katna) diversion, construction of colony, roads and drains is to be executed.

16.2.7 Socio-Economic Status

The project envisages 1915.59 Ha of land for quarry, industrial and residential complex and external dumps etc. for Departmental option, 1888.60 Ha for Outsourcing option and 1897.48 Ha for Coal Departmental and OB Outsourcing option of land for quarry, industrial and residential complex, safety zone etc. The total nos. of families to be rehabilitated is 1870 and the total nos. of land oustees involved is 3000 from seven villages viz. Rampur, Khanda, Belia, Ataria, Khairbana, Bichia and Kodaili village falling within the quarry area. The PAF's and PAP's will be rehabilitated and paid economic compensation / employment as per State Govt. R&R package. The location of R&R site would be between Batura OC Expansion&Batura extension block (East of Batura U/G block)

Table-16.13

Sl.No.	Impact on Socio-Economic Status
1	Population Growth & In-migration
2	Human Settlement & Resettlement / Rehabilitation
3	Transport & Communication
4	Income & Employment
5	Civic Amenities& Community Development
6	Educational facilities &Literacy Drive
7	Economic growth
8	Growth of Financial Revenues (State & Central)
9	Social status growth

SI. No	Impact on	Impact
3	Transport& Communication	Due to increase in industrial activities and population growth in the area, the existing transport and communication system have already improved with a view to cater to the increased traffic volume and frequency.
4	Income& Employment	Coal mining project forms the basic sector of employment. With increase in income opportunities and employment potentialities in this sector as the mining activities increase, the other economic sectors start gaining in momentum. New avenues of employment in the sectors such as construction, trade & commerce and service are also getting on the move resulting in high demand of workers and other manpower resources.
5.	Civic Amenities & Community Development	Due to the infrastructural facilities created and the consequent migrations from the project area and nearby area, socio-cultural interaction has resulted amongst population consisting of people from different areas. With added educational, medical and communication facilities developed in the areas, the standard of living has improved. With ongoing of mining activities additional facilities for local population by way of better communication, postal services, educational facilities, advanced medical services etc. are on in the area.
6	Educational facilities & Literacy Drive	A number of educational institutes already exist in the buffer zone. This has attracted populations from nearby villages to avail such facilities which in turn have increased literacy level in the area. An action plan for achieving 100% literacy among workers in the SECL, was launched in the year 1992. Under the same scheme, workers of Batura project will be covered to achieve 100% literacy level.
7	Economic growth	The mining activities have accelerated the economic transformation and urbanization in the region with the creation of new employment opportunities. This has boosted or will boost the economic growth of the region.
8	GrowthofFinancial Revenues- State & Central	State Government is benefited through financial revenues in crores of rupees by way of royalty, sales tax etc. from the direct and indirect operations in the project area. Central exchequer is also getting financial revenues by way of Income tax, Central Sales Tax etc.
9	Social stat	There is a marked change in social status of the area with opening of the project.

16.3Environnent Management

16.3.1 Air Quality Management

Following air pollution control measures are will be practiced within the mining area and at coal handling plants and railway siding.

1. Water spraying will be done regularly on approach roads within the mining area to minimise the dust generation.
2. Mist sprinkling arrangement will be provided at the transfer point of coal.
3. Intensive plantation of adequate width all along the haul road and other road will be raised to minimise transport generated pollutants.
4. Crusher house of CHP will be provided with dust extraction arrangements.
5. Minimising the transport of coal from the crusher house to silo loading system, belt conveyor has been provided.
6. Coal transportation to railway siding will be done in covered trucks.
7. Exposed overburden dumps will be covered through an appropriate plantation
8. The drills will be equipped with dust arresting devices or wet drilling arrangement.
9. Optimum blast-hole geometry will be followed to reduce the dust during blasting.
10. Regular monitoring of ambient air quality of project area.

16.3.2 Water Quality Management

Management of surface water drainage: -

Garland drains will be made around the periphery of the quarry. These drains will be connected to the local nalla (Katna) which is not likely to be disturbed by mining operation. In the workings, heavy duty pumps will be deployed in rainy season which after passing through settling ponds will throw the accumulated water from the working face into these garland drains.

Mine Water Discharge

Discharged mine water needs treatment before discharge to the surface water drainage. The collected water at the floor of mine sump (346212Cum capacity) will be pumped to the settling tank where suspended solids will get settled. The clear water after sedimentation will be reused for water sprinkling, plantation, ground water recharge

etc. Workshop effluents will be discharged through Oil and Grease trap and sedimentation tank.

Domestic Effluent Treatment: -

Domestic effluent from the colony will be treated in a conventional septic tank and soak pit arrangement. Such arrangement will be constructed for different groups of blocks.

Water Conservation: -

The waste water recycling after due treatment for the purpose mentioned above will enable conservation of water. Storage of conserved water in mine pits will be given due emphasis to provide water round the year and quality of water will be maintained before and after storage.

Control measures adopted against impact on ground water regime:-

i) The impact will be limited to a smaller distance and for a temporary period. The effected habitation will be provided with suitable drinking water supply by sinking hand pumps in the habitat.

ii) The entire mine industrial water demand, would be met from the treated mine discharge. The wastage of water will be minimized.

iii) The surplus treated mine water will be discharge into the agricultural fields. Thereby, the mine water will behave as constant source of recharge and improves the water levels in the mine area. This will also become a resource for the local public and increase agriculture output.

iv) So also, after cessation of mining, part of the quarry area will be reclaimed with highly permeable OB material. The final void would be converted into a water reservoir. Thus, in post-mining, the recharge and source potential in core zone will be much higher than the existing.

v) With the increase in secondary porosity, a significant improvement in the rainfall infiltration rate, close to the mine area can be anticipated.

vi) Son River flowing close to the mine workings, where surplus mine water is discharged, act as constant source of recharge and reduce the zone of influence.

16.3.3 Noise Management

The present noise levels are below the prescribed limits. If the impulsive noise levels increase due to mining operation, suitable measures will be adopted to maintain the noise level within permissible limits at working zone. The following measures are adopted and will be continued:

1. Planting of rows of trees with thick foliage along roads and other noise generating centers to act as acoustic barriers.
2. Isolating/enclosing the noisy machines/sources by using resilient mounting/altering structures.
3. Routine maintenance schedules for HEMM and other machineries to eliminate noise as far as possible.
4. Balanced and properly aligned conditioning of machines to reduce vibration.
5. Provision of ear muffs/ear plugs to workers subjected to noise level above recommended limits.
6. Controlled blasting.
7. Regular monitoring of noise level of project area.

16.3.4 Flora and Fauna Management

The location of Batura OC &Batura Extension Expansion Block does not have any importance as a holiday resort. The surface to be disturbed by open cast mining operation does contain any rare variety of flora or fauna. The area is also thinly populated. As such, consequent to the opencast mining operation, deterioration in quality of life or loss of amenity is not envisaged. Conservation plans of schedule I & II animals, if any, will be prepared and implemented.

Compensatory afforestation and Strengthening of safety zone will be done. Reclaimed and afforested internal dump of 105.00 Ha will form one integral unit at the cessation of the mining activity. SECL will develop this integrated area, as habitat for the fauna. The following steps will be taken for development of habitat.

Reclamation of mine void:

In the core zone, after the cessation of mining activity a void will be created. This

void will be used as a water body. This will be graded to a gentle slope so that it acts as a safe approach / access to the water body for the faunal species. Through Community development work in villages existing in the buffer zone existing water sources particularly the village tanks will be improved to provide drinking water to the local community so that biotic pressure on water resources present in the forest areas and used by fauna is gradually reduced.

Control of forest fire, fire in coal seam and coal stock.

Fire can destroy the entire habitats (micro and macro) and its life supporting potential in a forest area. Fire does not spare fauna also. SECL will implement the existing DGMS stipulated fire protection norms on coal seams and coal stock. This will ensure that a congenial atmosphere is created and fire does not affect the fauna and flora as well.

16.3.5 Land Resource Management

Present land use would be converted into internal dump, green belt, built up area, surface infrastructure, final void/water body& other surface water body etc. after the cessation of mining operation. Out of 1538.86 Ha. of quarry area, plantation would be done in 105.00Ha. There would be a final void/water body of 196.90 Ha (88.86 Ha water body,108.04Ha void). left in the project after mine closure. After cessation of mining operation the major part of internal dump (1236.96 Ha.) having heights 470m to 500m from MSL, would be developed as grass land. The dump surface would be maintained flat and top soil would be spread over it as a part of final reclamation. Such grass land would be converted/ utilised into cultivable land after mine closure.

Plantation would be done in Safety zone, around the mine, infrastructure, colony etc. @ 2500 Nos./Ha. The no. of plantation is given as under.

The plantation of trees would be of fruit bearing type. The species which are indigenous to the area will be planted. The details of the species are selected based on the flora data of that area.

Pre-mining Land Use: Provided in Table 16.14 (a) ,16.14 (b)& 16.14 (c)

Table-16.14 (a)-Pre-mining Land Use (Departmental Options)- Figures in Ha.

Area (Ha)											
Sl.No	**Requirement of land**	**Tenancy/Agricultural land**	**Forest land**			**Govt.land**					**Total land**
			Revenue forest	**Others**	**Total**	**Grazing land**	**Waste land**	**Surface waterbody land**	**Others**	**Total**	
1.	Land for quarry	1215.94	20.08	66.07	86.16	47.88	30.83	37.92	120.13	236.76	**1861.77**
2.	For external dump	0	0	0	0	0	0	0		0	**0**
3.	Surface industrial development Rly.sliding, colony approach road etc.,	109.31	0	0	0	0	0	0	3.12	0	**112.43**
4.	Nala diversion	20	0	0	0	0	0	0		0	**20**
5.	Safety zone	109.98	0	26.79	26.79	0	30.85	1.6	5.13	37.57	**238.71**
6.	Land for homestead/ family	68.08	0	0	0	0	0	0	0	0	**68.08**
7.	Land for explosive magazine	5	0	0	0	0	0	0	0	0	**5**
	Total land	**1528.31**	**20.08**	**92.86**	**112.95**	**47.88**	**61.68**	**39.52**	**128.38**	**274.33**	**1915.59**
	Less forest land in safety zone not to be acquired	0	0	0	0	0	0	0	0	0	
	Total land to be acquired	**1528.31**	**20.08**	**92.86**	**112.95**	**47.88**	**61.68**	**39.52**	**128.38**	**274.33**	**1915.59**

Post Mining Land Use: The tentative post–mining land use is given below.

Table-16.15A- Post Mining Land Use (Departmental Options),Figures in Ha.

Sl. No.	Particulars	Quarry Area (After backfilling & reclamation)	Safety zone as green belt	Infrastructure, Colony, Explosive magazine etc.	R&R site	Land for Nala Diversion	Grand Total
1	Afforested area	105	172.74	5	0	0	**282.74**
2	Cultivable Land	1236.96	0	30	0	0	**1266.96**
3	Water body	88.86	0	0	0	0	**88.86**
4	Other Void area	108.04	0	0	0	0	**108.04**
5	Other Water Bodies	0	1.6	0	0	20	**21.6**
6	Built-Up Area.	0	0	48.94	68.08	0	117.02
Total Land for the project		**1538.86**	**174.34**	**114.31**	**68.08**	**20**	**1915.59**

Table-16.14 (b)-Pre-mining Land Use (Outsourcing Options)

Area (Ha)											
Sl.No	**Requirement of land**	**Tenancy/Agricultural land**	**Forest land**			**Govt.land**					**Total land**
			Revenue forest	**Others**	**Total**	**Grazing land**	**Waste land**	**Surface waterbody land**	**Others**	**Total**	
1.	Land for quarry	1215.94	20.08	66.07	86.16	47.88	30.83	37.92	120.13	236.76	**1538.86**
2.	For external dump	0	0	0	0	0	0	0		0	**0**
3.	Surface industrial development Rly.sliding, colony approach road etc.,	82.32	0	0	0	0	0	0	0	0	**82.32**
4.	Nala diversion	20	0	0	0	0	0	0	0	0	**20**
5.	Safety zone	109.98	0	26.79	26.79	0	30.85	1.6	5.13	37.57	**174.34**
6.	Land for homestead/ family	68.08	0	0	0	0	0	0	0	0	**68.08**
7.	Land for explosive magazine	5	0	0	0	0	0	0	0	0	**5**
	Total land	**1501.32**	**20.08**	**92.86**	**112.95**	**47.88**	**61.68**	**39.52**	**125.26**	**274.33**	**1888.6**
	Less forest land in safety zone not to be acquired	0	0	0	0	0	0	0	0	0	**0**
	Total land to be acquired	**1501.32**	**20.08**	**92.86**	**112.95**	**47.88**	**61.68**	**39.52**	**125.26**	**274.33**	**1888.6**

Post Mining Land Use: The tentative post–mining land use is given below.

Table-16.15B- Post Mining Land Use (Outsourcing Options)-Figures in Ha.

Sl. No.	Particulars	Quarry Area (After backfilling & reclamation)	Safety zone as green belt	Infrastructure, Colony, Explosive magazine etc.	R&R site	Land for Nala Diversion	Grand Total
1	Afforested area	105	172.74	5	0	0	282.74
2	Cultivable Land	1236.96	0	51.2	0	0	1288.16
3	Water body	88.86	0	0	0	0	88.86
4	Other Void area	108.04	0	0	0	0	108.04
5	Other Water Bodies	0	1.6	0	0	20	21.6
6	Built-Up Area.	0	0	31.12	68.08	0	99.2
Total Land for the project		**1538.86**	**174.34**	**87.32**	**68.08**	**20**	**1888.60**

Table 16.14 C -Pre-mining Land Use (for Coal Departmental and OB Outsourcing option)

Area (Ha)											
Sl.No	**Requirement of land**	**Tenancy/Agricultural land**	**Forest land**			**Govt.land**					**Total land**
			Revenue forest	**Others**	**Total**	**Grazing land**	**Waste land**	**Surface waterbody land**	**Others**	**Total**	
1.	Land for quarry	1215.94	20.08	66.07	86.16	47.88	30.83	37.92	120.13	236.76	**1538.86**
2.	For external dump	0	0	0	0	0	0	0		0	**0**
3.	Surface industrial development Rly.sliding, colony approach road etc.,	91.2	0	0	0	0	0	0	0	0	**91.2**
4.	Nala diversion	20	0	0	0	0	0	0	0	0	**20**
5.	Safety zone	109.98	0	26.79	26.79	0	30.85	1.6	5.13	37.57	**174.34**

Sl.No	Requirement of land	Tenancy/Agricultural land	Area (Ha)								
			Forest land			Govt.land					Total land
			Revenue forest	Others	Total	Grazing land	Waste land	Surface waterbody land	Others	Total	
6.	Land for homestead/ family	68.08	0	0	0	0	0	0	0	0	68.08
7.	Land for explosive magazine	5	0	0	0	0	0	0	0	0	5
	Total land	**1510.20**	**20.08**	**92.86**	**112.95**	**47.88**	**61.68**	**39.52**	**128.38**	**274.33**	**1897.48**
	Less forest land in safety zone not to be acquired	0	0	0	0	0	0	0	0	0	0
	Total land to be acquired	**1510.20**	**20.08**	**92.86**	**112.95**	**47.88**	**61.68**	**39.52**	**128.38**	**274.33**	**1897.48**

Table-16.15C-**Post Mining Land Use (**for Coal Departmental and OB Outsourcing option**)**

Sl. No.	Particulars	Quarry Area (After backfilling & reclamation)	Safety zone as green belt	Infrastructure, Colony, Explosive magazine etc.	R&R site	Land for Nala Diversion	Grand Total
		Figures in Ha.					
1	Afforested area	105	172.74	5	0	0	282.74
2	Cultivable Land	1236.96	0	60.08	0	0	1297.04
3	Water body	88.86	0	0	0	0	88.86
4	Other Void area	108.04	0	0	0	0	108.04
5	Other Water Bodies	0	1.6	0	0	20	21.6
6	Built-Up Area.	0	0	31.12	68.08	0	99.2
Total Land for the project		**1538.86**	**174.34**	**96.2**	**68.08**	**20**	**1897.48**

16.4 Environment Management System

Monitoring Schedule

Environmental monitoring will be carried out following the monitoring schedule for Air, Water, and Noise levels as per Standards of MOEF (Vide GSR 742 (E) dated 25.9.2000)

Plantation Monitoring

The project authority at field level will continuously monitor the growth and survival/mortality rates of the plantations till the end of 3 years. Once trees attain desired growth, no further monitoring will be required.

Action Plan for Land Reclamation and Plantation

Details of action proposed for systematic land reclamation and plantation on a regulartime schedule is given in Figure-16. The action plan delineates the quantum ofoverburden to be excavated, backfilled, the plantation schedules etc. Interaction withdifferent Government Departments like Department of Agriculture, M.P State forestdepartment, Forest Research Institute would give additional technical guidelines.Guidelines from State and Central Ministry of Environment and Forest will beobtained for effective implementation of EMP

A total of 262500 no of Plantation will be done in safety zone, infrastructure, colony etc. and also in 105.00Ha. of internal dump @ 2500/Ha. An area of 196.90 Ha (88.86 Ha water body, 108.04Ha void).would be left as final void/water body after mine closure. After cessation of mining operation the major part of internal dump (1236.96 Ha.) having heights 470m to 500m from MSL, would be developed as grass land. The dump surface would be maintained flat and top soil would be spread over it as a part of final reclamation. Such grassland would be converted/ utilised into cultivable land after mine closure. Year wise programme of OB removal, dumping, & plantation has been given in table 16.16.Details of action plan proposed for systematic land reclamation and plantation on a regular time schedule is given in figure-16.2*.*

Table 16.16--PROGRAMME OF O.B. REMOVAL, DUMPING &PLANTATION:

`` Year	Coal production (MTes)	OB removal (Mcum)	Dump plan (Mcum)		Dump area (Ha.)		Dump area available for reclamation (Ha.)		No. of plantation @ 2500 Nos / Ha.		Total plantation @ 2500 Nos / Ha.
			External	Internal	External	Internal	External	Internal	External	Internal	
1	CONSTRUCTION YEAR										
2	0.50	12.00	*7.00	4.61	0.00	47.73	0.00	22.66	0.00	0.00	0
3	1.00	14.00	*1.00	12.96	0.00	47.73	0.00	22.66	0.00	0.00	0
4	2.00	24.00	0.00	24.00	0.00	47.73	0.00	22.66	0.00	25.00	0
5	3.00	34.00	0.00	34.00	0.00	47.73	0.00	22.66	0.00	30.00	0
6	4.00	37.50	0.00	37.50	0.00	82.91	0.00	71.91	0.00	50.00	0
7	4.00	37.50	0.00	37.50	0.00	82.91	0.00	71.91	0.00	0.00	0
8	4.00	37.50	0.00	37.50	0.00	82.91	0.00	71.91	0.00	0.00	0
9	4.00	37.50	0.00	37.50	0.00	82.91	0.00	71.91	0.00	0.00	0
10	4.00	37.50	0.00	37.50	0.00	82.91	0.00	71.91	0.00	0.00	0
11	4.00	37.50	0.00	37.50	0.00	87.41	0.00	101.08	0.00	0.00	0
12	4.00	37.50	0.00	37.50	0.00	87.41	0.00	101.08	0.00	0.00	0
13	4.00	37.50	0.00	37.50	0.00	87.41	0.00	101.08	0.00	0.00	0
14	4.00	37.50	0.00	37.50	0.00	87.41	0.00	101.08	0.00	0.00	0
15	4.00	34.50	0.00	34.50	0.00	87.41	0.00	101.08	0.00	0.00	0
16	4.00	34.50	0.00	34.50	0.00	81.50	0.00	63.2	0.00	0.00	0

`` Year	Coal production (MTes)	OB removal (Mcum)	Dump plan (Mcum)		Dump area (Ha.)		Dump area available for reclamation (Ha.)		No. of plantation @ 2500 Nos / Ha.		Total plantation @ 2500 Nos / Ha.
			External	Internal	External	Internal	External	Internal	External	Internal	
17	4.00	34.50	0.00	34.50	0.00	81.50	0.00	63.2	0.00	0.00	0
18	4.00	34.50	0.00	34.50	0.00	81.50	0.00	63.58	0.00	0.00	0
19	4.00	34.50	0.00	34.50	0.00	81.50	0.00	63.58	0.00	0.00	0
20	3.00	32.07	0.00	32.50	0.00	81.50	0.00	63.58	0.00	0.00	0
MC_1	0.00	0.00	0.00	0.00	0.00	0	0.00	30	0.00	0.00	75000
MC_2	0.00	0.00	0.00	0.00	0.00	0	0.00	40	0.00	0.00	100000
MC_3	0.00	0.00	0.00	0.00	0.00	0	0.00	45	0.00	0.00	112500
Total	65.50	626.07	8.00	618.07	0.00	1450	0.00	1387.73	0.00	105.00	262500

*** OB amount dumped on the dip side of the property would be removed in 6th to 9th year by rehandling into internal dump.**

**** The internal dump proposed is to be converted into cultivable area after mine closure, so the plantation is not shown in the flat area of internal dump. Only in slopes & terraces of the internal dump, plantation would be done, but only after cessation of all mining activities i.e. during mine closure phases.**

MC - Mine Closing Years

ACTION PROGRAMME FOR EMP IMPLEMENTATION

Rampur Batura OCP (4Mty), Sohagpur Area.

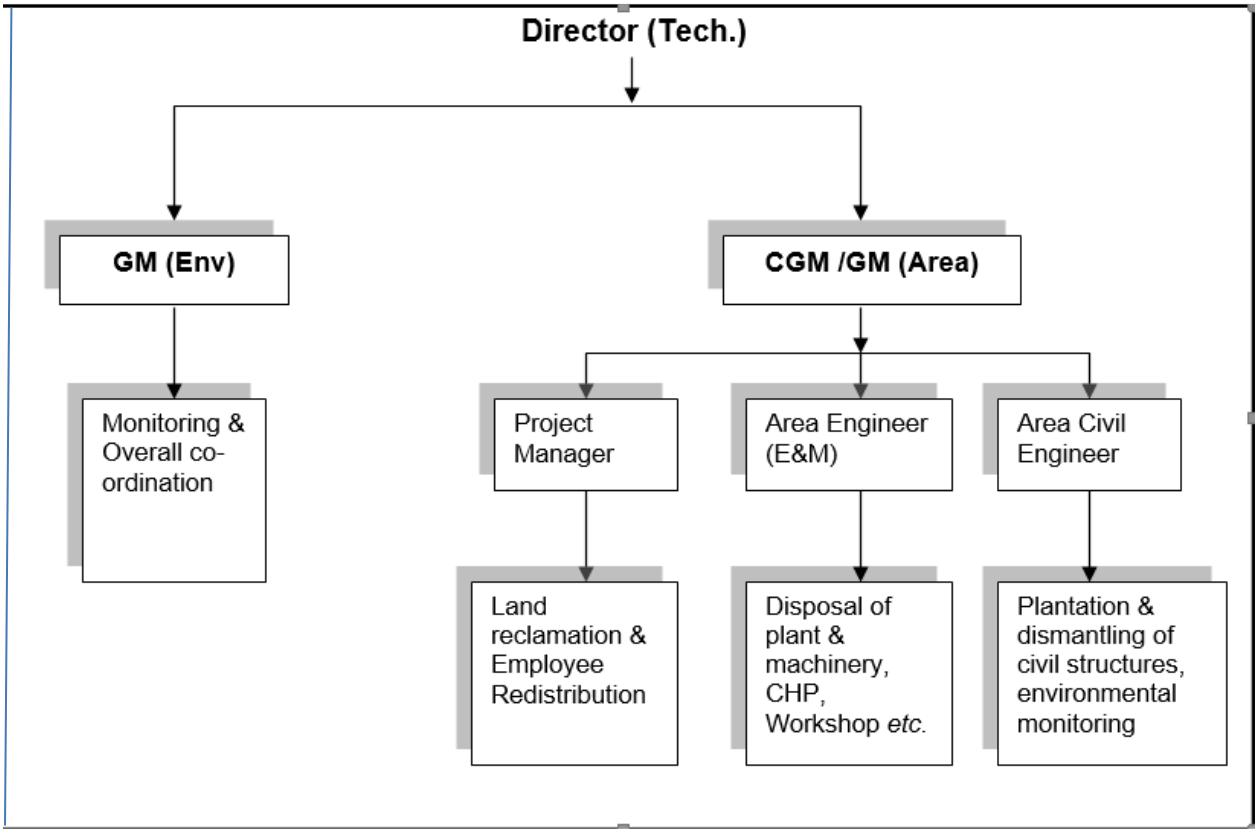
NO.	DURATION/ ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	M	M	M
1	REHABILITATION & RESETTLEMENT OF PROJECT AFFECTED FAMILIES/ PERSONS																							
2	ANTICIPATORY AFFORESTATION/ PLANTATION																							
3	COMPENSATORY AFFORESTATION																							
4	DUMP RECLAMATION																							
A	External Dump																							
	a. Filling(Dumping)																							
	b. Rehandled back into internal dump																							
B	Internal Dump																							
	a. Filling																							
	b. Reclamation(Technical)																							
	d. Plantation																							
5	ENV.MONITORING / HEALTH MONITORING																							
6	OPERATION/ MAINTENANCE OF OIL, GREASE TRAP																							
	DETP.																							
7	WATER SPRINKLING ON HAUL ROADS, CHP																							
8	COMMUNITY DEVELOPMENT IN VILLAGES																							
9	FINAL MINE CLOSURE ACTIVITY																							

M - MINE CLOSING STAGE

Figure-16.

Organisational Structure

For implementing the environment management plan (EMP) of the project, the Organisational structure as shown in figure-**16**.**3**has been proposed:



Environmental monitoring for three years after closure of mine will be carried out to evaluate the environmental quality of the area. If need be, proper mitigation measures will be taken up after evaluating the environmental quality. The funds for this have been provided in the cost estimate. Before closure of the mine, Area GM will prepare survey and disposal report and the same will be submitted to DGMS for acceptance

16.5 Capital Provision:

Statement showing the estimated capital requirement for environmental protection measures. (Departmental option) Table 16.17 (a)

S.NO.	PARTICULARS		Provision
			AMOUNT IN LAKH Rs
1	**CAPITAL FOR RESTORATION**		
a)	Scientific/Hydrogeological studies for slope stability, Environment monitoring instrument,Long range fogging machine,Noise mapping instrument,Vibrometer,Piezometer,CAAQMS etc. and Real time Slope Monitoring Instrument	Rs.	845.00
b)	LAND FOR HOMESTEAD/FAMILY (Appendix-A.1)	Rs.	1702.00
c)	Total cost of R&R as per second schedule of RFCTLAAR Act,2013	Rs.	13202.95
d)	Total cost for provision of infrastructure as per third schedule of RFCTLAAR Act,2013	Rs.	4244.27
	Sub-Total (1)	**Rs.**	**19994.22**
2	**CAPITAL FOR ANTI-POLLUTION MEASURE**		
	IN MINE & INDUSTRIAL AREA		
a)	Effulent treatment plant	Rs	413.00
b)	Housing personnel	Rs.	125.82
c)	Settling tank for mine water disposal	Rs.	47.20
d)	Other development measures in industrial site viz. drains, tree		
	guards etc. (Appendix-A.8.2.1.)	Rs.	493.32
e)	Garland drains (Appendix-A.8.1)	Rs.	500.00
f)	Arboriculture/plantation in industrial area (Appendix-A.8.1)	Rs.	20.00
g)	Barbed fencing/boundary walls for the project (Appendix-A.8.1)	Rs.	425.00
h)	HEMM for Reclamation (Appendix-A3.1)	Rs.	996.92
i)	Dust suppression arrangements (App.- A3.5)	Rs.	25.00
)	Water sprinkling arrangement along approach road (Appendix-A.8.1)	Rs.	30.00
	Sub-Total(2)	**Rs.**	**3076.26**
3	**ENVIRONMENTAL CONTROL MEASURES IN TOWNSHIP**		
a)	Flora and fauna study (Appendix-A.8.1)	Rs.	20.00
b)	Water drains in township (Appendix-A.8.2.1)	Rs.	44.37
c)	Other development measures in colony viz. drains, tree	Rs.	19.61
d)	STP	Rs.	413.00
e)	Sewage disposal arrangement in colony	Rs.	228.16
f)	Horticulture and land development	Rs.	106.20
g)	Rain Water Harvesting	Rs.	64.90
	Sub Total (3)	**Rs.**	**896.24**
4	Cost of EMP preparation(Appendix-A.8.4)	Rs.	20.00
5	CSR Cost(Appendix-A.8.1)	Rs.	0.00
	Total capital from 4	**Rs.**	**20.00**
	GRAND TOTAL		**23986.72**

B.	**Different type of Revenue nature cost to be considered**		
	in cost of production per tonne of Coal:-		
1	Environment Audit @ 0.60 lakhs/annum	Rs.	0.60
2	Environment monitoring@10.00 lakhs/annum	Rs.	10.00
3	Mine Closure cost	Rs.	752.37
4	Monitoring of CSR and RR Plan	Rs	2.00
5	Monitoring of land use through satellite survellance	Rs.	10.00
	Total Revenue nature cost per annum		**774.97**

Table 16.17 (b)

Statement showing the estimated capital requirement forEnvironmental and Social Measures (Outsourcing Option).

S.NO.	**PARTICULARS**		**Provision**
		Amount in Rs lakhs	
1	**CAPITAL FOR RESTORATION**		
a)	Scientific/Hydrogeological studies for slope stability, Environment monitoring instrument,Long range fogging machine,Noise mapping instrument,Vibrometer,Piezometer,CAAQMS etc. and Slope stability radar	Rs.	845.00
b)	LAND FOR HOMESTEAD/FAMILY (Appendix-A.1)	Rs.	1702.00
c)	Total cost of R&R as per second schedule of RFCTLAAR Act,2013	Rs.	13202.95
d)	Total cost for provision of infrastructure as per third schedule of RFCTLAAR Act,2013	Rs.	4244.27
	Sub-Total (1)	**Rs.**	**19994.22**
2	**CAPITAL FOR ANTI-POLLUTION MEASURE**		
	IN MINE & INDUSTRIAL AREA		
a)	Effulent treatment plant	Rs	
b)	Housing personnel	Rs.	43.89
c)	Settling tank for mine water disposal	Rs.	23.60
d)	Other development measures in industrial site viz. drains, tree guards etc. (Appendix-A.8.2.1.)	Rs.	89.00
e)	Garland drains (Appendix-A.8.1)	Rs.	500.00
f)	Arboriculture/plantation in industrial area (Appendix-A.8.1)	Rs.	20.00
g)	Barbed fencing/boundary walls for the project (Appendix-A.8.1)	Rs.	425.00
h)	HEMM for Reclamation (Appendix-A3.1)	Rs.	498.46
i)	Dust suppression arrangements (App.- A3.5)	Rs.	25.00

j)	Water sprinkling arrangement along approach road (Appendix-A.8.1)	Rs.	30.00
	Sub-Total(2)	**Rs.**	**1654.95**
3	**ENVIRONMENTAL CONTROL MEASURES IN TOWNSHIP**		
a)	Flora and fauna study (Appendix-A.8.1)	Rs.	20.00
b)	Water drains in township (Appendix-A.8.2.1)	Rs.	9.86
c)	Other development measures in colony viz. drains, tree	Rs.	12.22
d)	STP	Rs.	413.00
e)	Sewage disposal arrangement in colony	Rs.	48.13
f)	Horticulture and land development	Rs.	22.42
g)	Rain Water Harvesting	Rs.	18.88
	Sub Total (3)	**Rs.**	**544.51**
4	Cost of EMP preparation(Appendix-A.8.4)	Rs.	20.00
	Total capital from 4	**Rs.**	**20.00**
	GRAND TOTAL		**22213.68**
B.	**Different type of Revenue nature cost to be considered**		
	in cost of production per tonne of Coal:-		
1	Environment Audit @ 0.60 lakhs/annum	Rs.	0.60
2	Environment monitoring@10.00 lakhs/annum	Rs.	10.00
3	Mine closure cost	Rs.	741.38
4	Monitoring of CSR and RR Plan	Rs	2.00
5	Monitoring of land use through satellite survellance	Rs.	10.00
	Total Revenue nature cost per annum		**763.98**

Table 16.17 (C)

Statement showing the estimated capital requirement forEnvironmental and Social Measures (Departmental Coal & OB Outsourcing Option).

S.NO.	PARTICULARS		Provision
		Amount in Rs lakhs	
1	CAPITAL FOR RESTORATION		
a)	Scientific/Hydrogeological studies for slope stability, Environment monitoring instrument,Long range fogging machine,Noise mapping instrument,Vibrometer,Piezometer,CAAQMS etc. and Slope stability radar	Rs.	845.00
b)	LAND FOR HOMESTEAD/FAMILY (Appendix-A.1)	Rs.	1702.00
c)	Total cost of R&R as per second schedule of RFCTLAAR Act,2013	Rs.	13202.95
d)	Total cost for provision of infrastructure as per third schedule of RFCTLAAR Act,2013	Rs.	4244.27
	Sub-Total (1)	Rs.	19994.22

2	CAPITAL FOR ANTI-POLLUTION MEASURE		
	IN MINE & INDUSTRIAL AREA		
a)	Oil and Grease trap	Rs	17.70
b)	Housing personnel	Rs.	43.89
c)	Settling tank for mine water disposal	Rs.	23.60
d)	Other development measures in industrial site viz. drains, tree guards etc. (Appendix-A.8.2.1.)	Rs.	89.00
e)	Garland drains (Appendix-A.8.1)	Rs.	500.00
f)	Arboriculture/plantation in industrial area (Appendix-A.8.1)	Rs.	20.00
g)	Barbed fencing/boundary walls for the project (Appendix-A.8.1)	Rs.	425.00
h)	HEMM for Reclamation (Appendix-A3.1)	Rs.	498.46
i)	Dust suppression arrangements (App.- A3.5)	Rs.	25.00
j)	Water sprinkling arrangement along approach road (Appendix-A.8.1)	Rs.	30.00
	Sub-Total(2)	Rs.	1672.65
3	ENVIRONMENTAL CONTROL MEASURES IN TOWNSHIP		
a)	Flora and fauna study (Appendix-A.8.1)	Rs.	20.00
b)	Water drains in township (Appendix-A.8.2.1)	Rs.	12.32
c)	Other development measures in colony viz. drains, tree	Rs.	12.83
d)	STP	Rs.	413.00
e)	Sewage disposal arrangement in colony	Rs.	65.15
f)	Horticulture and land development	Rs.	30.68
g)	Rain Water Harvesting	Rs.	22.42
	Sub Total (3)	Rs.	576.40
4	Cost of EMP preparation(Appendix-A.8.4)	Rs.	20.00
	Total capital from 4	Rs.	20.00
	GRAND TOTAL		**22263.27**
B.	**Different type of Revenue nature cost to be considered in cost of production per tonne of Coal:-**		
S.NO.	**PARTICULARS**		**Provision**
			Amount
1	Environment Audit @ 0.60 lakhs/annum	Rs.	0.60
2	Environment monitoring@10.00 lakhs/annum	Rs.	10.00
3	Mine closure cost	Rs.	744.99
4	Monitoring of CSR and RR Plan	Rs	2.00
5	Monitoring of land use through satellite survellance	Rs.	10.00
	Total Revenue nature cost per annum		**767.59**

****

CHAPTER - XVII

LAND REQUIREMENT

17.1 GENERAL

The topography of the area is almost flat with surface elevation varying from 461.57 m to 509.25 m above MSL. The project envisages 1915.59 Ha of land for quarry, industrial and residential complex and external dumps etc. for Departmental option, 1888.60 Ha for Outsourcing option and 1897.48 Ha for Coal Departmental and OB Outsourcing option.

In the approved PR of Batura OC (2.0Mty), provision for land has been made for External dump, surface infrastructures, and diversion of Katna nallah. The total area of the above said proposed land works out to be 70.27 Ha. This land has been notified under Section 11 of CBA Act. The PR for Batura OC (2.0Mty) has been proposed to be dovetailed with PR for Rampur Batura OC (4.0 Mty), hence the above said provision of land in Batura OC (2.0Mty) has been incorporated in PR for Rampur Batura OC (4.0Mty).

Land already acquired is 171.59 Ha.The break-up of the land is as follows:-

REQUIREMENT OF LAND IN Ha (OPTION-I)							
SL. NO.	**PARTICULARS**	**LAND ALREADY ACQUIRED**	**LAND TO BE ACQUIRED**				**TOTAL LAND REQUIREMENT**
			TENANCY / AGRICULTURE LAND	**FOREST LAND**	**GOVT. LAND**	**TOTAL**	
1	LAND FOR QUARRY	171.59	1121.61	86.16	159.50	1367.27	1538.86
2	SURFACE INDUSTRIAL DEVELOPMENT, COLONY,APPROACH ROAD, DIVERTED ROAD,MAGAZINE,NALLAH DIVERSION, EXTERNAL DUMP ETC.	-	134.31	-	-	134.31	134.31
3	LAND FOR HOMESTEAD/FAMILY	-	68.08	-	-	68.08	68.08
4	MINING SAFETY ZONE	-	109.98	26.79	37.57	174.34	174.34
	TOTAL LAND	**171.59**	**1433.98**	**112.94**	**197.07**	**1744.00**	**1915.59**

REQUIREMENT OF LAND IN Ha (OPTION-II)							
SL. NO.	**PARTICULARS**	**LAND ALREADY ACQUIRED**	**LAND TO BE ACQUIRED**				**TOTAL LAND REQUIREMENT**
			TENANCY / AGRICULTURE LAND	**FOREST LAND**	**GOVT. LAND**	**TOTAL**	
1	LAND FOR QUARRY	171.59	1121.61	86.16	159.50	1367.27	1538.86
2	SURFACE INDUSTRIAL DEVELOPMENT, COLONY,APPROACH ROAD, DIVERTED ROAD,MAGAZINE,NALLAH DIVERSION, EXTERNAL DUMP ETC.	-	107.32	-	-	107.32	107.32
3	LAND FOR HOMESTEAD/FAMILY	-	68.08	-	-	68.08	68.08
4	MINING SAFETY ZONE	-	109.98	26.79	37.57	174.34	174.34
	TOTAL LAND	**171.59**	**1406.99**	**112.94**	**197.07**	**1717.01**	**1888.60**

REQUIREMENT OF LAND IN Ha (OPTION-III)							
SL. NO.	**PARTICULARS**	**LAND ALREADY ACQUIRED**	**LAND TO BE ACQUIRED**				**TOTAL LAND REQUIREMENT**
			TENANCY / AGRICULTURE LAND	**FOREST LAND**	**GOVT. LAND**	**TOTAL**	
1	LAND FOR QUARRY	171.59	1121.61	86.16	159.50	1367.27	1538.86
2	SURFACE INDUSTRIAL DEVELOPMENT, COLONY,APPROACH ROAD, DIVERTED ROAD,MAGAZINE,NALLAH DIVERSION, EXTERNAL DUMP ETC.	-	116.20	-	-	116.20	116.20
3	LAND FOR HOMESTEAD/FAMILY	-	68.08	-	-	68.08	68.08
4	MINING SAFETY ZONE	-	109.98	26.79	37.57	174.34	174.34
	TOTAL LAND	**171.59**	**1415.87**	**112.94**	**197.07**	**1725.89**	**1897.48**

If required the requirement of land can be readjusted within the total allotted land. The land for magazine comprise of land for construction of magazine, approach road and the boundary around the magazine. Suitable location for magazine to be planned so as to comply with the provisions of Explosive Rules,2008.

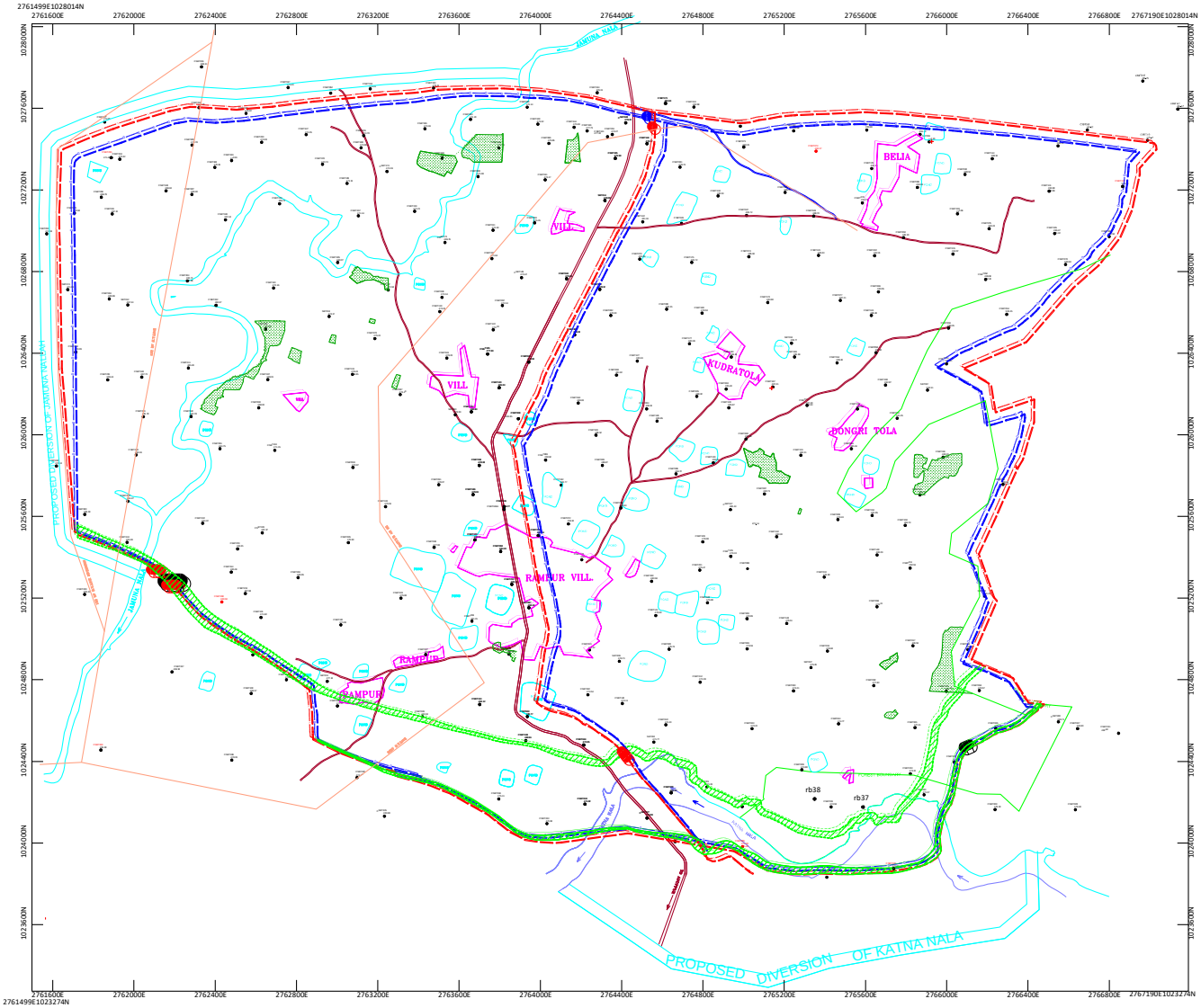
The estimated capital requirement for land acquisition of the quarry has been given in Appendix-A.1.

17.2 STATUS OF LAND ACQUISITION

Rampur Batura OC mine is being planned in the geological blocks, where PR for Batura OC mine is being approved. Based on the approval of PR for Batura OC land

acquisition is in progress. Till 1/04/2017 171.59 Ha of land is already being acquired and the process of acquisition is still in progress.

Seven nos. of villages namely Rampur, Belia, Khanda, Ataria, Khairbana, Bichhia & Kodaili fall within the mine lease hold area. Total nos. of Project affected families are 1870. Capital of 174.47Cr has been provisioned for Rehabilitation and Resettlement of Project affected families.



PROPOSED LAND ACQUISITION AREA

****

CHAPTER-XVIII

MINECLOSURE PLAN

18.1 Closure Planning details of mine

The Batura OC Expansion block is virgin and comprises mostly agricultural land. The block area is free from industrial and mining activities which generally contribute to environment pollution and degradation. The core & Buffer zone environmental data for Batura OC Project in respect of air quality, water quality, noise level, flora fauna, socio economic data etc. will be generated before preparation of Environmental Management Plan.

CMPDI on behalf of SECL carried out environmental base line data generation by Govt. approved labs at different locations as per prevailing wind pattern in the Batura OC block. This data will enable to obtain a comprehensive idea of environmental quality in and around the new expansion block.

The project has been planned for a target capacity of 4.0 Mty for 20 years life, to meet power grade coal. Beyond this life, the mine will be closed if no further expansion towards the above adjoining blocks is considered. The closure details are described below.

18.1.1 Mined out Land & proposed final land use;--

The proposed pre-mining and the tentative post mining land use plan has been given below in table 18.1 & 18.2. Since, the area is virgin, and proposed to be extracted in open cast method of mining, the danger for past subsidence will not arise

Table-18.1
Pre-mining Land Use (Departmental Options)-Figures in Ha.

Area (Ha)											
Sl.No	**Requirement of land**	**Tenancy/Agricultural land**	**Forest land**			**Govt.land**					**Total land**
			Revenue forest	**Others**	**Total**	**Grazing land**	**Waste land**	**Surface waterbody land**	**Others**	**Total**	
1.	Land for quarry	1215.94	20.08	66.07	86.16	47.88	30.83	37.92	120.13	236.76	**1861.77**
2.	For external dump	0	0	0	0	0	0	0		0	**0**
3.	Surface industrial development Rly.sliding, colony approach road etc.,	109.31	0	0	0	0	0	0	3.12	0	**112.43**
4.	Nala diversion	20	0	0	0	0	0	0		0	**20**

5.	Safety zone	109.98	0	26.79	26.79	0	30.85	1.6	5.13	37.57	**238.71**
6.	Land for homestead/ family	68.08	0	0	0	0	0	0	0	0	**68.08**
7.	Land for explosive magazine	5	0	0	0	0	0	0	0	0	**5**
	Total land	**1528.31**	**20.08**	**92.86**	**112.95**	**47.88**	**61.68**	**39.52**	**128.38**	**274.33**	**1915.59**
	Less forest land in safety zone not to be acquired	0	0	0	0	0	0	0	0	0	
	Total land to be acquired	**1528.31**	**20.08**	**92.86**	**112.95**	**47.88**	**61.68**	**39.52**	**128.38**	**274.33**	**1915.59**

Post Mining Land Use: The tentative post–mining land use is given below.

Table-18.2-Figures in Ha.
Conceptual Post Mining Land Use (Departmental Options)

Sl. No.	Particulars	Quarry Area (After backfilling & reclamation)	Safety zone as green belt	Infrastructure, Colony, Explosive magazine etc.	R&R site	Land for Nala Diversion	Grand Total
1	Afforested area	105	172.74	5	0	0	**282.74**
2	Cultivable Land	1236.96	0	30	0	0	**1266.96**
3	Water body	88.86	0	0	0	0	**88.86**
4	Other Void area	108.04	0	0	0	0	**108.04**
5	Other Water Bodies	0	1.6	0	0	20	**21.6**
6	Built-Up Area.	0	0	48.94	68.08	0	**117.02**
Total Land for the project		**1538.86**	**174.34**	**114.31**	**68.08**	**20**	**1915.59**

***** After mine closure, some portion of quarry area and infrastructure are proposed to be converted as cultivable area, as far as practicable, unless any difficulty arises after mine closure with respect to handing over the area of infrastructure after dismantling.

Table-18.1
Pre-mining Land Use (Outsourcing Options)-Figures in Ha.

Area (Ha)											
Sl.No	**Requirement of land**	**Tenancy/Agricultural land**	**Forest land**			**Govt.land**					**Total land**
			Revenue forest	**Others**	**Total**	**Grazing land**	**Waste land**	**Surface waterbody land**	**Others**	**Total**	
1.	Land for quarry	1215.94	20.08	66.07	86.16	47.88	30.83	37.92	120.13	236.76	**1538.86**
2.	For external dump	0	0	0	0	0	0	0		0	**0**
3.	Surface industrial development Rly.sliding, colony approach road etc.,	82.32	0	0	0	0	0	0	0	0	**82.32**
4.	Nala diversion	20	0	0	0	0	0	0	0	0	**20**
5.	Safety zone	109.98	0	26.79	26.79	0	30.85	1.6	5.13	37.57	**174.34**
6.	Land for homestead/ family	68.08	0	0	0	0	0	0	0	0	**68.08**
7.	Land for explosive magazine	5	0	0	0	0	0	0	0	0	**5**
	Total land	**1501.32**	**20.08**	**92.86**	**112.95**	**47.88**	**61.68**	**39.52**	**125.26**	**274.33**	**1888.6**
	Less forest land in safety zone not to be acquired	0	0	0	0	0	0	0	0	0	**0**
	Total land to be acquired	**1501.32**	**20.08**	**92.86**	**112.95**	**47.88**	**61.68**	**39.52**	**125.26**	**274.33**	**1888.6**

Post Mining Land Use: The tentative post–mining land use is given below.

Table-18.2
Post Mining Land Use (Outsourcing Options)-Figures in Ha.

Sl. No.	Particulars	Quarry Area (After backfilling & reclamation)	Safety zone as green belt	Infrastructure, Colony, Explosive magazine etc.	R&R site	Land for Nala Diversion	Grand Total
1	Afforested area	105	172.74	5	0	0	282.74
2	Cultivable Land	1236.96	0	51.2	0	0	1288.16
3	Water body	88.86	0	0	0	0	88.86
4	Other Void area	108.04	0	0	0	0	108.04
5	Other Water Bodies	0	1.6	0	0	20	21.6
6	Built-Up Area.	0	0	31.12	68.08	0	99.2
Total Land for the project		**1538.86**	**174.34**	**87.32**	**68.08**	**20**	**1888.60**

Table-18.1
Pre-mining Land Use (for Coal Departmental and OB Outsourcing option**)**
Figures in Ha.

Area (Ha)											
Sl.No	**Requirement of land**	**Tenancy/Agricultural land**	**Forest land**			**Govt.land**					**Total land**
			Revenue forest	**Others**	**Total**	**Grazing land**	**Waste land**	**Surface waterbody land**	**Others**	**Total**	
1.	Land for quarry	1215.94	20.08	66.07	86.16	47.88	30.83	37.92	120.13	236.76	**1538.86**
2.	For external dump	0	0	0	0	0	0	0		0	**0**
3.	Surface industrial development Rly.sliding, colony approach road etc.,	91.2	0	0	0	0	0	0	0	0	**91.2**
4.	Nala diversion	20	0	0	0	0	0	0	0	0	**20**
5.	Safety zone	109.98	0	26.79	26.79	0	30.85	1.6	5.13	37.57	**174.34**
6.	Land for homestead/ family	68.08	0	0	0	0	0	0	0	0	**68.08**
7.	Land for explosive magazine	5	0	0	0	0	0	0	0	0	**5**
	Total land	**1510.20**	**20.08**	**92.86**	**112.95**	**47.88**	**61.68**	**39.52**	**128.38**	**274.33**	**1897.48**
	Less forest land in safety zone not to be acquired	0	0	0	0	0	0	0	0	0	**0**
	Total land to be acquired	**1510.20**	**20.08**	**92.86**	**112.95**	**47.88**	**61.68**	**39.52**	**128.38**	**274.33**	**1897.48**

Post Mining Land Use: The tentative post–mining land use is given below.

Table-18.2

Post Mining Land Use (Coal Departmental and OB Outsourcing option**)-Figures in Ha.**

Sl. No.	Particulars	Quarry Area (After backfilling & reclamation)	Safety zone as green belt	Infrastructure, Colony, Explosive magazine etc.	R&R site	Land for Nala Diversion	Grand Total
		Figures in Ha.					
1	Afforested area	105	172.74	5	0	0	282.74
2	Cultivable Land	1236.96	0	60.08	0	0	1297.04
3	Water body	88.86	0	0	0	0	88.86
4	Other Void area	108.04	0	0	0	0	108.04
5	Other Water Bodies	0	1.6	0	0	20	21.6
6	Built-Up Area.	0	0	31.12	68.08	0	99.2
Total Land for the project		**1538.86**	**174.34**	**96.2**	**68.08**	**20**	**1897.48**

Present land use would be converted into internal dump, green belt, built up area, surface infrastructure, final void/water body & other surface water body etc. after the cessation of mining operation. Out of 1538.86 Ha. of quarry area, plantation would be done in 105.00 Ha. There would be a water body of 88.86Ha. left after mine closure with a total void area of 203.857 Ha. After cessation of mining operation the major part of internal dump (1236.96 Ha.) having heights 470m to 500m from MSL, would be developed as grass land. The dump surface would be maintained flat and top soil would be spread over it as a part of final reclamation. Such grass land would be converted/ utilised into cultivable land after mine closure for the use of local population.

Surface water body of 1.60 Ha. in safety zone would be kept undisturbed.

Year wise programme of OB removal, dumping, & plantation has been given in table 18.8.

18.2Water quality management:

a) Physiography and Drainage:

The block is gently undulating and exhibits a gentle rolling topography. The general scope of the area is towards the west of the Block. The elevations in the block vary between 461.57m to 509.25m above MSL. The Katna Nala delineating roughly the southern block boundary drains the area and finally discharges into Son River in the north-western part of the block. Besides smaller hillock capped by dolerite with roughly east-west trend is present in the northern part of the block.

b) Water quality status:

The details of water monitoringlocations have been described in table 18.3 and the present water quality of both surface and ground water has been shown in tables 18.4 and 18.5. The locations/stations have been considered from base line data of adjacent Batura OC Project.

Table-18.3

Sl. No	Location	Direction (w.r.t. Centre of core zone)	Distance (km)	Reasons for selection
01	Nallah Water, Kalahari, **(SW_1)**	North-East	3.5	To assess existing water quality
02	River Water, Bichia , **(SW_2)**	North-East	-	To assess existing water quality
03	Bichhia Village Hand Pump **(GW_1)**	West	0.5	To assess the ground water quality in the village area.
04	Rampur Village Hand Pump **(GW_2)**	Core-Zone	-	To assess the ground water qualityin the village area..

Table-18.4
Summarised Surface Water Quality Data

Sl.No.	Parameters	Values Kalahari,Nalla	Values Bichia River	Limit As Per IS:2296:1982 Norms (Tolerance Limit for Inland Surface Waters, Class-C)
1	pH	7.4	7.3	6.5 – 8.5
2	Total dissolved Solids	390	175	1500
3	Chloride as Cl	36.7	9.43	600
4	Sulphates as SO_4	4.0	12.0	400
5	Nitrate as N	<1.0	4.7	50
6	Iron as Fe	0.621	0.056	5.0
7	Zinc as Zn	0.005	0.01	15.0

-

Table-18.5 - Summarized Ground Water Quality Data
Summarized Ground Water Quality Data-Period: **20.09.15- 20.12. 2015**
Location; Bichhia Village Hand Pump **(GW_1)** Rampur Village Hand Pump **(GW_2)**

Sl.No.	Parameters	Range of Recorded Results (in mg/l except pH)		
		GW1	GW2	Desirable/ Permissible Limits. As per IS:10500
1	pH	7.4	6.9	6.5 - 8.5
2	Total dissolved solids	1170	384	500 / 2000
3	Total Alkalinity as $CaCO_3$	80	54	200 / 600
4	Total Hardness as $CaCO_3$	306	280	300 / 600

5	Chloride as Cl	377	234	250 / 1000
6	Sulphates as SO_4	360	289	200 / 400
7	Nitrate as N	30.9	28	45 / 100
8	Iron as Fe	0.17	3.1	0.3 / 1.0
9	Zinc as Zn	1.14	0.1	5.0 / 15.0

Ground water quality is found to be conforming to drinking water standard as per IS 10500.

c) Measures for control of pollution

Management of surface water drainage: -

Garland drainage will be made around the periphery of the quarry. These drains will be connected to Katna and Jamuna nala which will be diverted outside the mining area in the course of mining operation. In the workings, heavy duty pumps will be deployed in rainy season which after passing through settling ponds will throw the accumulated water from the working face into these garland drains.

Mine Water Discharge

The collected water at the floor of mine sump (351551cum capacity) will be pumped to the settling tank where suspended solids will get settled. The clear water after sedimentation & treatment will be reused for water sprinkling, plantation & agriculture purpose, ground water recharge & for use by the local villagers etc. Workshop effluents will be discharged through Oil and Grease trap and sedimentation tank.

Domestic Effluent Treatment: -

Domestic effluent from the colony will be treated in a conventional septic tank and soak pit arrangement. Such arrangement will be constructed for different groups of blocks.

Water Conservation: -

The waste water recycling after due treatment will enable conservation of water.Storage of conserved water in mine pits would be given due emphasis to providewater round the year and the quality of water would be maintained. Surface waterbody of 1.60 Ha. in safety zone would be kept undisturbed and the balance left mined out area of 88.86 Ha. would be treated as water body after mine closure.This would serve as a considerable source of water for the use of local population.

d) Water balance of the area (from EMP)

The ground water recharge was estimated by Rainfall-Infiltration method. The net annual groundwater recharge and draft for the study are were estimated as 47.98 and 12.53 M.Cum respectively.

Thus, the balance available annual groundwater recharge has been projected as 35.45M.Cum. The detailed annual groundwater recharge balance estimates are shown in Table - and in the pie diagram below

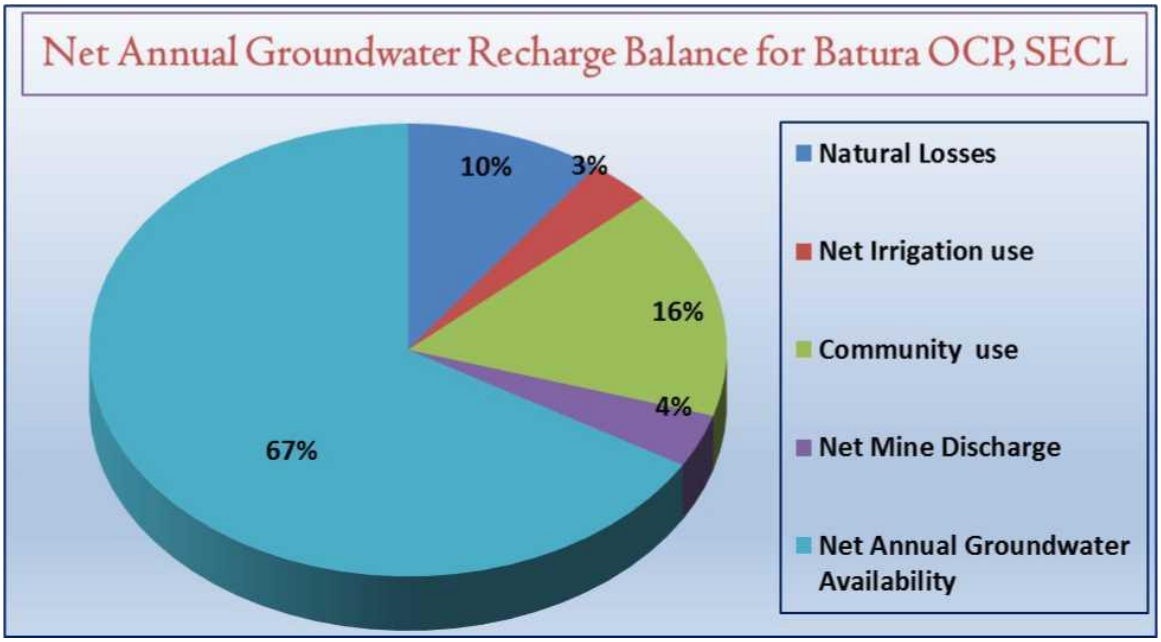


Figure-18.1

e) Acid mine drainage source (if any), the existing practice of control and future plan.

The existing mine water quality of the nearby mines are not acidic and it is expected the acid mine drainage problem will not arise in this project also. If however acid mine drainage problem arises suitable measures will be taken as per standard prevailing practice.

f) Underground water/ quarry water management after closure (specify its usage like domestic water supply, irrigation, pisciculture or stabilizing the ground water regime).

The waste water recycling after due treatment will enable conservation of water. Storage of conserved water in mine pits would be given due emphasis to provide water round the year and the quality of water would be maintained. Surface water body of 1.60

Ha. in safety zone would be kept undisturbed and the balance left mined out area of 88.86 Ha. would be treated as water body after mine closure. This would serve as a considerable source of water for the use of local population.

g) Water quality monitoring for three years after closure (specify the monitoring sampling station and frequency). The sampling stations shall be one no. mine water with quarterly frequency and two numbers ground water samples in core and buffer zone with quarterly frequency.

To comply with the statutory provision of MOEF and Pollution Control Board,fortnightly water quality is being monitored and evaluated. Corrective measureswhenever needed are taken on the basis of monitoring results

18.3 Air quality management:-

Following air pollution control measures are will be practiced within the mining area and at coal handling plants and railway siding.

1. Water spraying will be done regularly on approach roads within the mining area to minimise the dust generation.
2. Mist sprinkling arrangement will be provided at the transfer point of coal.
3. Intensive plantation of adequate width all along the haul road and other road will be raised to minimise transport generated pollutants.
4. Crusher house of CHP will be provided with dust extraction arrangements.
5. Minimising the transport of coal from the crusher house to silo loading system, belt conveyor has been provided.
6. Coal transportation to railway siding will be done in covered trucks.
7. Exposed overburden dumps will be covered through an appropriate plantation
8. The drills will be equipped with dust arresting devices or wet drilling arrangement.
9. Optimum blast-hole geometry will be followed to reduce the dust during blasting.
10. Regular monitoring of ambient air quality of project area.

Ambient Air quality in core and buffer zone

The air quality data generated for adjacent Batura OC block for the period Oct 08 to Dec 08 in respect of SPM, RPM, SO_2, & NO_x corresponding to different locations are considered and shown in the following tables18.6 & 18.7. This will enable to obtain a

comprehensive idea ofambient air quality in and around the project area. The data under different category are within the permissible limit of CPCB.

The data under different category are within the permissible limit of CPCB.

Table18.6

Sl. No.	Location	Distance (km)	Direction	Reasons for selection
		(w.r.t. periphery of core zone)		
1.0	Bichia Village **(A1)**	0.8	North-East	To assess upwind wind areas of the proposed project activity.
2.0	Batura village **(A2)**	-	North-East	To assess the base line environmental in crosswind areas of the project activity.
3.0	Rampur Village **(A3)**	-	Core Zone	To assess the base line environmental status in the core zone
4.0	Kodaili village**(A4)**	1.8	North-East	To assess the base line environmental status in the downwind areas of the proposed project.
5.0	Khamrudh village **(A5)**	-	North-East	To assess the base line environmental status in the downwind areas of the proposed project.
6.0	Kalahari Village **(A6)**	-	North-East	To assess the base line environmental status & to know the increase of the pollutant at the cross-wind areas of the project activity.

Table 18.7
Summarised Air Quality Data
Period: Oct. to Dec. 15 **(Values are in µgm/m^3)**

			SPM		RPM		SO2		NOx	
Monitoring Location	**No. of Samples Drawn.**	**Category* (R,I, S)**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Core zone										
1)SA_1	144	I	36	99	78	222	15	60	<5.0	21
Buffer Zone										
2)SA_2	144	R	33	98	71	214	12	55	<5.0	19.4
3)SA_3	144	R	33	98	71	227	11	53	<5.0	19.2
4)SA_4	144	R	45	105	92	237	11	51	<5.0	20.3
5)SA_5	144	R	36	111	85	218	11	68	<5.0	18
6)SA_6	144	R	31	97	79	214	13	54	<5.0	19.8

*** R = Residential; I = Industrial;**

In general, all SPM, RPM SO_2 and NO_x values are found to be well within the prescribed limits of CPCB for Residential and rural area.

18.4 Waste disposal :--

a) External OB dump & internal backfilling details (specify the reclaimed backfilled area, area of voids for water reservoir and also the OB dump area height and volume) prior to closure of mine or during progressive mine closure (as the case be).

The total volume of OB has been estimated as 626.07 Mcum. In the initial years i.e. upto 3rd year, part (8.00 MCum) of OB quantities will be externally dumped in the dip side of the property and rehandled back into internal dump from 6th to 9th year. Internal dumping will start from the 1st year onwards.

So, the total volume of OB will be placed finally into the internal dump and hence, there will be no external dump in the post mining scenario.

Maximum height of internal dump will be upto 30m (above ground level)

Slope of waste bench of internal dump	-	37 degrees
Height of individual bench	-	30 m
Width of berm.	-	30 m

Present land use would be converted into internal dump, green belt, built up area, surface infrastructure, final void/water body & other surface water body etc. after the cessation of mining operation. Out of 1538.86 Ha. of quarry area, plantation would be done in 105.00 Ha. There would be a final void/water body of 88.86Ha. left in the project after mine closure. After cessation of mining operation the major part of internal dump (1236.96Ha.) having heights 470m to 500m from MSL, would be developed as grass land. The dump surface would be maintained flat and top soil would be spread over it as a part of final reclamation. Such grass land would be converted/ utilised into cultivable land after mine closure.

Initially to the extent possible, top soil will be removed and stored separately. Subsequently this soil will be directly spread over the leveled graded backfilled spoil for reclamation of the quarried out land. Biological reclamation work will follow in next progressive year. Year wise proposed overburden removal, coal production and plantation is given in Table18.8 below.

The final stage reclamation plan and cross-section thereof has been shown in figures 18.4.and 18.5 respectively.

Surface water body of 1.60 Ha. in safety zone would be kept undisturbed. Plantation of 431850, Nos, would be done in 172.74 Ha. of Safety zone, 12500 Nos. in 5.0 Ha. around the mine, infrastructure, colony etc. @ 2500 Nos./Ha. The no. of plantation is given as under.

a. Safety zone: 431850 Nos,

b. Mine, infrastructure, colony etc. : 12500 Nos,

c. Quarry area after backfilling**:** 262500 Nos, in 105.00 Ha

Total Plantation = 706850 Nos.

The plantation of trees would be of fruit bearing type. The species which are indigenous to the area will be planted. The details of the species are selected based on the flora data of that area. Stage Dump plan are shown in figures -18.2 for 5th year, 18.3 for 10th year, 18.4 for 15th year. Final stage reclamation plan is shown in fig. 18.5. X-section of final stage reclamation is shown in figure 18.6.

b) Stabilization of external O.B. dumps and backfilled area (Technical Reclamation)

Technical reclamation would involve breaking and levelling the top of OB dumps, filling of gulleys and terracing etc. The maximum depth of the project will be 80 m. There will be no external dump after cessation of mining operation. Initially, upto 3rd year OB (8.00 MCum) will be dumped externally on the dip side of the quarry but from 6th to 9thyear when mining will reach to this point, the OB will start rehandling. Internal dumping, technical reclamation & biological reclamation will start from the 2nd, 3rd, & 4th year onwards respectively.

The height of each waste bench is restricted to only 30 m. The decoaled area after simultaneous backfilling will be levelled by means of dozers keeping a mild slope of about 1 in 200 for surface water drainage for plantation and other purposes.

Table 18.8
PROGRAMME OF O.B. REMOVAL, DUMPING & PLANTATION:

Year	Coal production (MTe)	OB removal (Mcum)	Dump plan (Mcum)		Dump area (Ha.)		Area available for reclamation (Ha.)		No. of plantation @ 2500 Nos / Ha.		Total plantation @ 2500 Nos / Ha.
			External	Internal	External	Internal	External	Internal	External	Internal	
1	CONSTRUCTION YEAR										
2	0.50	12.00	*7.00	4.61	0.00	47.73	0.00	22.66	0.00	0.00**	0
3	1.00	14.00	*1.00	12.96	0.00	47.73	0.00	22.66	0.00	0.00	0

Year	Coal production (MTe)	OB removal (Mcum)	Dump plan (Mcum)		Dump area (Ha.)		Area available for reclamation (Ha.)		No. of plantation @ 2500 Nos / Ha.		Total plantation @ 2500 Nos / Ha.
			External	Internal	External	Internal	External	Internal	External	Internal	
4	2.00	24.00	0.00	24.00	0.00	47.73	0.00	22.66	0.00	0.00	0
5	3.00	34.00	0.00	34.00	0.00	47.73	0.00	22.66	0.00	0.00	0
6	4.00	37.50	0.00	37.50	0.00	82.91	0.00	71.91	0.00	0.00	0
7	4.00	37.50	0.00	37.50	0.00	82.91	0.00	71.91	0.00	0.00	0
8	4.00	37.50	0.00	37.50	0.00	82.91	0.00	71.91	0.00	0.00	0
9	4.00	37.50	0.00	37.50	0.00	82.91	0.00	71.91	0.00	0.00	0
10	4.00	37.50	0.00	37.50	0.00	82.91	0.00	71.91	0.00	0.00	0
11	4.00	37.50	0.00	37.50	0.00	87.41	0.00	101.08	0.00	0.00	0
12	4.00	37.50	0.00	37.50	0.00	87.41	0.00	101.08	0.00	0.00	0
13	4.00	37.50	0.00	37.50	0.00	87.41	0.00	101.08	0.00	0.00	0
14	4.00	37.50	0.00	37.50	0.00	87.41	0.00	101.08	0.00	0.00	0
15	4.00	34.50	0.00	34.50	0.00	87.41	0.00	101.08	0.00	0.00	0
16	4.00	34.50	0.00	34.50	0.00	81.50	0.00	63.2	0.00	0.00	0
17	4.00	34.50	0.00	34.50	0.00	81.50	0.00	63.2	0.00	0.00	0
18	4.00	34.50	0.00	34.50	0.00	81.50	0.00	63.58	0.00	0.00	0
19	4.00	34.50	0.00	34.50	0.00	81.50	0.00	63.58	0.00	0.00	0
20	3.00	32.07	0.00	32.50	0.00	81.50	0.00	63.58	0.00	0.00	0
MC_1	0.00	0.00	0.00	0.00	0.00	0	0.00	30	0.00	75000	75000
MC_2	0.00	0.00	0.00	0.00	0.00	0	0.00	40	0.00	100000	100000
MC_3	0.00	0.00	0.00	0.00	0.00	0	0.00	45	0.00	112500	112500
Total	**65.50**	**626.07**	**8.00**	**618.07**	**0.00**	**1450.00**	**0.00**	**1387.73**	0.00	**105.00**	**262500**

*** OB amount dumped on the dip side of the property would be removed in 6th to 9th year by rehandling into internal dump.**

**** The internal dump is proposed to be converted into cultivable area after mine closure, so the plantation is not shown in the flat area of internal dump. Only in slopes & terraces of the internal dump, plantation would be done, but only after cessation of all mining activities i.e. during mine closure phases.**

MC - Mine Closing Years

Figure: 18.2 5th year Dump Plan (1st stage)

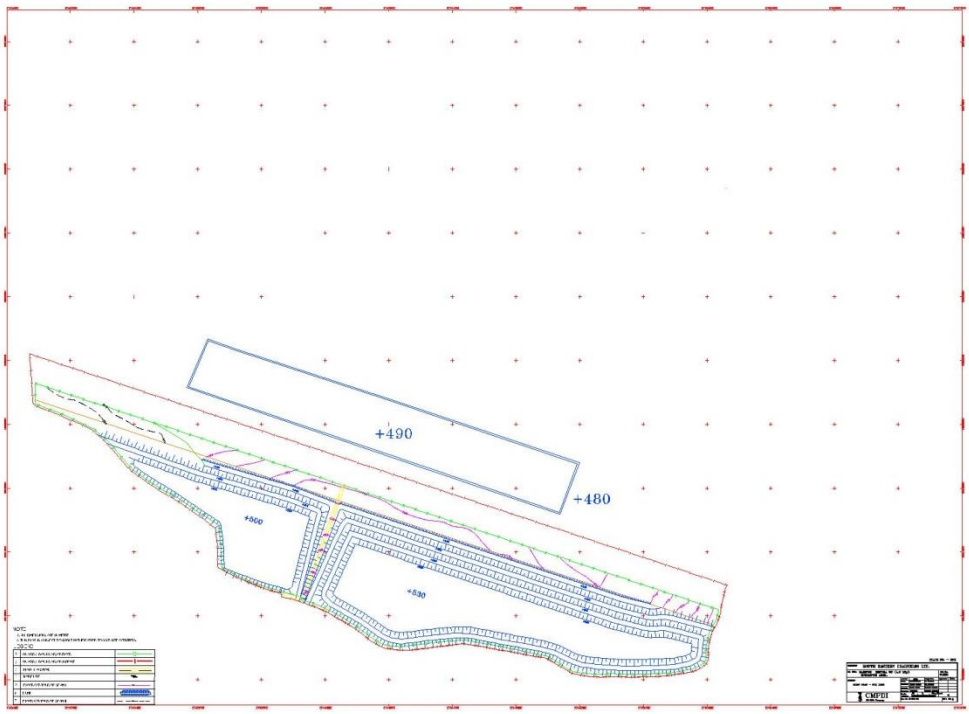


Figure: 18.3 10th year Dump Plan (2nd stage)

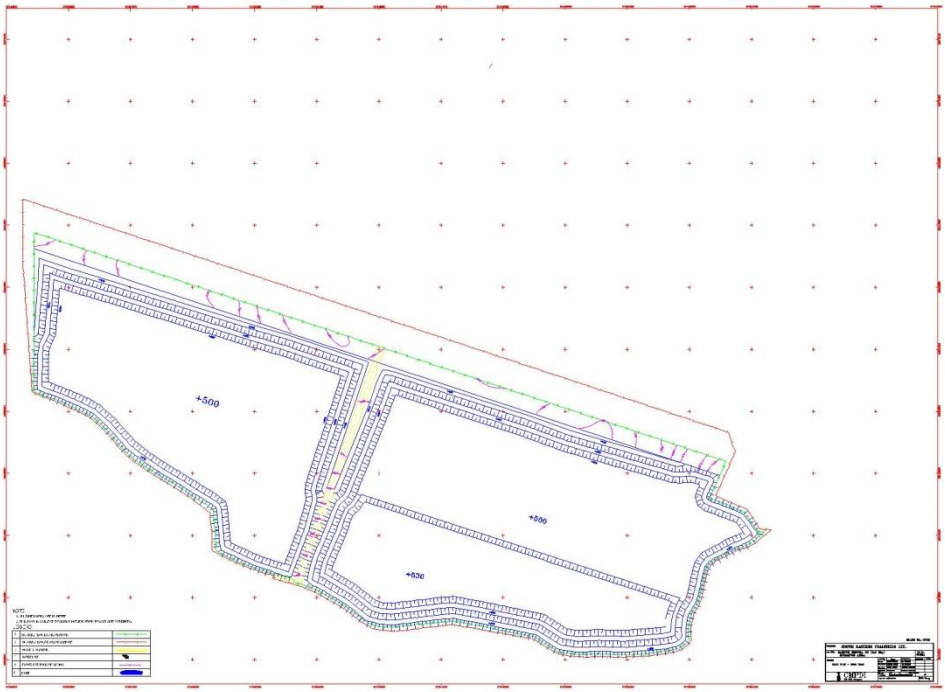


Figure: 18.4 15th year Dump Plan (3rd stage)

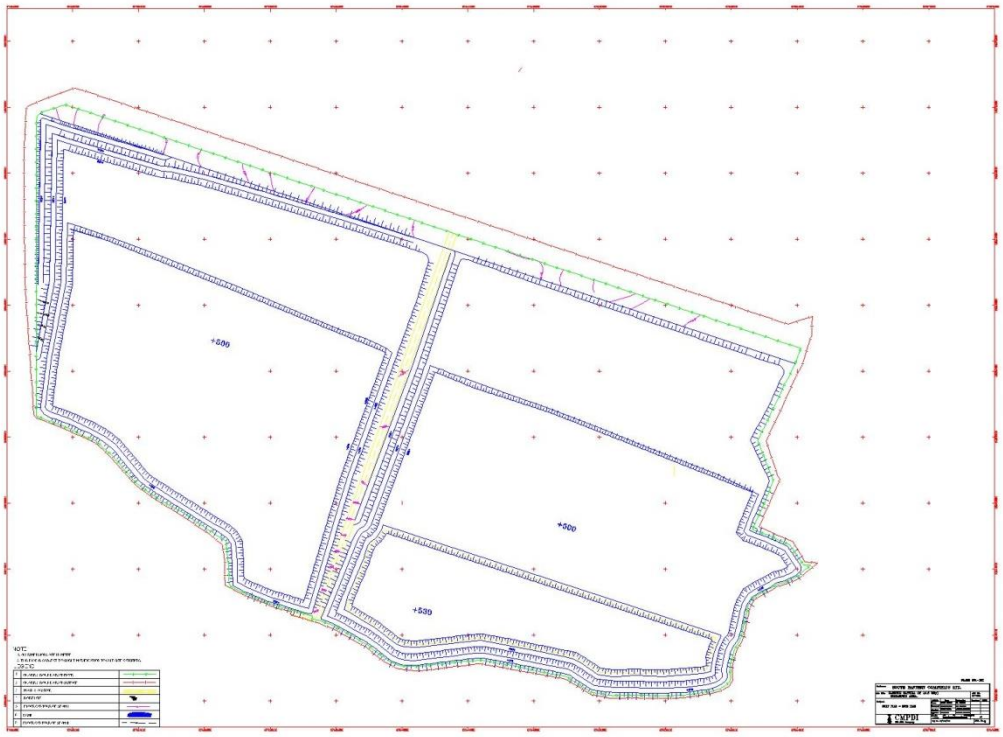
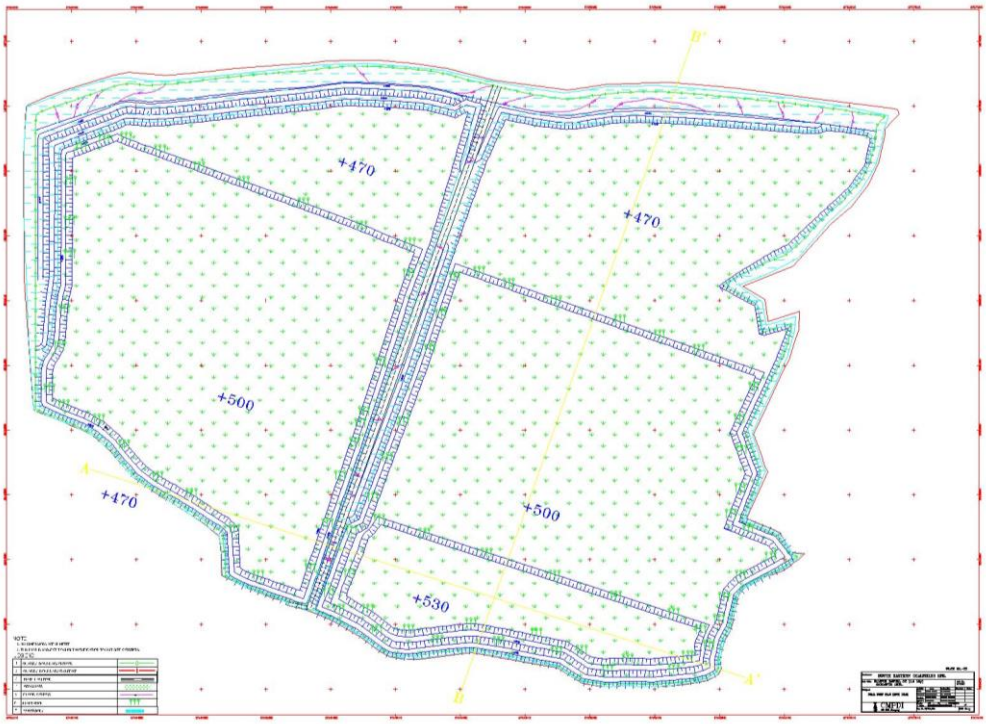


Figure: 18.5 20th year Reclamation Plan (Final stage)



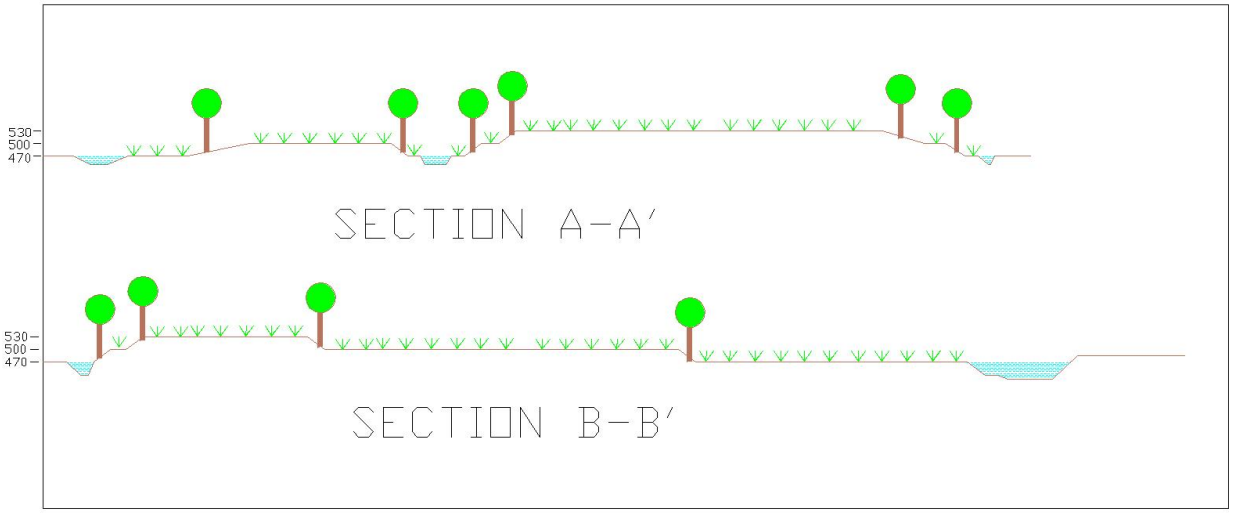


Figure: 18.6 X-Sectional View of Final Stage Reclamation Plan

c) Top soil / soil amendment application

The stock piling of top soil will be as follows:

i) Top soil and other materials removed shall be stock-piled only when it is impractical to promptly redistribute such materials on regarded areas.

ii) Stock-piled materials shall be selectively placed on a stable area, not disturbed, and protected from wind and water erosion, unnecessary compaction, and contaminants which lessen the capability of the materials to support vegetation when redistributed.

iii) After the final grading the topsoil would be redistributed in a manner that achieves an approximate uniform stable thickness consistent with the post mining land uses, contours, and surface water drainage system.

d) Plantation on external & backfilled area, avenue and block plantation with type of plantation i.e. local/native species. Name the local species for plantation.

Green belt on dumps:-

After technical reclamation of internal OB dumps and redistribution of top soil over it, the dumps will be biologically reclaimed followed by plantation as details given in table 18.8 above. About 262500nos, of plants would be planted over a part of internal dump (i.e. 105.00Ha.) and plantation will be done during the mine life.

Green Belt around Mine: -

In the directions where natural forest does not exist, there is need for creating green belt of adequate width as an effective dust and sight curtain in the periphery of mining area. The trees planted in the green belt area shall act as buffers and shock absorber against dusts, noise and stone flying. The trees in the green belt will be tall, wind firm, broad leaved and evergreen. Plantation of 431850 Nos, would be done in 172.74 Ha of safety zone around the mine.

Haul Roads: -

A green belt of adequate width on either side of the haul road will be raised and the existing vegetation will be protected. The plants will be raised at spacing of 2.0x2.0 m.

All other roads: -

Along the roads other than the haul roads, dust resistant plants will be planted. The plants will be raised at spacing of 2.0x2.0 m. There will be 12500 Nos. of plants in 5.0 Ha. of area in infrastructure, colony etc.

Infrastructural Facilities (Nursery):-

A nursery is a prerequisite for supply of seedlings of suitable species of right size to the extent required. M.P.Rajya Van Vikas Nigam has already raised a nursery to grow saplings and related activities.

Species for plantation.-

- **Fruit bearing trees**
  - Jamun, Mango, Imli, Sitaphal, Bel, Ganga Imli, etc.
- **Medicinal trees**
  - Neem, Karanj, Harra, Behara, Aonla, Arjun, Shikakai, Mahua, Kusum
- **Timber value trees**
  - Teak, Shivan / Ghamar, Sissoo, Sisham, Safed Sirus, Bamboo, Peltaforum, Babool,
- **Ornamental trees**
  - Gulmohur, Kachnar, Amaltas, Saptaparni, Grevelia, Peepal, Palm tree

e) Disposal of Coal beneficiation process reject.

There is no coal beneficiation except silo proposed in Batura OC.

18.5 Details of surface structures proposed for dismantling (brief description)
(Unless used in a gainful way **)**

a) Industrial / mine structures

CHP, Workshop (E&M and Excavation), Managers & Pit Offices to be dismantled unless otherwise gainfully utilized by company, State Govt./Local Body.

b) Residential Buildings

Would be handed over to closest project.

c) Service buildings

Dispensary, telephone exchange, sub area Managers Office, Store to be handed over to closest project.

d) Telephone Cables

Telephone cables to be removed for re-use in other projects of the area, as far as practicable.

e) Sub-stations

Would be dismantled and equipment will be gainfully utilized in other projects.

f) Transformers

Would be dismantled and equipment will be gainfully utilized in other projects.

g) Community Services

Handed over to the local authorities.

h) Water line

Handed over to the local authorities.

i) Water Treatment Plants

Handed over to the local authorities.

j) Rly. Siding

Would be used for other projects in the area.

k) ETP/STP

Handed over to the local authorities.

l) Power line

Would be dismantled.

18.6 Disposal of Plants & Machineries

a) Disposal or reuse of existing HEMM, CHP, workshop and railway siding for OC.

Reused for other projects in the area.

b) Disposal or reuse of haulage system, ventilation, CHP, workshop, and railway siding for UG.

Not applicable.

c) Disposal or reuse of transmission and sub-station.

To be reused for other projects.

18.7 Safety and security arrangement

a) **Details of fencing around abandoned quarry indicating the length of the fencing.**

About 17 Kms. of fencing around the mine has been proposed with Stone wall / brick wall 1.2 m. height above GL.

b) Mine entry sealing arrangements and subsidence management for UG mines. Sealing details and dimensions shall also be provided. The thickness of mine sealing will be 100 cm RCC (M20) with nominal reinforcement. For incline entry, the mine entry path of 5 m will be filled with debris and clay before sealing the mine.

Not applicable.

c) Providing One Time Lighting Arrangement.

Would be provided.

d) Slope stability arrangement for high wall and back filled dumps.

Slope stability analysis for high wall and backfilled dumps would be done, if required.

NOTE: However, possibility shall be explored for handing over the residential & non-residential buildings and other infrastructures including the reclaimed land to state govt. for the benefit of local villagers and strengthening the area infrastructures. The end use of these facilities shall be decided by State Govt. with the help of local govt. and Village Panchayat.

18.8 Economic Repercussions of closure of mine

18.8.1 Manpower of the Project-

Departmental Options: = 1287 nos;
Outsourcing Options: = 270 nos.
Partial Hiring Option = 366 nos.

18.8.2 Assessment of Income Scenario of local people

Table 18.9

Sl. No.	Particulars	Proposed Disposal Practice
a	Number of local employees redeployed in other projects of the company till their superannuation.	All manpower including local employees in the role of SECL will be engaged in other projects of SECL till their superannuation.
b	Approximate no. of people engaged in indirect employment / ancillary activities.	This number would vary. It would be about 3 to 4 times of departmental employees. They would find no financial loss due to the mine closure as their activities will be shifted in the new or expansion mines located in the same or other coalfield area.
c	Resettlement / Redeployment of a & b.	(i) Decided by the company. (ii) Will be decided in consultation with local authority if required.
d	If no redeployment is possible then sustenance plan. Compensation for losing employment or income.	Affected persons would be given vocational and skill development training for continuance / sustenance of income level.

	ii) Vocational training for continuance / sustenance of income level	
e	Views of society and expectation on closure of mine.	Society's anxiety is limited to assurance about continuation of employment opportunities and availability of civic amenities presently provided by mine management. The employment opportunities will remain available, albeit in other nearby projects. Civic amenities will also be available as the infrastructure for same will be handed over to State Government for future use of society.

NOTE: It is proposed that reclaimed and afforested land will be handed over to State Forest Dept. for the benefit of local ecosystem. The forest wealth can also be utilized by local people or tribal in the form of fruits and fodders. The water reservoir in the mine voids will be utilized for pisciculture, irrigation, domestic drinking water or stabilizing the ground water regime. Landscaping during closure of mine will make the spot for tourist attraction.

18.9 Time Schedule

The closure of mines involves environmental, technical, social aspect and financial assurance for implementing the post closure activities as per guidelines of Ministry of Coal. The post closure implementing activities will run for three years. The following activities will be implemented as per bar chart (figure – 18.2).

Figure – 18.2

Sl. No.	Activities	Time Frame	Half Yearly					
			1	2	3	4	5	6
1.	Preparation of Survey & Disposal Report	1 month						
2.	Slope Stability study for high walls and internal backfilled dumps	1 month						
3.	Disposal of P&M including HEMM, CHP, W/S, Siding	2 and half years						
4.	Backfilling of mined out Area (OC)	2 years						
5.	Dismantling of Industrial structure	2 years						
6.	Grading & dozing of high walls for OC	2 years						
7.	Fencing of quarry	2 years						
8.	Clearing of Coal Stock and Infrastructural Area.	2 years						
9.	Disposal / Dismantling of Residential colony	2 &1/2 years						

10.	Plantation & landscaping on backfilled area.	3 years						
11.	Plantation over cleaned land of Infrastructure.	from 2nd year						
12	Sealing of mine entries for UG mine	from 2nd year	Not Applicable					
13.	Environmental Monitoring	3 years						
14.	Subsidence Management for U/G	3 years	Not Applicable					
15.	Post closure subsidence monitoring for UG	3 years	Not Applicable					
16	Any project specific activities	Nil						

The manpower for implementing the above activities with time bound manner would be provided.

NOTE: The progressive mine closure will be done as per the calendar plan of the project for technical and biological reclamation of dumps and internal voids.

18.10 Mine Closure Cost –

A : DEPARTMENTAL OPTION

The mine closure cost will cover the following activities for which a corpus escrow account @ Rs. 6.0 lakhs per Ha for OCP & @ Rs. 1.0 lakh per Ha. for UG mine of the project area shall be opened with the coal controller organization. In case of mines having acid mine drainage, post closure acid mine drainage management cost shall also be included in the total closure cost.

As per the guidelines of the MoC, the cost of the mine closure is to be computed based on the basis of the project area involved in the project.

In Rampur Batura OCP, the total project area is **1847.510**Ha. (Area includes land for quarry, infrastructure and safety zone). So, the closure cost is to be computed considering a total project area of **1847.510Ha**.

For estimation of the corpus, WPI for June 2017 is considered,. The latest WPI as on June2017 is 112.7 based on the 2011-12 series. The base year of 2009 over which the escalation is to be done is of 2004-05 series. The linking factor for converting 2011-12 series to 2004-05 series is 1.561.

The WPI for June2017 converted to 2004-05 series is therefore 112.6 * 1.561 which arrives to 175.92.

The escalation factor for June2017 (WPI 175.92) over Aug 2009 (WPI 129.6) comes to 1.357. The updated cost of the mine closure as on June2017 is estimated to be Rs.

8.144 lakh per hectare.

The Final mine closure cost (@ Rs. 8.354 /Ha.) works out to be Rs.15046.94lakh

18.10.1The detail of escrow account

The current value of corpus is **Rs.15046.94lakhs**(as on June2017). This corpus is to be divided by balance life of mine. Since, this is a new project and the estimated life is 20 years, the annual corpus comes to **Rs752.35Lakhs** by dividing 20 years. This amount is to be deposited in escrow account every year.

Fund to be deposited in escrow account: Year wise amount to be deposited has been given below in table 18.10.

Table – 18.10

Year	Fund Deposited in Escrow Fund(Rs in lakh	Fund to be Reimbursed (Maximum) Rs in lakh+Accrued interest as applicable
1	752.35	NIL
2	789.96	NIL
3	829.46	NIL
4	870.94	NIL
5	914.48	NIL
Phase-1 Total	**4157.19**	**3325.75**
6	960.21	NIL
7	1008.22	NIL
8	1058.63	NIL
9	1111.56	NIL
10	1167.14	NIL
Phase-2 Total	**5305.75**	**4244.60**
11	1225.49	NIL
12	1286.77	NIL
13	1351.11	NIL
14	1418.66	NIL
15	1489.60	NIL
Phase-3 Total	**6771.63**	**5417.30**
16	1564.08	NIL
17	1642.28	NIL

18	1724.39	NIL
19	1810.61	NIL
20	1901.14	NIL
Final Phase	**8642.51**	**11889.42**
Grand Total	**24877.08**	**24877.08**

ESCALATION TABLE				
Year	Amount as	Escalation	Escalation	Amount to
	on June2017	Rate	Amount	be deposited
FIGURES IN LAKH Rs				
1	752.347	1.00	0.00	752.35
2	752.347	1.05	37.62	789.96
3	752.347	1.10	77.12	829.46
4	752.347	1.16	118.59	870.94
5	752.347	1.22	162.14	914.48
6	752.347	1.28	207.86	960.21
7	752.347	1.34	255.87	1008.22
8	752.347	1.41	306.28	1058.63
9	752.347	1.48	359.21	1111.56
10	752.347	1.55	414.79	1167.14
11	752.347	1.63	473.15	1225.49
12	752.347	1.71	534.42	1286.77
13	752.347	1.80	598.76	1351.11
14	752.347	1.89	666.32	1418.66
15	752.347	1.98	737.25	1489.60
16	752.347	2.08	811.73	1564.08
17	752.347	2.19	889.93	1642.28
18	752.347	2.30	972.05	1724.39
19	752.347	2.41	1058.27	1810.61
20	752.347	2.53	1148.80	1901.14
TOTAL	15046.94		9830.13	24877.08

B : OUTSOURCING OPTION

The total project area in outsourcing option is **1820.52** Ha. (Area includes land for quarry, infrastructure and safety zone). So, the closure cost is to be computed considering a total project area of **1820.52 Ha**.

The escalation factor for June2017 (WPI 175.92) over Aug 2009 (WPI 129.6) comes to 1.357. The updated cost of the mine closure as on June2017 is estimated to be Rs.

8.144 lakh per hectare.

The Final mine closure cost (@ Rs. 8.144 /Ha.) comes to Rs.14827.12lakh

18.10.1**The detail of escrow account**

The current value of corpus is **Rs.14827.12lakhs** (as on June2017). This corpus is to be divided by balance life of mine. Since, this is a new project and the estimated life is 20 years, the annual corpus comes to **Rs741.36Lakhs** by dividing 20 years. This amount is to be deposited in escrow account every year.

Fund to be deposited in escrow account: Year wise amount to be deposited has been given below in table 18.10.

Table – 18.10

Year	Fund Deposited in Escrow Fund(Rs in lakh	Fund to be Reimbursed (Maximum) Rs in lakh+Accrued interest as applicable
1	741.36	NIL
2	778.42	NIL
3	817.34	NIL
4	858.21	NIL
5	901.12	NIL
Phase-1	**4096.46**	**3277.17**
6	946.18	NIL
7	993.49	NIL
8	1043.16	NIL
9	1095.32	NIL
10	1150.09	NIL
Phase-2	**5228.24**	**4182.59**
11	1207.59	NIL
12	1267.97	NIL
13	1331.37	NIL
14	1397.94	NIL
15	1467.83	NIL
Phase-3	**6672.70**	**5338.16**
16	1541.23	NIL
17	1618.29	NIL
18	1699.20	NIL
19	1784.16	NIL
20	1873.37	NIL

Final Phase	**8516.25**	**11715.73**
Grand Total	**24513.64**	**24513.64**

ESCALATION TABLE				
Year	Amount as on June 2017	Escalation Rate rate	Escalation Amount	Amount to be deposited
FIGURES IN LAKH Rs				
1	741.36	1.00	0.00	741.36
2	741.36	1.05	37.07	778.42
3	741.36	1.10	75.99	817.34
4	741.36	1.16	116.86	858.21
5	741.36	1.22	159.77	901.12
6	741.36	1.28	204.82	946.18
7	741.36	1.34	252.13	993.49
8	741.36	1.41	301.81	1043.16
9	741.36	1.48	353.96	1095.32
10	741.36	1.55	408.73	1150.09
11	741.36	1.63	466.23	1207.59
12	741.36	1.71	526.61	1267.97
13	741.36	1.80	590.01	1331.37
14	741.36	1.89	656.58	1397.94
15	741.36	1.98	726.48	1467.83
16	741.36	2.08	799.87	1541.23
17	741.36	2.19	876.93	1618.29
18	741.36	2.30	957.85	1699.20
19	741.36	2.41	1042.81	1784.16
20	741.36	2.53	1132.01	1873.37
TOTAL	14827.12		9686.52	24513.64

C : PARTIAL HIRING OPTION

The total project area in outsourcing option is **1829.40** Ha. (Area includes land for quarry, infrastructure and safety zone). So, the closure cost is to be computed considering a total project area of **1829.40 Ha**.

The escalation factor for June2017 (WPI 175.92) over Aug 2009 (WPI 129.6) comes to 1.357. The updated cost of the mine closure as on June2017 is estimated to be Rs.

8.144 lakh per hectare.

The Final mine closure cost (@ Rs. 8.144 /Ha.) comes to Rs.**14899.45**lakh

18.10.1**The detail of escrow account**

The current value of corpus is **Rs.14899.45lakhs** (as on June2017). This corpus is to be divided by balance life of mine. Since, this is a new project and the estimated life is 20 years, the annual corpus comes to **Rs745Lakhs** by dividing 20 years. This amount is to be deposited in escrow account every year.

Fund to be deposited in escrow account: Year wise amount to be deposited has been given below in table 18.10.

Table – 18.10

Year	Fund Deposited in Escrow Fund(in lakh Rs)	Fund to be Reimbursed (Maximum) Rs in lakh+Accrued interest as applicable
1	745.00	NIL
2	782.25	NIL
3	821.36	NIL
4	862.43	NIL
5	905.55	NIL
Phase-1	**4116.60**	**3293.28**
6	950.83	NIL
7	998.37	NIL
8	1048.29	NIL
9	1100.70	NIL
10	1155.74	NIL
Phase-2	**5253.93**	**4203.15**
11	1213.53	NIL
12	1274.20	NIL
13	1337.91	NIL
14	1404.81	NIL
15	1475.05	NIL
Phase-3	**6705.50**	**5364.40**
16	1548.80	NIL
17	1626.24	NIL
18	1707.55	NIL
19	1792.93	NIL
20	1882.58	NIL
Final Phase	**8558.11**	**11773.31**

Grand Total	**24634.14**	**24634.14**

ESCALATION TABLE

Year	**Amount as on June 2017**	**Escalation Rate rate**	**Escalation Amount**	**Amount to be deposited**
FIGURES IN LAKH Rs				
1	745.00	1.00	0.00	745.00
2	745.00	1.05	37.25	782.25
3	745.00	1.10	76.36	821.36
4	745.00	1.16	117.43	862.43
5	745.00	1.22	160.55	905.55
6	745.00	1.28	205.83	950.83
7	745.00	1.34	253.37	998.37
8	745.00	1.41	303.29	1048.29
9	745.00	1.48	355.70	1100.70
10	745.00	1.55	410.74	1155.74
11	745.00	1.63	468.53	1213.53
12	745.00	1.71	529.20	1274.20
13	745.00	1.80	592.91	1337.91
14	745.00	1.89	659.81	1404.81
15	745.00	1.98	732.11	1477.11
16	745.00	2.08	805.97	1550.97
17	745.00	2.19	883.51	1628.51
18	745.00	2.30	964.94	1709.94
19	745.00	2.41	1050.44	1795.44
20	745.00	2.53	1140.21	1885.21
TOTAL	14900.00		9748.16	24648.16

18.10.4 Tentative Final Mine Closure Activities & Cost Break-up:

The break-up of some major mine closure activities along with their tentative estimation of cost in terms of percentages of the total mine closure cost has been indicated in Table-18.11 below. The detailed activity schedule for the 'Final Mine Closure Plan' would be prepared five years before the intended final closure of the mine along with the detailed mine closure cost break-up.

Table 18.11TENTATIVE MINE CLOSURE ACTIVITIES & COST BREAK-UP

Type of mine: Open cast **Production Capacity:** 4.0 MTY

Project Area:1885.22 Ha (Dept.)/ 1857.40 Ha (Outsourcing)/1829.40 Ha(Partial Hiring)

Depth of the mine: 80m.

Sl. No.	Major Closure Activities	% of Total Closure Cost
A	**Dismantling of Structures**	
	Service Buildings	0.20
	Residential Buildings,	2.67
	Industrial Structures i.e. workshop complex, 33kv/3.3kv Sub-Station, Unit Stores, Security Barrack	0.30
B	**Permanent fencing of mine void & other dangerous areas**	
	Random rubble masonry of height 1.2m including levelling up in cement concrete 1:6:12 in mud mortar.	1.50
C	**Grading of highwall slopes**	
	Levelling & grading of highwall slopes	1.77
D	**OB Dump Reclamation**	
	Handling/Dozing of external OB dump into mine void.	88.66
	Bio-reclamation including soil spreading, plantation & maintenance.	0.00
E	**Landscaping**	
	Landscaping of the cleared land for improving its esthetic	0.30
F	**Plantation**	
	Plantation over area obtained after dismantling.	0.50
	Plantation around fencing	0.20
	Plantation over the cleared off external OB dump.	0.00
G	**Monitoring / testing of environmental parameters for three years.**	
	Air quality	0.22
	Water quality	0.20
H	**Entrepreneurship development (vocational and skill**	0.26

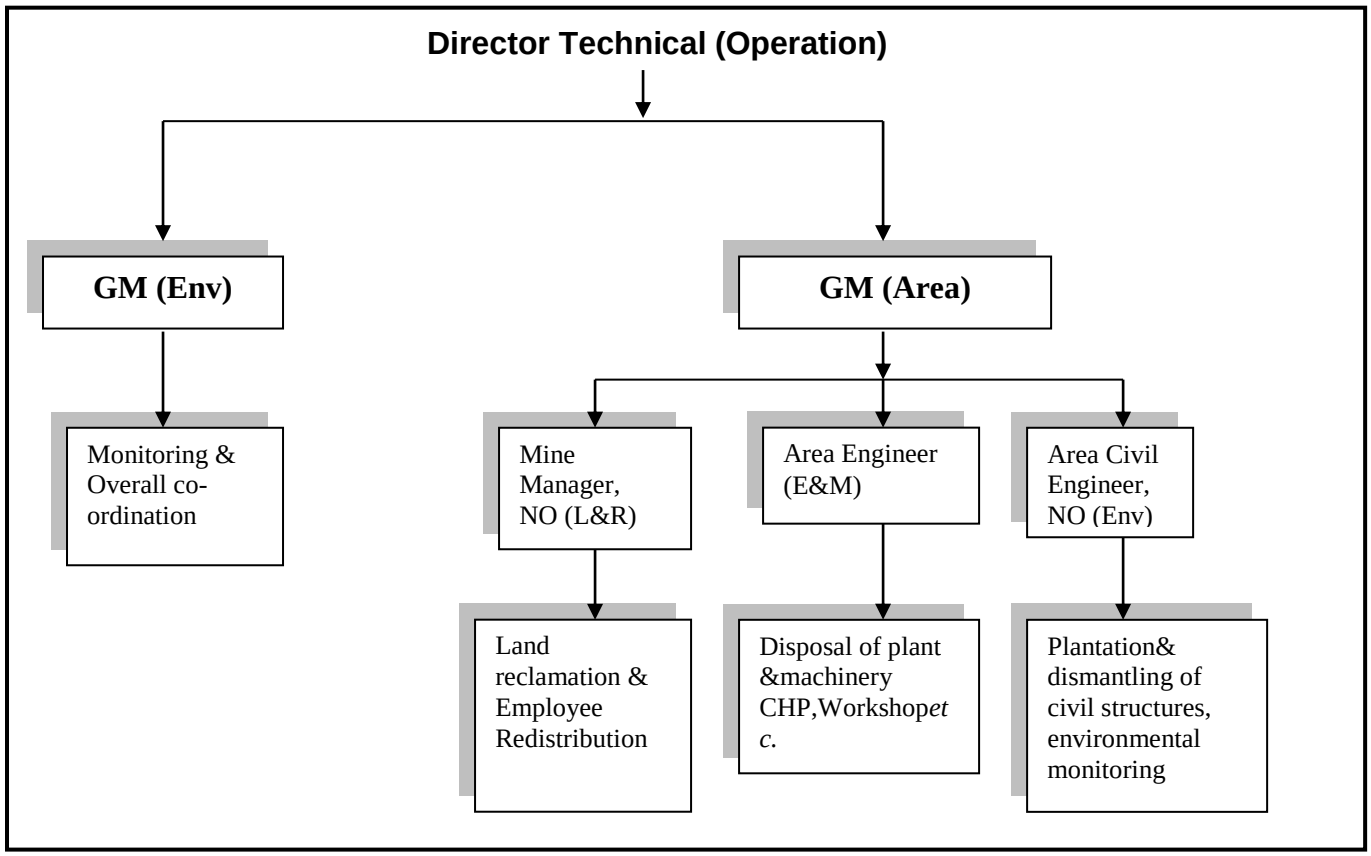
Sl. No.	Major Closure Activities	% of Total Closure Cost
	development training for sustainable income of affected people)	
I	**Miscellaneous & other mitigative measures**	2.60
J	**Manpower Cost for supervision**	0.80
Total (%)		**100.00**

NOTE: The above cost expenditure will be met from the corpus escrow account deposited by the mine operator. In case of mines having acid mine drainage, post closure acid mine drainage management cost shall also be included in the total closure cost. However, the additional amount beyond the escrow account will be provided by the mine operator after estimating the final mine closure cost five years prior to mine closure (as per the mine closure guideline)**.**

18.11 Implementation Protocol

For implementing the mine closure activities, the following Organizational structure has been proposed:

Figure 18.2



Environmental monitoring for three years after closure of mine will be carried out to evaluate the environmental quality of the area. If needed, proper mitigation measures will be taken up after evaluating the environmental quality. The funds for this have been provided in the cost estimate. Before closure of the mine, Area GM will prepare survey and disposal report and the same will be submitted to DGMS for acceptance.

****

CHAPTER - XIX

MANPOWER, PRODUCTIVITY AND TRAINING

19.1 MANPOWER ASSESSMENT

The requirement of manpower at the rated capacity of 4.0 Mt of coal and 37.5Mcum of OB removal per year has been estimated as 1287 for Option-I, 270 for Option-II and 366 for Option-III. While estimating the total manpower an additional provision of 15.5% has been made for leave and sick.

Job-wise details of manpower with scale/category are given in Appendix-B. The group-wise break-up of total manpower is given below:-

Sl. No.	Particulars	Option-I	
		Nos.	% of total Manpower
1	Workers	968	75.21
2	Monthly paid staff	242	18.80
3	Executives	77	5.99
	Total	1287	100.00

Sl. No.	Particulars	Option-II	
		Nos.	% of total Manpower
1	Workers	120	44.44
2	Monthly paid staff	123	45.55
3	Executives	27	10.00
	Total	270	100.00

Sl. No.	Particulars	Option-III	
		Nos.	% of total Manpower
1	Workers	209	57.10
2	Monthly paid staff	129	35.24
3	Executives	28	7.66
	Total	366	100.00

It may be noted that deployment of manpower and their category / scale may change in actual practice. Such changes will however be within the overall provisions of this report.

19.2 MANPOWER PHASING

Manpower phasing is done as per Project Implementation Schedule and building up of production capacity. The year wise phasing of man power is given in the following table.

OPTION I – TOTAL DEPARTMENTAL OPTION

Figures are Cummulative

YEAR	OVERBURDEN MANPOWER	COAL MANPOWER	COMMON & EMP MANPOWER	TOTAL MAN-POWER
1			03	03
2	127	25	210	363
3	149	51	250	450
4	255	102	433	789
5	361	152	615	1128
6	**398**	**203**	**686**	**1287**

OPTION II – TOTAL OUTSOURCING OPTION

Figures are Cummulative

YEAR	OVERBURDEN MANPOWER	COAL MANPOWER	COMMON & EMP MANPOWER	TOTAL MAN-POWER
1			03	03
2	13	9	48	70
3	15	18	57	62
4	26	37	98	161
5	37	55	140	232
6	**41**	**73**	**156**	**270**

OPTION III – PARTIAL OUTSOURCING OPTION

Figures are Cummulative

YEAR	OVERBURDEN MANPOWER	COAL MANPOWER	COMMON & EMP MANPOWER	TOTAL MAN-POWER
1			3	3
2	13	18	56	87
3	15	36	67	62
4	26	71	115	213
5	37	107	164	308
6	**41**	**142**	**183**	**366**

19.3 PRODUCTIVITY

The overall OMS will be 11.26t, 54.18t and 39.89t for Option-I, II and III.

19.4 TRAINING

It is proposed that all the workers who will operate the HEMM etc. will be given proper training, so that, they are able to operate these equipment efficiently and safely. Refresher training will also be given to these workers at regular interval. Adequate no. of executives has been provided in the report to look after different activities. These executives have also been proposed to be given training in their fields at regular intervals, so that; they will be updated with the advancement in their respective field of operation.

****

CHAPTER - XX

PROJECT IMPLEMENTATION SCHEDULE

20.1 INTRODUCTION

It is well known fact that for timely implementation of a project, it is essential that all the activities related with project construction are properly planned, closely monitored and effectively supervised. All implementing departments should prepare their own implementation manuals which are to be followed for monitoring and construction of the project, so that, man, materials and money are made available to the project in time as spelt in the project report, with a view to prevent cost and time over-run. Responsibility and power for each executive is to be included in the implementation manual to prevent overlapping of operational areas. Sufficient administrative and financial power has to be defined for key executive to take timely and effective decisions for the implementation of the project. All the basic infrastructures like power, industrial area, including stores, workshop, project office etc. are to developed and provided as per time schedule.

Time estimates are broad and indicative only, necessary modifications to suit local site conditions are to be incorporated subsequently.

20.2 PROJECT SCHEDULE

The life of the proposed mine will be 20 years including construction period. The maximum quarry depth will be approximately 80 m. The Production Program proposed is as given below:-

Year	O.B. Removal	Coal Production
	(M cum)	(Mt)
1st year	0.00	0.00
2nd year	12.00	0.50
3rd year	14.00	1.00
4th year	24.00	2.00
5th year	34.00	3.00
6th year	37.50	4.00

Technically, zero date has been adopted as the date of approval and/or date of environmental clearance or the date of the land acquisition whichever is later. For the purpose of implementation, PR for Batura OC (2.0 Mty) may be treated as dovetailed with PR for Rampur Batura OC Project (4.0 Mty). In this PR all the activities and financial provisions of Batura OC Project (2.0Mty) are proposed to be dovetailed.

In case Batura OC(2.0Mty) production starts before approval of PR for Rampur Batura OC(4.0Mty), zero date will be the date of approval of Rampur Batura OC(4.0Mty).

Some of the preliminary activities as enumerated below may be initiated as advance action.

I. Posting of key personnel.

II. Proceedings of land acquisition for the proposed quarry complex.

III. Survey and marking of the road alignment, dumping area, site for service building etc.

IV. Alignment/Diversion of power line .

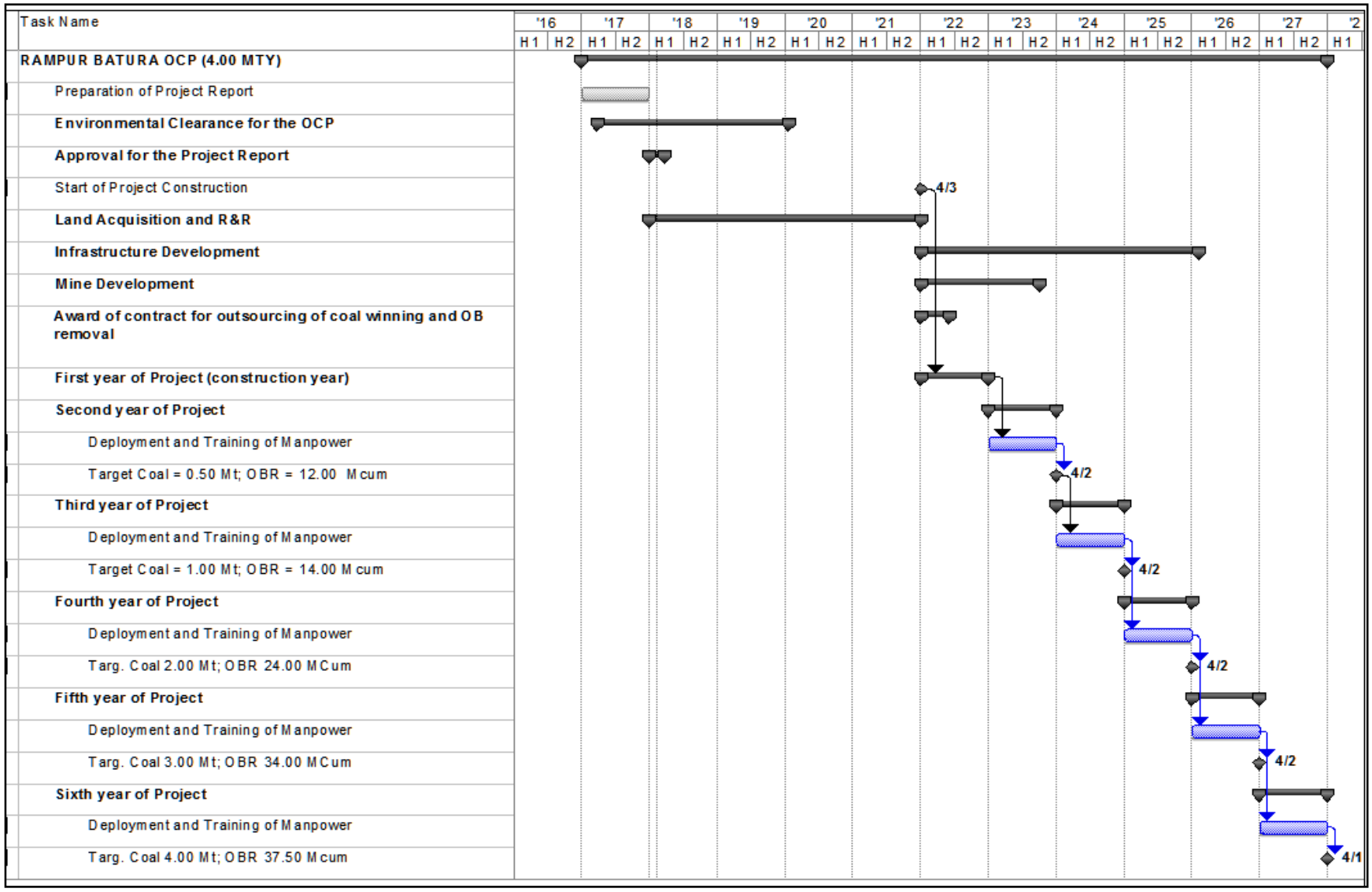
V. Arrangement of water supply and sub-station

VI. Construction of approach roads and culverts.

VII. Processing indent for Principal HEMMs to be used during development period.

20.3 BAR CHART OF MAJOR ACTIVITIES (PERT NETWORK)

Bar chart is enclosed.


Task Name
'16 '17 '18 '19 '20 '21 '22 '23 '24 '25 '26 '27 '2
H1 H2 H1 H2 H1 H2 H1 H2 H1 H2 H1 H2 H1 H2 H1 H2 H1 H2 H1 H2 H1 H2 H1 H2 H1
RAMPUR BATURA OCP (4.00 MTY)
Preparation of Project Report
Environmental Clearance for the OCP
Approval for the Project Report
Start of Project Construction
Land Acquisition and R&R
Infrastructure Development
Mine Development
Award of contract for outsourcing of coal winning and OB removal
First year of Project (construction year)
Second year of Project
Deployment and Training of Manpower
Target Coal = 0.50 Mt; OBR = 12.00 Mcum
Third year of Project
Deployment and Training of Manpower
Target Coal = 1.00 Mt; OBR = 14.00 Mcum
Fourth year of Project
Deployment and Training of Manpower
Targ. Coal 2.00 Mt; OBR 24.00 MCum
Fifth year of Project
Deployment and Training of Manpower
Targ. Coal 3.00 Mt; OBR 34.00 MCum
Sixth year of Project
Deployment and Training of Manpower
Targ. Coal 4.00 Mt; OBR 37.50 Mcum
4/3
4/2
4/2
4/2
4/2
4/1

****

CHAPTER - XXI

FINANCIAL EVALUATION

21.1 CAPITAL INVESTMENT

21.1.1 Total capital with phasing

(₹. In lakhs)

	Phasing of capital (₹. In lakhs)							Total capital
Year	1st	2nd	3rd	4th	5th	6th	7th	
Option-I	9927.53	89545.52	45571.17	74455.17	74364.97	36687.53	104.28	330656.18

21.1.2 Basis of price of P&M, Civil works & hiring rate

Price of P&M has been taken from the standard price list published by CMPDI, HQ in June 2017. Prices have been updated up to October 2017 as per escalation rate given in the price list.

The preparation of cost estimates for civil infrastructure is based on prevailing cost index of the area in October 2017. The cost index value has been calculated from the market rate of the area. Considering the prevailing rates of materials and labour in Sohagpur Area, the cost index works out to 3626 in October 2017 w.r.t. 100 base in Delhi as on 1.10.1976.

Prevailing hiring rate at SECL has been considered.

21.1.3 Foreign Capital

No foreign capital investment has been envisaged.

21.1.4 Capital investment

	Option II
Capital up to target year (₹. crores)	3305.51
Specific investment (₹./t)	8341.32
Specific investment for P&M (₹./t)	5231.43

21.2 OPENING OF REVENUE ACCOUNT

The norms for bringing coal projects into revenue account as decided in the meeting held under the chairmanship of JS&FA on 9.6.04 are as follows:-

1. Revenue expenditure to be capitalized should be net of sales receipts of coal produced during the construction period.

2. The period of construction has to be defined to determine the commercial readiness of the project to yield on a sustainable basis.

3. In case of opencast projects, the volume of stripping of OB and in case of UG projects, the completion of required development activities during the above period of construction have to be clearly defined.

4. Based on the above, the capitalization of revenue expenses / opening of revenue account will be decided.

Accordingly, a definition of the term 'commercial readiness of a project has been drafted and based on this a norm for capitalization of revenue expense / opening of revenue expenditure of a project has been suggested as under: -

A. Commercial Readiness:

A project will be treated to have reached the stage of commercial readiness to yield production on sustainable basis from the year when all the following criteria have been achieved –

- 30% of the total volume of excavation (Coal and OB) envisaged in the target year.
- The land required for the project up to target year has been acquired.
- Construction of CHP and railway siding have been completed or adequate alternative arrangement for sizing and dispatch of coal have been commissioned for the project.

B. Capitalization of Revenue Expenses based on commercial readiness:

For the preparation of Feasibility Reports, the revenue expenditure of a project can be capitalized till the year the project achieves commercial readiness as per the plan envisaged. The capitalization of revenue expenditure, in no case, shall extend beyond the year the project achieves the status of commercial readiness.

Revenue expenditure has been capitalized for first three years since the revenue expenditure is more than the sales receipt only during this period.

Considering the above guidelines, the project would be brought under revenue account w.e.f. the beginning of 4th year of operation. Since from 4th year revenue sales will be higher as compared to revenue expenditure.

C. Period of construction (i.e. Upto target year)

The period of construction of this Project is 6 years and the capacity build-up for the Project would be as follows:-

Year	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	5th Yr.	6th Yr.
Production (Mt)	0.0	0.50	1.00	2.00	3.00	4.00
OB (Mcum)	0.0	12.00	14.00	24.00	34.00	37.50

Within the above mentioned construction period, the project is in commercial readiness as it would be able to yield production on sustainable basis and most of the infrastructure facilities like Road, CHP, Workshop, Service building, Power Supply, Water Supply and Development activities for mine operation would be completed and accordingly capital provision has been made.

21.3 REPLACEMENT CAPITAL

Year-wise phasing of replacement capital is given in Appendix-D.1 column No.3.

21.4 SOURCES OF FINANCE

The project will be financed completely by internal resources.

21.5 COMPLETION COST

As per the latest guidelines, the completion cost of a project will qualify all the following conditions:

- Achievement of coal production capacity of 80% of the rated output.
- Completion of all major facilities and initial mine development work.
- Procurement of major and essential plant & machinery.

Completion cost of the project is estimated as ₹.4053.15 crores.

21.6 METHOD OF ESTIMATION OF CAPITAL COST:

a) Land

Rate of Tenancy, Forest & Govt. land considered is as shown below:-

	Rate/Ha(₹ lakhs)
Tenancy Land	**25.00**
Forest Land	**22.00**
Govt. Land	**10.00**

b) Civil Construction (along with Cost Index)

The preparation of cost estimates for civil infrastructure is based on prevailing cost index of the area in up to October 2017. The cost index value has been calculated from the market rate of the area. Considering the prevailing rates of materials and labour in Sohagpur Area, the cost index works out to 3626 w.r.t. 100 base in Delhi as on 1.10.1976.

c) P&M

Price of P&M has been taken from the standard price list published by CMPDI, HQ in June 2017. Prices have been updated upto October 2017 as per escalation rate given in the price list.

21.7 COST OF PRODUCTION AT DIFFERENT LEVEL OF PRODUCTION

a) Salaries & Wages Cost

The detail of category-wise /scale-wise manpower requirement and year-wise estimated wages cost is given in Appendix-B.1.

Estimated salaries & wages cost is worked out as ₹.270.24/Te.

b) Stores Cost

Stores Cost has been estimated taking into account provision for Repair & Maintenance, POL, Explosive and miscellaneous stores cost. The estimated Stores Cost has been worked out to ₹.739.39/Te.

c) Power Cost

Estimated Energy Consumption is given in the relevant chapter for Power Supply. The power cost has been taken as ₹11.0/unit. The average power cost per tonne of coal production works out to ₹.142.25 at 100% level of operation.

d) Misc. Expenditure

This cost has been estimated to cover expenditure on Printing & Stationary, Postage, Telephone, repair & Maintenance of assets other than P&M, Workshop Workshop Debit, Insurance & Taxes for vehicles and other repairs and a further provision has been made for deterioration of coal stock. Miscellaneous expenditure per tonne works out to ₹.136.76.

e) Administrative Charges

A provision has been made in total revenue cost estimate for Administrative charges based on the Admn. Cost per tonne of coal production as was appearing in the

last Annual Report of SECL. Total Admn. Cost has been calculated at 100% level and treated as fixed cost. As such for all other estimated level of operation the absolute Admn. Cost has been taken as it worked out for 100% level of operation. The Admn. Cost comes to ₹.88.00/t.

f) Interest on Working Capital

Interest on Working Capital has been calculated on the basis of 4 months operating expenditure. Rate of interest is taken as 14.50%.

g) Depreciation

Straight line method of depreciation has been provided to arrive at Depreciation cost per tonne of coal production.

h) Interest on Loan Capital

Interest @ 11.5% on loan capital is to be considered for computation based on given Debt Equity Mix. However, loan capital in this project is NIL.

i) Environment related cost

₹.127.74/Te of coal has been provided to absorb Environmental related Cost in the project.

j) Mine Closure Cost

Mine closure cost has been taken at the rate as per new guidelines issued by MOC. Mine Closure Cost at the rate of ₹.37.98/t has been considered in the project costing.

K) Cost of production per tonne at 100% and 85% level of production works out to ₹.2055.41 & ₹. 2331.39.

21.8 SELLING PRICE

The weighted average GCV of coal is 5576 KCal/Kg. The project economics has been calculated based on the selling price of coal for power utility.

CALCULATION OF SELLING PRICE (₹./t)

S.no	Particulars	Power Utility
1.	Base price	1900.00
2.	5 % grade slippage	1805.00
3.	Cutting charges for -100 mm	87.00
4.	Rapid loading charges	29.00
	Total	**1921.00***

***** In the PR commissioning of rapid loading system has been projected in the 4th year. Therefore average selling price for the life of the mine works out to be ₹ 1920.34.

21.9 OUTSOURCING COST (FOR REHANDLING)

The rates have been arrived based on the prevailing rates at the mines of SECL under same lead and compensating for diesel escalation based on escalation rates received from SECL.

The outsourcing cost considered for Rehandling of OB is ₹. 45.60/m^3. Outsourcing rates considered does not include GST Component as CENVAT credit is available against it. HOE rates considered in this PR is for planning purpose only and to work out the economic evaluation of the project.

The scope of work by outsourcing will include loading and transportation, dozing and maintenance of haul roads. All statutory rules, regulations and applicable laws are to be followed.

21.10 Profitability (Profit/Loss) (₹./t) at 100% - (-) 135.07
85% - (-) 411.05

21.11 Manpower - 1287
OMS - 11.26t

21.12 EMS - ₹.3042.16.

21.13 Financial IRR - at 100% level of production – (-) ve.
at 85% level of production – (-) ve.

21.14 Desired Selling Price: Desired selling price to achieve 12% IRR at 100% and 85% level is worked to ₹.2540.03 & ₹.2906.54.

21.15 CONCLUSION

The project has been planned in line with the present technology and forthcoming changes in neighboring mines as well as in other parts of the country. The techno-economics have been worked out based on the prevalent norms of productivity, operating cost, spare consumption etc.

In Total Departmental Option, the proposed project is yielding a loss of ₹. 135.07/t at 100% and ₹. 411.05/t at 85% level of production. The financial IRR of the project at 85% is (-) ve and as such it is not meeting the criteria of approval i.e. 12% IRR at 85% capacity level.

****

CHAPTER – XXII
A Chapter on Outsourcing (Option-II & Option-III)

22.1 INTRODUCTION

Outsourcing has become increasingly attractive for many organizations in recent past. Businesses irrespective of its size, skill, knowledge and technology are finding outsourcing mechanism most befitting in terms of cost reduction as well as quality improvement .With globalization and removal of barriers, outsourcing has created new opportunities for generation of employment. Today whether it is a canteen services or security services or courier services or gardening, is no longer one man providing service to one organization. These are just examples and we can go on listing them but essentially they are contractor or organizations which provide a specialized service at a competitive price. The service itself is much better than what an entrepreneur if he engages workmen on his roll would be able to provide. Further, the quality of the service is much better and it leaves the entrepreneur to concentrate on its core activity.

Outsourcing will remain in the fore front of every business executive mind as a business strategy that will let their organization to create and sustain business value in the competitive global market for reduced cost, focus on core business processes, improve services, enhance skills, and increase competitive advantages.

Growth in outsourcing is expanding to include not only IT functions, but critical business processes, as well as evolving application areas like enterprise resource planning and re-business initiatives. Successful companies are incorporating outsourcing as a key strategy for growth and differentiation. No longer considered merely a tactic for cutting costs and adding temporary staff, outsourcing is being accepted in board rooms around the world as a critical success factor for business survival. We need to give as much attention to managing processes as we have in the past to managing products.

For years, outsourcing was more a matter of “out asking” – hiring outside vendors to perform specific jobs or manage specific projects within a department of a large organization. Many things that are done inside the companies are labour intensive.

Those are the kind of work where human being have to intervene in a process and use decision – making skills – such as interpretation, validation, translation, transliteration or transformation.

22.2 SCOPE OF WORK PROPOSED TO BE OUTSOURCED

In Option II, OB and Coal extraction will be outsourced. In Option III, Coal will be extracted departmentally and OB will be outsourced.

i) Drilling:-

Drilling will be done in OB. In Option II and III, the external agency will prepare the site and carry out drilling as per the pattern decided by the project authorities according to strata conditions and stipulations of DGMS..

ii) Loading and Transportation of coal:-

In Option II, Coal extraction will be done contractually by Surface miner in combination with FEL/Dumpers. The work involves cutting, loading and transportation of coal to dumping site as per guidelines of the project authorities or otherwise to suit local conditions. All activities involving the cutting, loading and transportation have been proposed to be done by outside agencies. All statutory rules , regulation and applicable laws are to be followed including those related to Govt. licenses , workmen compensation , insurance etc. by the agency to whom the job has been awarded. Coal has to be transported to and from the site as decided by the project authorities from time to time in accordance with the requirement of the project.

In Option III, Coal extraction will be done departmentally by Surface miner in combination with FEL/Dumpers.

iii) OB Removal:-

In Option II and III, OB extraction will be done contractually. The contractual work involves drilling, excavation of OB and transportation of the same to different dump locations. This includes construction and maintenance of haul roads for plying of dumpers/tippers with suitable number of graders and dozers.

The leveling of the dumps is to be carried out by the agency to which the work has been awarded for OB removal.

The site of excavation and dumping is to be decided by the project authorities in accordance with the requirement of the project. All statutory rules , regulation and applicable laws are to be followed including those related to Govt. licenses , workmen compensation , insurance etc. by the agency to whom the job has been awarded.

iv) Accommodation, Site Office, Electricity etc.

Site office may be provided by the company on availability basis, which will be chargeable. However regarding accommodation and other facilities to persons engaged by the outside agency has to be arranged by the agency at their own cost.

Electricity to the site office may be provided on chargeable basis.

22.3 ANNUAL WORK LOAD FOR EXTERNAL AGENCY

The annual workload will be as follows. In option II total Coal and OB will be outsourced. In option III Coal will be extracted departmentally and OB will be outsourced.

YEAR	1	2	3	4	5	6-14	15- 19	20
Total Coal,MT	0	0.50	1.0	2.0	3.0	4.0	4.0	3.0
Total OBR Planned,Mcum	0	12.00	14.00	24.00	34.00	37.50	34.50	32.07

22.4 OUTSOURCING RATES

The rates have been arrived based on the prevailing rates at the mines of SECL under same lead and compensating for diesel escalation based on escalation rates table received from SECL.

The outsourcing cost of OB and Coal considered for economic evaluation is as shown in the table:-

- Coal - Rs 69.00/t.
- OB - Rs 57.00/m^3.
- Rehandling of OB – 45.60/m^3.

Outsourcing rates are exclusive of GST.

The scope of work by outsourcing will include drilling, loading and transportation, dozing and maintenance of haul roads. All statutory rules, regulations and applicable laws are to be followed.

22.5 SAFETY ASPECTS FOR OUTSOURCING OF HEMM

Outside agency deploying HEMM or any equipment in the mine for excavation of coal shall plan their activities in confirmation with the prevailing statutory provisions as per Mines Act 1952 and CMR 1957 applicable for safety in opencast mines.

However, all statutory rules, regulations, applicable laws etc. and statutory requirement related to Govt. licenses, workers compensation, insurance, etc., including minimum wage act for workers employed by the outside agency shall have to be adhered to. Rules if any imposed by local / state / central authorities should also be complied by leaser of HEMM / equipment and then shall have to supply various protective equipment viz., helmet, shoes etc. to the workmen at their cost. All the regulations and schedules of Coal Mines Regulations 1957 relating to opencast mining have to be adhered to and implemented in order to maintain day to day safety precautions as per stature.

Special precaution should be taken while deploying workers in the mine. Before employing any worker to the mine proper vocation training should be imparted and recommendations of VIII Safety Conference should be strictly followed. Terms and conditions shall be fixed by management for deployment of workers by outside agency. Some of the major aspects are as follows: -

A) For Persons:

i) No persons shall be deployed unless he is trained at VTC.

ii) Records in Form-B, Form-D shall be maintained.

iii) Records of Vocational Training Certificate and driving license of operators shall be kept by HEMM outsourcing agency and shall be made readily available for inspection by management.

iv) Salaries shall be distributed in front of management representative.

v) No person shall be employed unless person holds VTC certificate and management is informed. A record of it shall be maintained.

vi) Adequate supervision shall be maintained by qualified competent persons.

vii) Outside agency shall follow safety guidelines and safety instructions from project authorities.

B) For Machineries as recommended by DGMS Cir. (Tech.) 1 of 1999 :

i) All the machineries to be deployed in mines should be checked before deployment by competent authority.

ii) Regular checking of m/c deployed by outside agency shall be done. No unfit machine shall be deployed before the defect is rectified.

iii) A proper record of repair and maintenance along with inspection done by management and defect pointed out shall be maintained and signed by authorized person.

iv) The trucks deployed outside agency shall be provided with audio visual alarms, proper light for use at night and period when natural light is not sufficient. Also audiovisual alarms for reversing on trucks shall be provided.

Other precautions for machines

i) RTO certificate photocopies of all vehicles shall be submitted to management.

ii) Daily welding, monitoring, inspection shall be done by the agency's mechanic as directed by management.

iii) Machine manufacturers should be asked to give risk analysis details in respect of machines deployed by outside agencies.

iv) Suitable type of the fire extinguishers shall be provided in every machine.

C) General :

i) No person / vehicle shall be deployed at any place other than authorized place.

ii) All workers should obey lawful instruction of mine management.

iii) Risk Management Plan of tipper / pay loader shall be made and implemented.

iv) Drivers shall obey systematic traffics rules prepared by management.

v) 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 with the Mines Act 1952.

vi) Outside Agency shall operate transport system in such a way so as to minimize pollution in the mine.

22.6 CAPITAL INVESTMENT

22.6.1 Existing capital and additional capital with phasing

Amount in ₹ Lakhs

	Total Additional capital							Total Capital
Year	1st	2nd	3rd	4th	5th	6th	7th	
Option-II	8877.20	18810.67	29568.49	18322.41	15337.58	19421.67	104.28	110442.31
Option-III	9952.20	22173.98	30326.10	19291.26	17959.47	21008.23	104.28	120815.53

22.6.2 Basis of price of P&M, Civil works & hiring rate

Price of P&M has been taken from the standard price list published by CMPDI, HQ in June 2017. Prices have been updated up to October 2017 as per escalation rate given in the price list.

The preparation of cost estimates for civil infrastructures is based on prevailing cost index of the area in October' 2017. The cost index value has been calculated from market rate of the area. Standard guidelines provided by B.P.E have been adopted for arriving at cost index value. Considering the prevalent rates of materials and labour in Sohagpur Area, the cost index works out to 3626 in October’ 2017 with reference to 100 base in Delhi as on 1.10.76.

22.6.3 Foreign Capital

No foreign capital investment has been envisaged.

22.6.4 Capital Investment

	Option II	Option III
Capital up to target year	₹1103.38 Crores	₹1207.11 Crores
Specific investment	₹2835.97 per tonne	₹3095.30 per tonne
Specific investment for P&M	₹709.22 per tonne	₹862.55 per tonne

22.7 REPLACEMENT CAPITAL

Year-wise phasing of replacement capital is given in Appendix-D.1 column No.3.

22.8 SOURCES OF FINANCE

The project will be financed completely by internal resources.

22.9 COMPLETION COST

Completion cost of the project worked out is as shown below.

Completion cost In ₹ crores	Option II	Option III
	1372.43	1497.63

22.10 OPENING OF REVENUE ACCOUNT

In Option II, Revenue Expenditure net of sales have been capitalized up to 2nd year since revenue expenses are more than the corresponding revenue sales in this period and Revenue account has been opened at the beginning of 3rd year where the revenue sales is 189.20 cr against revenue expenses of 152.14 cr.

In Option III, Revenue Expenditure net of sales have been capitalized up to 2nd year since revenue expenses are more than the corresponding revenue sales in this period and Revenue account has been opened at the beginning of 3rd year where the revenue sales is 189.20 cr against revenue expenses of 154.99 cr.

22.11 METHOD OF ESTIMATION OF CAPITAL COST:

a) Land

Rate of Tenancy, Forest & Govt. land considered is as shown below:-

	Rate/Ha(₹ lakhs)
Tenancy Land	**25.00**
Forest Land	**22.00**
Govt. Land	**10.00**

b) Civil Construction (alongwith Cost Index)

The preparation of cost estimates for civil infrastructures is based on prevailing cost index of the area in October' 2017. The cost index value has been calculated from market rate of the area. Standard guidelines provided by B.P.E have been adopted for arriving at cost index value. Considering the prevalent rates of materials and labour in Sohagpur Area, the cost index works out to 3626 in October' 2017 with reference to 100 base in Delhi as on 1.10.76.

c) P&M

Price of P&M has been taken from the standard price list published by CMPDI, HQ in June 2017. Prices have been updated up to October 2017 as per escalation rate given in the price list.

22.12 COST OF PRODUCTION AT DIFFERENT LEVEL OF PRODUCTION

a) Salaries & Wages Cost

The detail of category-wise / scale-wise manpower requirement and year-wise estimated wages cost is given in Appendix-B.1.

Estimated salaries & wages cost worked out is ₹56.33/t for option-II and ₹75.65/t for option-III.

b) Stores Cost

Stores Cost has been estimated taking into account provision for Repair & Maintenance, POL, Explosive and miscellaneous stores cost.

The estimated Stores Cost has been worked out is ₹132.11/t for option-II and ₹181.94/t for option-III.

c) Power Cost

Estimated Energy Consumption is given in the relevant chapter for Power Supply. The power cost has been taken as ₹11.0/unit.

The average power cost per tonne of coal production works out to ₹43.97/t and ₹44.19/t at 100% level of operation for Option-II and Option-III respectively.

d) Misc. Expenditure

This cost has been estimated to cover expenditure on Printing & Stationary, Postage, Telephone, repair & Maintenance of assets other than P&M, Workshop Workshop Debit, and Insurance & Taxes for vehicles and other repairs and a further provision has been made for deterioration of coal stock. Miscellaneous expenditure per tonne works out to ₹39.45/t for option-II and ₹45.21/t for option-III. (Including EMP monitoring cost, Contractual Labour cost and contractual vehicle cost).

e) Administrative Charges

A provision has been made in total revenue cost estimate for Administrative charges based on the Admn. Cost per tonne of coal production as was appearing in the last Annual Report of S.E.C.L. Total Admn. Cost has been calculated at 100% level and treated as fixed cost. As such for all other estimated level of operation the absolute Admn. cost has been taken as it worked out for 100% level of operation. The Admn. Cost is ₹88.00/t.

f) Outsourcing cost - with lead distance

The rates have been arrived based on the prevailing rates at the mines of SECL under same lead and compensating for diesel escalation based on escalation rates table received from SECL.

The outsourcing cost of OB and Coal considered for economic evaluation is as shown in the table:-

- Coal - Rs 69.00/t.
- OB - Rs 57.00/m^3.
- Rehandling of OB – 44.60/m^3.

Outsourcing rates are exclusive of GST.

The scope of work by outsourcing will include drilling, loading and transportation, dozing and maintenance of haul roads. All statutory rules, regulations and applicable laws are to be followed.

g) Interest on Working Capital

Interest on Working Capital has been calculated on the basis of 4 months operating expenditure. Rate of interest is taken as 14.50%.

h) Depreciation

Straight line method of depreciation has been provided to arrive at depreciation cost per te of coal production. The depreciation cost works out to be ₹163.26/t for option-II and ₹184.00/t for option-III.

i) Interest on Loan Capital

Interest @ 11.5% on loan capital is to be considered for computation based on given Debt Equity Mix. However, loan capital in this project is NIL.

j) Environment related Cost

Environmental related Cost worked out to be ₹88.27/t for option-II and ₹88.34/t for option-III.

k) Mine Closure Cost

Mine closure Cost worked out to be ₹37.43/t for option-II and ₹37.61/t for option-III.

l) Cost of production per tonne

CPT at 100% level of production is shown below.

Sl.No.	Particulars	Unit	Option-II (Total Outsourcing)	Option-III (Partial Outsourcing)
1	Salaries and wages cost	₹./t	56.33	75.65
2	Stores cost	₹./t	132.11	181.94
3	Power cost	₹./t	43.97	44.19
4	MiscellaneousExpenditure	₹./t	39.45	45.21
5	Administrative Expenses	₹./t	88.00	88.00

Sl.No.	Particulars	Unit	Option-II (Total Outsourcing)	Option-III (Partial Outsourcing)
6	Outsourcing Cost			
6.1	Coal	₹./t	69.00	-
6.2	OB	₹./t	544.82	544.82
6.3	Rehandled OB	₹./t	5.57	5.57
7	Interest on Loan capital	%	-	-
8	Interest on working capital	%	46.16	46.47
9	Depreciation	₹./t	163.26	184.00
11	Mine closure cost	₹./t	37.43	37.61
	TOTAL	**₹./t**	**1226.09**	**1253.46**

22.13 Selling price of coal

The weighted average GCV of coal is 5576 KCal/Kg. The project economics has been calculated based on the selling price of coal for power utility. The calculation of selling price of coal is as follows.

CALCULATION OF SELLING PRICE (₹./t)

S.no	Particulars	Power Utility
1.	Base price	1900.00
2.	5 % grade slippage	1805.00
3.	Cutting charges for -100 mm	87.00
4.	Rapid loading charges	29.00
	Total	**1921.00***

***** In the PR commissioning of rapid loading system has been projected in the 4th year . Therefore average selling price for the life of the mine works out to be ₹1920.34.

22.14 Financial Evaluation Results:-

The financial evaluation results for Total Departmental Option,Total Outsourcing option and Partial Outsourcing option is as shown in the table below:-

Sl.No	Particulars	Unit	Option-II (Total Outsourcing)	Option-III (Coal Deptt and OB Outsourcing)
1	a) Existing capital(Gross)	₹. Crores	40.78	40.78
	b) Additional capital investment	₹. Crores	1104.42	1208.16
	c) Total Capital	₹./t	1145.20	1248.93
	d) Capital outlay /t of annual output	₹./t	2835.97	3095.30
2	a) Capital requirement of P&M	₹. crores	283.69	345.02
	b) Per tonne of annual output	₹./t	709.22	862.55
3	Selling price (95% of notified selling	₹./ t	1920.34	1920.34

Sl.No	Particulars	Unit	Option-II (Total Outsourcing)	Option-III (Coal Deptt and OB Outsourcing)
	price) of processed ROM Coal.			
	Estimated cost of production			
	a) at 100% level	₹./t	1226.09	1253.46
4	b) at 85% level	₹./t	1302.16	1342.01
	Profit per tonne a) at 100% level	₹./t	694.24	666.88
5	b) at 85% level	₹./t	618.18	578.32
	Break-even-point (%)		38.30	42.94
6	(Mty)		1.53	1.72
7	No. of personnel		270	366
8	OMS	t	54.18	39.89
9	EMS	₹.	3051.91	3017.65
10	Anticipated year of achieving target	Year	6th	6th
11	IRR at 100% level of production	%	28.40	25.84
12	IRR at 85% level of production	%	23.40	20.87
13	Completion Cost	₹. crores	1372.43	1497.63
14	NPV @ 12% at 100% level of production	₹. crores	935.05	839.94
15	NPV @ 12% at 85% level of production	₹. crores	620.17	512.43

22.15 CONCLUSION

The project has been planned in line with the present technology and forthcoming changes in neighbouring mines as well as in other parts of the country. The techno-economics have been worked out based on the prevalent norms of productivity, operating cost, spare consumption etc.

In Total Outsourcing option (Option-II), the proposed project is yielding a profit of ₹. 694.24/t at 100% and ₹.618.18/t at 85% level of production. The financial IRR of the project at 85% is 23.40 % and as such it is meeting the criteria of approval i.e. 12% IRR at 85% capacity level.

In Coal Departmental OB Outsourcing option (Option-III), the proposed project is yielding a profit of ₹. 666.88/t at 100% and ₹.578.32/t at 85% level of production. The financial IRR of the project at 85% is 20.87 % and as such it is meeting the criteria of approval i.e. 12% IRR at 85% capacity level.

Considering the above, Option II or Option-III may be considered for approval by competent authority.

****

APPENDICES

OPTION-III

APPENDIX-A

PROJECT REPORT FOR RAMPUR BATURA OPENCAST PROJECT (4.00 Mty)

PARTIAL OUTSOURCING OPTION

STATEMENT SHOWING THE ESTIMATED HEADWISE CAPITAL INVESTMENT

LIFE-: 20 YEARS

(AMOUNT IN RS. LAKHS)

SL. NO.	PARTICULARS	EXISTING CAPITAL INVESTMENT AS ON 1/04/2017	ADDITIONAL CAPITAL INVESTMENT	TOTAL CAPITAL INVESTMENT	EMP CAPITAL INVESTMENT	YEARWISE PHASING						
						1st. Year.	2nd. Year.	3rd. Year.	4th. Year.	5th. Year.	6th. Year.	7th Year.
1	LAND	2913.06	40038.04	42951.10	1702.00	5000.00	5000.00	5000.00	5000.00	10000.00	10038.04	
2	BUILDING:-											
	a) SERVICE		4149.97	4149.97		1000.00	500.00	500.00	500.00	500.00	1149.97	
	b)RESIDENTIAL		2110.11	2110.11	114.69	500.00	300.00	300.00	300.00	300.00	410.11	
3	PLANT & MACHINERY											
	a) HEMM		6719.15	6719.15	498.46		3459.57	252.71	505.42	1996.02	505.42	
	b) OTHER THAN HEMM		27783.05	27783.05	25.00		4771.68	17093.64	5206.76	505.95	100.74	104.28
4	FURNITURE & FITTINGS	1.58	40.00	41.58			10.00	7.50	7.50	7.50	7.50	
5	RAILWAY SIDING		8875.33	8875.33			1750.00	3513.00	3612.33			
6	VEHICLES		96.48	96.48		9.25	68.72	9.25	9.25			
7	PROSPECTING & BORING	1079.43	36.50	1115.93		36.50						
8	**DEVELOPMENT**											
8.1	CAPITAL OUTLAY IN MINES		20362.22	20362.22	19287.22	1000.00	2000.00	3000.00	3500.00	4000.00	6862.22	
8.2	ROADS & CULVERTS		4214.83	4214.83	114.15	500.00	500.00	500.00	500.00	500.00	1714.83	
8.3	WATER SUPPLY & SEWAGE DISPOSAL		969.40	969.40	501.75	150.00	150.00	150.00	150.00	150.00	219.40	
8.4	PR PREPARATION COST		1605.32	1605.32	20.00	802.66	802.66					
	TOTAL OF 8		**27151.77**	**27151.77**	**19923.12**	**2452.66**	**3452.66**	**3650.00**	**4150.00**	**4650.00**	**8796.45**	
	TOTAL OF 1 TO 8	**3994.07**	**117000.40**	**120994.47**	**22263.27**	**8998.41**	**19312.64**	**30326.11**	**19291.26**	**17959.47**	**21008.23**	**104.28**
9(A)	OTHER EXPENSES OF REVENUE NATURE CAPITALISED DURING DEVELOPMENT PERIOD	84.03	5898.72	5982.89		1365.46	4533.25					
9(B)	OBRE-DRE	0.14										
	TOTAL OF 1 TO 9	**4078.24**	**122899.11**	**126977.35**	**22263.27**	**10363.88**	**23845.89**	**30326.11**	**19291.26**	**17959.47**	**21008.23**	**104.28**
10.	LESS-DEPRECIATION CAPITALISED DURING DEVELOPMENT PERIOD		2083.58	2083.58		411.68	1671.90					
	TOTAL CAPITAL INVESTMENT	**4078.24**	**120815.53**	**124893.77**	**22263.27**	**9952.20**	**22173.99**	**30326.11**	**19291.26**	**17959.47**	**21008.23**	**104.28**

NET CAPITAL=40.76Crs

NOTE :- TOTAL CAPITAL INCLUDES EMP CAPITAL

APPENDIX-A.1
PARTIAL OUTSOURCING OPTION

PROJECT REPORT FOR RAMPUR BATURA OPENCAST (4.00 Mty)
ESTIMATED CAPITAL INVESTMENT FOR LAND ACQUISITION

Sr. No.	REQUIREMENT OF LAND	Area(Ha)									
		TENANCY/ AGRICULURE LAND	Forest Land			GOVT. LAND					TOTAL LAND
			Revenue Forest	Others	Total	Grasing Land	Waste Land	Surface water body land	Others	Total	
1	LAND FOR QUARRY	1215.94	20.08	66.07	86.16	47.88	30.83	37.92	120.13	236.76	**1538.86**
2	SURFACE INDUSTRIAL DEVELOPMENT ,COLONY,APPROACH ROAD, DIVERTED ROAD,MAGAZINE, ETC.	116.20									**116.20**
3	SAFETY ZONE	109.98		26.79	26.79		30.85	1.60	5.13	37.57	**174.34**
4	LAND FOR HOMESTEAD/FAMILY	68.08									**68.08**
	TOTAL LAND	**1510.20**			**112.94**					**274.34**	**1897.48**

ESTIMATED CAPITAL FOR LAND COMPENSATION

Amount in Rs lakhs

SL NO	TYPE OF LAND	Area(Ha)	Quantum of land(In Ha) for which compensation paid as on 1/04/2017	Amount of compensation paid	Rate/Ha					TOTAL PROVISION	ADDITIONAL PROVISION
1	TENANCY LAND	1510.20	94.33	2214.90	25.00					37754.97	35540.07
2	FOREST LAND	112.94			22.00					2484.75	2484.75
3	GOVT. LAND	274.34	77.26	730.13	10.00					2743.36	2013.23
	TOTAL COMPENSATION FOR LAND	**1897.48**								**42951.10**	**40038.04**

NOTE :
1.Changes in figures of additional land to be acquired may take place at the time of actual acquisition.
due to unforeseen discripencies/anomalies in different records with different departments of state government.
2.Land for homestead/Family @ 6 decimal/family x 1.5 times

APPENDIX-A.2

Project Report for Rampur Batura Opencast (4.0 Mty)

Statement showing the Capital Investment on Civil Works

(Amount in Rs. Lakhs)

Sl.No.	Particulars	PR Provision without GST	PR Provision with GST @18%	References
1.	Service Buildings	3516.92	4149.97	Appendix-A.2.1
2.	Residential Buildings	1788.23	2110.11	Appendix-A.2.2
3.	Roads and Culverts	3571.89	4214.83	Appendix-A.8.2
4.	Water Supply arrangement	276.17	325.88	Appendix-A.8.3
5.	Sewerage System	545.35	643.52	Appendix-A.8.3a
Total		**9698.55**	**11444.31**	

Appendix- A.2.1.

Project Report for Rampur Batura Opencast (4.0 Mty)

Statement Showing the Estimated Capital Requirement on Service Buildings

(Amount in Rs.Lakhs)

Sl. No.	Particulars	Unit	Quantity	Rate at 100CI (Rs.)	Rate at 3626 CI (Rs.)	Total Amount (lakhs)
1	i) Office of the Project officer	Sq.m.	500	446.00	16171.96	80.86
	ii) Boundary wall for office	RM	200	112.00	4061.12	8.12
2	First aid centre - 1no.	Sq.m.	17	467.00	16933.42	2.88
3	Magazine - 50 Te capacity	Sq.m.	152	550.00	19943.00	30.31
4	Lavatories & Urinals - 2nos.	Sq.m.	60	685.00	24838.10	14.90
5	A/C Canteen (80 seater)	Sq.m.	245	380.00	13778.80	33.76
6	i) Officers' Club	Sq.m.	158	380.00	13778.80	21.77
	ii) Boundary wall	RM	125	112.00	4061.12	5.08
7	i) Workers' Institute	Sq.m.	148	380.00	13778.80	20.39
	ii) Boundary wall	RM	125	112.00	4061.12	5.08
8	i) Officers' Rest House - 4 roomed	Sq.m.	276	380.00	13778.80	38.03
	ii) Boundary wall	RM	150	112.00	4061.12	6.09
9	Rest Shelter	Sq.m.	39	380.00	13778.80	5.37
10	Security Room - 4 nos.	Sq.m.	42	380.00	13778.80	5.79
11	CDS control room	Sq.m.	133.5	446.00	16171.96	21.59
12	Laboratory building	Sq.m.	50	446.00	16171.96	8.09
13	Garage	Sq.m.	100	235.00	8521.10	8.52
14	Maintenance office	Sq.m.	50	446.00	16171.96	8.09
15	Scooter and Cycle Shed - 2 nos.	Sq.m.	200	200.00	7252.00	14.50
16	Boundary wall for colony	RM	600	112.00	4061.12	24.37
17	Soil Investigation			LS		8.00
18	33 kV / 3.3kV Sub- Station	LS				243.26
19	**Workshop**					
i)	Dozer &Dumper repair Shed (11.5 m ht)	Sq.m.	540	740.00	26832.40	144.89
ii)	Workshop Office	Sq.m.	92	550.00	19943.00	18.35
iii)	Switch room	Sq.m.	80	550.00	19943.00	15.95
iv	Tyre shed and Tyre dismantal(11.5m ht)	Sq.m.	540	740.00	26832.40	144.89
v	Dozer & Dumper parking	Sq.m.	1800	108.00	3916.08	70.49
vi	Engine/M/c/Hyd.Repair shop	Sq.m.	1620	550.00	19943.00	323.08

Appendix- A.2.1.

Project Report for Rampur Batura Opencast (4.0 Mty)

Statement Showing the Estimated Capital Requirement on Service Buildings

(Amount in Rs.Lakhs)

Sl. No.	Particulars	Unit	Quantity	Rate at 100CI (Rs.)	Rate at 3626 CI (Rs.)	Total Amount (lakhs)
vii	Electrical/Heavy/Radiator & other repair shop	Sq.m.	1620	550.00	19943.00	323.08
viii)	Scrap yard			LS		15.00
ix	Oil and grease trap			LS		15.00
x	Fuel Station			LS		40.00
xi	Washing Ramp for Dumper	Sq.m.	150	740.00	26832.40	40.25
xii	Canteen (80 seater)	Sq.m.	245	380.00	13778.80	33.76
xiii	Motor Cycle/Cycle Stand	Sq.m.	100	200.00	7252.00	7.25
xiv	Boundary wall with gate	RM	1168	112.00	4061.12	47.43
xv	Concrete pavement	Sq.m.	34320	108.00	3916.08	1344.00
xvii	Security post	Sq.m.	10.5	380.00	13778.80	1.45
xviii	Motor Cycle shed	Sq.m.	450	200.00	7252.00	32.63
xix	Store	Sq.m.	450	550.00	19943.00	89.74
xx	WC	Sq.m.	30	685.00	24838.10	7.45
xxi	First aid centre - 1no.	Sq.m.	17	467.00	16933.42	2.88
20	Parks & Play ground	LS				10.00
21	Security Barrack (twin sharing)	No.	20	9938.50	360370.01	72.07
	Sub-Total					**3414.49**
	Add for contingencies @ 3%					102.43
	Total					**3516.92**

Appendix - A.2.2

Project Report for Rampur Batura Opencast (4.0 Mty)
Statement showing Capital Investment on Residential Building

(Amount in Rs. Lakhs)

Sl. No.	Category/Scale	Type of Qtrs.	Manpower	% satis-faction	No. of Quarters Reqd.	Net Quarters Reqd.	Unit Cost at 100CI	Unit Cost at 3626 CI	Total Amount
1	Cat-I toVI and Excv. Grades B,C,D&E	MQ	156	42	66	66	0.150	5.439	358.97
2	Excv. Grade G and H	A	0	50	0	0	0.157	5.693	0.00
3	Grade A to F ,Grade A1, Excv.Grade A and Spl.Grade. E1 and E2	B	183	60	110	(110 - 27*) = 83	0.224	8.122	674.13
4	E3 to E5	C	13	100	13	13	0.359	13.017	169.23
5	E6 and Above	D	14	100	14	14	0.772	27.993	391.90
6	Hostel type Accommodation					27	0.099	3.590	96.92
7	Provision for land development and Horticulture						LS		26.00
8	Provision for rain water harvesting						LS		19.00
Sub - Total			**366**	**55.46**	**203**	**203**			**1736.15**
Add 3% contingencies									52.08
Total									**1788.23**

Note: 1. 27 nos. of type quarters has been considered as hostel type accomodation.
2. All quarters will be of (G+3) configuration or higher considering optimal utilisation of land.

Appendix-A.2.3

Project Report for Rampur Batura Opencast (4.0 Mty)

Statement showing the Building Cost Index with reference to 100 Base in Delhi as on 1.10.76 in September 2017

SL. NO.	DESCRIPTION	UNITS	RATES AS ON 1.10.76 AT DELHI	RATES AT AREA	PERCENTAGE INCREASE (RATIO BETWEEN COL.5&4)	WEIGH-TAGE	COST INDEX
1.	2.	3.	4.	5.	6.	7.	8.
1.	BRICKS	1000	106.15	2912.50	27.44	16.0	439.04
2.	SAND 67% COARSE, 33 % FINE	Cu.M	21.92	800.00	36.50	5.0	182.50
3.	CEMENT	QUINTAL	35.28	396.00	11.22	21.0	235.62
4.	STONES |50% - 40mm AGGREGATE |50% - 20mm	Cu.M	27.10	1100.00	40.59	6.5	263.84
5.	TIMBER (SAL/BIJA SAL)	Cu.M	2021.00	70590.00	34.93	18.0	628.74
6.	MILD/TOR STRUCTURAL STEEL	QUINTAL	183.20	3400.00	18.56	10.0	185.60
7.	LABOUR :						
	a) MASON	EACH	9.89	570.36	57.67	8.5	490.20
	b) CARPENTER	EACH	9.89	473.42	47.87	4.0	191.48
	c) UNSKILLED	EACH	4.41	404.66	91.76	11.0	1009.36
					TOTAL		3626.38
					SAY		**3626**

Appendix- A.3

PROJECT REPORT FOR RAMPUR BATURA OPENCAST PROJECT (4.00 Mty)

Statement showing the estimated capital investment for Plant and Machinery

(AMOUNT IN Rs Lakhs)

Sl. No.	Particulars	Additional Provision	Phasing						Rate Of Deprn.(%)
			2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	
A.	**OVERBURDEN (App-A.3.1)**								3.33-14.28
B.	**COAL (App-A.3.1)**	5754.06	2494.48	252.71	505.42	1996.02	505.42		11.11-14.29
C.	**RECLAMATION (App-A.3.1)**	498.46	498.46						10-11.11
D.	**COMMON (App-A.3.1)**	466.63	466.63						11.11
	Total HEMM (A+B+C+D)	**6719.15**	**3459.57**	**252.71**	**505.42**	**1996.02**	**505.42**		
E.	**Other than HEMM**								
1	Electrical P&M (APP-A.3.2)	1982.02	1190.58	400.80	272.64	118.00			5.15
2	Workshop P&M (APP-A.3.3)	890.30	392.62	316.93	83.77	96.97			5.15
3	Pumps Pipes & Fittings (APP-A.3.4)	671.92	42.74	152.46	93.43	178.27	100.74	104.28	5.15
4	Coal Handling Plant (APP-A3.5A and A3.5B)	23997.61	3087.04	16188.05	4722.52				5.15-33.33
5	Other P&M (APP-A.3.6)	241.20	58.70	35.40	34.40	112.70			11.11
	Total Other P&M (E)	**27783.05**	**4771.68**	**17093.64**	**5206.76**	**505.95**	**100.74**	**104.28**	
	Grand Total P&M (A+B+C+D+E)	**34502.20**	**8231.26**	**17346.35**	**5712.18**	**2501.97**	**606.16**	**104.28**	

APPENDIX-A.3.1

PROJECT REPORT FOR RAMPUR BATURA OPENCAST PROJECT (4.00 Mty)
ESTIMATED CAPITAL REQUIREMENT FOR PLANT AND MACHINERY

(AMOUNT IN Rs Lakhs)

SL. NO.	PARTICULARS	SIZE CAPACITY	TOTAL CAP. PROVISION			PHASING OF CAPITAL										ANNUAL DEPRE-CIATION RATE IN %AGE	ANNUAL DEPRE-CIATION
						C-0.5 Mty,OB-12 Mcum		C-1.0 Mty,OB-14 Mcum		C-2.0 Mty,OB-24 Mcum		C-3.0 Mty,OB-34 Mcum		C-4.0 Mty,OB-37.50 Mcum			
			NO.	UNIT PRICE	AMOUNT	2nd year		3rd year		4th year		5th year		6th year			
						No.	Amt.	No.	Amt.	No.	Amt.	No.	Amt.	No.	Amt.		
A.	**HEMM**																
	OVERBURDEN			16343.3													
1	Elec. Rope Shovel	42 cum		8												4.55	
2	Elec. Rope Shovel	10 cum		2801.28												4.55	
3	Rear dumper	240 T		2018.75												8.33	
4	Rear dumper	100 T		384.00												8.33	
5	Elec.RBH Drill	250 mm		446.17												11.11	
6	Diesel RBH Drill	160 mm		146.91												11.11	
7	Dozer with ripper	850 HP		719.01												11.11	
8	Dozer	410 HP		269.03												11.11	
9	Wheel Dozer	450 HP		269.03												11.11	
10	Spare Enginers for dozers & dumpers @12.5															11.11	
11	Contingency (5%)															11.11	
	SUB-TOTAL OF (A)																
B.	**COAL**																
1	Surface Miner	Cutting width:2.2 m,cutting depth:0-0.30 m,671 kw,2 MT/YR.,Windrowing mode:0-0.25 M,without conveyor	2	415.89	831.78	1	415.89					1	415.8891			11.11	92.41
2	Pay Loader	10 cum	2	1003.73	2007.47	1	1003.73					1	1003.7337			4.55	91.34
3	Truck (coal body)	60 T (coal body)	9	213.93	1925.41	2	427.87	1	213.93	2	427.8687	2	427.8687	2	427.8687	8.33	160.39
4	Dozer	410 HP	1	269.03	269.03	1	269.03									11.11	29.89
5	Water Sprinkler	28 KL	1	172.07	172.07	1	172.07									10.00	17.21
6	Spare Enginers for dozers & dumpers @12.5				274.30		87.11		26.74		53.48		53.48		53.48	11.11	30.48
7	Contingency (5%)				274.00		118.78		12.03		24.07		95.05		24.07	11.11	30.44
	SUB-TOTAL OF (B)				5754.06		2494.48		252.71		505.42		1996.02		505.42		452.15

PROJECT REPORT FOR RAMPUR BATURA OPENCAST PROJECT (4.00 Mty) **APPENDIX-A.3.1**

ESTIMATED CAPITAL REQUIREMENT FOR PLANT AND MACHINERY **(AMOUNT IN Rs Lakhs)**

SL. NO.	PARTICULARS	SIZE CAPACITY	TOTAL CAP. PROVISION			PHASING OF CAPITAL										ANNUAL DEPRE-CIATION RATE IN %AGE	ANNUAL DEPRE-CIATION
			NO.	UNIT PRICE	AMOUNT	2nd year		3rd year		4th year		5th year		6th year			
						No.	Amt.	No.	Amt.	No.	Amt.	No.	Amt.	No.	Amt.		
C	**RECLAMATION**																
1	Water Sprinkler	28 KL	1	172.07	172.07	1	172.07									10.00	17.21
2	Dozer	410 HP	1	269.03	269.03	1	269.03									11.11	29.89
3	Spare Enginers for dozers & dumpers @12.5%				33.63		33.63									11.11	3.74
4	Contingency (5%)				23.74		23.74									11.11	2.64
	SUB-TOTAL OF (C)				498.46		498.46										53.47
D.	**COMMON**																
1	Grader	280 HP	1	260.48	260.48	1	260.48									11.11	28.94
2	Crane	8 T	1	11.95	11.95	1	11.95									11.11	1.33
3	Diesel hyd. shovel	1.3-1.5 cum	1	104.27	104.27	1	104.27									14.28	14.89
4	Front End loader	2.0-3.0 cum	1	39.43	39.43	1	39.43										
5	Diesel Bouser	10 KL	1	28.29	28.29	1	28.29									11.11	3.14
6	Contingency (5%)				22.22		22.22									11.11	2.47
	SUB-TOTAL OF (D)				466.63		466.63										50.77
	TOTAL OF HEMM (A+B+C+D)				**6719.15**		**3459.57**		**252.71**		**505.42**		**1996.02**		**505.42**		**556.39**

Appendix-A.3.2

Project Report for Rampur Batura Open Cast Project 4 Mty (PARTIAL OUTSORCING OPTION)

Summarised Capital Requirement for Electrical and Communication Plant and Machinery

(Amount in Rs' lakhs)

Sl.No.	Particulars	Amount with GST	Yearwise phasing of capital requirement					
			2nd	3rd	4th	5th	6th	7th
1	Surface Substation	494.00	400.27	66.74	26.99	0.00	0.00	0.00
2	Quarry Power Supply	163.10	91.36	38.20	25.54	8.00	0.00	0.00
3	O/H Line and Cables (in km)	758.57	370.20	142.75	145.62	100.00	0.00	0.00
4	Lighting Arrangement (in the Quarry)	80.00	35.00	35.00	10.00	0.00	0.00	0.00
5	Township Electrification	110.00	75.00	10.00	15.00	10.00	0.00	0.00
6	Safety,Testing and maint.including telscopic ladder	12.00	6.00	3.00	3.00	0.00	0.00	0.00
7	Diversion of 132 kV overhead lines (Approximately 4 Km)	300.00	300.00	0.00	0.00	0.00	0.00	0.00
8	Diversion of HT & LT rural feeders within mine boundary	60.00	30.00	30.00	0.00	0.00	0.00	0.00
9	Miscellaneous items	40.00	20.00	10.00	10.00	0.00	0.00	0.00
10	Total of items 1 to 8(Appendis A.3.2.1)	1657.67	997.83	305.69	236.15	118.00	0.00	0.00
11	Communication	324.36	192.75	95.11	36.50	0.00	0.00	0.00
12	Total	1982.02	1190.58	400.80	272.65	118.00	0.00	0.00

Appendix - A.3.2.1

Project Report for Rampur Batura open cast project (4 Mty)- Partial Outsourcing Option

Capital Requirement for Electrical & Communication Plant and Machinery

(Amount in Rs lakhs)

Sl.No.	Particulars	Qty	Unit Rate	Amount with GST	Yearwise phasing of capital requirement					
					2 nd	3rd	4th	5th	6th	7th
1.0	**SURFACE SUBSTATION**									
1.1	Isolator, 33 kV, 3pole, outdoor type, gang operated, 1250 amps, conforming to IS:1818 (Current)	4	2.10	8.40	8.40					
1.2	Isolator, 33 kV, 3pole, outdoor type, gang operated,1250 amps with earth switch confirming to IS:1818(current)	2	2.37	4.74	4.74					
1.3	Isolator, 33 kV, 3pole, outdoor type, gang operated,630 amps with earth switch confirming to IS:1818(current)	2	2.03	4.06	4.06					
1.4	-DO--but with earth switch and D.O. Fuses.	4	2.29	9.16	9.16					
1.5	Lightning arrestor,station class, 30 kV ,10 kA for 33 kV system	8	0.47	3.76	3.76					
1.6	Single phase current transformer ,outdoor type with CT ratio of 200/5 A for 33 kV system for metering and protection (1 set consists of 3 nos for 3 phase supply)	2	1.39	2.78	2.78					
1.7	Single phase current transformer ,outdoor type with CT ratio of 100/5 A for 33 kV system for metering and protection(1set consists of 3 nos for 3 phase supply)	2	1.85	3.70	3.70					
1.8	Potential transformer ,outdoor type 33kV, 100 VA each 33 kV/ 110V with two cores for metering and protection	2	1.10	2.20	2.20					
1.9	Vaccum Circuit Breaker, 33kV,1250 A, outdoor type, 750 MVA symmetrical breaking capacity with remote control panel having IDMTL relay for O/L and E/F protection, Digital type microprocessor based power meter, battery,battery charging system etc.	4	6.45	25.80	25.80					

Appendix - A.3.2.1

Project Report for Rampur Batura open cast project (4 Mty)- Partial Outsourcing Option

Capital Requirement for Electrical & Communication Plant and Machinery

(Amount in Rs lakhs)

Sl.No.	Particulars	Qty	Unit Rate	Amount with GST	Yearwise phasing of capital requirement					
					2 nd	3rd	4th	5th	6th	7th
1.10	Transformer outdoor type conforming to IS:2026 (current) having ON-LOAD tap changer on HV side with all accessories as per IS:3639 (Current) with the ratinga as follows: Rated kVA: 5000 Rated Voltage(primary):33000V Rated Voltage(secondary): 6600V Connection and vector group:Dy11	2	26.95	53.90	53.90					
1.11	Substation Transformer outdoor type conforming to IS:2026 (current) having OFF-LOAD tap changer on HV side with all accessories as per IS:3639 (Current) with the ratinga as follows: Rated kVA: 160 Rated Voltage(primary):33000V Rated Voltage(secondary):433V Connection and vector group:Dy11	1	3.30	3.30	3.30					
1.12	19- panel ,6.6 kV switch-board, indoor type, with 16 vacuum circuit breakers, 630 amps for incomer and sectionaliser, 630 A for outgoing, 150 MVA symmetrical breaking capacity. The function of each panel is as follows: -2 nos incoming feeder control circuit breaker panel having CT ratio of 400/5 amps -1 no sectionliser control circuit breaker panel having CT ratio of 400/5 amps -2 nos capacitor bank control circuit breaker panel with automatic power factor control facility. having CT ratio of 100/5 amps -1 no outgoing feeder control circuit breaker panel for workshop (primary control of 250 kVA, 3.3/0.433 kV Transformer) having CT ratio of 50/5 amps -2 nos outgoing feeder control circuit breaker panel for CHP having CT ratio of 300/5 amps	1 Set	57.40	57.40	57.40					

Appendix - A.3.2.1

Project Report for Rampur Batura open cast project (4 Mty)- Partial Outsourcing Option

Capital Requirement for Electrical & Communication Plant and Machinery

(Amount in Rs lakhs)

Sl.No.	Particulars	Qty	Unit Rate	Amount with GST	Yearwise phasing of capital requirement					
					2 nd	3rd	4th	5th	6th	7th
	-1 no outgoing feeder control circuit breaker panel for Quarry lighting having CT ratio of 50/5 amps -2 nos outgoing feeder control circuit breaker panel for pumps having CT ratio of 300/5 amps -2 nos. reserve circuit breaker panel having CT ratio of having CT ratio of 300/5 & 200/5 amps -2 no. reserve circuit breaker panel for having CT ratio of having CT ratio of 200/5 amps 2 nos for colony with CTR 50 or 100/5 All panels will conform to IS:3427 (current) and relevent parts to IS:2516. These will be provided with cable end boxes. The incoming panels will be provided with restricted earth fault Protection. All panels will be provided with IDMTL relays for over current and earth fault protection. All incoming control circuit breaker shall be provided with Digital type microprocer based Power meter and outgoing control circuit breaker shall be provided with Digital type ammeter & energy meter.									
1.13	Neutral Grounding Resistance with protection system	2 set	LS	3.18	1.59		1.59			
1.14	Fire Fighting of Transformers along with high velocity water system		LS	45.00	30.00	10.00	5.00			
1.15	Lighting Transformer,outdoor type rated as follows: Rated kVA: 100 Rated Voltage(primary):66000 V Rated Voltage(secondary):230 V (L-L)	1	1.50	1.50	1.50					
1.16	Transformer,indoor type rated as follows Rated kVA: 250	1	2.24	2.24		2.24				

Appendix - A.3.2.1

Project Report for Rampur Batura open cast project (4 Mty)- Partial Outsourcing Option

Capital Requirement for Electrical & Communication Plant and Machinery

(Amount in Rs lakhs)

Sl.No.	Particulars	Qty	Unit Rate	Amount with GST	Yearwise phasing of capital requirement					
					2 nd	3rd	4th	5th	6th	7th
	Rated Voltage(primary):6600 V Rated Voltage(secondary):433 V									
1.17	415V switch board, indoor type with 4nos ACB having O/L,S/C and E/L protection, 25 MVA symmetrical breaking .capacity (All out going panels will be provided with Energy meter & ammeter. The incomming panel will be provided Energy meter, ammeter and voltmeter) The function of each panel will be as follows: - 1 no , ACB, 800A, CTR of 300/5 A, as controler for incoming feeder. - 3 nos , ACBs, 400A, CTR of 100/5 A, as controler for out going feeders.	1	2.61	2.61	2.61					
1.18	230 V (L-L) Lighting switch boardwith the following : --1no. MCCB, 3 pole,400 amps for control of incoming feeder. --2 nos. MCCB, 3 pole,100 A for control of outgoinging feeders. -2 nos.,MCBs, 3 pole,63 amps for control of out going feeders. -3 nos.,MCBs, 2 pole,63 amps for control of out going feeders. -3 nos.,MCBs, 2 pole, 40 amps for control of out going feeders.	1	3.87	3.87	3.87					
1.19	Capacitor bank ,6.6 kV indoor type 1000 kVAR including APFC.	2	15.00	30.00	30.00					
1.20	110 V Battery and battery charging set for emergency lighting inside Switching station building.	LS		7.00	3.50	3.50				
1.21	Substation earthing and Lightning protection arrangement.	LS		18.00	10.00	4.00	4.00			
1.22	Cables(Power,Lighting and Control)	LS		45.00	30.00	10.00	5.00			
1.23	33 kV bus bar,Insulators , nut ,bolts etc	LS		15.00	8.00	7.00				
1.24	Installation and other charges.(40 %)	LS		141.40	100.00	30.00	11.40			

Appendix - A.3.2.1

Project Report for Rampur Batura open cast project (4 Mty)- Partial Outsourcing Option

Capital Requirement for Electrical & Communication Plant and Machinery

(Amount in Rs lakhs)

Sl.No.	Particulars	Qty	Unit Rate	Amount with GST	Yearwise phasing of capital requirement					
					2 nd	3rd	4th	5th	6th	7th
	Sub Total (1.1 to 1.25)			**494.00**	**400.27**	**66.74**	**26.99**	**0.00**	**0.00**	**0.00**
2.0	**QUARRY POWER SUPPLY:**									
2.1	5- panel ,6.6 kV switch-board, outdoor type, with 5 vacuum circuit breakers, 630 amps, 75 MVA symmetrical breaking capacity. The function of each panel is as follows: -1 no. Circuit breaker panel having CT ratio of 400/5 A as controller for incoming feeder -4nos. Circuit breaker panels having CT ratio of 100/5 A as controller for pump feeders. All panels will conform to IS:3427 (current) and relevent parts to IS:2516. These will be provided with cable end boxes. The incoming panels will be provided with restricted earth fault Protection. All panels will be provided with IDMTL relays for over current and earth fault protection. All incoming control circuit breaker shall be provided with Digital type microprocer based Power meter and outgoing control circuit breaker shall be provided with Digital type ammeter & energy meter.	3 Sets	14.04	42.12	14.04	14.04	14.04			
2.2	Unitised Substation, 400 kVA,3.3 kV/415 V with 3.3 kV, 400 A, 150 MVA, VCB (1 no) and 433V, 800 A, 50 MVA, ACB (2nos)	2	12.16	24.32	12.16	12.16				
2.3	FIELD Switch 6.6 kV, 400/500 Amp	15.00	5.40	81.00	54.00	10.00	9.00	8.00		
2.4	Lighting transformer, single phase, pole mounted 25 kVA, 3.3 kV/230 V (L-L)	8	0.52	4.16	4.16					

Appendix - A.3.2.1

Project Report for Rampur Batura open cast project (4 Mty)- Partial Outsourcing Option

Capital Requirement for Electrical & Communication Plant and Machinery

(Amount in Rs lakhs)

Sl.No.	Particulars	Qty	Unit Rate	Amount with GST	Yearwise phasing of capital requirement					
					2 nd	3rd	4th	5th	6th	7th
2.5	Isolator, 6.6 kV, 3pole, outdoor type, gang operated, 630 amps conforming to IS:1818 (Current)	10	0.28	2.80	2.00		0.80			
2.6	Lightning arrestor 3 kV distribution type for 6.6kV system	30	0.29	8.70	5.00	2.00	1.70			
	Sub Total 2.1 to 2.5)			**163.10**	**91.36**	**38.20**	**25.54**	**8.00**	**0.00**	**0.00**
3.0	**O/H LINE AND CABLES**									
3.1	33 kV O/H line with all accessories in km (Double circuit line on rail pole, incoming from Chachai S/S)	5	26.00	130.00	130.00					
3.2	6.6 kV O/H line with all accessories in km	35	12.00	420.00	120.00	100.00	100.00	100.00		
3.3	Cables PVC DWA mining type, 3 core, copper conductors 6.6 kV grade of sizes 120 sq.mm in km.	3.5	44.10	154.35	88.20	22.05	44.10			
3.4	Cables PVC DWA mining type, 3 core, copper conductors 6.6 kV grade of size 35 sq.mm	0.5	18.43	9.22	5.00	2.70	1.52			
3.5	Cables,PVCDWA, mining type, 3 core, copper conductors, 1100V grade of sizes 95 sq.mm, 70 sq. mm,35 sq.mm, 25 sq.mm.,16 sq.mm.& 10 sq. mm.	LS		45.00	27.00	18.00				
	Sub Total (3.1 to 3.5)			**758.57**	**370.20**	**142.75**	**145.62**	**100.00**	**0.00**	**0.00**
4.0	Lighting Arrangement (in the Quarry,roads etc.) includes towers, poles, cables, luminaries, conductors etc.	LS		80.00	35.00	35.00	10.00		**0.00**	**0.00**
5.0	Township Electrification(250 kVA, 6.6/.433 kV, 4 nos Tr)	LS		110.00	75.00	10.00	15.00	10.00		
6.0	Safety,Testing and maint.including mini truck mounted	LS		12.00	6.00	3.00	3.00			

Appendix - A.3.2.1

Project Report for Rampur Batura open cast project (4 Mty)- Partial Outsourcing Option

Capital Requirement for Electrical & Communication Plant and Machinery

(Amount in Rs lakhs)

Sl.No.	Particulars	Qty	Unit Rate	Amount with GST	Yearwise phasing of capital requirement					
					2 nd	3rd	4th	5th	6th	7th
	telescopic ladder etc.									
7.0	Diversion of 132 kV overhead lines (Approximately 4 Km)	4	75.00	300.00	300.00					
8.0	Diversion of HT & LT rural feeders within mine boundary	LS		60.00	30.00	30.00				
9.0	**Total (items 1 to 8)**			**1617.7**	**977.8**	**295.7**	**226.2**	**118.0**	**0.0**	**0.0**
10.0	Miscellaneous			40.00	20.00	10.00	10.00			
	Grand Total			**1657.7**	**997.8**	**305.7**	**236.2**	**118.0**	**0.0**	**0.0**

* Cable lengths are indicative and may vary as per site conditions.

Project Report for Rampur Batura OCP (Partial Outsourcing Options)
Estimated Capital investment on P&M-Communication system

Appendix A.3.2.2
Amount in Rs'Lakhs

Sl.No.	Particulars	Qty	Unit Price	Amount with GST	Year wise Addl. capital requirement			
					2nd Yr	3rd Yr	4 th Yr	5 th Yr
1	IP enabled Exchange 400 lines with accessories	1	9.87	9.87	9.87			
2	Tetra system with base Stn. , NMS , Gateway, Mobile set, AVLS Module & other accessories	1 set	LS	178.00	100.00	50.00	28.00	
	a) 2-carrier system (8-channel) with all accessories	1						
	b) Fixed terminal for mines	80						
	c) Mobile terminal for mines	40						
	d) Network Management Terminal with AVLS, Telephone gateway and accessories.	1						
3	Battery and battery charger	2.00	1.77	3.54	1.77	1.77		
4	VHF instrument with battery for VHF	3.00	0.07	0.21	0.21			
5	Walkie -Talkie Set	30.00	0.03	0.90	0.60	0.30		
6	BSNL fixed lines	15	0.04	0.60	0.30	0.30		
7	BSNL Mobile connection with accessories	15	0.05	0.75	0.50	0.25		
8	BSNL 2Mbps leased line, Routers & accessories	1	10.00	10.00	10.00			
9	L3/L4 Switch, L2 (24/48), W LAN , PCs , Internet & accessories	1	32.00	32.00	15.00	11.00	6.00	
10	Armoured telephone cables , UPT, OFC & accessories	LS		50.00	30.00	20.00		
11	Testing and Measuring Instruments	LS		5.00	2.50		2.50	
12	Miscellaneous including CCTV Camera	LS		4.00	2.00	2.00	0.00	
13	Installation and Commissioning			29.49	20.00	9.49		
14	**Total**			**324.36**	**192.75**	**95.11**	**36.50**	**0.00**

Note: Installation and Commissioning does not include items 11 & 12

Appendix A.3.3

PR For Rampur Batura OCP (4.0 Mty)

Statement Showing the Estimated Capital Investment on Unit Workshop and Stores Plant and Machinery

(COAL DEPARTMENTAL & OB OUTSOURCING)

(Amount in Rs.lakhs)

Sl.no.	Description	Provision			Year wise Phasing				
		Qty	Unit price	Amount	Ist	2nd	3rd	4th	5th
1	Combined(Excavation & E&M)workshop(Appendix A.3.3.1)			829.33	0.00	366.31	290.17	75.89	96.97
2	Unit Stores(Appendix A.3.3.2)			60.97		26.32	26.77	7.88	
	Total			**890.30**	**0.00**	**392.62**	**316.93**	**83.77**	**96.97**

ANNEXURE - A.3.3.1

PR FOR RAMPUR BATURA OC (4.0 Mty)
(COAL DEPARTMENTAL & OB OUTSOURCING)
Statement showing estimated capital requirement for Excavation workshop plant and machinery

Amount in Rs lakhs

Sl.no	Description	Qty.	Unit Rate	Amount	Phasing				
					1st Yr	2nd Yr	3rd Yr	4 th Yr	5th Yr
A.	**Mahine shop**								
1.	Light duty Centre Lathe,CH-200 mm,DBC-1000mm alongwith accessories.	1	3.12	3.12					3.12
2	High speed precision lathe ,CH-260mm, DBC-1500mm,power kW.	1	17.32	17.32		17.32			
3	Radial drilling mach., drilling cap. in steel 50mm, max. drilling rad. 1500mm.	1	13.33	13.33			13.33		
4	Pillar drilling machine, drilling capacity in steel 25mm, power 2.5kw	1	2.14	2.14		2.14			
5	Shaping machine, stroke-630 mm, power- 2.5 kW	2	2.51	5.02		2.51		2.51	
6	Power hack saw to cut rounds upto 300mm, power 1.5kw	1	2.24	2.24		2.24			
7	Pedestal grinder , wheel dia. 250 mm, 0.66 kW	2	1.12	2.24		1.12	1.12		
8	Non standard items, surface plate, tools, tackles, cabinet,racks etc.	LS	LS	3.00			1.00	1.00	1.00
	SUB-TOTAL			**48.41**	**0.00**	**25.33**	**15.45**	**3.51**	**4.12**
B.	**Electrical repair shop**								
1.	Coil winding machine for armature of dynamo self starter, wire range 0.5-5mm	1	0.34	0.34			0.34		
	coil dia. 10-100mm,layer width 0.5-5mm,DBC-150mm, motor power 0.5hp.								
2	Soldering iron,1500 W	1	0.01	0.01		0.01			
3	Cable vulcaniser	1	1.06	1.06		1.06			
4	Automatic Battery charging set 144V/ 72V	1	0.83	0.83		0.83		0.00	
5	Distill water plant,Cap 16l/hr.	1	0.60	0.60		0.60			
6	Test bench for strater, dynamo, alternators etc.	1	1.69	1.69			1.69		0.00
7	Motor checker	1	0.24	0.24				0.24	
8	Hydraulic crimping tool	1	0.67	0.67				0.67	
9	Earth tester	1	0.12	0.12			0.12		
10	Tools, tackles, working benches,racks,trolleys etc.	LS		1.00		0.50			0.50
11	Bearing puller 100 t. cap. Hydraulic	1	17.02	17.02					17.02
12	Apparatus for testing electric insulation (Megger-550V) circuit voltage 200V	LS		2.00		1.00			1.00
	testing voltage-1.1kV.								
13	Motor drying chamber, 0-200 deg.C	1	1.47	1.47			1.47		
14	H.V. Testing kit	1	0.81	0.81			0.81		
15	Cable fault detector	1	1.00	1.00			1.00		
16	Emergency / inflable portable lighting system	1	3.89	3.89		3.89			
17	Deminaralisation plant	1	6.88	6.88				6.88	

ANNEXURE - A.3.3.1

PR FOR RAMPUR BATURA OC (4.0 Mty)
(COAL DEPARTMENTAL & OB OUTSOURCING)
Statement showing estimated capital requirement for Excavation workshop plant and machinery

Amount in Rs lakhs

Sl.no	Description	Qty.	Unit Rate	Amount	Phasing				
					1st Yr	2nd Yr	3rd Yr	4 th Yr	5th Yr
	Sub total			**39.63**		**7.89**	**5.43**	**7.79**	**18.52**
C.	**Engine repair shop**								
1	Valve refacer	1	0.81	0.81			0.81		
2	Valve puller kit	1	0.40	0.40					0.40
3	Electric hand drill, cap.to drill 25 mm, 0.55kW.	1	0.43	0.43				0.43	
4	Electric hand grinder,100 mm, power 0.55 Kw.	1	0.15	0.15					0.15
5	Electrical steam zenny , electrically heated with heater, power 8KW.	1	1.90	1.90		1.90			
6	Master tool kit	1	2.88	2.88		2.88			
7	General tools and tackles	LS		2.00		0.50	0.50	0.50	0.50
8	Chemical tank for component washing	1	0.62	0.62				0.62	
9	Engine Repair stand	2	0.68	1.36		0.68		0.68	
10	Induction type bearing heater	1	6.61	6.61			6.61		
11	Non standard items like parts storage rack, working tables,trolley cabinets etc.	LS		2.00		0.50		0.50	1.00
	SUB-TOTAL			**19.16**		**6.46**	**7.92**	**2.73**	**2.05**
D.	**Radiator & other repair shop**								
1.	Gas torch for brazing of radiator	2	0.43	0.86			0.43		0.43
2.	Electric soldering iron 1500 W	1	0.02	0.02		0.02			
3.	Appliance for push out of high and low pressure pipes	1	0.43	0.43		0.43			
4	Stand for radiator testing	1	0.67	0.67					0.67
5	Tools and tackles ,other misc. items	LS		1.00		0.50			0.50
	SUB-TOTAL			**2.98**		**0.95**	**0.43**		**1.60**
E.	**Dumper & Dozer repair shop**								
1	Hydraulic jack ,remote controlled type with power pack & pump 100t cap.	1	25.53	25.53			25.53		
2	Nitrogen charging kit	1	0.28	0.28			0.28		
3	Air comressor,1.82 cu.m/min. cap.,10kg/sq.cm , power 2.2kw.	1	2.88	2.88		2.88			0.00
4	Master tool kit	2	4.13	8.26		4.13		4.13	
5	Heavy duty impact sockets	1	17.63	17.63			17.63		
6	Hydraulic Torque wrenches and multipliers	1	14.85	14.85			14.85		
7	Electric hand tools								
	a) Hand drill 25 mm	1	0.43	0.43		0.43			0.00
	b) Flexible shaft grinder- 100 mm	1	0.51	0.51		0.51			0.00

ANNEXURE - A.3.3.1

PR FOR RAMPUR BATURA OC (4.0 Mty)
(COAL DEPARTMENTAL & OB OUTSOURCING)
Statement showing estimated capital requirement for Excavation workshop plant and machinery

Amount in Rs lakhs

Sl.no	Description	Qty.	Unit Rate	Amount	Phasing				
					1st Yr	2nd Yr	3rd Yr	4 th Yr	5th Yr
	c) Hand grinder, 100 mm	1	0.15	0.15		0.15			
8	Transformer welding set 400 A	1	1.25	1.25			1.25		
9	Gas cutting and brazing set	2	0.43	0.86		0.43		0.43	
10	Tyre inflator (electronic type)	1	3.94	3.94		3.94			0.00
11	Wall type inflator	1	0.12	0.12		0.12			0.00
12	Invertor based welding set	1	0.97	0.97			0.97		
13	Bearing heater, induction type	1	6.61	6.61			6.61		
14	Limited clearence rachet tools & other accssories for hydraulic torque wrench	1	4.28	4.28			4.28		
15	SPM vibration analyser	1	3.94	3.94			3.94		
16	Portable Boring machine with welding resuface m/c	1	5.33	5.33			5.33		
17	Tools , tackles, working benches,vices etc.	LS		3.50		0.50	1.00	1.00	1.00
18	Trolley mounted access platform	1	0.38	0.38					0.38
19	Portable oil filteration m/c for solid particles	1	6.63	6.63		6.63			0.00
20	EOT crane 15/2t capacity	1	89.24	89.24		89.24			
	SUB-TOTAL			**197.57**		**108.96**	**81.67**	**5.56**	**1.38**
F	**Dumper & Dozer daily maintenance shop**								
1.	Centralised pressurised lubrication system	1	8.26	8.26		8.26			
2	Articulated mobile tank with telescopic funnel for collection of waste oil.	LS		0.53		0.20		0.12	0.21
3	Diagnestic tools and instruments	LS		2.00		0.50	0.50	0.50	0.50
4	Air compressor 8 cu.m / min, 10 kg/sq cm along with accessories	1	13.96	13.96		13.96			
	SUB-TOTAL			**24.75**		**22.92**	**0.50**	**0.62**	**0.71**
G	**Heavy repair shop**								
1.	Hydraulic press, 200 t,area of bed 1000x1000 mm,stroke-630mm,power 30kw	1	12.73	12.73			12.73		
2	Hydraulic bearing puller kit- 100t cap.	1	17.02	17.02			17.02		
3	Bath for heating bearings prior to force fitting	1	7.05	7.05				7.05	
4	Hydraulic jack 30t	1	2.13	2.13		2.13			0.00
5	Electrical hand tools								
	a) Hand drill 25 mm	1	0.43	0.43				0.43	
	b) Flexible shaft grinder- 100 mm	1	0.51	0.51				0.51	
	c) Hand grinder, 100 mm	1	0.15	0.15				0.15	
	d) Angle grinder	1	0.51	0.51				0.51	

ANNEXURE - A.3.3.1

PR FOR RAMPUR BATURA OC (4.0 Mty)
(COAL DEPARTMENTAL & OB OUTSOURCING)
Statement showing estimated capital requirement for Excavation workshop plant and machinery

Amount in Rs lakhs

Sl.no	Description	Qty.	Unit Rate	Amount	Phasing				
					1st Yr	2nd Yr	3rd Yr	4 th Yr	5th Yr
6	Master tool kits	1	4.13	4.13				4.13	
7	Torque wrenches and multipliers	1	4.28	4.28			4.28		
8	Tools ,tackles and misc.	LS		3.50				1.50	2.00
9	Motor alignment tool	1	8.32	8.32			8.32		
10	Oil filteration machine	1	6.63	6.63				6.63	
11	Electronic and electrical testing and measuring equipment.	LS		4.00		1.00	1.00	2.00	
	SUB-TOTAL			**71.39**		**3.13**	**43.35**	**22.91**	**2.00**
H	**Hydraulic repair shop**								
1	Pump testing stand	1	9.87	9.87			9.87		
2	Compressor testing machine	1	7.31	7.31				7.31	
3	Inductionl oven	1	4.38	4.38			4.38		
4	Deep freezer	1	4.38	4.38			4.38		
5	Parts cleaning booth, discharge 20 lit/ min, tank cap. 2X50 lit.	1	1.95	1.95				1.95	
6	Bench drill, drilling cap. 13 mm	1	0.33	0.33			0.33		
7	Hand operated press 5t cap.	1	0.26	0.26			0.26		
8	Hydraulic equipment assembly and dis assembly tools	LS		2.00				2.00	
9	Hydraulic test bench	1	9.75	9.75					9.75
10	Misc. items	LS		1.50			0.50	1.00	
	SUB TOTAL			**41.73**			**19.72**	**12.26**	**9.75**
I	**Washing stations**								
1.	High pressure water and steam jet washing unit Dumper & Dozer	1	8.78	8.78		8.78			
2	High pressure water and steam jet machine	1	2.61	2.61			2.61		
3	Trailor mounted diesel pump for washing of field equipment	1	3.96	3.96					3.96
	SUB-TOTAL			**15.35**		**8.78**	**2.61**	**0.00**	**3.96**
J	**Material handling equipment**								
1	Portable Jib crane, hydraulic operated,3 t cap.	1	1.06	1.06					1.06
2	Pallet trucks, wheel barrows	LS		2.00		1.00		1.00	
3	Hydraulic operated floor crane,2 t cap.	1	0.40	0.40			0.40		
4	EOT crane -								
	a) E.O.T.Crane,span 24m,15/5 t	1	58.20	58.20		58.20			
	b) Electric hoist,monorail mounted 6t cap.	3	4.41	13.23		13.23			

ANNEXURE - A.3.3.1

PR FOR RAMPUR BATURA OC (4.0 Mty)
(COAL DEPARTMENTAL & OB OUTSOURCING)
Statement showing estimated capital requirement for Excavation workshop plant and machinery

Amount in Rs lakhs

Sl.no	Description	Qty.	Unit Rate	Amount	Phasing				
					1st Yr	2nd Yr	3rd Yr	4 th Yr	5th Yr
5	Chain pulley blocks/ hoist etc. cap.2/3 t	1	0.27	0.27		0.27			
	SUB-TOTAL			**75.16**		**72.70**	**0.40**	**1.00**	**1.06**
K	**Mobile/ field service equipment**								
1.	Mobile service van for field lubrication work	1	15.84	15.84			15.84		
	SUB-TOTAL			**15.84**			**15.84**		**0.00**
L	**Common equipment**								
1	Fire fighting equipment(Fire hydrants,Fire extinguishers,Fire pumps)	LS		15.00			10.00		5.00
2	Time clock and card punching machine	1	0.19	0.19			0.19		
3	Electrical siren - range 5 km	1	0.19	0.19		0.19			
4	Furniture and fittings	LS		3.00		1.00	2.00		
5	Diesel generator welding set 600 amps.,tyre mounted	1	7.17	7.17					7.17
6	Ventilation and pressurisation system	LS		5.00		2.00	1.00	1.00	1.00
7	Air conditioner	1	0.36	0.36		0.36	0.00		
8	PC	1	0.28	0.28		0.28			
9	Portable incinerator for burning of combustible trash	1	7.50	7.50			7.50		
	like oil soaked cotton etc.								
10	Industrial vacuum cleaner	1	0.40	0.40			0.40		
11	Electrically operated tyre mounted Jack,100 t cap.`	1	11.03	11.03		11.03			
12	Oil testing instruments such as viscometer, particle counter,TAN/TBN	LS		25.00		5.00	5.00		15.00
	SUB-TOTAL			**75.12**		**19.86**	**26.09**	**1.00**	**28.17**
M	**TOTAL (A TO L)**			**627.09**		**276.98**	**219.41**	**57.38**	**73.32**
N	Electrical plant and machinery including substation								
	power supply etc. @ 15% of item M			94.06		41.55	32.91	8.61	10.99
O	Installation charges @ 10 % of items (N and M)			72.12		31.85	25.23	6.60	8.44
P	Contingencies @ 5% of items (N and M)			36.06		15.93	12.62	3.30	4.22
	GRAND TOTAL			**829.33**		**366.31**	**290.17**	**75.89**	**96.97**

Appendix-A.3.3.2

PR for Rampur Batura OCP (4.0 Mty)
Statement showing the estimated capital requirement for unit Store P&M
(COAL DEPARTMENTAL & OB OUTSOURCING)

Amount in Rs lakhs

Sl.no	Description	Qty.	Unit Rate	Amount	Year wise phasing			
					1st yr.	2nd yr.	3rd yr.	4th yr.
1	**Material Handling Equipment**							
1.1	Fork lift truck 5t cap.	1	14.99	14.99			14.99	
1.2	Electric hoist block, mono rail mounted,3/5 t cap	1	4.41	4.41				4.41
1.3	Pallet trucks, wheel barrows	ls		0.70		0.30	0.25	0.15
	Sub total			**20.10**	**0.00**	**0.30**	**15.24**	**4.56**
2	**Storage system**							
2.1	Racks, bins, cabinets, almirahs, tables,							
	trolleys, pallet trucks, cardex, ventillation	ls		20.00		15.00	5.00	
	equipment, weighing machine etc.							
	Sub total			**20.00**		**15.00**	**5.00**	**0.00**
3	**Common eqiupment**							
3.1	Pressurization system	ls		2.00		2.00		
3.2	Fire fighting equipment	ls		1.00		0.60		0.40
3.3	Furniture and fiting	ls		3.00		2.00		1.00
	Sub total			**6.00**		**4.60**	**0.00**	**1.40**
4	Total of item 1 to3			46.10		19.90	20.24	5.96
5	Electricals(15% of item3)			6.92		2.99	3.04	0.89
6	Installation 10% of item (4+5)			5.30		2.29	2.33	0.69
7	Contingencies 5% of item(4+5)			2.65		1.14	1.16	0.34
	Grand Total (4 to 7)			**60.97**		**26.32**	**26.77**	**7.88**

Appendix.- A.3.4

PR FOR Rampur Batura OC (4.0 Mty)
Statement showing estimated capital requirements for pumps,pipes and pipe fittings

(Amount in Rs. Lakhs)

Sl.no.	Description	Qty.	Unit cost	Total cost	Yearwise Phasing					
					2nd	3rd	4th	5th	6th	7th
A	**PUMPS**									
1	Centrifugal Pump , multi stage, horizontal split casing, Bronze impeller, 225 lps, 100 m head, 370 kW, NFLP electricals suitable for 3.3 kV supply along with accessories such as non-return valve,foot valve,sluice etc.	5	17.83	89.15		17.83	17.83	17.83		35.66
2	Centrifugal pump-motor set, multi stage, 38lps, 60m head, 45 kW, 415kV, NFLP electricals.	2	4.30	8.60	4.30	4.30				
3	Slurry pump 14lps,35m head, 50 kw with 415V electricals	2	3.88	7.76			3.88	3.88		
4	Face pumps, 11lps,30m ,9.3kw , 415kV, NFLP electricals.	4	0.84	3.36	0.84	0.84	1.68			
5	Diesel Engine operated pumps, 80 lps,100 m head, 185hp	2	8.22	16.44	8.22	8.22				
6	**Sub total of A (of item 1 to 5)**			**125.31**	**10.41**	**30.18**	**25.38**	**23.88**		**35.46**
B	**Pipes and pipe fittings**									
1	ERW Steel Pipes 355.6 mm out side dia.and wall thickness (8 mm) in (km)	12	25.52	306.24		51.04	51.04	102.08	51.04	51.04
2	ERW Steel Pipes 219 mm out side dia..and wall thickness (8 mm) in(km)	3	17.74	53.22	17.74	35.48				
3	GI pipes medium duty, 100 mm dia, in km	2	6.99	13.98	6.99	6.99				
4	GI Pipes, medium duty, 50 mm dia. (km)	0.5	4.51	2.26	1.13	1.13				
5	Pipe fittings such as bends,elbows, T joints , valves etc.	ls		37.57	2.59	9.46	5.10	10.21	5.10	5.10
6	**Sub total of B(of item 1 to 5)**			**413.26**	**28.44**	**104.10**	**56.14**	**112.29**	**72.49**	**39.80**
C	Civil cost for providing cross ways	ls		44.00				10.00	20.00	14.00
D	Pontoons etc.	5	2.75	13.75		2.75	2.75	2.75		5.50
E	Tools , instruments, pulling and lifting tackles, hoist blocks,	ls		7.00		2.00	1.00	1.00	1.00	2.00
F	Installation charges	ls		53.86	3.89	13.43	8.15	13.62	7.25	7.53
I	Truck mounted crane, 10T capacity	1	14.74	14.74				14.74		
	GRAND TOTAL			**671.92**	**42.74**	**152.46**	**93.43**	**178.27**	**100.74**	**104.28**

APPENDIX- A.3.5.A

PR FOR RAMPUR BATURA OC (4.0 Mty)

Summaruy of the estimated capital requirement on Coal Handling Plant,Capacity (6.0Mty)

Amount in Rs lakhs

Sl.no	Particulars	Qty.	Unit rate	Amount	Year wise phasing				Life in	Annual
					1st	2nd	3rd	4th	%	Dep.
1	Plant and machinery (Mechanical)			7778.51	0.00	1699.99	3716.41	2362.12	5.15	453.30
2	Plant and machinery			12.96	0.00	12.96	0.00	0.00	11.11	1.44
3	Idlers and N-N belting			499.51	0.00	20.94	395.61	82.96	33.33	166.49
4	Steel cord belting			167.80	0.00	0.00	167.80	0.00	14.28	23.96
5	Civil and Structurals			6937.21		1387.44	3468.61	2081.16	5.15	357.27
	Grand Total			**15395.98**	**0.00**	**3121.33**	**7748.42**	**4526.24**		**1002.46**
	As 25% of grand total apportion to Batura west(1.5Mty) remaing portion will be considered for this project.			**11546.99**		**2340.99**	**5811.32**	**3394.68**		**751.85**

APPENDIX- A.3.5.A.1

PR FOR RAMPUR BATURA OC (4.0 Mty)
Statement showing estimated capital requirement on Coal Handling Plant,Capacity(6.0Mty)

Amount in Rs lakhs

Sl.no	Particulars	Qty.	Unit rate	Amount	Year wise phasing				Life in	Annual
					1st yr.	2nd yr.	3rd yr	4th yr.		
1	**Belt Conveyor**									
1.1	Belt conveyor C1, 1400 mm wide,80 m long, 400tph,2.5m/s speed, 55 kW drive suitable for 0.415kV, 3 phase, 50 Hz supply	1Set								
a	Drive head and structurals	1.00	62.13	62.13			62.13		5.15	3.20
b	Idlers and loading point	1.00	21.64	21.64			21.64		33.33	7.21
c	Nylon-Nylon belting, NN-630/4 in Km	0.18	25.95	4.57			4.57		33.33	1.52
1.2	Belt conveyor C2 & C3, 1400 mm wide, 220 m long, 1200tph 3 m/s speed, 1X300kW drive ,suitable for 6.6KV, 3 phase, 50HZsupply	2Set								
a	Drive head and structurals	2	116.62	233.24			233.24		5.15	12.01
b	Idlers and loading point	2	55.65	111.30			111.30		33.33	37.10
c	Nylon-Nylon belting, NN-1000/4 in Km	1.00	26.16	26.16			26.16		33.33	8.72
1.3	Tripper conveyor C4 & C5,1400 mm wide, 138 m long, 1200 tph 3 m/s speed, 2x75 Kw drive with tripper 5.5 kw, suitable for 0.415 kV,3 phase, 50 Hz supply	2Set								
a	Drive head and structurals	2	107.88	215.76				215.76	5.15	11.11
b	Idlers and loading point	2	33.60	67.20				67.20	33.33	22.40
c	Nylon-Nylon belting, NN-630/4 in Km	0.61	25.95	15.76				15.76	33.33	5.25
1.4	Belt conveyor C6 & C7, 1600 mm wide, 315 m long , 3000tph, 4.3 m/s speed, 4X300 kW drive, suitable for 6.6KV, 3 phase, 50 Hz supply	2Set								
a	Drive head and structurals	2	303.75	607.50			607.50		5.15	31.29
b	Idlers and loading point	2	115.97	231.94			231.94		33.33	77.31
c	Steel cord belting, ST 1600 in Km	1.39	120.72	167.80			167.80		14.28	23.96
1.5	Belt conveyor C8, 1400 mm wide, 60 m long , 1200tph, 3 m/s speed, 1X75 kW drive, suitable for 0.415KV, 3 phase, 50 Hz supply	1Set								
a	Drive head and structurals	1	62.93	62.93		62.93			5.15	3.24
b	Idlers and loading point	1	17.51	17.51		17.51			33.33	5.84
c	Nylon-Nylon belting, NN-630/4 in Km	0.13	25.95	3.43		3.43			33.33	1.14

APPENDIX- A.3.5.A.1

PR FOR RAMPUR BATURA OC (4.0 Mty)
Statement showing estimated capital requirement on Coal Handling Plant,Capacity(6.0Mty)

Amount in Rs lakhs

Sl.no	Particulars	Qty.	Unit rate	Amount	Year wise phasing				Life in	Annual
					1st yr.	2nd yr.	3rd yr	4th yr.		
1	**Belt Conveyor**									
1.6	Belt conveyor BW1 & BW2, 1200 mm wide,170 m long each, 400tph,2.0m/s speed, 2x55 kW drive suitable for 0.415kV, 3 phase, 50 Hz supply	2Set								
a	Drive head and structurals	2	84.25	168.50				168.50	5.15	8.68
b	Idlers and loading point	2	40.21	80.42				80.42	33.33	26.80
c	Nylon-Nylon belting, NN-630/4 in Km	0.75	25.95	19.46				19.46	33.33	6.49
1.7	Belt conveyor BW3 & BW4, 1600 mm wide, 95 m long , 3000tph, 4.3 m/s speed, 1X300 kW drive, suitable for 6.6KV, 3 phase, 50 Hz supply	2Set								
a	Drive head and structurals	2	124.77	249.54			249.54		5.15	12.85
b	Idlers and loading point	2	35.39	70.78			70.78		33.33	23.59
c	Steel cord belting, ST 1600 in Km	0.42	120.72	50.70			50.70		14.28	7.24
2	**Vibratory feeders**									0.00
2.1	Mechanical vibro feeders, 200 tph capacity	2	28.36	56.72		56.72			5.15	2.92
2.2	Mechanical vibro feeders, 800 tph capacity	8	57.13	457.04		457.04			5.15	23.54
3	Rotary plough feeders, 3000 tph capacity	4	145.80	583.20			583.20		5.15	30.03
4	Electronic, pit less,Road weigh bridge, 100 t cap., Digital display with printer	3	15.26	45.78		45.78			5.15	2.36
5	Diesiel engine with creep control speed,suitable for 58 wagons	1	712.80	712.80				712.80	5.15	36.71
6	**Wagon loading system(Load out system & associated equipment)**									
6.1	Rapid loading system consisting of two sets preweigh hopper,load cells, emergency gates,loadout discharge gates, teliscopic chute with flow control gate, track logic system, system hydraulics, control system,low level/high level switches,temperature sensors etc.	1	329.40	329.40		329.40			5.15	16.96
6.2	Automatic sampler unit along with required chutes and lifting tackles .	1	177.34	177.34			177.34		5.15	9.13
7	Passanger lift 1t cap.	3	45.63	136.89				136.89	5.15	7.05
8	Dust suppression system	LS		15.00		10.00	5.00		5.15	0.77
9	Fire fighting system	LS		45.00		15.00	20.00	10.00	5.15	2.32

APPENDIX- A.3.5.A.1

PR FOR RAMPUR BATURA OC (4.0 Mty)
Statement showing estimated capital requirement on Coal Handling Plant,Capacity(6.0Mty)

Amount in Rs lakhs

Sl.no	Particulars	Qty.	Unit rate	Amount	Year wise phasing				Life in	Annual
					1st yr.	2nd yr.	3rd yr	4th yr.		
1	**Belt Conveyor**									
10	Airconditioning system & Pressurisation system	LS		30.00		20.00	5.00	5.00	5.15	1.55
11	Chute with liners									0.00
11	Transfer chute with liners	7	2.38	16.66		16.66			5.15	0.86
11	Two way chute with motorised flap gate & liners	3	3.67	11.01			11.01		5.15	0.57
11	Chute below feeder with liners	2	2.38	4.76		4.76			5.15	0.25
12	Condition monitoring system	10	0.76	7.60				7.60	5.15	0.39
13	Hoisting devices,tools, tackles, instruments, etc.	LS		60.00		25.00	20.00	15.00	5.15	3.09
14	Truck mounted crane 10 t cap.	1	12.96	12.96		12.96			11.11	1.44
15	Belt Handling device	1	11.66	11.66				11.66	5.15	0.60
16	Belt vulcanising unit	2	26.48	52.96				52.96	5.15	2.73
17	Plant and machinery (Mechanical)(Sum 1 to 16)			5255.05		1077.19	2658.85	1519.01		480.22
18	Plant and machinery (Electricals) 15% of item 17			800.34		164.06	404.94	231.35	5.15	41.22
19	**Total P & M (Sum item18 and 17)**			**6055.39**		**1241.25**	**3063.79**	**1750.36**		**521.44**
20	Erection and Commissioning Charges @10% of item 19			605.54		124.12	306.38	175.04	5.15	31.19
21	Civil & Structurals at CI 3626 incl. contingencies, design & engg and overhead construction cost			6937.21		1387.44	3468.61	2081.16	5.15	357.27
22	Design & Engg @ 5% of item 20 & 19			333.05		68.27	168.51	96.27	5.15	17.15
23	Contingencies @ 3% of item 19,20 ,22 & 24			241.29		49.46	122.08	69.75	5.15	12.43
24	Overhead construction cost, @ 15% of item 19, 20 & 22			1049.10		215.05	530.80	303.25	5.15	54.03
25	Training on O&M staff @ 0.05% of item 20 & 19			3.33		0.68	1.69	0.96	5.15	0.17
26	Store cost for maintanace of P & M @2% of item 19			121.11		24.82	61.28	35.01	5.15	6.24
27	Insurance @ 0.75 % of item 20 & 19			49.96		10.24	25.28	14.44	5.15	2.57
	Grand Total			**15395.98**		**3121.33**	**7748.42**	**4526.24**		**1002.46**
28	**As 25% of grand total apportion to Batura west(1.5Mty) remaing portion will be considered for this project.**			**11546.99**		**2340.99**	**5811.32**	**3394.68**		**751.85**

APPENDIX- A.3.5.B

PR FOR RAMPUR BATURA OC (4.0 Mty)

Statement showing estimated capital requirement on Inpit conveyor system,Capacity(4.0Mty)

Amount in Rs lakhs

Sl.no	Particulars	Qty.	Unit rate	Amount	Year wise phasing				Life in %	Annual Dep.
					1st	2nd	3rd	4th		
1	Plant and machinery (Mechanical)			6223.08	0.00	92.27	5823.81	307.00	5.15	320.46
2	Plant and machinery			144.84	0.00	12.96	131.88	0.00	11.11	16.09
3	Idlers			1567.64	0.00	0.00	1526.48	41.16	33.33	522.49
4	Steel cord belting			1310.98	0.00	0.00	1292.52	18.46	14.28	187.21
5	Civil and Structurals			3204.08		640.82	1602.04	961.22	5.15	165.01
	Grand Total			**12450.62**	**0.00**	**746.05**	**10376.73**	**1327.84**		**1211.26**

PR FOR RAMPUR BATURA OC (4.0 Mty) **APPENDIX-A.3.5.B.1**

Statement showing estimated capital requirement on Inpit conveyor system,Capacity(4.0Mty)

Amount in Rs lakhs

Sl.no	Particulars	Qty.	Unit rate	Amount	Year wise phasing				Life in %	Annual Dep.
					1st yr.	2nd yr.	3rd yr	4th yr.		
1	**Belt Conveyor**									
1.1	Belt conveyor IP1 & IP2, 1400 mm wide,800 m long, 800tph 3 m/s speed, 3X150 kW drive suitable for6.6kV, 3 phase, 50 Hz supply	2 Set								
a	Drive head and structurals	2.00	233.70	467.40			467.40		5.15	24.07
b	Idlers and loading point	2.00	175.33	350.66			350.66		33.33	116.87
c	Steel cord belting, ST-800 in Km	3.52	83.93	295.43			295.43		14.28	42.19
1.2	Belt conveyor IP3 to IP8, 1400 mm wide, 900 m long, 800tph 3 m/s speed, 2X150kW drive ,suitable for 6.6KV, 3 phase, 50HZsupply	6 Set								
a	Drive head and structurals	6	200.07	1200.42			1200.42		5.15	61.82
b	Idlers and loading point	6	195.97	1175.82			1175.82		33.33	391.90
c	Steel cord belting, ST-800 in Km	11.88	83.93	997.09			997.09		14.28	142.38
1.3	Belt conveyor IP9 & IP10,1400 mm wide, 50 m long, 800 tph 3 m/s speed, 90 Kw drive with tripper 5.5 kw, suitable for 0.415 kV,3 phase, 50 Hz supply	2 Set								
a	Drive head and structurals	2	68.23	136.46				136.46	5.15	7.03
b	Idlers and loading point	2	20.58	41.16				41.16	33.33	13.72
c	Steel cord belting, ST-800 in Km	0.22	83.93	18.46				18.46	14.28	2.64
2	Reclaim feeder 800tph capacity,90 KW	3	286.20	858.60			858.60		5.15	44.22
3	Dozer 90 HP	2	65.94	131.88			131.88		11.11	14.65
4	Dust suppression system	LS		10.00		6.00	4.00		5.15	0.52
5	Fire fighting system	LS		40.00		10.00	20.00	10.00	5.15	2.06
6	Airconditioning system & Pressurisation system	LS		5.00		3.00	1.00	1.00	5.15	0.26
7	**Chute with liners**									0.00
7.1	Transfer chute with liners	6	2.38	14.28		14.28			5.15	0.74
7.2	Two way chute with motorised flap gate & liners	3	3.67	11.01			11.01		5.15	0.57
8	Condition monitoring system	18	0.76	13.68				13.68	5.15	0.70
9	Hoisting devices,tools, tackles, instruments, etc.	LS		40.00		20.00	10.00	10.00	5.15	2.06
10	Truck mounted crane 10 t cap.	1	12.96	12.96		12.96			11.11	1.44
11	Plant and machinery (Mechanical)(Sum 1 to 10)			5820.31	0.00	66.24	5523.31	230.76		869.84
12	Plant and machinery (Electricals) 15% of item 11.			873.05	0.00	9.94	828.50	34.61	5.15	44.96

PR FOR RAMPUR BATURA OC (4.0 Mty) **APPENDIX-A.3.5.B.1**

Statement showing estimated capital requirement on Inpit conveyor system,Capacity(4.0Mty)

Amount in Rs lakhs

Sl.no	Particulars	Qty.	Unit rate	Amount	Year wise phasing				Life in %	Annual Dep.
					1st yr.	2nd yr.	3rd yr	4th yr.		
13	**Total P & M (Sum item11 and 12)**			**6693.36**	**0.00**	**76.18**	**6351.81**	**265.37**		**914.80**
14	Erection and Commissioning Charges @10% of item 13			669.34	0.00	7.62	635.18	26.54	5.15	34.47
15	Civil & Structurals at CI 3626 incl. contingencies, design & engg and overhead construction cost			3204.08		640.82	1602.04	961.22	5.15	165.01
16	Design & Engg @ 5% of item 13 & 14			368.14	0.00	4.19	349.35	14.60	5.15	18.96
17	Contingencies @ 3% of item 13,14 ,16 & 18			263.70	0.00	3.00	250.25	10.46	5.15	13.58
18	Overhead construction cost, @ 15% of item 11, 12 & 16			1059.23	0.00	12.05	1005.17	42.00	5.15	54.55
19	Training on O&M staff @ 0.05% of item 13 & 14			3.68	0.00	0.04	3.49	0.15	5.15	0.19
20	Store cost for maintanace of P & M @2% of item 13			133.87	0.00	1.52	127.04	5.31	5.15	6.89
21	Insurance @ 0.75 % of item 13 & 14			55.22	0.00	0.63	52.40	2.19	5.15	2.84
	Grand Total			**12450.62**	**0.00**	**746.05**	**10376.73**	**1327.84**		**1211.26**

APPENDIX-A.3.6

PROJECT REPORT FOR RAMPUR BATURA OPENCAST PROJECT(4.00 MTY)
ESTIMATED CAPITAL INVESTMENT ON OTHER PLANT AND MACHINERY

Amount in Rs lakhs

SL.No	Particulars	Size/ Capacity	Total Prov. (Nos)	Unit Price	Total Prov. (Amt.)	PHASING OF CAPITAL										Rate of Depr. (%)	Annual Depr.
						1st year		2nd year		3rd year		4th year		5th year			
						No.	Amt.	No.	Amt.	No.	Amt.	No.	Amt.	No.	Amt.		
1	EXPLODER WITH CONTINUITY TESTER		LS		1.20		0.00		0.20		0.40		0.40		0.20	11.11	0.13
2	SURVEY EQUIPMENT		LS		40.00				25.00		5.00		5.00		5.00	11.11	4.44
3	OTHER FIRE FIGHTING EQUIPMENT		LS		5.00				2.00		1.00		1.00		1.00	11.11	0.56
4	SAFETY DEVICES		LS		10.00				2.00		2.00		2.00		4.00	11.11	1.11
5	MINE PLANNING SOFTWARE		LS		25.00										25.00	11.11	2.78
6	COMPUTERS & PERIPHERALS		LS		5.00				1.50		1.00		1.00		1.50	11.11	0.56
7	NEAR FIELD BLAST DESIGN		LS		5.00				3.00		1.00				1.00	11.11	0.56
8	MISC.(For incorporation of latest technology in mine safety,survelliance & control system for colony,office,despatch network,mgazine and attendence capturing,etc)		LS		150.00				25.00		25.00		25.00		75.00	11.11	16.67
	TOTAL				**241.20**		**0.00**		**58.70**		**35.40**		**34.40**		**112.70**		**26.80**

APPENDIX-A.4

PROJECT REPORT FOR RAMPUR BATURA OPENCAST PROJECT (4.00 Mty)

ESTIMATED CAPITAL INVESTMENT FOR FURNITURE & FITTINGS

Amount in Rs lakhs

SL. NO.	PARTICULARS	ADDITIONAL PROVISION
1	GENERAL FURNITURE & FITTINGS FOR OFFICE	7.50
2	F&F FOR CANTEEN,HOSPITAL,STORES	7.50
3	AIR CONDITIONERS & COOLERS	5.00
4	REFRIGERATOR & WATER COOLER	3.00
5	FIRE ARMS	3.00
6	OFFICE EQUIPMENT	4.00
7	MISCELLANEOUS	10.00
	TOTAL	**40.00**

Appendix-A.5

PR for Rampur Batura OCP (4.0 Mty)
Statement showing estimated capital requirement for Railway siding

Amount in Rs Lakhs

Sl .No	Description	Qty.	Unit rate	Amount	Yearwise Phasing			
					1st	2nd	3rd	4th
1	Railway siding consisting of one load standage line(suitable for 58 box-N-wagons), one empty standagelines(suitable for 58 box-N-wagons),Engine escape line, loading stations, cross overs, turnouts, electrification signalling etc.at the project (Km)	2.00	800.00	1600.00		500.00	1000.00	100.00
2	Shed for repair of diesel engine,office	LS		50.00			15.00	35.00
3	E.O.T crane of 10t capacity	1		73.65				73.65
4	Power supply and illumination at the shed	LS		17.00			7.00	10.00
5	Miscellaneous	LS		10.00			4.00	6.00
6	Extension of railway line from Anuppur upto Batura Open Cast project consisting of rail lines,culverts, bridges, electrification, signalling, block stations etc (Km)	20	800.00	16000.00		3000.00	6000.00	7000.00
7	**Grand Total**			**17750.65**	**0.00**	**3500.00**	**7026.00**	**7224.65**
8	**As 50% of grand total Apportioned to Batura West(1.5Mty) remaning portion will be considered for this project.**			**8875.33**	**0.00**	**1750.00**	**3513.00**	**3612.33**

APPENDIX-A6

PROJECT REPORT FOR RAMPUR BATURA OPENCAST PROJECT (4.00 MTY)

Statement showing the estimated capital requirement on vehicles

Amount in Rs lakhs

Sl.No.	Description	Additional Provision			Unit cost	Total provision		Phasing of Additional Capital										Rate of Deprn.(%)	Annual Deprn.
		Deptt.	Amount	Outsourcing		NO	Amount	NO	1	NO	2	NO	3	NO	4	NO	5		
1	Diesel Jeep	4	37.02	4	9.25	8	37.02	1	9.25	1	9.25	1	9.25	1	9.25			11.11	4.11
2	Ambulance			2	12.35	2												11.11	
3	Staff/School Bus			2	23.10	2												11.11	
4	Pick-up Van			1	10.00	1												11.11	
5	Explosive Van	1	22.63		22.63	1	22.63			1	22.63							11.11	2.51
6	Truck			1	15.73	1												11.11	
7	Fire Tender	1	36.84		36.84	1	36.84			1	36.84							11.11	4.09
	Total	**6**	**96.48**	**10**		**16**	**96.48**	**1**	**9.25**	**3**	**68.72**	**1**	**9.25**	**1**	**9.25**			**11.11**	**10.72**

APPENDIX-A.7

PROJECT REPORT FOR RAMPUR BATURA OPENCAST PROJECT (4.00 MTY)

STATEMENT SHOWING ESTIMATED CAPITAL REQUIREMENT ON PROSPECTING & BORING

(AMOUNT IN RS.LAKHS)

SL. NO.	PARTICULARS	AGENCY	NO.OF BORE-HOLES.	TOTAL METERAGE	EXPLORATION EXPENDITURE INCURED in lakhs	ADDITIONAL PORVISION			TOTAL PROVISION
						METERAGE	DRILLING COST(Rs/m)	AMOUNT In Lakhs	
1	BATURA OC (Within and surrounding the Quarry area of project).	CMPDI	245	13634.10	1079.43	500.00	7300.00	36.50	**1115.93**
	TOTAL				**1079.43**	**500.00**	**7300.00**	**36.50**	**1115.93**

APPENDIX-A.8.1

PROJECT REPORT FOR RAMPUR BATURA OPENCAST (4.00 MTY)
ESTIMATED CAPITAL OUTLAY IN MINES

(Amount in Rs Lakhs.)

Sl.No.	P A R T I C U L A R S	Total Capital
1	**Temporary**	
	a) Office building/sheds	10.00
	b) Stores	5.00
	c) Water Supply & power supply	10.00
	d) Roads	10.00
2	Concrete -lined garland drain to handle the max. expected rain water from hills on the East side of the quarry (5 km)	500.00
3	Barbed wire fencing for the Project (approx.17 km)	425.00
4	Steps to be taken for prevention of possible inundation of the mine(Embankments)	30.00
5	Nalla diversion and embankment construction	1000.00
6	Permanent water sprinkler for haul road	30.00
7	Piezometer (4 nos.)	10.00
8	Hydrogeological study including drilling study,etc	25.00
9	Scientific study of Slope stability and real time slope monitoring instrument	720.00
10	Aboriculture/plantation in colony & industrial Site	20.00
11	Flora & Fauna study	20.00
12	Others(Environment monitoring instrument,long range fogging machine,CAAQMS,etc)	100.00
	R & R PACKAGE IN QUARRY	
13	Total cost of R&R as per second schedule of RFCTLAAR Act,2013	13202.95
14	Total cost for provision of infrastructure as per third schedule of RFCTLAAR Act,2013	4244.27
	TOTAL	20362.22

Appendix.A.8.2.

Project Report for Rampur Batura Opencast (4.0 Mty)

Statement showing the Capital Investment on Roads and Culverts

(Amount in Rs. Lakhs.)

Sl.No.	Particulars	Length(km)	Amount	Remarks
1	Colony Road	0.80	111.57	App - A.8.2.1
2	Approach Road and Service Road	5.00	1309.73	App - A.8.2.2
3	Haul Road	4.00	2150.59	App - A.8.2.3
Total			**3571.89**	

Appendix-A.8.2.1.

Project Report for Rampur Batura Opencast (4.0 Mty)

Statement showing the Estimated Capital Investment on Colony Roads

(Amount in Rs. Lakhs)

Sl.No.	Particulars	Unit	Quantity	Cost at 100CI (RS.)	Cost at 3626 CI (RS.)	Total Cost (Lakhs)
1	**Colony Roads** **3.75 M Wide Road (Intermediate Width Road)** **Specifications: (CBR Value=4)** i) 400mm thick moorum filling ii) 200mm thick Grade I WBM. iii) 150mm thivk Grade-II WBM iv) 75mm thivk Grade-III WBM along with 50mm thick bituminous macadam with single coat surface dressing Rate estimated on the basis of CPWD' DSOR'07 (equivalent Cost Index 1727) = Rs.4015/RM	M.	1000.00	-	8430.00	84.30
2	**Culverts:(7.5m wide)**					
	i)3.05m span RCC slab culvert	No.	1.00	25000.00	906500.00	9.07
	ii)0.61m diameter hume pipe culvert	No.	1.00	3100.00	112406.00	1.12
3	**Pucca Drains:**					
	i)22.5cm X 30cm	RM.	250.00	28.00	1015.00	2.54
	ii)30cm X 45cm	RM.	200.00	57.00	2067.00	4.13
	iii)60cm X 90cm	RM.	100.00	104.00	3771.00	3.77
4	**Tree Guards:**	No.	40.00	31.00	1124.00	0.45
5	**RCC slab for drain crossing:** (1.53m X 0.61m X 7.5cm)	No.	81.00	26.00	943.00	0.76
6	Add for poor soil @ 10% of 2 to 5					2.18
	Total					**108.32**
	Contingencies @ 3%					3.25
	Grand Total					**111.57**

Appendix-A.8.2.2

Project Report for Rampur Batura Opencast (4.0 Mty)

Statement showing the Estimated Capital Investment on Approach Road and Service Road

(Amount in Rs. Lakhs)

Sl.No.	Particulars	Unit	Quantity	Rate at 100 CI (Rs.)	Rate at 3626 CI (Rs.)	Total Amount (Lakhs)
1	**Approach Road** **7.5M Wide Road (Intermediate Width Road)** Specifications: (CBR Value=4) i) 400mm thick moorum filling ii) 300mm thick Grade I WBM. iii) 150mm thivk Grade-II WBM iv) 150mm thivk Grade-III WBM along with 50mm thick bituminous macadam and 20mm thick seal coat. Rate estimated on the basis of CPWD DSOR'07 (equivalent Cost Index 1727) = Rs. 9570/RM	RM	5000.000	-	20093.12	1004.66
2	**Culverts:(13.0m wide)**					
	i)4.57m span RCC slab culvert	Each	1.000	49500.000	1794870.00	17.95
	ii)3.05m span RCC slab culvert	Each	1.000	33000.000	1196580.00	11.97
	iii)1.83m span RCC slab culvert	Each	1.000	19800.000	717948.00	7.18
	iv)1.22m span RCC slab culvert	Each	2.000	13200.000	478632.00	9.57
	iii)0.61m diameter hume pipe culvert	Each	5.000	4100.000	148666.00	7.43
3	Pucca Drains : 60 x 90 cm	RM	5000.000	104.000	3771.04	188.55
4	Extra for poor/ B.C. soil on item no.2 & 3					24.27
	Sub Total					**1271.58**
	Contingencies(3%)					38.15
	Total					**1309.73**

Appendix-A.8.2.3

Project Report for Rampur Batura Opencast (4.0 Mty)

Statement showing the Estimated Capital Investment on Haul Road

(Amount in Rs. Lakhs)

Sl.No.	Particulars	Unit	Quantity	Rate at 100CI	Rate at 3626 CI	Total Cost
1	**Haul Road**					
	Total width of Road -23m(Double Lane)	M.	4000.00	-	46018.92	1840.76
	Width of carriage way-14m					
	Width of Dozer track- 5m					
	Width of shoulder on each side-2m					
	Specifications:(For CBR value 4)					
	i)23m wide 400mm th. Moorum					
	ii)23m wide 300mm th. WBM Grade I					
	iii)23m wide 150mm th.WBM Grade II					
	iii)23m wide 150mm th.WBM Grade III					
	Rate estimated on the basis of CPWD DSOR'07					
	(equivalent Cost Index 1727) = Rs.21918/RM					
2	**Culverts:**					
	i)4.57m span RCC slab culvert	No.	2.00	169110.00	6131928.60	122.64
	ii)3.05m span RCC slab culvert	No.	2.00	112750.00	4088315.00	81.77
	iii)0.61m diameter hume pipe culvert	No.	4.00	14000.00	507640.00	20.31
3	Add for poor soil @ 10% on item no. 2					22.47
	Total					**2087.95**
	Contingencies(3%)					62.64
	Grand Total					**2150.59**

Appendix - A.8.3

Project Report for Rampur Batura Opencast (4.0 Mty)

Statement Showing the Capital Investment in Water Supply Arrangement

(Amount in Rs.Lakhs)

Sl.No.	Particulars	Unit	Qty	Rate at 100 CI (Rs.)	Rate at 3626 CI (Rs.)	Total Cost (Lakhs)
	For Domestic water requirement					
1.	Bore well including submerssible pump ,GI connections upto Ground Water Reservoir including electricals.	Nos	2	LS		8.00
2	Ground water reservoir	Litres	90000	0.65	23.57	21.21
3	Clear water pumps (centrifugal type) 5 HP.	Nos	4	LS		6.00
4	Pump House - 1no.@ 25 sq.m.	Sq.m.	25	380.00	13778.80	3.44
5	**Clear water rising main :**					
	i) 150 mm.dia.	RM	300	143.45	5201.50	15.60
	ii) Add 7.5% for saddle supports valves,bends,etc.					1.17
6	**Zonal storage :**					
	a) RCC Overhead tank:					
	i) For clear water in township. - 2nos. |	Litres	60000	1.10	39.89	23.93
	ii) For clear water in servce bldg. |					
7	**Distribution system :**					
	A.For Colony :					
	i) 100 mm dia main.	RM	600	88.80	3219.89	19.32
	ii) 80 mm dia.	RM	400	68.25	2474.75	9.90
	iii) Add 7.5% for saddle supports,valves,bends etc.					2.19

Appendix - A.8.3 (Contd.)

(Amount in Rs.Lakhs)

Sl.No.	Particulars	Unit	Qty	Rate at 100 CI (Rs.)	Rate at 3626 CI (Rs.)	Total Cost (Lakhs)
	For Industrial water requirement					
8	Ground water reservoir - 2nos. @ 150000 litres	Litres	300000	0.65	23.57	70.71
9	Water pumps - 10 HP	Nos	4	LS		6.00
10	**Distribution system :**					
	B)For Industry:					
	i) 100 mm dia main.	RM	1000	88.80	3219.89	32.20
	ii) 80 mm dia.main.	RM	1000	68.25	2474.75	24.75
	iii) Add 7.5% for saddle supports, valves, bends etc.					4.27
11	**Investigations for :**			LS		7.00
	Hydro-geological & Geo - Technical data					
12	**Electrical installations :**					
	A) Transformer and switchgear |				
	B) Overhead line. |	5%of sl. no.1				12.43
	C) Instruments, tools etc. |	to 10 above				
	D) Switch room. |					
	Sub-Total					**268.13**
	Add contingencies @ 3%					8.04
	Grand Total					**276.17**

Appendix - A.8.3(a)

Project Report for Rampur Batura Opencast (4.0 Mty)

Statement Showing the Capital Investment in Sewerage Disposal Scheme.

(Amount in Rs.Lakhs)

Sl.No.	Particulars	Unit	Qty	Rate (RS.) at 100Cl	Cost at 3626 Cl
1.	**Colony**				
	Total No. of houses in the colony	Nos.	203		
	Cost of sewage disposal scheme per house (For conventional sewage disposal arrangement)	Rs.		750	
	Therefore, total cost of sewage disposal scheme of colony	Rs.			55.21
2.	**Service buildings**				
	i) Total cost of service buildings	Rs.lakh	576.85		
	ii) Cost of sewage disposal scheme 5% of above				28.84
3.	Disposal of mine water settling tank (2 nos.)	LS			20.00
4	**Pucca Drains for industrial sewerage**				
	i)60cm X 90cm	RM.	2000.00	104.00	75.42
5	Sewage Treatment Plant	LS			350.00
	Sub-Total				**529.47**
	Contingencies @ 3%				15.88
	Grand Total				**545.35**

Project Report for Rampur Batura Opencast (4.00 Mty)
Water Demand Calculations

DATA AVAILABLE		
i)Manpower=	479	
ii)Total No.of houses required=	203	
iii)Total No.of existing houses=	0	
iv)Total No.of houses to be constructed=	203	
Population:		
1.Residential population @ 5 persons per house=	1015	
2.Non - Residential workers=	276	
Water Demand:		
A.Potable Water Demand:		
i)Water requirement for residential populalion @135 litres per capita per day=	137025	
ii)Water requirement for non - residential population @45 litres per capita per day=	12420	
iii)Water requrement for service buildings 10%of item A(i)& (ii)	14945	
iv)Sub - total of above (i),(ii) & (iii)	164390	
v)Process and other losses 10% of (iv)	16439	
Total	180828	Litres per day
Say	**0.181**	**MLD**
B.Industrial Water Demand in Opencast Projects:		
i)Total No of Serviceable Dumpers and Dozers	2	
ii)Water required for washing of Dumpers and Dozers @2250 litres per dumper	4500	
iii)Water required for dust suppression in CHP & other industrial premises 22500 litres per day for million tonne of coal production per annum	90000	
iv)Water required for fire fighting in coal 45000 LPD for every million tonne of coal production per annum	180000	
v)Water required for road watering including watering of haul roads 67500 LPD for every million tonne coal production per annum	270000	
vi)Add for losses 10%of (ii) to (v)	54450	
	598950	Litres per day
Say,	**0.599**	**MLD**
Total Water Demand (Potable Water Demand & Industrial Water Demand)	**0.78**	**MLD**

Option-III,PARTIAL OUTSOURCING

RAMPUR BATURA OC [4.00 Mty]
Statement showing the revenue expenditure
capitalised during development period
(ob,coal & common)

App - A.9.1 & 2
RS. IN LAKHS.

Sl. No.	P a r t i c u l a r s		Yr.1	Yr.2	Total
A	Production (in mt)		0.00	0.50	0.50
B	Sales Value @ Rs.	1892.00	0.00	9460.00	9460.00
C	**Revenue Expenses**				
1	Wages & benefits		43.16	708.85	752.02
2	Stores		0.19	2319.59	2319.77
3	Power		0.00	588.17	588.17
4	Misc.Exps.incl.w/s debits		910.44	8704.74	9615.18
5	Total (1 to 5)		953.79	12321.35	13275.14
6	Interest on loan capital		0.00	0.00	0.00
7	Depreciation		411.68	1671.90	2083.58
8	Total (6 to 8)		1365.46	13993.25	15358.72
9	Less sales realisation		0.00	9460.00	9460.00
10	Net Total		1365.46	4533.25	5898.72
11	Less depreciation		411.68	1671.90	2083.58
12	Net Development capital (i.e. Rev. exps capitalised during development period)		953.79	2861.35	3815.14

REC-A-9	**1365.46**	**4533.25**
DEPR.	**411.68**	**1671.90**
Net REC	**953.79**	**2861.35**

APPENDIX-B

PROJECT REPORT FOR RAMPUR BATURA OC (4.00 Mty).

STATEMENT SHOWING JOB/CATEGORYWISE REQUIREMENT OF MANPOWER

SL.No.	PARTICULARS	CATEGORY/SCALE	STRENGTH
A.	**OB MANPOWER**		
1	MINING SIRDAR/SHORTFIRER/OVERMAN	GRADE-D	24
2	MAZDOOR INCLUDING BLASTING	I/II	17
SUB-TOTAL			41
B.	**COAL MANPOWER**		
A.	**COAL DIRECT MANPOWER**		
1	SURFACE MINER OPERATOR	A	10
2	SURFACE MINER HELPER	C	10
3	PAYLOADER OPERATOR	A	6
4	PAYLOADER OPERATOR HELPER	C	6
5	DUMPER OPERATOR	B	30
6	DOZER OPERATOR	A	3
7	SHOT FIRER/MINING SIRDAR/OVERMAN	GRADE-D	20
8	PITMAN/DUMPMAN/TRIPMAN	GRADE-E	4
SUB-TOTAL			89
B.	**COAL HANDLING PLANT AND INPIT CONVEYOR**		
1	FORMAN INCHARGE(E&M)	GRADE-B	1
2	FOREMAN(E&M)	GRADE-B	2
3	FOREMAN (E&T)	GRADE-B	2
4	MECHANICAL FITTER	IV/V	10
5	ELECTRICAL FITTER	IV/V	10
6	MECHANIC ELECTRONIC	IV/V	
7	WELDER	V	3
8	CONTROL ROOM ATTENDENT	IV/V	6
9	SUBSTATION ATTENDENT	III	
10	FIRESTATION ATTENDENT	III/IV	4
11	CONVEYOR OPERATOR	III/IV	7
12	HELPERS FOR FITTERS,WELDERS	II	

APPENDIX-B

PROJECT REPORT FOR RAMPUR BATURA OC (4.00 Mty).

STATEMENT SHOWING JOB/CATEGORYWISE REQUIREMENT OF MANPOWER

SL.No.	PARTICULARS	CATEGORY/SCALE	STRENGTH
13	FEEDER OPERATOR	III	
14	TYNDALS	IV/V	4
15	RECLAIM FEEDER OPERATOR	III	4
16	GENERAL MAZDOORS/BELT CLEANERS	I	
SUB-TOTAL			53
C.	**E&M AND EXCAVATION SUPERVISION**		
1	CHIEF MANAGER (E&M)	E7	1
2	SR. MANAGER (E&M)	E6	2
3	DY. MANAGER (E&M)	E4	3
4	ASST. MANAGER (E&T)	E3	1
5	SR. OFFICER (E&M)	E2	1
6	SR. MANAGER (EXCAVATION)	E6	1
7	DY. MANAGER (EXCAVATION)	E4	2
10	SR.PA	GRADE-B	1
11	LDC/TYPIST	GRADE-D	2
12	PEON	GRADE-H	0
SUB-TOTAL			14

APPENDIX-B(CONTD.)

SL. NO.	PARTICULARS	CATEGORY/ SCALE	STRENGTH
D.	**WORKSHOP & E&M MAINTENANCE**		
1	FOREMAN INCHARGE(E&M)	GRADE-A	1
2	ELECTRICAL SUPERVISOR	GRADE-A	1
3	FOREMAN (E&M)	GRADE-B	2
4	FOREMAN (E&T)	GRADE-B	1
5	SUBSTATION ATTENDENT	III/IV	4
6	ELECTRICIAN	IV/V	2
7	PUMP KHALASI/OPERATOR	III	10
8	TELEPHONE MECHANIC	IV/V	1
9	TELEPHONE LINEMAN	II	
10	TURNER/MACHINIST	IV/V	3
11	MECHANICAL FITTER	IV/V	8

APPENDIX-B

PROJECT REPORT FOR RAMPUR BATURA OC (4.00 Mty).

STATEMENT SHOWING JOB/CATEGORYWISE REQUIREMENT OF MANPOWER

SL.No.	PARTICULARS	CATEGORY/SCALE	STRENGTH
12	ELECTRICAL FITTER	IV/V	8
13	PIPE FITTER	IV/V	
14	ELECTRICAL FITTER/ARMATURE WINDER	IV/V	
15	WELDER	IV/V	2
16	HELPER	II	2
17	TYNDALS	I	2
18	CABLE JOINTER	III	2
19	GENERAL MAZDOORS, GREASING ETC.	I	6
20	AUTO MECHANIC	V/VI	2
SUB-TOTAL			57
E.	**OTHER OPERATOR**		
1	HV DRIVER	GRADE-D	10
2	DOZER OPERATOR	A	4
3	CRANE OPERATOR	A	3
4	LOCO OPERATOR	SPL	4
5	SHOVEL OPERATOR/FEL OPERATOR	A	5
6	WATER SPRINKLER OPERATOR	A	4
7	GRADER OPERATOR	A	2
SUB-TOTAL			32
F.	**MINING SAFETY DESPATCH AND QUALITY CONTROL**		
1	CHIEF MANAGER (MINING)	E7	1
2	SR. MANAGER (MINING)	E6	2
3	DY. MANAGER (MINING)	E4	2
4	ASSTT. MANAGER (MINING)	E3	4
5	OVERMAN	GRADE-A	1
6	MINING SIRDARS	GRADE-C	2
7	PA./JR.STENOGRAPHER	GRADE-B	1
8	LDC/TYPIST	GRADE-D	1
9	MTK/REGISTER KEEPER	GRADE-D	4
10	PEON	GRADE-H	

APPENDIX-B

PROJECT REPORT FOR RAMPUR BATURA OC (4.00 Mty).

STATEMENT SHOWING JOB/CATEGORYWISE REQUIREMENT OF MANPOWER

SL.No.	PARTICULARS	CATEGORY/SCALE	STRENGTH
11	CHEMIST (TECH.GR-I)	GRADE-B	1
12	SCIENTIFIC ASST.	GRADE-C	1
13	LOADING SUPERVISOR	GRADE-B	2
14	WEIGH BRIDGE CLERK	GRADE-D	7
15	SAMPLING ASST.	GRADE-D	2
16	SAMPLING MAZDOOR	I/II	0
17	DATA ENTRY OPERATOR	GRADE-C	1
18	LABORATORY ASST.	GRADE-D	2
19	SR.TECH.INSPECTOR	GRADE-D	1
20	ASST. TECHNICAL INSPECTOR	GRADE-E	2
SUB-TOTAL			37

APPENDIX-B(CONTD.)

SL. NO.	PARTICULARS	CATEGORY/ SCALE	STRENGTH
G.	**ACCOUNTS**		
1	SR. MANAGER (FINANCE)	E6	1
2	ACCOUNTANT	GRADE-A	1
3	ACCOUNTS CLERK	GRADE-D	1
4	LDC/TYPIST	GRADE-D	1
5	CASHIER	GRADE-C	1
SUB-TOTAL			5
H.	**PERSONNEL AND WELFARE**		
1	SR. MANAGER (PERSONNEL)	E6	1
2	LDC/TYPIST	GRADE-D	1
SUB-TOTAL			2
I.	**MEDICAL AND SANITATION**		
1	SR. MANAGER (MEDICAL)	E6	1
2	COMPOUNDER	GRADE-D	1
3	DRESSER	GRADE-E	1
4	NURSE/MIDWIFE	GRADE-D	1
5	CLERK CUM STORE KEEPER	GRADE-D	1
SUB-TOTAL			5

APPENDIX-B

PROJECT REPORT FOR RAMPUR BATURA OC (4.00 Mty).

STATEMENT SHOWING JOB/CATEGORYWISE REQUIREMENT OF MANPOWER

SL.No.	PARTICULARS	CATEGORY/SCALE	STRENGTH
J.	**STORES**		
1	STORE KEEPER/ASSTT. STORE KEEPER	GRADE-D	1
2	MAZDOOR	I	1
3	MAGAZINE CLERK	GRADE-D	4
SUB-TOTAL			6
K.	**CIVIL**		
1	SR. MANAGER (CIVIL)	E6	1
2	ASSTT. MANAGER (CIVIL)	E3	1
3	OVERSEER	GRADE-C	1
4	PUMP ATTENDANT	III	
5	PIPE FITTER HELPER/VALVEMAN	II	
SUB-TOTAL			3
L.	**SURVEY**		
1	SR. MANAGER(SURVEY)	E6	1
3	SURVEYOR	GRADE-A	1
4	DRAFTSMAN	GRADE-B	1
5	CHAINMAN	GRADE-F	3
6	MAZDOOR	I	3
SUB-TOTAL			9
N	**SECURITY**		
1	SR. MANAGER (SECURITY)	E6	1
2	ARMED GUARD	GRADE-F	9
	SUB -TOTAL		10
	EMP & REHABILAITATION		
1	SR. MANAGER (ENV.)	E6	1
2	LDC/TYPIST	GRADE-D	1
3	MAZDOOR	I	1
SUB-TOTAL			3
GRAND TOTAL			**366**

RAMPUR BATURA OC [4.00 Mty]
Statement Showing Wages & Benefits Cost

Appendix B-1

Option-III,PARTIAL OUTSOURCING

RS. IN LAKHS.

	PARTICULARS	Annual	O.B.		COAL		COMMON		SUB-TOTAL		L.R & EMP		GRAND TOTAL	
		Earning	NO.	AMT.	NO.	AMT.	NO.	AMT.	NO.	AMT.	NO.	AMT.	NO.	AMT.
	DAILY RATED EMPLOYEES													
	Excavation													
1	SPL.GRADE	8.43520		0.00		0.00	16	134.96	16	134.96		0.00	16	134.96
2	GRADE-A	8.08868		0.00	19	153.68	18	145.60	37	299.28		0.00	37	299.28
3	GRADE-B	7.69416		0.00	30	230.82		0.00	30	230.82		0.00	30	230.82
4	GRADE-C	7.42198		0.00	16	118.75		0.00	16	118.75		0.00	16	118.75
5	GRADE-D	7.20782		0.00		0.00		0.00	0	0.00		0.00	0	0.00
6	GRADE-E	6.82159		0.00		0.00		0.00	0	0.00		0.00	0	0.00
	Category													
7	CAT-I	6.47559	9	58.28		0.00	12	77.71	21	135.99	1	6.48	22	142.46
8	CAT-II	6.59264	8	52.74		0.00	2	13.19	10	65.93		0.00	10	65.93
9	CAT-III	6.75410		0.00	10	67.54	14	94.56	24	162.10		0.00	24	162.10
10	CAT-IV	6.86496		0.00	20	137.30	14	96.11	34	233.41		0.00	34	233.41
11	CAT-V	7.09674		0.00	18	127.74	1	7.10	19	134.84		0.00	19	134.84
12	CAT-VI	7.35055		0.00		0.00	1	7.35	1	7.35		0.00	1	7.35
	MONTHLY PAID EMPLOYEES													
13	A1	10.70896		0.00		0.00		0.00	0	0.00		0.00	0	0.00
14	A	8.59736		0.00		0.00	5	42.99	5	42.99		0.00	5	42.99
15	B	8.07229		0.00	5	40.36	9	72.65	14	113.01		0.00	14	113.01
16	C	7.57233		0.00		0.00	6	45.43	6	45.43		0.00	6	45.43
17	D	7.10238	24	170.46	20	142.05	40	284.10	84	596.60	1	7.10	85	603.70
18	E	6.86254		0.00	4	27.45	3	20.59	7	48.04		0.00	7	48.04
19	F	6.80096		0.00		0.00	12	81.61	12	81.61		0.00	12	81.61
20	G	6.72479		0.00		0.00		0.00	0	0.00		0.00	0	0.00
21	H	6.61053		0.00		0.00		0.00	0	0.00		0.00	0	0.00
	EXECUTIVES:													
22	E-1	9.69977		0.00		0.00		0.00	0	0.00		0.00	0	0.00
23	E-2	11.40777		0.00		0.00	1	11.41	1	11.41		0.00	1	11.41
24	E-3	13.14003		0.00		0.00	6	78.84	6	78.84		0.00	6	78.84
25	E-4	14.79842		0.00		0.00	7	103.59	7	103.59		0.00	7	103.59
26	E-5	16.29886		0.00		0.00		0.00	0	0.00		0.00	0	0.00
27	E-6	17.75982		0.00		0.00	11	195.36	11	195.36	1	17.76	12	213.12
28	E-7	20.36585		0.00		0.00	2	40.73	2	40.73		0.00	2	40.73
29	E-8	23.56417		0.00		0.00		0.00	0	0.00		0.00	0	0.00
			41	281.48	142	1045.70	180	1553.86	363	2881.04	3	31.34	366	2912.38
E . M . S. (Rs.)														3017.65
Prod (Peak) In Lakh tonne.														40.00
O . M . S. (t)														39.89
COST/T (Rs.)														75.65

.

RAMPUR BATURA OC [4.00 Mty]
Statement Showing Unit Cost Estimate.

Option-III,PARTIAL OUTSOURCING

APP-C

Sl.No	Particulars		Total Cost (Rs./t)	Fixed Cost (Rs./t)	Variable Cost (Rs./t)	OB Cost (Rs./cum)	OB Cost (Rs./t)	COAL Cost (Rs./t)	COMN. Cost (Rs./t)
1	Salaries,Wages & Benefits		75.65	75.65		0.77	7.40	26.56	41.70
2	Stores		181.94	37.88	144.07	10.70	102.23	66.28	13.43
3	Power		44.19	33.14	11.05	0.00	0.00	0.00	44.19
4	Misc. exp. incl.w/s debits		45.21	33.71	11.50	0.02	0.18	21.25	23.77
5	Mine Closure Cost		37.61	37.61					37.61
6	Admn. Expenses		88.00	88.00					88.00
7	Int. on wkg. cap @	14.50%	19.87	11.81	8.05	0.56	5.31	5.51	9.04
8	Int. on loan cap @ *	11.50%	0.00	0.00		0.00	0.00	0.00	0.00
9	Depreciation		184.00	184.00		0.00	0.00	86.91	97.09
	Sub-Total		676.46	501.80	174.66	12.04	115.12	206.52	354.82
10	Comn cost apportioned to OB & Coal					34.72	331.83	22.99	-354.82
11	OB O/S Cost		544.82		544.82	57.00	544.82		
12	OB Rehandling Cost/Ton		5.57		5.57	0.58	5.57		
13	Int. on wkg. cap @	14.50%	26.60		26.60	2.78	26.60		
	All Inclusive Cost		1253.46	501.80	751.66	107.13	1023.95	229.51	0.00

RAMPUR BATURA OC [4.00 Mty]
Statement Of Cost and Profitability At Various Levels

Option-III,PARTIAL OUTSOURCING APP-C.1

Sl.No	LEVEL OF PRODUCTION (%)	75	80	85	90	100
1	Production(mt)	3.00	3.20	3.40	3.60	4.00
2	Variable cost/t(Rs.)	751.66	751.66	751.66	751.66	751.66
3	Fixed cost/t(Rs.)	669.07	627.25	590.35	557.56	501.80
4	Total cost/t(Rs.)	1420.73	1378.91	1342.01	1309.22	1253.46
5	Cap.investment/annual output(Rs.)	4127.07	3869.13	3641.53	3439.22	3095.30
6	Present s.p/t (Rs.)	1920.34	1920.34	1920.34	1920.34	1920.34
7	Profit/t (Rs.)	499.61	541.43	578.32	611.12	666.88
8	R.O.I.(gross before charging int.on loan capital)(%)	12.11	13.99	15.88	17.77	21.54
9	B.E.P. (%) (Mt.)					42.94 1.72
	Capital Employed Rs.in lakhs		123812.09			
	Equity Capital Rs.in lakhs		123812.09			
	Loan Capital Rs.in lakhs		0.00			
	Sale Price Per Tn. Rs.		1920.34			

RAMPUR BATURA OC [4.00 Mty]
Statement showing EMP Cost per/t App-C2

SL.No	Particulars	Rs./t
1	Salaries,Wages & Benefits	0.96
2	Stores	16.91
3	Power	1.40
4	Misc. exp. incl.w/s debits	7.37
5	Community Development Cost	0.00
5	Enviromental cost	5.00
6	Mine Closure Cost	37.61
7	Admn. Expenses	10.20
8	Int. on wkg. cap @ 14.50 %	3.84
9	Depreciation	33.99
	Total	117.28

RAMPUR BATURA OC [4.00 Mty]

Statement Showing Economics at different Capacity Utilisation

Appendix-C.3

Option-III,PARTIAL OUTSOURCING

		Capacity Utilisation Level				
		100%	90%	85%	80%	75%
1	Output(Mty)	4.00	3.60	3.40	3.20	3.00
2	Cost/te(₹.)	1253.46	1309.22	1342.01	1378.91	1420.73
3	Selling Price(₹./te)	1920.34	1920.34	1920.34	1920.34	1920.34
4	Profit(₹./te)	666.88	611.12	578.32	541.43	499.61
5	IRR (%)	25.84%	22.57%	20.87%	19.11%	17.30%

RAMPUR BATURA OC [4.00 Mty]

Statement showing sensitivity of IRR **Appendix-C.4**

Option-III,PARTIAL OUTSOURCING

		Capacity utilisation level				
		100%	90%	85%	80%	75%
A	Base case	25.84%	22.57%	20.87%	19.11%	17.30%
B	Increase in Capital					
	i) 5%	24.70%	21.52%	19.86%	18.15%	16.37%
	ii) 10%	23.64%	20.53%	18.91%	17.24%	15.51%
	iii) 15 %	22.64%	19.61%	18.03%	16.39%	14.70%
C	Increase in op. cost					
	i) 5%	24.32%	21.12%	19.45%	17.72%	15.93%
	ii) 10%	22.79%	19.65%	18.01%	16.31%	14.54%
	iii) 15 %	21.24%	18.17%	16.55%	14.87%	13.12%
D	Decrease in Sales					
	i) 5%	23.04%	19.94%	18.31%	16.64%	14.89%
	ii) 10%	20.15%	17.20%	15.66%	14.05%	12.38%
	iii) 15 %	17.14%	14.34%	12.86%	11.32%	9.71%
E	Increase in both Capital & op. cost					
	i) 5%	23.23%	20.11%	18.48%	16.79%	15.04%
	ii) 10%	20.77%	17.78%	16.21%	14.59%	12.90%
	iii) 15 %	18.44%	15.57%	14.06%	12.49%	10.84%

RAMPUR BATURA OC [4.00 Mty] APP-D.1
Cashflow statement at 100 % capacity
& DCF Cost / tn. @ different rates

Option-III,PARTIAL OUTSOURCING Rs. in Lakhs.

YEAR (1)	Capital Exp. (2)	Repl. Cap. (3)	REV. Exp. (4)	Total Outflow (5)	Sales Receipt (6)	Prod. lakh te. (7)	Net Flow (8)
Net Block As on 31.03.2017	2997			2997		0.00	-2997
Yr 1	9952	0	0	9952	0	0.00	-9952
Yr 2	22174	0	0	22174	0	5.00	-22174
Yr 3	30326	0	15499	45825	18920	10.00	-26905
Yr 4	19291	0	24612	43903	38420	20.00	-5483
Yr 5	17959	16	34091	52067	57630	30.00	5563
Yr 6	21008	1823	38614	61446	76840	40.00	15394
Yr 7	104	104	38667	38875	76840	40.00	37965
Yr 8	0	16	38719	38735	76840	40.00	38105
Yr 9	0	1823	38774	40597	76840	40.00	36243
Yr 10	0	1532	37876	39408	76840	40.00	37432
Yr 11	0	3383	37936	41320	76840	40.00	35520
Yr 12	0	2238	38000	40238	76840	40.00	36602
Yr 13	0	601	38067	38668	76840	40.00	38172
Yr 14	0	1951	38137	40088	76840	40.00	36752
Yr 15	0	2251	36082	38332	76840	40.00	38508
Yr 16	0	104	36159	36263	76840	40.00	40577
Yr 17	0	1434	36240	37674	76840	40.00	39166
Yr 18	0	1841	36325	38167	76840	40.00	38673
Yr 19	0	104	36415	36519	76840	40.00	40321
Yr 20	0	16	34577	34592	57630	30.00	23038
RES.VALUE		-2335		-2335	0	0	2335
	123812	16904	634791	775506	1248360	655	472854
				IRR			**25.84%**
				NPV at	12%	(Rs. Crore)	**839.94**
			Cost of production discounted @		12%	(Rs./tn.)	**1448.45**

RAMPUR BATURA OC [4.00 Mty]
Cashflow statement at 85 % capacity
& DCF Cost / tn. @ different rates

APP-D.2

Option-III,PARTIAL OUTSOURCING

Rs. in Lakhs.

YEAR	Incremental Capital Exp.	Repl. Cap.	REV. Exp.	Total Outflow	Sales Receipt	Prod. lakh te.	Net Flow
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Net Block As on 31.03.2017	2996.57			2997		0.00	-2997
Yr 1	9952	0	0	9952	0	0.00	-9952
Yr 2	22174	0	0	22174	0	4.25	-22174
Yr 3	30326	0	13811	44137	16082	8.50	-28055
Yr 4	19291	0	21814	41106	32657	17.00	-8449
Yr 5	17959	16	30111	48086	48986	25.50	899
Yr 6	21008	1823	34100	56931	65314	34.00	8383
Yr 7	104	104	34152	34361	65314	34.00	30953
Yr 8	0	16	34205	34220	65314	34.00	31094
Yr 9	0	1823	34260	36083	65314	34.00	29231
Yr 10	0	1532	33505	35037	65314	34.00	30277
Yr 11	0	3383	33565	36949	65314	34.00	28365
Yr 12	0	2238	33629	35867	65314	34.00	29447
Yr 13	0	601	33696	34297	65314	34.00	31017
Yr 14	0	1951	33766	35717	65314	34.00	29597
Yr 15	0	2251	32030	34281	65314	34.00	31033
Yr 16	0	104	32107	32211	65314	34.00	33103
Yr 17	0	1434	32188	33623	65314	34.00	31691
Yr 18	0	1841	32274	34115	65314	34.00	31199
Yr 19	0	104	32363	32467	65314	34.00	32847
Yr 20	0	16	30785	30801	48986	25.50	18185
RES.VALUE		-2335		-2335	0		2335
	123812	16904	562361	703077	1061106	557	358029

IRR			**20.87%**
NPV at	12%	(Rs. Crore)	**512.43**
Cost of production discounted @	12%	(Rs./tn.)	**1570.42**

RAMPUR BATURA OC [4.00 Mty] APP-E.1

Revenue expenditure statement at 100 % capacity

Option-III,PARTIAL OUTSOURCING Rs.lakhs

Year	Wages			STORES			POWER			Misc. Expences			M.Closure	OB Reh Cost	OB O/S Cost	Admn. Expences		Int on w/c @	Total
	TOTAL	Fixed	var.	TOTAL	Fixed	var.	TOTAL	Fixed	var.	TOTAL	Fixed	var.	37.61	45.60	57.00	TOTAL	Fixed	14.50%	**Rev.Exp.**
1	43	43		0	0	0	0	0	0	121	121	0	745	0	0	0	0	44	954
2	709	709		2320	365	1954	588	441	147	470	374	96	782	0	6840	44	44	568	12321
3	952	952		2987	774	2213	979	734	245	977	682	295	821	0	7980	88	88	715	15499
4	1700	1700		4403	998	3405	1356	1017	339	1300	935	365	862	0	13680	176	176	1135	24612
5	2463	2463		6392	1262	5130	1599	1199	400	1516	1112	404	906	0	19380	264	264	1572	34091
6	2912	2912		7018	1429	5589	1628	1221	407	1686	1261	425	951	912	21375	352	352	1780	38614
7	2912	2912		7020	1430	5590	1628	1221	407	1687	1261	425	998	912	21375	352	352	1783	38667
8	2912	2912		7020	1430	5590	1628	1221	407	1687	1261	425	1048	912	21375	352	352	1785	38719
9	2912	2912		7020	1430	5590	1628	1221	407	1687	1261	425	1101	912	21375	352	352	1788	38774
10	2912	2912		7020	1430	5590	1628	1221	407	1687	1261	425	1156	0	21375	352	352	1746	37876
11	2912	2912		7020	1430	5590	1628	1221	407	1687	1261	425	1214	0	21375	352	352	1749	37936
12	2912	2912		7020	1430	5590	1628	1221	407	1687	1261	425	1274	0	21375	352	352	1752	38000
13	2912	2912		7020	1430	5590	1628	1221	407	1687	1261	425	1338	0	21375	352	352	1755	38067
14	2912	2912		7020	1430	5590	1628	1221	407	1687	1261	425	1405	0	21375	352	352	1758	38137
15	2912	2912		6699	1430	5269	1628	1221	407	1687	1261	425	1475	0	19665	352	352	1664	36082
16	2912	2912		6699	1430	5269	1628	1221	407	1687	1261	425	1549	0	19665	352	352	1667	36159
17	2912	2912		6699	1430	5269	1628	1221	407	1687	1261	425	1626	0	19665	352	352	1671	36240
18	2912	2912		6699	1430	5269	1628	1221	407	1687	1261	425	1708	0	19665	352	352	1675	36325
19	2912	2912		6699	1430	5269	1628	1221	407	1687	1261	425	1793	0	19665	352	352	1679	36415
20	2912	2912		6399	1390	5009	1628	1221	407	1617	1201	415	1883	0	18280	264	264	1594	34577

RAMPUR BATURA OC [4.00 Mty]

Revenue expenditure statement at 85 % capacity

APP-E.2

Option-III,PARTIAL OUTSOURCING

Rs.lakhs

	Wages			**STORES**			**POWER**			**Misc. Expences**			**M.Closure**	**OB Reh Cost**	**OB O/S Cost**	**Admn. Expences**		**Int on w/c @**	**Total**
Year	TOTAL	Fixed	var.	TOTAL	Fixed	var.	TOTAL	Fixed	var.	TOTAL	Fixed	var.	37.61	45.60	57.00	TOTAL	Fixed	14.50%	Rev.Exp.
1	43	43	0	0	0	0	0	0	0	121	121	0	745	0	0	0	0	44	954
2	709	709	0	2026	365	1661.2	566	441	125	456	374	82	782	0	5814	44	44	503	10900
3	952	952	0	2655	774	1881.5	942	734	208	933	682	250	821	0	6783	88	88	637	13811
4	1700	1700	0	3892	998	2894.6	1305	1017	288	1245	935	310	862	0	11628	176	176	1006	21814
5	2463	2463	0	5622	1262	4360.5	1539	1199	340	1456	1112	343	906	0	16473	264	264	1388	30111
6	2912	2912	0	6179	1429	4750.6	1567	1221	346	1622	1261	361	951	775	18169	352	352	1572	34100
7	2912	2912	0	6181	1430	4751.3	1567	1221	346	1623	1261	362	998	775	18169	352	352	1575	34152
8	2912	2912	0	6181	1430	4751.3	1567	1221	346	1623	1261	362	1048	775	18169	352	352	1577	34205
9	2912	2912	0	6181	1430	4751.3	1567	1221	346	1623	1261	362	1101	775	18169	352	352	1580	34260
10	2912	2912	0	6181	1430	4751.3	1567	1221	346	1623	1261	362	1156	0	18169	352	352	1545	33505
11	2912	2912	0	6181	1430	4751.3	1567	1221	346	1623	1261	362	1214	0	18169	352	352	1548	33565
12	2912	2912	0	6181	1430	4751.3	1567	1221	346	1623	1261	362	1274	0	18169	352	352	1550	33629
13	2912	2912	0	6181	1430	4751.3	1567	1221	346	1623	1261	362	1338	0	18169	352	352	1554	33696
14	2912	2912	0	6181	1430	4751.3	1567	1221	346	1623	1261	362	1405	0	18169	352	352	1557	33766
15	2912	2912	0	5909	1430	4478.6	1567	1221	346	1623	1261	362	1475	0	16715	352	352	1477	32030
16	2912	2912	0	5909	1430	4478.6	1567	1221	346	1623	1261	362	1549	0	16715	352	352	1480	32107
17	2912	2912	0	5909	1430	4478.6	1567	1221	346	1623	1261	362	1626	0	16715	352	352	1484	32188
18	2912	2912	0	5909	1430	4478.6	1567	1221	346	1623	1261	362	1708	0	16715	352	352	1488	32274
19	2912	2912	0	5909	1430	4478.6	1567	1221	346	1623	1261	362	1793	0	16715	352	352	1492	32363
20	2912	2912	0	5648	1390	4257.7	1567	1221	346	1554	1201	353	1883	0	15538	264	264	1419	30785

APPENDIX-F

PROJECT REPORT FOR RAMPUR BATURA OPENCAST PROJECT (4.00 Mty)
Statement showing the estimated capital requirement for environmental protection measures.

Amount in Rs lakhs

S.NO.	PARTICULARS		Provision Amount
1	**CAPITAL FOR RESTORATION**		
a)	Scientific/Hydrogeological studies for slope stability, Environment monitoring instrument,Long range fogging machine,Noise mapping instrument,Vibrometer,Piezometer,CAAQMS etc. and Slope stability radar	Rs.	845.00
b)	LAND FOR HOMESTEAD/FAMILY (Appendix-A.1)	Rs.	1702.00
c)	Total cost of R&R as per second schedule of RFCTLAAR Act,2013	Rs.	13202.95
d)	Total cost for provision of infrastructure as per third schedule of RFCTLAAR Act,2013	Rs.	4244.27
	Sub-Total (1)	**Rs.**	**19994.22**
2	**CAPITAL FOR ANTI-POLLUTION MEASURE IN MINE & INDUSTRIAL AREA**		
a)	Oil and Grease trap	Rs	17.70
b)	Housing personnel	Rs.	43.89
c)	Settling tank for mine water disposal	Rs.	23.60
d)	Other development measures in industrial site viz. drains, tree guards etc. (Appendix-A.8.2.1.)	Rs.	89.00
e)	Garland drains (Appendix-A.8.1)	Rs.	500.00
f)	Arboriculture/plantation in industrial area (Appendix-A.8.1)	Rs.	20.00
g)	Barbed fencing/boundary walls for the project (Appendix-A.8.1)	Rs.	425.00

APPENDIX-F

PROJECT REPORT FOR RAMPUR BATURA OPENCAST PROJECT (4.00 Mty)
Statement showing the estimated capital requirement for environmental protection measures.

Amount in Rs lakhs

S.NO.	PARTICULARS		Provision Amount
h)	HEMM for Reclamation (Appendix-A3.1)	Rs.	498.46
i)	Dust suppression arrangements (App.- A3.5)	Rs.	25.00
j)	Water sprinkling arrangement along approach road (Appendix-A.8.1)	Rs.	30.00
	Sub-Total(2)	**Rs.**	**1672.65**
3.	**ENVIRONMENTAL CONTROL MEASURES IN TOWNSHIP**		
a)	Flora and fauna study (Appendix-A.8.1)	Rs.	20.00
b)	Water drains in township (Appendix-A.8.2.1)	Rs.	12.32
c)	Other development measures in colony viz. drains, tree	Rs.	12.83
d)	STP	Rs.	413.00
e)	Sewage disposal arrangement in colony	Rs.	65.15
f)	Horticulture and land development	Rs.	30.68
g)	Rain Water Harvesting	Rs.	22.42
	Sub Total (3)	**Rs.**	**576.40**
4.	Cost of EMP preparation(Appendix-A.8.4)	Rs.	20.00
	Total capital from 4	**Rs.**	**20.00**
	GRAND TOTAL		**22263.27**
B.	**Different type of Revenue nature cost to be considered**		
	in cost of production per tonne of Coal:-		

APPENDIX-F

PROJECT REPORT FOR RAMPUR BATURA OPENCAST PROJECT (4.00 Mty)
Statement showing the estimated capital requirement for environmental protection measures.

Amount in Rs lakhs

S.NO.	PARTICULARS		Provision Amount
1	Environment Audit @ 0.60 lakhs/annum	Rs.	0.60
2	Environment monitoring@10.00 lakhs/annum	Rs.	10.00
3	Mine closure cost	Rs.	744.99
4	Monitoring of CSR and RR Plan	Rs	2.00
5	Monitoring of land use through satellite survellance	Rs.	10.00
	Total Revenue nature cost per annum		**767.59**

RAMPUR BATURA OCP [4.00 Mty]

Option-III,PARTIAL OUTSOURCING **Replacement Schedule**

	Year			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Total							**16**	**1823**	**104**	**16**	**1823**	**1532**	**3383**	**2238**	**601**	**1951**	**2251**	**104**	**1434**	**1841**	**104**	**16**
YEAR	**Surface Miner**	Unit price	**416**	1	2	3	4	5	6	7	8	9	10	11	**12**	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**	2		**1**			**1**															
		Life	**9**		416			416															
REPLACEMENT		**no**												**1**			**1**						
		Amt.												**416**			**416**						
DEPR.																	323						
YEAR	**Water Sprinkler**	Unit price	**172.07**	1	2	3	4	5	6	7	8	9	10	11	**12**	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**	1		**1**																		
		Life	**9**		172																		
REPLACEMENT		**no**												**1**									
		amt.												**172**									
DEPR.																							
YEAR	**PAY LOADER**	Unit price	**1003.73**	1	2	3	4	5	6	7	8	9	10	11	**12**	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**	2		**1**			**1**															
		Life	**9**		1004			1004															
REPLACEMENT		**no**												**1**			**1**						
		Amt.												**1004**			**1004**						
DEPR.																	781						
YEAR	**TRUCK 60T**	Unit price	**213.93**	1	2	3	4	5	6	7	8	9	10	11	**12**	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**	9		**2**	**1**	**2**	**2**	**2**														
		Life	**9**		428	214	428	428	428														
REPLACEMENT		**no**												**2**	**1**	**2**	**2**	**2**					
		Amt.												428	**214**	428	428	428					
DEPR.															214	380	333	285					
YEAR	**DZ 410 T-COAL**	Unit price	**269.03**	1	2	3	4	5	6	7	8	9	10	11	**12**	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**	2		**2**																		
		Life	**9**		538																		
REPLACEMENT		**no**												**2**									
		Amt.												**538**									
DEPR.																							
YEAR	**WATER SPRINKLER**	Unit price	**172.07**	1	2	3	4	5	6	7	8	9	10	11	**12**	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**	1		**1**																		
		Life	**9**		172																		
REPLACEMENT		**no**												**1**									
		Amt.												**172**									
DEPR.																							
YEAR	**Grader-280 HP**	Unit price	**260.48**	1	2	3	4	5	6	7	8	9	10	11	**12**	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**	1		**1**																		
		Life	**9**		260																		
REPLACEMENT		**no**												**1**									
		Amt.												**260**									
DEPR.																							
YEAR	**CRANE 8T**	Unit price	**11.95**	1	2	3	4	5	6	7	8	9	10	11	**12**	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**	1		**1**																		
		Life	**9**		12																		
REPL.		**no**												**1**									
		Amt.												**12**									

RAMPUR BATURA OCP [4.00 Mty]

Option-III,PARTIAL OUTSOURCING **Replacement Schedule**

	Year Total			1	2	3	4	5 **16**	6 **1823**	7 **104**	8 **16**	9 **1823**	10 **1532**	11 **3383**	12 **2238**	13 **601**	14 **1951**	15 **2251**	16 **104**	17 **1434**	18 **1841**	19 **104**	20 **16**
DEPR.																							
YEAR	DYD HYD SHOVEL	Unit price	**104.27**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**	1		**1**																		
		Life	**9**		104																		
REPLACEMENT		**no**												**1**									
		Amt.												104									
DEPR.																							
YEAR	DIESEL BROWSER	Unit price	**28**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**	1		**1**																		
		Life	**9**		28																		
REPLACEMENT		**no**												**1**									
		Amt.												**28**									
DEPR.																							
YEAR	MOBILE WORKSHOP	Unit price	**40**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**	1		**1**																		
		Life	**9**		40																		
REPLACEMENT		**no**												**1**									
		Amt.												**40**									
DEPR.																							
YEAR	Vehicle	Unit price		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**	96	**9**	**69**	**9**	**9**																
		Life	**9**	9	69	9	9																
REPLACEMENT		**no**											**9**	**69**	**9**	**9**							
		Amt.											9	69	9	9							
DEPR.															9	8							
YEAR	**chp 9 yrs life**	Unit price	**1**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**	155		**23**	**132**																	
		Life	**9**		23	132																	
REPLACEMENT		**no**												**23**	**132**								
		Amt.												23	**132**								
DEPR.																							
YEAR	**chp 3 yrs life**	Unit price	**1.00**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**	1943		**16**	**1823**	**104**																
		Life	**3**		16	1823	104																
REPLACEMENT		**no**						16	1823	104	16	1823	104	16	1823	104	16	1823	104	16	1823	104	16
		Amt.						16	1823	104	16	1823	104	16	1823	104	16	1823	104	16	1823	104	16
DEPR.																					1823	70	5
YEAR	**chp 7 yrs life**	Unit price	**1**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
INVST.	Target+Addl.	**no**				**1419**	**18**																
		Life	**7**			1419	18																
REPLACEMENT		**no**											1419	18						1419	18		
		Amt.											1419	18						1419	18		
DEPR.																				811	8		
YEAR	**chp 18 yrs life**		1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
INVST.					3048	12814	4600																
		Life	**18**		3048	12814	4600																
REPL.		**Amt.**																					
DEPR.						12814	4345																

Option-III,PARTIAL OUTSOURCING

RAMPUR BATURA OCP [4.00 Mty]
Replacement Schedule

	Year Total			1	2	3	4	5 **16**	6 **1823**	7 **104**	8 **16**	9 **1823**	10 **1532**	11 **3383**	**12** **2238**	13 **601**	14 **1951**	15 **2251**	16 **104**	17 **1434**	18 **1841**	19 **104**	20 **16**
YEAR	**Other P&M,Misc**		1	1	2	3	4	5	6	7	8	9	10	11	**12**	13	14	15	16	17	18	19	20
INVST.					83	60	60	88															
		Life	**9**		83	60	60	88															
														83	60	60	88						
REPL.		**Amt.**												83	60	60	88						
DEPR.															60	53	68						
YEAR	**ELECT P&M/WORKSHOP**		1	1	2	3	4	5	6	7	8	9	10	11	**12**	13	14	15	16	17	18	19	20
					1626	869	451	393	101	104													
INVST.		**Life**	**18**		1626	869	451	393	101	104													
REPL.																							
DEPR.		**Amt.**				869	426	349	84	81													

****

ANNEXURES

CENTRAL MINE PLANNING & DESIGN INSTITUTE LIMITED,
REGIONAL INSTITUTE – V, BILASPUR – 495 006 (C.G.)

No. CMPDI:RV:Batura:OC:11: 4296 Dated : 23.2.2011

MINUTES OF PLANNING COMMITTEE MEETING TO BE HELD ON 17.2.2011 IN THE CONFERENCE HALL OF DIRECTOR (T) P&P, SECL TO DISCUSS THE PROJECT REPORTS OF BATURA OC (4.0 Mty), BATURA WEST EXTENSION OC (1.50 Mty) & JHILIMILI UG (0.50 MTY).

List of participants are enclosed as Annexure-I.

The following points were discussed in the meeting: -

I. BATURA OC (4.0 Mty) & BATURA WEST EXTENSION (1.50 Mty)

1. Western quarry boundary of Batura OC (4.0 Mty) considering property of Batura UG geological block and possibility of enhancing the annual capacity from 4 Mty to 5 Mty is to be examined.
2. Only full departmental option is to be worked out indicating desired selling price of coal for 12% IRR.
3. Management of top soil should be spelt out in detail.
4. After exhaustion of the mine, as a mine closure activity, all the OB dumps internal or external are to be re-organised for minimum possible height above ground level and levelled top surface.
5. Along quarry boundary provisions for 7.5 m of green belt are to be made.
6. Present rate of compensation to the land oustees in lieu of job is Rs.2 lakhs per land oustees in lieu of employment. However, considering the difficulties in land acquisition, in future, provisions for Rs.5 lakhs per land oustees are to be made. A Comparative Chart for different slabs Rs.2 lakhs to Rs.10 lakhs per land oustees is to be provided.
7. Both projects are in MP State but considering the recent Chhattisgarh Govt. notification for land acquisition the rate for tenancy land has been considered as Rs.25 lakhs per Ha. A Comparative Chart for different slabs from Rs.5 to Rs.25 lakhs / Ha is to be provided.

II. JHILIMILI UG (0.50 MTY).

1. Provision for residential quarter should be re-examined.
2. Assessment of extractable reserve should be re-examined.

REGIONAL DIRECTOR

Distribution : To all participants.

ANNEXURE-I

A. SECL (HQ), Bilaspur.
S/Shri
1. G. Singh, D (T) (P&P)
2. K.C. Kisku, COF
3. S.S. Malhi, CGM (P&P)
4. R.K. Manjhi, CGM (Prodn.)
5. S.K. Neogi, GM (P&P)
6. P.V. Krishna, GM(F)
7. D.H. Limsay, GM (Siding)
8. Iqbal Ahmad, GM (Exploration)
9. D.D. Tripathy, GM (L&R)
10. U.K. Padhy, CM (CP)
11. A. Bhattacharya, TS to DT(P&)
12. Manoj Kumar, Sr. Manager(P&P)
13. D. Nehar, Sr. Manager (F)
14. R. Sobti, Sr. Manager (Mining).

B. CMPDI, RI-V, Bilaspur.
S/Shri
1. R.N. Biswas, Regional Director
2. P.K. Ghosh, GM (E&M)
3. D. Dubey, GM(E&M)
4. A.K. Sen, Dy.GM(Civil)
5. I. Chakraborty, CM(E&M)
6. A. Chattopadhyay, CM(E&M)
7. N.K. Rai, Sr.Manager (E&M)
8. R. Ralhan, Sr.Manager (Mining)
9. Badal Manna, Sr.Manager (Mining)
10. B.K. Thakur, Sr.Manager (Mining)
11. R. Dhingra, Sr. Manager (Mining)

C. Sohagpur Area, SECL
S/Shri
1. A.K. Pandey, GM
2. A.K. Goswami, SAM, Batura
3. T.S. Pantode, SO (P&P)
4. B.P. Sahu, Sr. Manager
5. S.P. Rao, Sr. Manager (Survey)

परियोजना मुल्यांकन विभाग
सेन्ट्रल माईन प्लानिंग एण्ड डिजाईन इन्स्टीच्युट लिमिटेड
गोन्दवाना प्लेस, काँके रोड, राँची – 834 008

पत्र संख्या :पीएडी/जी-42/11/ 178 – 196 दिनांक : 17.01.2011

विषय :- <u>दिनांक 11.01.11 को सी.एम.पी.डी.आई.(मु) में आयोजित एस.ई.सी.एल. के (1) बागदेवा भूमिगत खदान (पुनरीक्षण) (0.75 मि.टन. प्रतिवर्ष), (2) बट्रा वेस्ट एक्सटेंशन खुली खदान (1.5 मि.टन.प्रतिवर्ष), (3) बट्रा खुली खदान (4.0 मि.ट. प्रति वर्ष) की बैठक का कार्यवृत</u>

उपरोक्त कार्यवृतों की एक-एक प्रति आपके अवलोकनार्थ प्रेषित है ।

संलग्नक : यथोपरि

मुख्य महाप्रबंधक(प.मु.वि.)

वितरण:

1. अध्यक्ष–सह–प्रबंध निदेशक, सी.एम.पी.डी.आई.
2. निदेशक तकनीकी,कोल इण्डिया लि., कोलकाता
3. निदेशक तकनीकी (पी.एण्ड.पी), एस.ई.सी.एल, बिलासपुर
4. निदेशक तकनीकी (सी.आर.डी.), सी.एम.पी.डी.आई.
5. निदेशक तकनीकी (पी.एण्ड.डी), सी.एम.पी.डी.आई.
6. निदेशक तकनीकी (ई.एस.), सी.एम.पी.डी.आई.
7. निदेशक तकनीकी (आर.डी.एण्ड.टी.), सी.एम.पी.डी.आई.
8. क्षेत्रीय निदेशक, क्षे.सं. –V, सी.एम.पी.डी.आई., बिलासपुर – फैक्स द्वारा.
9. मुख्य महाप्रबंधक (पी एण्ड पी), एस.ई.सी.एल, बिलासपुर
10. मुख्य महाप्रबंधक(खुली खदान), सी.एम.पी.डी.आई.
11. मुख्य महाप्रबन्धक (यु.एम.डी.), सी.एम.पी.डी.आई.
12. मुख्य महाप्रबंधक(वित), सी.एम.पी.डी.आई.
13. महाप्रबंधक (विद्युत एवं यांत्रिकी), सी.एम.पी.डी.आई.
14. महाप्रबंधक(गवेषणा)
15. महाप्रबंधक (असैनिक)
16. महाप्रबंधक(इलेक्ट्रॉनिक्स)
17. महाप्रबंधक(पर्यावरण)
18. महाप्रबन्धक (सी.एम.पी.)
19. महाप्रबंधक (टी.एस.)

दिनांक 11.01.11 को एस.ई.सी.एल. के बटूरा खुली खदान परियोजना (4 मि.ट. प्रति वर्ष) के प्रारूप परियोजना प्रतिवेदन के प्रस्तुतिकरण के दौरान हुई चर्चा का कार्यवृत

The above report was presented by the team from RI-5 in the forenoon on 11.01.11 in the Board Room of CMPDI (HQ) for obtaining guidance of CMPDI (HQ) before finalization of the report. The list of participants is enclosed.

During the discussions, the following decisions were taken:

1. Feasibility of coal transportation by belt conveyor in the central haul road may be examined. Coal of seam II may be brought down to the conveyor loading point in bottom-most seam I.
2. Rate for tenancy land should be taken as per the written communication received from SECL.
3. Location of the internal dump of 8 M.cum at the starting of the project which is proposed to be rehandled as internal dumping later should be selected for the lead and the phasing of rehandling cost that can yield the most favorable IRR.
4. NPV should be mentioned for the rate of return of 12 % instead of 16 % as given in the draft report.
5. The comments / observations submitted by PAD as well as other departments of CMPDI (HQ) should also be taken into consideration while finalizing the report.

LIST OF PARTICIPANTS

CMPDI (HQ)

1. Shri A.K. Singh, CMD
2. A.K. Debnath, D (T) (P&D)
3. Shri A.N. Sahay, D (T) (RD&T)
4. Shri S.K. Mitra, D (T) (ES)
5. Shri D.P. Pandey, CGM (PAD)
6. Shri B.C. Dey, CGM (OC)
7. Shri P.K. Pal, GM (E&M)
8. Shri B. Dayal, GM (TS)
9. Smt Sujata Pal, GM (E&M)
10. Dr. R.K. Jain, GM (Geology)
11. Shri A.K. Das, GM (Min), UMD
12. Shri Sunil Kumar, GM (Min), PAD
13. Shri A.K. Gupta, CM (Civil)
14. Shri V. Sinha, CM (Civil)
15. Shri S.S.P. Singh, CM (Excvn)
16. Shri K.V.S. Subrahmanyam, CM (CP)
17. Shri D.K. Chatterjee, Sr Mngr (Fin)
18. Shri P. Pandey, Sr Mngr (Min)
19. Shri K.K. Singh, Sr Mngr (E&T)
20. Shri D.P. Singh, Sr Mngr (Min)
21. Shri R.K. Sinha, Sr Mngr (Excvn)
22. Shri T. Verma, Sr Mngr (Min)

RI-V

1. Shri Manoj Kumar, GM (Mining)
2. Shri P.K. Ghosh, GM (E&M)
3. Shri Md. Kalimuddin, Sr Mngr (Excvn)
4. Shri B.P. Mishra, Sr Mngr (Civil)
5. Shri M. Mishra, Sr Mngr (E&M)
6. Shri R. Ralhan, Sr Mngr (Min)
7. Shri B. Manna, Sr Mngr (Min)
8. Shri B.K. Thakur, Sr Mngr (Min)

ANNEXURE-III

खुली खनन प्रभाग
सी.एम.पी.डी.आई., रांची

संख्या: सी॰ इ/क्यू-331/3654

दिनांक 07.09.2010

Sub. : Conceptual Note on Batura Extn. & Batura West Extn. Blocks for pre-draft report discussion.

The reference to the letter no. CMPDI/RI-5/OC/Misc./10/2026 dated 20/08/2010 from RD, RI-V, the comments of Opencast Division, CMPDI(HQ) is as follows :

1. The earlier PR for Bhatura West OCP (1.5Mty) had indicated seam thickness of 0.25m to 0.45m and was not considered mineable. Inclusion of Bhatura Extn. Block in the new study indicates Seam-I thickness of 1.35 – 1.75m which contributes 27.2 Mt of mineable reserves. Similarly, Seam-II which earlier had seam thickness range of 0.5 to 1.6m has new thickness of 2.00 2.30m on inclusion of Bhatura Extn. and contributes for 33.67 Mt. of mineable reserves. Such coal thickness to be mined by opencast method requires proving of consistency of thickness and continuity of coal seams as a number of dykes have been observed. These issues should be addressed thoroughly before deployment of surface miners.
2. Mining loss and geological loss of 10% may not be adequate for such thin coal seams. Plywise analysis for bands may be required to arrive at actual mining loss.
3. Peak OB removal for OB is 37.5Mcum. It is suggested that application of 35cum Rope Shovel/Hydraulic Shovels with 240T dumpers should be explored instead of 20cum Rope Shovel with 190T dumper.
4. Economics of proposed rehandling of OB dumped within quarry boundary against cost of acquiring 25.4 Ha of additional non-coal bearing area for external OB may be investigated.
5. The note has no mention of the existing Jamuna nala and Katna Nala falling within the quarry boundary and whether diversion is required outside the block boundary.
6. Considering a high stripping ratio of 9.55cum/t, and the average grade of coal being 'C', the cost of production is likely to higher and the project may yield a negative IRR. If linkages are available for customers willing to purchase coal on a cost plus basis, the project may then be considered for formulation of PR.

मुख्य महाप्रबन्धक (खुली खनन)

CGM (PAD)

DECISIONS TAKEN DURING DISCUSSION OF CONCEPTUAL NOTES OF BATURA EXPN OC (4 MTY), BATURA WEST EXTN OC (1.5 MTY) AND BAKULMUNI OC (1.5 MTY)

The above mentioned Conceptual Notes prepared by RI-V were discussed in the chamber of Director (T) (P&D) on 21.09.2010 in the forenoon for obtaining guidance before preparation of Draft PRs for these 3 projects. RD, RI-V, CGM (PAD) and CGM (OC) participated in the discussions along with their respective teams. During the discussions, the following decisions were taken.

A - Conceptual Note for Batura Expansion OC:

1. The project should be named 'Batura OC' instead of 'Batura Expansion OC' since the earlier PR for Batura OC, though sanctioned, has not yet been started and the expansion PR has been prepared taking the whole property into consideration, including the property of earlier sanctioned Batura OC.
2. Incremental mineable reserves and incremental stripping ratios in both scenarios, i.e. mining upto seam I and mining upto seam II, should be mentioned for comparison and the option which is techno-economically more suitable should be selected.
3. Possibility of providing equipment of higher size, e.g. 35 cum hydraulic shovel with 240 T rear dumpers, should be examined for OB removal.
4. Mining losses should be taklen as 10 %.
5. Proper justification with cost-benefit and environmental viewpoints should be given in the report for dumping of initial OB within mine boundary and its subsequent rehandling. Scheduling of this proposed rehandling should be optimized for minimum lead instead of proposing rehandling at the end of mine life.

B - Conceptual Note for Batura West Extension OC:

1. Provision should be made for a 5 m wide road on the embankment against the Son River to provide road-connectivity upto the national highway for the villages in the north side.
2. Proper justification with cost-benefit and environmental viewpoints should be given in the report for dumping of initial OB within mine boundary and its subsequent rehandling. Scheduling of this proposed rehandling should be optimized for minimum lead instead of proposing rehandling at the end of mine life.
3. Mining losses should be taklen as 10 %.
4. Possibility of providing 20 cum rope shovel with 190 T rear dumpers for top OB and for parting between top two seams, and 15 cum hydraulic shovel with 150 T rear dumpers for lower partings may be examined.

C - Conceptual Note for Bakulmuni OC:

1. The exploration status of Dumar Block located in the north of Bakulmini Block should be clarified in the report and possibility of its annexation with Bakulmuni OC either at present or in future may be examined.
2. Incremental mineable reserves and incremental stripping ratios in both scenarios, i.e. mining upto seam I,KII and mining upto seam I,KI, should be mentioned for comparison and the option which is techno-economically more suitable should be selected. Seam-wise grade wise reserves should also be given in both options.
3. Proper justification with cost-benefit and environmental viewpoints should be given in the report for dumping of initial OB within mine boundary and its subsequent rehandling. Scheduling of this proposed rehandling should be optimized for minimum lead instead of proposing rehandling at the end of mine life.
4. Mining losses should be taklen as 10 %.
5. The net geological reserves should be mentioned as 25.226 MT.
6. The phasing and sum-total of planned OB should be checked and corrected. The proposed rehandling should also be shown in the calendar plan.
7. 15 cum hydraulic shovels with 150 T rear dumpers for OBR should be considered.

CENTRAL MINE PLANNING & DESIGN INSTITUTE LIMITED,
REGIONAL INSTITUTE – V, SECL COMPLEX, BILASPUR – C.G.

No.: CMPDI: RV: 012: 1976 Dated :11.09.2012

MINUTES OF PLANNING COMMITTEE MEETING HELD ON 06.09.12 IN THE CONFERENCE HALL OF D(T) (O), SECL, BILASPUR TO DISCUSS THE FINAL PROJECT REPORT BATURA OPENCAST PROJECT (4.0 MTY), SOHAGPUR AREA

List of participants are given in Annexure-I.

During discussion following decisions were taken: -

1. Additional Land already acquired for Katna nala diversion to be considered in total land requirement.
2. Name of PR to be changed to Rampur Batura OC in place of Batura OC
3. Location of placement of Top Soil to be indicated in the dump plan.
4. Peak production to be indicated as 1.35 times of PR capacity instead of 1.25 times as indicated in the PR.
5. Haul road maintenance will be done contractually based upon the latest mining, safety and environment practices.
6. Route of diversion of nallas to be shown in plan.
7. Definition of mine boundary to be clarified.

REGIONAL DIRECTOR

Distribution :-

1) To all participants
2) GM, Sohagpur Area, SECL.

ANNEXURE-I

LIST OF PARTICIPANTS

A. SECL, BILASPUR
S/Shri

1. P K Roychowdhury, DT(O)
2. S.S.Malhi, CGM(P&P)
3. D.K.Goswami GM(S&R)
4. S.K.Neogi,GM(L&R)
5. M.K.Agarwal,GM(P&P)
6. U.T.Kanzarkar,GM(WBP & Env.)
7. I.Ahmed,GM(Exp.)
8. P.K.Sahoo, GM(F)
9. S.Prasad, Dy. GM(P&P)
10. Soumitra Singh, Sr. Manager (Env.)
11. S.R.Tripathi, Sr. Manager (Env.)
12. K.C. Dhar,Sr. Mgr(Survey),L&R

B. CMPDI, RI.V, BILASPUR
S/Shri

1. B.Dayal, Regional Director
2. I. Chakraborty, Chief Manager(E&M)
3. R. Ralhan, Sr. Manager (Mining)
4. A.K.Bal, Sr. Manager(F)
5. A.K.Biswas, Sr. Manager (Civil)
6. S.K.Gupta, Sr. Officer (E&M)

C. SOHAGPUR AREA, SECL
S/Shri

1. T.S.Pantode ,SO(P&P)
2. S.P.Rao,Sr. Manager (Survey)

Minutes of the 45th meeting of the Technical Sub Committee of SECL for Projects held on 13th Sept' 13 at DT (O)'s Conference hall, SECL, Bilaspur

Members participated:

1. Shri P. K. Roy Chowdhury, DT (O), SECL - Chairman
2. Shri A. P. Panda, D (F), SECL - Member

In attendance:

1. Shri B. Dayal, GM (P&P)/HOD, SECL
2. Shri V. S. Ram, GM (L&R), SECL
3. Shri Manoj Kumar, RD, RI-V, CMPDI, Bilaspur
4. Shri P. S. Raju, GM (E&M), CMPDI, RI-V.
5. Shri A. K. Singh, Chief Manager (E&M), CMPDI, RI-V
6. Shri R. Ralhan, Chief Manager (Mining), CMPDI, RI-V
7. Shri D. Mehra, Sr. Manager (Finance) (C&B), SECL
8. Shri Anand Bakshi, TS to D (F), SECL
9. Shri P. K. Somani, Asstt. Manager (Finance), CMPDI, RI-V

The chairman welcomed the members of the 45th Meeting of Technical Sub Committee (TSC) and called the meeting in order.

1. **Item No. 45.1: Project Report for Chhal OC (Seam-III) Project (6.0 MTY) along with its Draft Financial Appraisal Report**

Project Report for Chhal OC (Seam-III) Project (6.0 MTY) with Outsourcing option amounting to ₹ 609.99 Crores and its Draft Financial Appraisal Report submitted by M/S Deloitte, were put up before the TSC. The observations of TSC are as under:

I) Provision for revenue expenditure during the construction period to be capitalized may be kept in the PR.

TSC recommended that, after incorporating the above observations of TSC, Project Report for Chhal OC (Seam-III) Project (6 MTY) with Outsourcing option along with its Financial Appraisal Report may be put up to SECL Board for kind perusal and its approval.

2. **Item No. 45.2: Project Report for Rampur Batura OC Project (4.0 MTY) along with its Draft Financial Appraisal Report**

Project Report for Rampur Batura OC Project (4.0 MTY) with Outsourcing option amounting to ₹ 1128.13 Crores and its Draft Financial Appraisal Report submitted by M/S Deloitte, were put up before the TSC. The observations of TSC are as under:

I) The provision of 4 nos. front end loaders may be kept in the PR.

TSC recommended that:

I) After incorporating the above observations of TSC, Project Report for Rampur Batura OC Project (4.0 MTY) with Outsourcing option along with its Financial Appraisal Report may be put up to SECL Board for kind perusal and its approval.

II) Project Report for Batura OC Project (2.0 MTY) may be treated as dovetailed with Project Report for Rampur Batura OC Project (4.0 MTY) for the purpose of implementation as all the activities and financial provisions of Batura OC Project (2 MTY) have been included in Rampur Batura OC Project (4.0 MTY).

Meeting ended with vote of thanks to the chair.

General Manager (P&P)/HOD

Director Technical (Operation) 16/09

Ref No.SECL/BSP/P&P/13/ 724 Dated: 16.09.13
17

Copy to:

- DT (O), SECL
- D (F), SECL
- Company Secretary, SECL
- RD, CMPDI, RI-V, Bilaspur
- GM (Mining) (P&P) / Nodal Officer (P&P), SECL

Minutes of the 53rd meeting of the Technical Sub Committee of SECL for Projects held on 28th May'14 at DT (P&P)'s Conference hall, SECL, Bilaspur

Members participated:

1. Shri R.P.Thakur, DT (O), SECL - Chairman
2. Shri A. P. Panda, D (F), SECL - Member

In attendance:

1. Shri B. Dayal, GM (P&P)/HOD, SECL
2. Shri Manoj Kumar, RD, CMPDI, RI-V, Bilaspur
3. Shri A.S.Bapat, CM (Mining) (P&P), SECL
4. Shri A.M.Mulay, CM (Finance), SECL
5. Shri I.D.Narayan, HOD (OC), CMPDI, RI-V
6. Shri A.Saxena, HOD (Environment), CMPDI, RI-V
7. Shri S.M.Singh, Sr. Manager (Mining), CMPDI, RI-V
8. Shri A.K.Roy, Sr. Manager (Mining) (P&P), SECL

The Chairman welcomed the members of the 53rd Meeting of Technical Sub Committee (TSC) and called the meeting in order.

1. **Item No. 53.1: Project Report for Rampur Batura OC Project (4.0 MTY) along with its Draft Financial Appraisal Report submitted by M/S Deloitte:**

Project Report for Rampur Batura OC Project (4.0 MTY) with Outsourcing option amounting to ₹ 1189.33 Crores and its Financial Appraisal Report submitted by M/S Deloitte, were put up before the TSC. The observations of TSC are as under:

I) In line of the earlier decision of 45th meeting of TSC of SECL held on 13.09.13, Project Report for Batura OC Project (2.0 MTY) may be treated as dovetailed with Project Report for Rampur Batura OC Project (4.0 MTY) for the purpose of implementation as all the activities and financial provisions of Batura OC Project (2 MTY) have been included in Rampur Batura OC Project (4.0 MTY).

II) TSC recommended that Project Report for Rampur Batura OC Project (4.0 MTY) with Outsourcing option amounting to ₹ 1189.33 Crores and its Financial Appraisal Report submitted by M/S Deloitte may be put up to SECL Board for kind perusal and its approval.

2. **Item No. 53.2: Mine Closure Plans of following mines:**
   Rajgamar 4 & 5 UG, Korba Area
   Rajgamar 6 & 7 UG, Korba Area
   Kotma West OC Patch, J&K Area
   Binkara UG, Bishrampur Area

III) Mine Closure Plans of above mines submitted by CMPDI, RI-V were discussed by TSC in detail. TSC recommended that above Mine Closure Plans may be put up to SECL Board for kind perusal and its approval.

Meeting ended with vote of thanks to the chair.

General Manager (P&P)/HOD

Director Technical (Operation)

Ref No.SECL/BSP/P&P/14/ 462 Dated: 30.05.14 / 31

Copy to:

- D (F), SECL
- Company Secretary, SECL
- RD, CMPDI, RI-V, Bilaspur
- CM (Mining) (P&P) / Nodal Officer (P&P), SECL

SOUTH EASTERN COALFIELDS LIMITED

SEEPAT ROAD, BILASPUR (CG)

REF.NO.SECL/BSP/CAD/225 BM EXT/14-15/ 218 DTD 13.07.2014

EXTRACT OF THE 225TH MEETING OF THE BOARD OF DIRECTORS OF SOUTH EASTERN COALFIELDS LIMITED HELD ON SATURDAY,THE 5TH JULY, 2014 AT 11.00 AM AT RAIPUR

ITEM NO.225:4:6

Sub: Approval of Mine Closure Plan for 4 Mines / Project of SECL

Deferred.

ITEM NO.225:4:8

Sub: Project Report for Rampur Batura Opencast Project (4.0 MTY).

The Board deliberated on the subject PR in detail along with the Financial Appraisal Report of M/s. Deloitte, the comments of Director (F), CIL, and observed that the IRR of 23.86% can be obtained only if the entire coal is supplied to non-power sector consumers and if the coal is supplied to power and non-power consumers in 70:30 ratio, the IRR works out to 13.06% which is marginally high as the minimum IRR acceptable is 12%. Moreover, if there is a grade slippage by one grade only, the scenario would entirely change and the IRR would work out to 16.92%, 0.86%, 6.23% for sale to non-power sector only, power sectors only and power & non-power sectors in 70:30 ratio respectively. Thus, in that case, the IRR is not acceptable, except when the coal is sold to non-power sectors exclusively.

Therefore, the Board directed that the Economics of the subject PR should be revisited taking into consideration the notified price of coal applicable to power sector and if necessary, the capacity of the PR may also be reviewed and resubmit the reviewed PR for further deliberation and consideration by the Board.

18/7/14

COMPANY SECRETARY

Distribution:

1. GM(P&P)-HOD
2. GM(PRODN)-HOD
3. GM(F) C&B

Copy to:

All FDs, SECL

RD Iqbal Ahmad 15.7.14

Sri Bapat CM(M) P&P

NO (P&P).

Board file

CENTRAL MINE PLANNING & DESIGN INSTITUTE LIMITED
REGIONAL INSTITUTE-V, SECL COMPLEX, BILASPUR- C.G. 495 006

MINUTES OF MEETING HELD ON 14th AUGUST 2014 IN THE CHAMBER D(T) (OP) SECL TO DISCUSS THE PROJECT REPORT OF RAMPUR BATURA OPENCAST PROJECT(4.00 MTY) OF SOHAGPUR AREA, SECL.

No. CMPDI/RV/OC/2014/1853 Dated 14th August 2014
21/8

The project report of Rampur Batura Opencast Project (4.00Mty) was discussed with reference to resolution of 225th meeting of SECL Board held on 05.07.2014. The following issues were deliberated and agreed upon:

1. The economics of the PR would be projected considering notified price of coal applicable for POWER SECTOR consumer only.
2. In the outsourcing option the service tax component considered in rate for hiring of HEMM would be excluded as the CENVAT credit is available against it.
3. It was also decided that in view of provisions of Section 9(C) of Coal Mines (conservation & development) Act, 1974 following financial provisions would be reduced from PR :-

   A. The financial provision of 20 km of railway line for connecting Rampur Batura OCP with Anuppur railway station would be deleted. The grant for this railway line would be obtained from CCDA.

   B. Financial provision of proposed railway siding would be reduced by 70% of total provision as it would be granted by CCDA. Provision for rest 30% would be made in PR.

20/8/14
REGIONAL DIRECTOR

Distribution to:- All Participants

Encl:- list of participants as in Annexure-I

ANNEXURE-I

LIST OF PARTICIPANTS

S.No.	Name	Designation
A. SECL HQ		
1	Shri A P PANDA	Dir (Fin)
2	Shri R P TAKUR	Dir (Tech)
3	Shri B DAYAL	GM (P&P)/HOD
4	Shri K K PARIDA	GM (F)
5	Shri S K SHARMA	GM (Civil)/HOD
6	Shri M K AGRAWAL	GM (Mining)/OSD,CCO
7	Shri A BHATTACHARYA	TS to D(T) (P&P)
8	Shri MANOJ KUMAR	Sr. Manager (mining)
9	Shri A BAKSHI	TS to D(F)
B. CMPDIL, RI-V, BILASPUR		
1	Shri I D NARAYAN	Dy. GM (Mining)/HOD (OC)
2	Shri SANJEEV M SINGH	Sr. Manager (mining)

Minutes of the 57th meeting of the Technical Sub Committee of SECL for Projects held on 8th Sept'14 at DT (P&P)'s Conference hall, SECL, Bilaspur

Members participated:
1. Shri R.P.Thakur, DT (O), SECL - Chairman
2. Shri A. P. Panda, D (F), SECL - Member

In attendance:
1. Shri B. Dayal, GM (P&P)/HOD, SECL
2. Shri K.K.Parida, GM (F), SECL
3. Shri Manoj Kumar, RD, CMPDI, RI-V, Bilaspur
4. Shri I.D.Narayan, HOD (OC), CMPDI, RI-V
5. Shri A.K.Singh, CM (Mining), DT (P&P) Secretariate
6. Shri A. Bhattacharya, Sr. Manager / TS to DT (P&P)
7. Shri Sanjeev M Singh, Sr. Manager (Mining), CMPDI, RI-V
8. Shri Manoj Kumar, Sr. Manager (Mining) (P&P), SECL
9. Shri P.K.Somani, AM (F), CMPDI, RI-V

The Chairman welcomed the members of the 57th Meeting of Technical Sub Committee (TSC) and called the meeting in order.

1. **Item No. 57.1: Project Report for Kanchan OC Expansion Project (0.65-2.00 MTY):**

Project Report for Kanchan OC Expansion Project (0.65-2.00 MTY) with following options was put up before the TSC:

Parameters	Option-I (Total Departmental with G-9 grade quality as per Geological Report	Option – II (A) (Contractual with G-6 grade as per Annual Grade declaration)	Option – II (B) (Contractual with G-9 grade as per Geological Report)
Financial IRR			
I) At 100% level of production	-Ve	39.18	-Ve
II) At 85% level of production	-Ve	28.57	-Ve

The Committee noticed that the project is not viable on the basis of the sale prices applicable for geological grade of coal. The project is found economically viable for declared grade of G-6 GCV grade coal.

Data containing information regarding sales realization for the same seams being worked in the existing project submitted by GM, Johilla Area (enclosed with the PR) was presented to the Committee. Data confirmed that the seams proposed to be worked in the subject Kanchan OC Expansion Project (0.65-2.00 MTY) have been fetching the price of G-6 grade in the existing operations. Further, GM (QC) has also confirmed the grade as C/G-6 for last 5 years as per year wise grade declaration. During the last 5 years grade realization was that of G-6 band grade and there was an average slippage of about 0.027 %.

In view of above. the recommendations of TSC are as under:

I) Project Report for Kanchan OC Expansion Project (0.65-2.00 MTY) may be considered for financial appraisal by Financial Institutions or reputed professional organizations having expertise in the areas.

II) After financial appraisal, PR for Kanchan OC Expansion Project (0.65-2.00 MTY) with option-II (A) and total capital investment of ₹ 371.04 Crores along with its financial appraisal report may be put up to SECL Board for its approval.

III) The Expansion PR of 0.65 MTY capacity presently under implementation will get merged with Kanchan OC Expansion Project (0.65-2.00 MTY).

2. Item No. 57.2: Project Report for Rampur Batura OC Project (4 MTY):

Project Report for Rampur Batura OC Project (4 MTY) was put up to SECL Board in its 225th meeting held on 05.07.2014 vide item no. 225:4:8. In above meeting the Board directed that the Economics of the PR should be revisited taking into consideration the notified price of coal applicable to power sector and if necessary, the capacity of the PR may also be reviewed and resubmit the reviewed PR for further deliberation and consideration by the Board.

Accordingly, economics of the PR was revisited by CMPDI, RI-V. In this revised PR, followings were considered for working out the economics:

I) In the outsourcing .option, the service tax component considered in rate for hiring of HEMM was excluded as the CENVAT credit is available against it.

II) It was envisaged that capital for proposed Railway line (20 Km) connecting the project with main Rail line would be granted by CCDA and provision for capital for the same was not considered in the PR.

During discussion, it was learnt that there is paucity of fund in CCDA. Hence, capital provision for the above rail line must be kept in the PR and the economics may be revisited again.

Subsequently, the economics of the PR was again revised by CMPDI, RI-V with following considerations:

I) In the outsourcing option, the service tax component considered in rate for hiring of HEMM was excluded as the CENVAT credit is available against it.

II) The provision of capital for Railway line (20 Km) connecting the project with main rail line was made.

III) Lead for OB removal has been revised based on 5 yearly stages of the proposed mine instead of average lead envisaged earlier.

The above revised PR was put up before TSC with two options namely Departmental and Outsourcing. This was discussed by TSC in detail.

The observations/recommendations of TSC are as under:

I) Project Report for Rampur Batura OC Project (4 MTY) may be considered for financial appraisal by Financial Institutions or reputed professional organizations having expertise in the areas.

II) After financial appraisal, PR for Rampur Batura OC Project (4 MTY) with Outsourcing option amounting to ₹ 1186.64 Crores along with its financial appraisal report may be put up to SECL Board for its approval

23/9/14

General Manager (P&P)/HOD

Director Technical (Operation)

Ref No.SECL/BSP/P&P/14/ 767 Dated: 23.09.14

Copy to:
- D (F), SECL
- Company Secretary, SECL
- RD, CMPDI, RI-V, Bilaspur
- CM (Mining) (P&P) / Nodal Officer (P&P), SECL

South Eastern Coalfields Limited
(A MINIRATNA PSU)
CIN: U10102CT1985GOI003161
Regd. Office: SEEPAT ROAD, BILASPUR (CG) 495 006
CORPORATE AFFAIRS DEPARTMENT
Phone : 07752-246340, Fax : 07752 246412, 417666
Website: www.secl.gov.in e-mail : compsecy.secl@coalindia.in

प्राप्तकर्ता क्र. 2521 10.11.14

REF.NO.SECL/BSP/CAD/229 BM EXT/14-15/ 407 DTD.08.11.2014

EXTRACT OF THE 229TH MEETING OF THE BOARD OF DIRECTORS OF SOUTH EASTERN COALFIELDS LIMITED HELD ON FRIDAY, THE 31st OCTOBER, 2014 AT 11.00 AM AT NEW DELHI

ITEM NO.229:4:3

Sub: Project Report for Rampur Batura Opencast Project (4.0 MTY)

The Board viewed the Power Point presentation on the highlights of the subject PR presented by GM (P&P)-HOD & RD, CMPDIL, RI-V and also noted the Financial Appraisal Report on the Project Report submitted by M/s Deloitte recommending that the *projected pre-tax IRR at 85% capacity under Option-II i.e. (total coal and OB Outsourcing) is 12.36% (which is marginally higher than 12%) and therefore, the project may be considered financially viable under the outsourcing option.*

The Board discussed on the subject PR in detail and after detailed deliberations approved the following for onward submission to CIL, as the PR value is more than ₹ 500.00 Crores.

1) Project Report for Rampur Batura OC Project (4 MTY) of Sohagpur Area amounting to ₹ 1186.64 Crs;
2) Dovetailing of PR for Batura OC Project (2.0 MTY) with Project Report for Rampur Batura OC Project (4.0 MTY) for the purpose of implementation as all the activities and financial provisions of Batura OC Project (2 MTY) have been included in Rampur Batura OC Project (4.0 MTY) as recommended by TSC at its 53rd meeting held on 28.05.2014.

8/11/14
COMPANY SECRETARY

Distribution for action:
1. GM(P&P)-HOD
2. GM(F)-HOD
3. GM, Sohagpur Area

Copy to:
All Functional Directors, SECL

Coal India Limited
A MAHARATNA COMPANY
Coal Bhawan, 3rd Floor, Core - 2
New Town, Rajarhat,Kolkata- 700 156.
PHONE: 033-2324-6526, FAX:033-2324-6510
Email – mviswanathan2@coalindia.in
WEBSITE:www.coalindia.in
CIN – L23109WB1973G01028844

Ref No.CIL:XI(D):04112:2015: 10856. Dated 26th Aug.'2015

27/8/15

To
GM (PMD),
Coal India Limited,
3rd Floor, New Town,
Rajarhat, Kolkata – 700 156.

Sub: Minutes of 319th CIL Board Meeting held on 12th August'2015.

Dear Sir,

Reproduced below is the relevant extracts from the minutes of 319th meeting of Board of Directors of Coal India Limited held on 12th August'2015 at Kolkata with regard to the following item:

"ITEM No.319: 4 (B)

Sub:- Project Report of Rampur Batura OCP-4.00 MTY, SECL

4.2 Director(Technical)-P&P, SECL made a power-point presentation of Project Report. He also apprised that Project economics was re-worked as per revised guidelines circulated by CIL for cost provisioning in Project Report. Hence at 85% capacity utilisation, IRR works to 14.28% for this project against earlier projection of 12.36%.

In view of the above, Board after detailed deliberations accorded its 'in principle' approval to Project Report of Rampur Batura OCP with a rated capacity of 4.0 Mty. with an estimated capital investment of Rs.1186.64 crores on Coal and OBR outsourcintg option as recommended by ESC of CIL and as brought out in the agenda note.

Further, Board also approved first year expenditure of Rs.84.23 crores for the project."

This is for your information and taking necessary action please.

Yours faithfully,
26/8/15
(M.Viswanathan)
Company Secretary

Sri Achyut
Sri Jamal
} fit discuss
28/8

NOC(P&P) 02.09.15

Coal India Limited
A MAHARATNA COMPANY
Registered Office:- Coal Bhawan, Core-2, 3rd Floor,
Premises No.04 MAR, Plot No.AF-III,
Action Area-1A, New Town, Rajarhat, Kolkata 700156.
PHONE: 033 - 23246526, FAX:033 - 23246510
Email – inviswanathan2.cil@coalindia.in
WEBSITE: www.coalindia.in
CIN – L23109WB1973GOI028844

Ref. No.CIL: XI (D):04112:2016: 14439. Dated 17th August'2016

To
GM(PMD),
Coal India Limited,
Coal Bhawan, Plot No.AF-III, Action Area-1A,
New Town, Rajarhat, Kolkata 700156.

Sub:- Minutes of 330th CIL Board Meeting held on Tuesday, the 19th July'2016 and Wednesday, the 20th July'2016 at CIL (HQ), Kolkata.

Dear Sir,

Reproduced below is the relevant extracts from the minutes of 330th meeting of Board of Directors of Coal India Limited held on 19th July'2016 and 20th July'2016 at CIL (HQ), Kolkata with regard to the following item:-

"ITEM No.330:4(T)

Sub:- Project Report for Rampur Batura OCP (4 Mty.), SECL.

Director (Technical), SECL made power-point presentation. He also apprised that NH-78 passes through the middle of the proposed quarry. Rampur village and six other villages are required to be shifted. Katna Nala and Jamuna Nala are to be diverted and embankment is to be constructed.

To a query, he clarified that till date an amount of Rs.12.75 crores has been spent on the project.

After detailed deliberations, CIL Board advised SECL to review Project Report in view of various constraints and assumptions and place it to CIL with the recommendations of SECL Board."

This is for your information and taking necessary action please.

Yours faithfully,

17/8/16

(M. Viswanathan),
Company Secretary

MINUTES OF MEETING HELD ON 11.04.2017 AT THE OFFICE OF DT (P&P) TO REVIEW THE PROJECT REPORT FOR RAMPUR BATURA OCP (4.0 MTY), SOHAGPUR AREA

Meeting was chaired by DT (P&P), SECL.

GM (P&P), GM (L&R), GM (Siding), SECL, RD, RI-V, officials of P&P department and CMPDI, RI-V were present in the meeting.

The Project Report for Rampur Batura OCP (4.0 MTY) was reviewed to comply with the directives of 330th CIL Board meeting held on 20.07.2016, communicated vide ref. No. CIL: XI (D):04112:2016:14439 dated 17th August 2016. The PR was deliberated in detail and it has been decided to consider the following while formulating the Project Report.

1. Land already notified for external dump and infrastructure as per the provisions of Batura OCP 2.0 MTY shall be considered and Capital provision for the balance land to be acquired, shall be kept as per RFCT LARR Act 2013.
2. Capital Provision for proposed railway line to connect Batura group of mines shall be re-looked into considering the part provision of the same kept in the Project Report for Batura West OCP (1.50 MTY) and Batura HW project (O.50 MTY).
3. Partial outsourcing option shall also be included in the PR of Rampur Batura OCP.
4. Provision for Load out system shall be considered for rapid loading.
5. The earlier alignment of NH-78 was passing through the quarriable area of proposed Rampur Batura OCP. However, recently part of NH-78 has been diverted and now the present alignment is passing way beyond the project area of Rampur Batura OCP. Hence, the capital provision kept for this purpose in earlier PR may be deleted.
6. An updated Project Report shall be submitted including the current selling price of coal.

सी.एम.पी.डी.आई./बे.सं.5
क्रमांक 4528
दिनांक 17.04.17

13/4/17
General Manager (P&P)-HOD
SECL, Bilaspur

Copy to:

1. Director Technical (P&P),SECL - For kind information
2. RD, RI-V, CMPDI
3. GM (L&R), SECL
4. GM (Siding), SECL
5. CM (M)-HOD (OC), CMPDI
6. CM (M)/PMS (P&P), SECL
7. TS to DT (P&P), SECL

श्री संजीव सिंह
रामपुर बटुरा ओ पी
17/4/17

जावक
कार्यालय, महाप्रबंधक (यो./चरि.)
एस.ई.सी.एल., मुख्यालय, बिलासपुर
क्रमांक 189
दिनांक 13/4/17

South Eastern Coalfields Limited
(A Mini Ratna Company)
Contract Management Cell,
SECL Bhawan, Seepat Road,
Bilaspur (Chhattisgarh), Pin : 495006.
STD: 07752
Phone: 246328
Fax: 246458

No. SECL/BSP/CMC/ 609 Dated 27/9/

24

To

Registered post

M/s. CART – Roadwings JV
IC Ballygunge Circular Road,
Tivoli Court Building
Block B, Flat - 93
KOLKATA WB - 700019

LETTER OF INTENT

Dear Sir,

Sub: LOI for the work of Hiring of HEMM for OB Removal including Re-handling (including drilling in all kinds of strata/over burden) loading into tippers, transportation and unloading of excavated materials and silt and other allied works at Eastern part of Sector D of Dhanpuri OCM, Sohagpur Area against e- NIT No 83 dated 04.05.2016.

Please refer to your offer for undertaking the subject tendered work.

The SECL Management has been pleased to accept your offers for executing the subject tendered works i.e. Hiring of HEMM for OB removal including re-handling (including drilling in all kinds of strata/over burden), loading in to tippers, transportation and unloading of excavated materials & silt, dumping, dozing, scrapping /removal of bands, preparation & maintenance of haul road/natural garland drain, water sprinkling and spreading of material at the site shown and as per directives of the management /Engineer –in-Charge at Eastern part of Sector D of Dhanpuri OCM, Sohagpur Area as per the following details :

Sl No	Description of work	Quantity	Rate (Rs/M^3)	Value (in Rs.)
1	Hiring of HEMM for OB removal including re-handling (including drilling in all kinds of strata/over burden), loading in to tippers, transportation and unloading of excavated materials & silt, dumping, dozing, scrapping /removal of bands, preparation & maintenance of haul road/natural garland drain, water sprinkling and spreading of material at the site shown and as per directives of the management /Engineer –in-Charge at Eastern part of Sector D of Dhanpuri OCM, Sohagpur Area	176,45,800 M^3 (167,98,800 M^3 insitu OBR + 08,47,000 M^3 RH OBR)	43.82	77,32,38,956.00
			Add shortfall amount	98,258.93
			Total value excl SB Cess	77,33,37,214.93
			Total value Incl. SB Cess-As Quoted	77,72,03,901.00
			Total cost to company (Incl SB & KK Cess @ 0.5% each)	78,10,70,587.07
			TOTAL VALUE (incl Service Tax @ 14%, SBC & KKC)	**88,93,37,797.16**

for a period of 1095 days with minimum 16,115 M^3 per day with Composite lead: 0.15- 3.17 kms [Comp wt av. Lead (insitu & RH OB) -1.42 kms, Weighted Average Lead RH - 0.885 kms, Wt.Av.Lead in situ OB - 1.45 kms] and lift: 0 - 90m.

The item rate is exclusive of Service Tax, Swachchha Bharat Cess & Krishi Kalyan Cess and is subject to variations in accordance with the rise and fall of diesel price as per escalation clause no. 19.04.01 and wages & other components as per clause no. 19.04.02 based of tender document keeping the diesel base price of ₹ 59.87 per litre, as on 21.05.2016 and at composite weighted average lead of 1.42 KMs.

The payment/re imbursement of Service Tax shall be dealt by the Area as per prevailing Service Tax rule.

As per quoted value uploaded by you in the price breakup, a differential amount of ₹ 98258.93 will be released in RA bill on pro-rata basis.

The provisions of the CENVAT Credit Rules, 2004 of Central Excise Act, 1944, for availing of CENVAT Credit to the tune of service tax paid on input services shall be availed as per rule.

You are directed to mobilize equipments for executing the above work to handle minimum allotted quantity per day and commence the work within 10 (ten) days of issuance of LOI as per provisions of tender document. You are further directed to report to the General Manager, Sohagpur Area for immediate commencement of work.

You are to deposit Performance Security Deposit limited to a sum equal to 5% of annualised contract amount, within 28 days from the date of issuance of this LOI, as per provisions of tender document and sign Integrity Pact before entering into the agreement in accordance with the tender document. Work order will be issued and agreement will be executed at area office.

The date of commencement of work may be intimated to this office and agreement may be concluded within 30 days at Area office as per provisions of tender document.

This may be treated as **LETTER OF INTENT.**

Yours faithfully,

29/9/16

General Manager (CMC)
SECL, Bilaspur.

Copy to:
The Dir.(T)(Oprn),SECL
The GM(Prodn.),CIL, Kolkata
The GM (CS/TS), SECL
The GM(Prodn.),SECL,
The GM, Sohagpur area
The GM(Fin.),SECL
The AFM, Sohagpur area. : Kindly note that the validity period of BG is upto 31.12.2016

Cc: Tender file.

Minutes of the 91st meeting of the Technical Sub Committee of SECL for Projects held on 31st January 2018 at the Conference hall of DT (P&P), SECL, Bilaspur

Members participated:

1. Shri Kuldip Prasad, DT (O)/DT (P&P), SECL - Chairman
2. Shri A. P. Panda, D (F), SECL - Member

In attendance:

1. Shri Umesh Choudary, GM (P&P)/HOD, SECL
2. Shri D K Chandrakar, GM (L&R), SECL
3. Shri E R K Patro, GM (F), SECL
4. Shri I D Narayan, RD, RI-V, CMPDI, Bilaspur
5. Shri Sanjeev Singh, SR. Manager (M), RI-V, CMPDI
6. Shri P. K. Somani, Dy. Manager (Finance), RI-V, CMPDI
7. Shri Sudarshan Rath Dy. Manager (M), CMPDI (HQ), Ranchi
8. Shri Abhay Nand Jee Yadav, AM (E&M), RI-V, CMPDI
9. Shri S K Gupta, AM (E&M), RI-V, CMPDI
10. Shri S S Sinha, Sr. Manager (Finance) (C&B), SECL
11. Shri N U M sharma, Chief Manager (M)/MCP (P&P), SECL
12. Shri A K pattanaik, Chief Manager (C/siding), SECL
13. Shri B P Sahu, Sr. Manager, (C/siding), SECL

The Chairman welcomed the members of the 91st Meeting of Technical Sub Committee (TSC) and called the meeting in order.

Item No. 91.1: Project Report for Rampur Batura OC Project (4.0 MTY) (Revised & Updated Oct' 17)

Project Report for Rampur Batura OCP (4.0 MTY) with three options i.e. Departmental option, Outsourcing option and partial outsourcing option was placed before the TSC. The report was discussed by TSC in detail. The salient features of the revised PR presented by RI-V, CMPDI is as below:

Parameters	Departmental option	Outsourcing Option	Partial outsourcing option
Financial Internal Rate of Return (FIRR) (%)			
I) At 100% level of production	-0.96	28.40	25.84
II) At 85% level of production	-5.93	23.40	20.87
Total Capital (₹ in Cr)	3347.34	1145.20	1248.93

The observations of TSC are as under:

1. As all the activities and financial provisions of Batura OC Project (2.0 MTY) are proposed to be dovetailed with the Project Report for Rampur Batura OCP (4.0 MTY), the amount deposited in the Escrow account of Batura OCP (2.0 MTY) will be adjusted with the mine closure cost of Rampur Batura OCP (4.0 MTY).

Rampur Batura OCP

7.2.18

The revised mine closure cost as per the latest WPI will be deposited in the Escrow account after obtaining 'Consent to Operate' for Rampur-Batura (4.0 MTY).

2. The proposed rail alignment of extension of railway line from Anuppur/Amlai up to Rampur Batura OCP needs to be re-examined considering all the alternate routes before finalizing the rail alignment by RITES.
3. After detailed deliberations TSC opined following regarding options presented in PR:
   a. Rampur Batura OCP (4.0 MTY) is having multi seam workings and high stripping ratio. In multi seam workings it is better to opt for either total departmental option or total outsourcing option as inter dependency for winning coal as well as removal of OB/parting is more.
   b. TSC advised RI-V, CMPDI to do simulation analysis for partial outsourcing option and total outsourcing option.
4. A separate Annexure showing the economics of the PR evaluated considering the revised coal price shall be attached.

Further TSC recommended for getting the financial appraisal of the project and again put up to TSC.

7-2-18

General Manager (P&P)/HOD

Director Technical (Operation)

Ref No: SECL/BSP/P&P/18/904 Dated: 10/2/18

Copy to:

1. DT (O), SECL
2. D (F), SECL
3. Company Secretary, SECL
4. RD, RI-V, CMPDI, Bilaspur
5. GM (M)/PMS (P&P)
6. Nodal Officer (P&P), SECL

Minutes of the 93rd meeting of the Technical Sub Committee of SECL for Projects held on 24th April 2018 at the Conference hall of DT (P&P), SECL, Bilaspur.

Members participated:

1. Shri Kuldip Prasad, DT (O)/DT (P&P), SECL - Chairman
2. Shri A. P. Panda, D (F), SECL - Member

In attendance:

1. Shri Umesh Choudary, GM (P&P)/HOD, SECL
2. Shri I D Narayan, RD, RI-V, CMPDI, Bilaspur
3. Shri E R K Patro, GM (F), SECL
4. Shri K Rajasekhar, GM (M)/PMS (P&P), SECL
5. Shri Sanjeev Singh, SR. Manager (M), RI-V, CMPDI
6. Shri P K Somani, Dy. Manager (Finance), RI-V, CMPDI
7. Shri S S Sinha, Sr. Manager (Finance) (C&B), SECL
8. Shri B Ravi, Manager (M), (P&P)
9. Shri Ankit Gupta, PwC

The Chairman welcomed the members of the 93rd Meeting of Technical Sub Committee (TSC).

Item No. 93.1: Project Report for Rampur Batura OC Project (4.0 MTY) (Revised & Updated Oct' 17)

Project Report for Rampur Batura OCP (4.0 MTY) (Revised & Updated Oct' 17) along with its Financial Appraisal Report prepared by PricewaterhouseCoopers Pvt. Ltd. was placed before the TSC.

TSC noted that "*Earlier PR for Batura OCP (2.0 MTY) with a capital investment of ₹ 203.82 Cr was prepared and submitted by CMPDI in May 2008 and was approved by SECL Board in its 172nd meeting held on 9.09.2008. Later Project Report (PR) for Rampur Batura OCP (4.0 MTY) was prepared and submitted by CMPDI, RI-V considering two adjoining blocks namely Batura OC Block and Batura Extension Block. CIL Board in its 319th meeting held on 12.08.2015 accorded it's 'In principle' approval with a capital outlay of ₹ 1186.64 Cr. Further Board also approved first year expenditure of ₹ 84.23 Cr for the Project. In the PR for Rampur Batura OCP (4.0 MTY) all the activities and financial provisions of Batura OCP (2.0 MTY) have dovetailed.*

Subsequently PR for Rampur Batura OCP (4.0 MTY) was placed before CIL Board in its 330th meeting held on 19.7.2016. As per minutes of meeting, CIL Board advised SECL to review Project Report in view of various constraints and assumptions and place it to CIL with the recommendations of SECL Board."

Accordingly RI-V, CMPDI revised and submitted the Project Report for Rampur Batura OCP (4.0 MTY) (revised & Updated Oct' 2017) with three options i.e. Departmental Option, Outsourcing Option and Partial Outsourcing Option. The IRR in the departmental option is negative.

Financial appraisal was carried out by M/s PricewaterhouseCoopers Private Limited, for total outsourcing option and partial outsourcing option. M/s PricewaterhouseCoopers Private Limited presented the financial appraisal of the project through Power Point Presentation.

After detailed deliberations TSC is of the following opinion regarding options presented in PR:

Rampur Batura OCP (4.0 MTY) is having multi seam workings and high stripping ratio. In multi seam workings it is better to opt for either total departmental option or total outsourcing option as inter dependency for winning coal as well as removal of OB/parting is more. In the present PR the departmental option is yielding negative IRR whereas the total outsourcing option is yielding more than 12% IRR at 85% capacity. Hence it would be prudent to opt for total outsourcing option as it is yielding better IRR.

As such, TSC recommended that the Project Report for Rampur Batura OCP (4.0 MTY) (revised & updated Oct' 2017) along with its financial appraisal report for implementation through total outsourcing (Coal & OB) option with a capital investment of ₹ 1145.20 Cr, before SECL Board for kind perusal and its approval.

Meeting ended with vote of thanks to the Chair.

8.5.18

General Manager (P&P)/HOD

Director Technical (Operation)

Ref No: SECL/BSP/P&P/18/1048 Dated:10/5/18

Copy to:

1. DT (O), SECL
2. D (F), SECL
3. GM (CS/TS), SECL
4. Company Secretary, SECL
5. RD, RI-V, CMPDI, Bilaspur
6. GM (M)/PMS (P&P), SECL
7. Members participated

Economics of PR considering the revised coal price

The sale price of coal was revised w.e.f. 9/1/2018. As per the directives of TSC of SECL Board the economics of PR has been calculated considering the revised coal price as shown below:-

		Capacity Utilisation Level					
		OPTION I		OPTION-II		OPTION-III	
		100%	85%	100%	85%	100%	85%
1	Output(Mty)	4.00	3.40	4.00	3.40	4.00	3.40
2	Cost/te(Rs)	2055.41	2331.39	1226.09	1302.16	1253.46	1342.01
3	Selling Price(Rs/te)	2316.49	2316.49	2316.49	2316.49	2316.49	2316.49
4	Profit(Rs/te)	261.08	-14.90	1090.39	1014.33	1063.03	974.47
5	IRR (%)	6.59%	1.67%	40.76%	34.49%	37.42%	31.30%

In **Total Departmental option (Option-I)**, the proposed project is yielding a profit of ₹. 261.08/t at 100% and loss of ₹. 14.90/t at 85% level of production. The financial IRR of the project at 85% is 1.67% and as such it is not meeting the criteria of approval i.e. 12% IRR at 85% capacity level.

In **Total Outsourcing option (Option-II)**, the proposed project is yielding a profit of ₹. 1090.39/t at 100% and ₹.1014.33/t at 85% level of production. The financial IRR of the project at 85% is 34.49 % and as such it is meeting the criteria of approval i.e. 12% IRR at 85% capacity level.

In **Coal Departmental OB Outsourcing option (Option-III)**, the proposed project is yielding a profit of ₹. 1063.03/t at 100% and ₹.974.47/t at 85% level of production. The financial IRR of the project at 85% is 31.30 % and as such it is meeting the criteria of approval i.e. 12% IRR at 85% capacity level.

****

Simulation analysis for Partial Outsourcing and Total Outsourcing option

As per the directives of TSC of SECL Board the simulation analysis for Partial outsourcing and Total outsourcing option was done by Oracle Monte Carlo simulation technique. The assumptions and the results are enumerated below:-

Table 1- Monte carlo simulation assumption.

S.NO	PARAMETER	ASSUMPTION	MIN	MAX	INDEX
1	COAL PRICE	Triangular Distribution	-8%	3.02%	LAST 5 Years Non Cooking Coal GCV exceeding 5500. (Base Year 2011-12)
2	PROJECT INVESTMENT (HEMM)	Triangular Distribution	As per PR	4.00%	LAST 10 Years Mining/Quarrying Equipment (Base Year 2004-05)
3	PROJECT INVESTMENT (LAND & R&R)	Triangular Distribution	As per PR	5.53%	LAST 10 Years WPI (Base Year 2004-05)
4	PROJECT INVESTMENT (OTHERS)	Triangular Distribution	As per PR	5.53%	LAST 10 Years WPI (Base Year 2004-05)
5	SALARY & WAGES	Triangular Distribution	As per PR	8.56%	LAST 9 Years CPI INDUSTRIAL WORKERS (Base Year 2001)
6	POWER COST	Triangular Distribution	As per PR	10.00%	Power Tariff in MP State
7	EXPLOSIVE COST	Triangular Distribution	As per PR	10.00%	LAST 10 Years Explosive & others chemicals (Base Year 2004-05)
8	REVENUE CASH COST	Triangular Distribution	-2.38%	5.53%Inflation Rate	AS CIL INVESTOR MEET REPORT (LATEST)
9	DIESEL RATE	Triangular Distribution	-3.00%	5.22%	LAST 10 Years HSD WPI (Base Year 2004-05)
10	OB OUTSOURCING COST	Triangular Distribution	As per PR	5.53%	LAST 10 Years WPI (Base Year 2004-05)
11	COAL OUTSOURCING COST	Triangular Distribution	As per PR	5.53%	LAST 10 Years WPI (Base Year 2004-05)
12	NET CASH FLOW	Normal Distribution	Z Curve		Normal Distribution

Note:
CAGR of cost per tonne is 0.76 % as against inflation of 3.14% . Which means cost per tonne has reduced by 2.38% in real term.

Table-2 Forecast IRR (Total Outsourcing Option)

Summary:	
Entire range is from 13.60% to 27.96%	
Base case IRR is	23.40%
After 1,000 trials, the std. error of the mean is 0.08%	
Statistics:	**Forecast values**
Trials	1,000
Base Case	23.40%
Mean	21.03%
Median	21.09%
Mode	---
Standard Deviation	2.61%
Variance	0.07%
Skewness	-0.1269
Kurtosis	2.62
Coeff. of Variation	0.1242
Minimum	13.60%
Maximum	27.96%
Range Width	14.36%
Mean Std. Error	0.08%

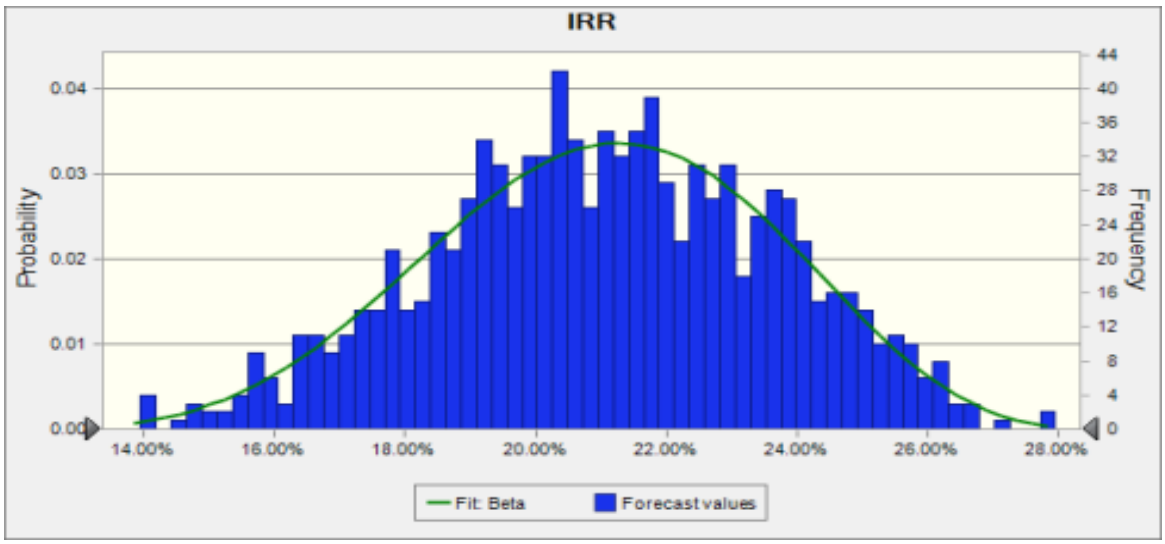
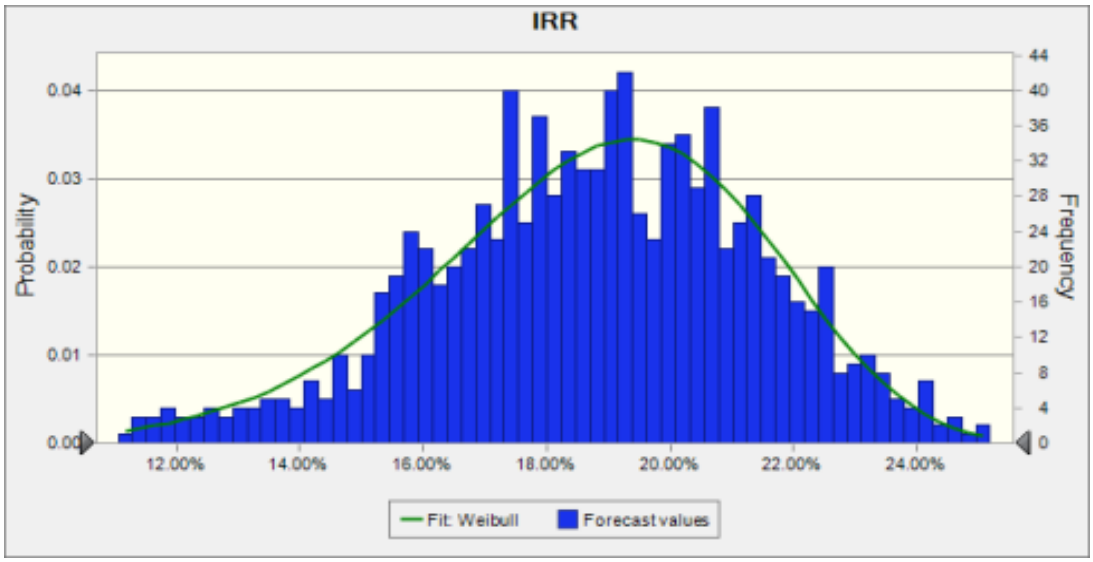


Table-2 Forecast IRR (Partial Outsourcing Option)

Summary:		
	Entire range is from 8.07% to 25.19%	
	Base case IRR	20.87%
	After 1,000 trials, the std. error of the mean is 0.09%	
Statistics:		**Forecast values**
	Trials	1,000
	Base Case	20.87%
	Mean	18.70%
	Median	18.87%
	Mode	---
	Standard Deviation	2.73%
	Variance	0.07%
	Skewness	-0.4270
	Kurtosis	3.30
	Coeff. of Variation	0.1459
	Minimum	8.07%
	Maximum	25.19%
	Range Width	17.12%
	Mean Std. Error	0.09%



आवक
कार्यालय, महाप्रबंधक (यो./परि.)
क्षे.शि.कॉलेज, प्रशासन भवन, बिलासपुर
क्रमांक 2656
दिनांक 10.12.18
11.12.18

SOUTH EASTERN COALFIELDS LIMITED

CIN: U10102CT1985GOI003161

SEEPAT ROAD, BILASPUR (CG)

MINUTES OF THE 279TH MEETING OF THE BOARD OF DIRECTORS OF SOUTH EASTERN COALFIELDS LIMITED HELD ON 28.11.2018 (WEDNESDAY) AT RAIPUR (CG).

Ref. No. SECL/BSP/CAD/279 BM EXT/18-19/1245 Date: 08.12.2018

ITEM NO:279:4:1

Sub: Project Report for Rampur Batura Opencast Project (4.0 MTY) (Revised & Updated Oct' 2017), Sohagpur Area.

The Board viewed the presentation on the subject PR and GM (P&P)-HOD apprised the Board in detail, the salient features of the subject Project Report for Rampur Batura Opencast Project (4.0 MTY) as under:

- CIL Board at its 319th Meeting held on 12.08.2015 (Item No. 319:4(B)) accorded in-principle to the Project Report for Rampur Batura Opencast Project (4.0 MTY) with a capital outlay of ₹ 1186.64 Crore with complete outsourcing and the Board also approved the 1st year expenditure of ₹ 84.23 Crore for the project. Subsequently, CIL Board at its 330th Meeting held on 20.07.2016 (Item No. 330:4(T)) advised SECL to review the PR in view of the various constraints and assumptions and re-submit the same with SECL Board's recommendations.
- Accordingly, the subject Project Report for Rampur Batura Opencast Project (4.0 MTY) (Revised & Updated Oct' 2017) has been prepared by CMPDIL, HQ with three options i.e. (I) Departmental Option, (II) Outsourcing Option and (III) Partial Outsourcing Option and all the activities and financial provisions of Batura OCP (2.0 MTY) have been included dovetailing the PR of Batura OCP. The three options worked out are tabulated below:

Sl. No.	Particulars	Unit	Departmental Option-I	Outsourcing Option-II	Partial Outsourcing Option-III
1.	Existing Capital	₹ Cr	40.78	40.78	40.78
2.	Additional Capital Investment	₹ Cr	3306.56	1104.42	1208.16
3.	Total Capital Investment	₹ Cr	3347.34	1145.20	1248.93
4.	Estimated cost of production				
4a.	At 100% production level	₹ / T	2055.41	1226.09	1253.46
4b	At 85% production level	₹ / T	2331.39	1302.16	1342.01
5.	Estimated weighted Avg. selling price	₹ / T	1920.34	1920.34	1920.34
6.	Estimated Profit				
6a	At 100% production level	₹ / T	(-) 135.07	694.24	666.88
6b	At 85% production level	₹ / T	(-) 411.05	618.18	578.32
7.	FIRR				
7a	At 100% production level	%	- 0.96	26.40	25.84
7b	At 85% production level	%	- 5.93	23.40	20.87
8.	Earnings per Manshift (EMS)	₹	3042.16	3051.91	3017.65
9.	Mine Closure Cost (for corpus fund)	₹ L / Ha	6	6	6
10.	Expected Completion capital	₹ Cr	4053.15	1372.43	1497.83

File

GM(P&P) - II
NO

CMPDIL has recommended the Option-II (Total Outsourcing) having highest IRR of 23.40% at 85% level of production, for competent approval.

- Financial Appraisal Report submitted by M/s. PricewaterhouseCoopers Pvt. Ltd. indicates that the Project IRR (Pre-tax) under 'Total Outsourcing Option' works out to 40.85% at 100% production capacity and 34.37% at 85% production capacity; and the Project IRR (Pre-tax) under 'Partial Outsourcing Option' works out to 37.28% at 100% production capacity and 31.04% at 85% production capacity; as such, recommended that the project is viable under both these options.
- The Technical Sub-Committee (TSC) of SECL Board at its 93rd Meeting held on 24.04.2018 (Item No. 93.1) deliberated on the subject PR and recommended the same for approval of SECL Board, with the Total Outsourcing (Coal & OB) Option-II, involving capital outlay of ₹1145.20 Crore.

The Board noted the above apprisel and after detailed discussions, observed and opined that although the main purpose of outsourcing remains to cut cost and to obtain the capabilities not available in-house, business transformation and concentrating on the core business and retaining core competency are equally important factors for consideration, as such, the Board after detailed deliberations approved the subject Project Report for Rampur Batura Opencast Project (4.0 MTY) (Revised & Updated Oct' 2017) of Sohagpur Area, for Partial Outsourcing Option-III (i.e. Coal Departmental and OB Outsourcing), involving a capital investment of ₹1248.93 Crore, as detailed and brought out in the agenda and advised to forward the same to CIL for further deliberation and approval.

8/5/18

COMPANY SECRETARY

Distribution for action:

1. GM (P&P)-HOD, SECL
2. GM (Sohagpur), SECL
3. GM (F)-HOD, SECL

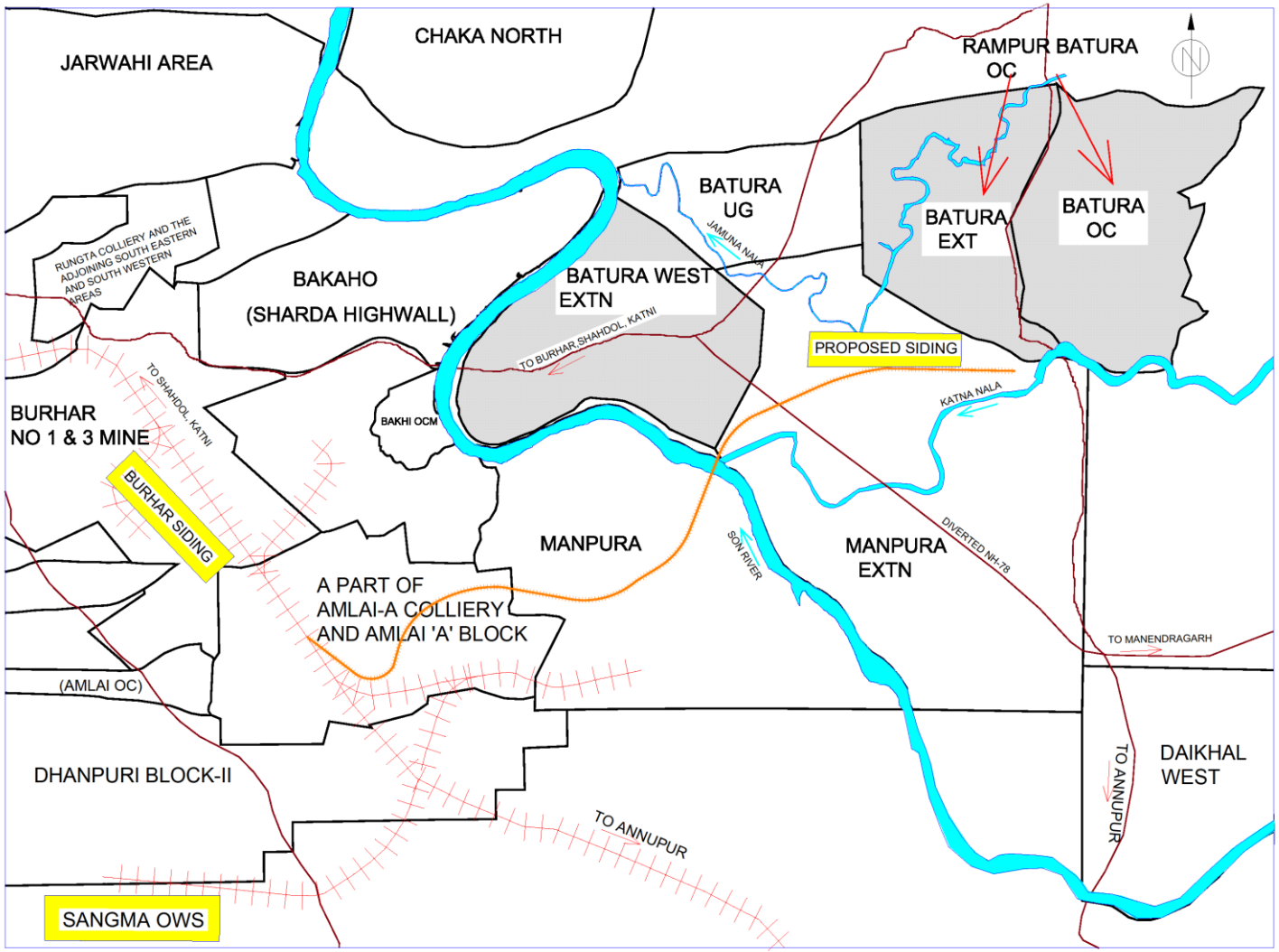
Copy to:

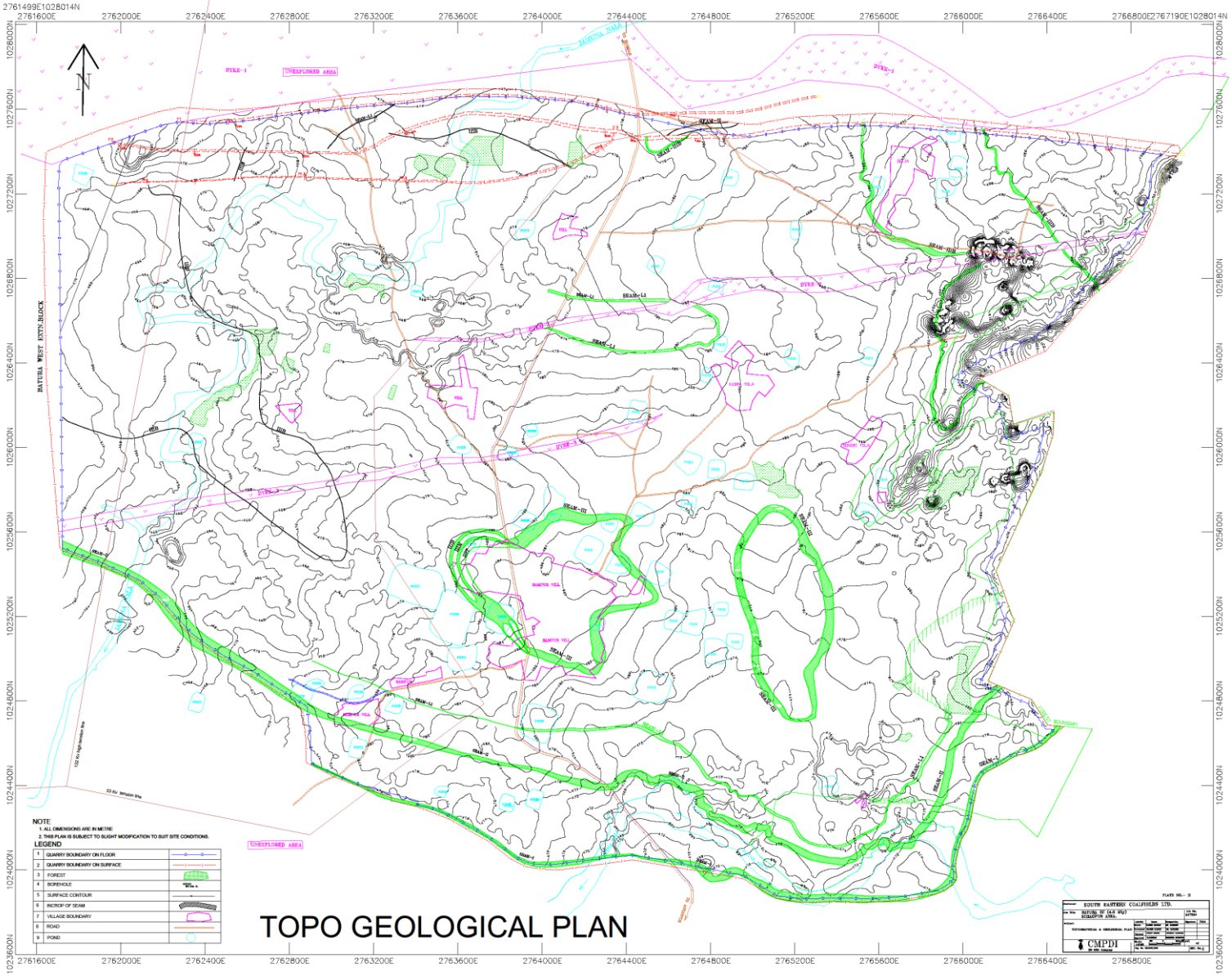
All Functional Directors.

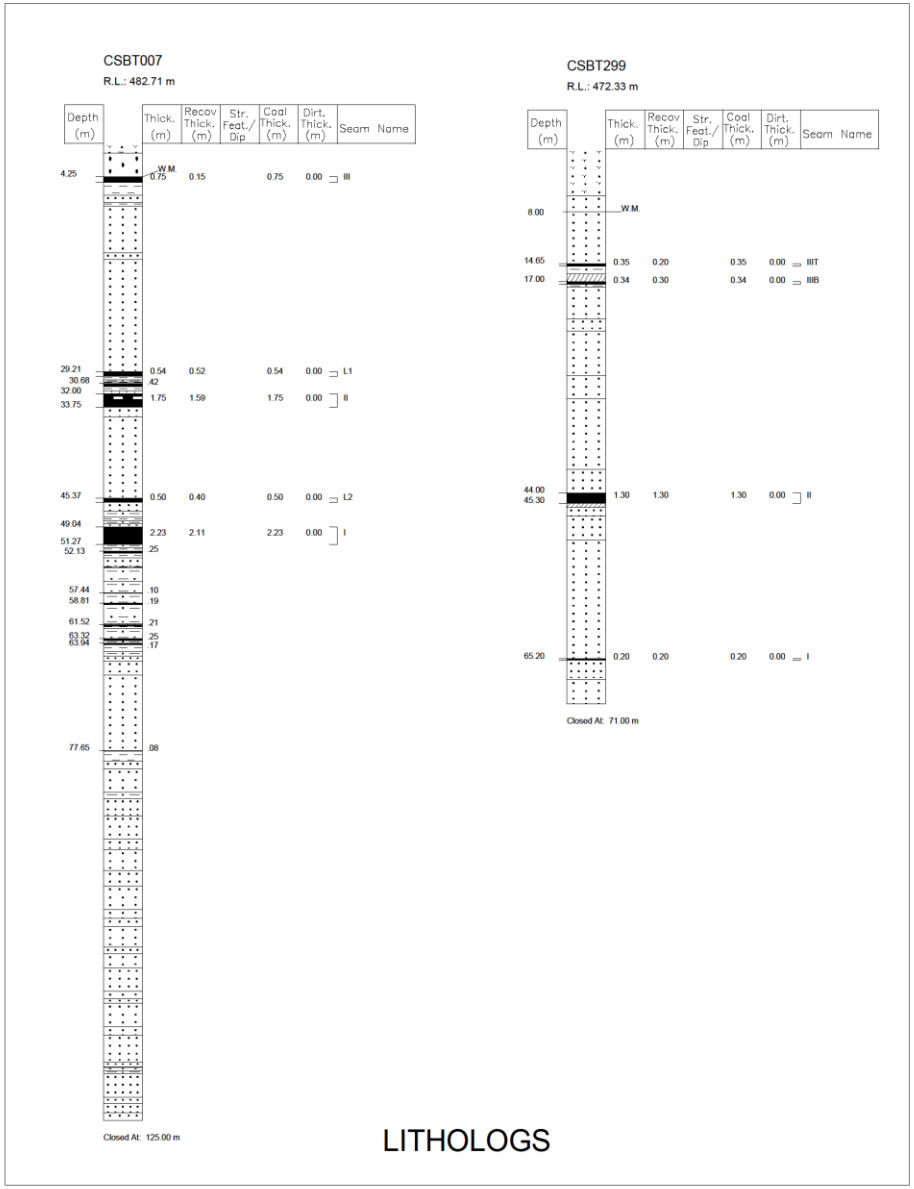
****

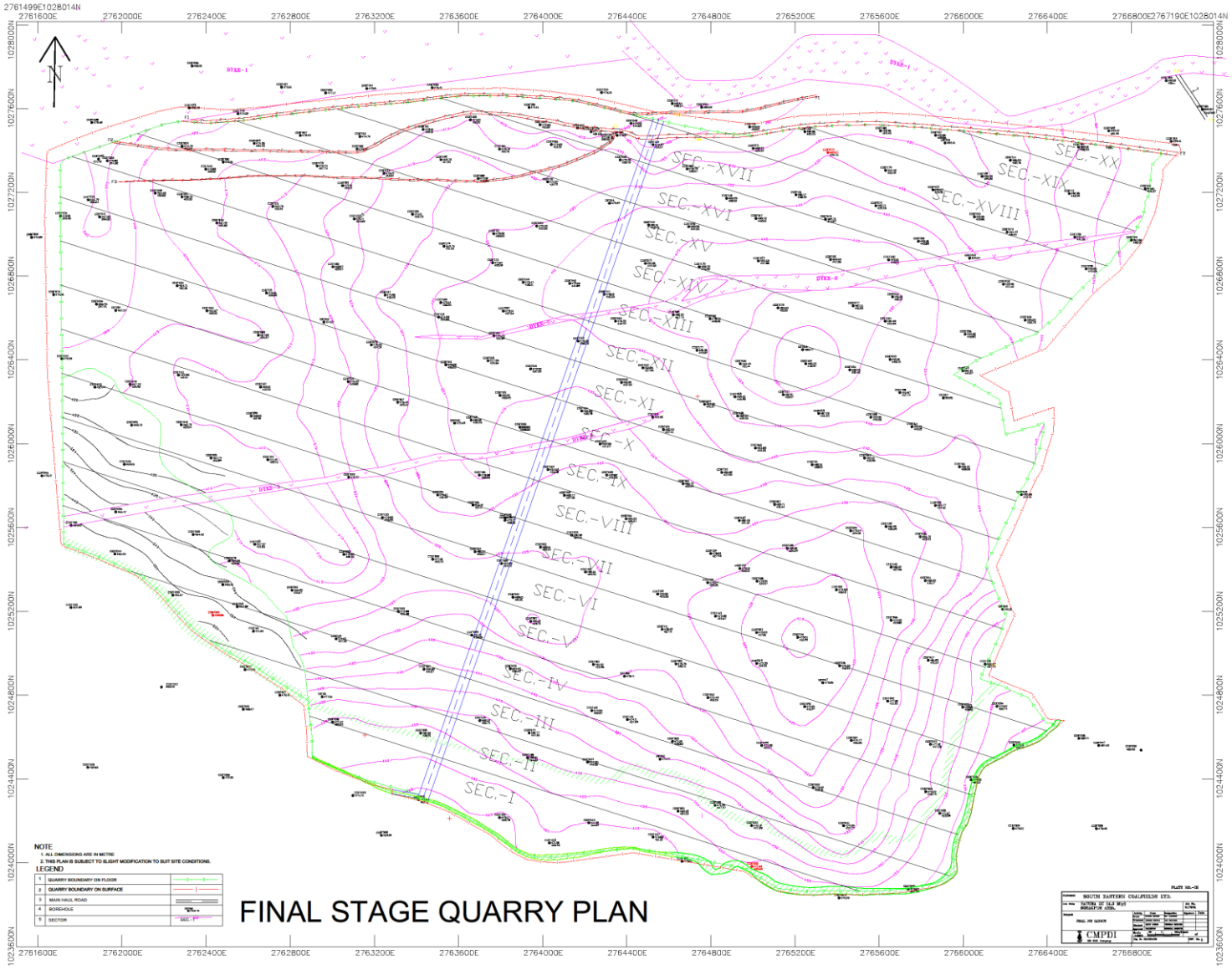
PLANS

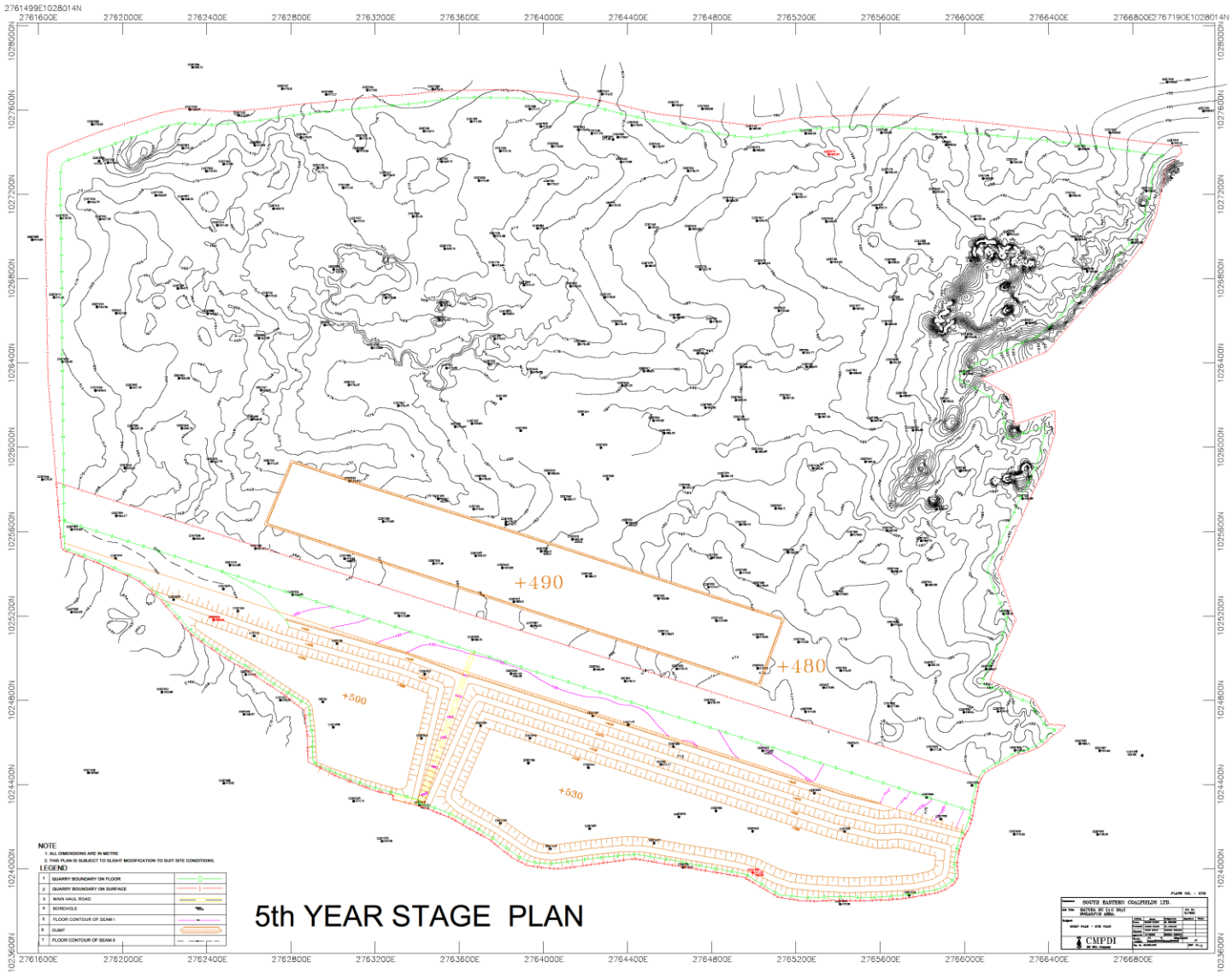
LOCATION PLAN

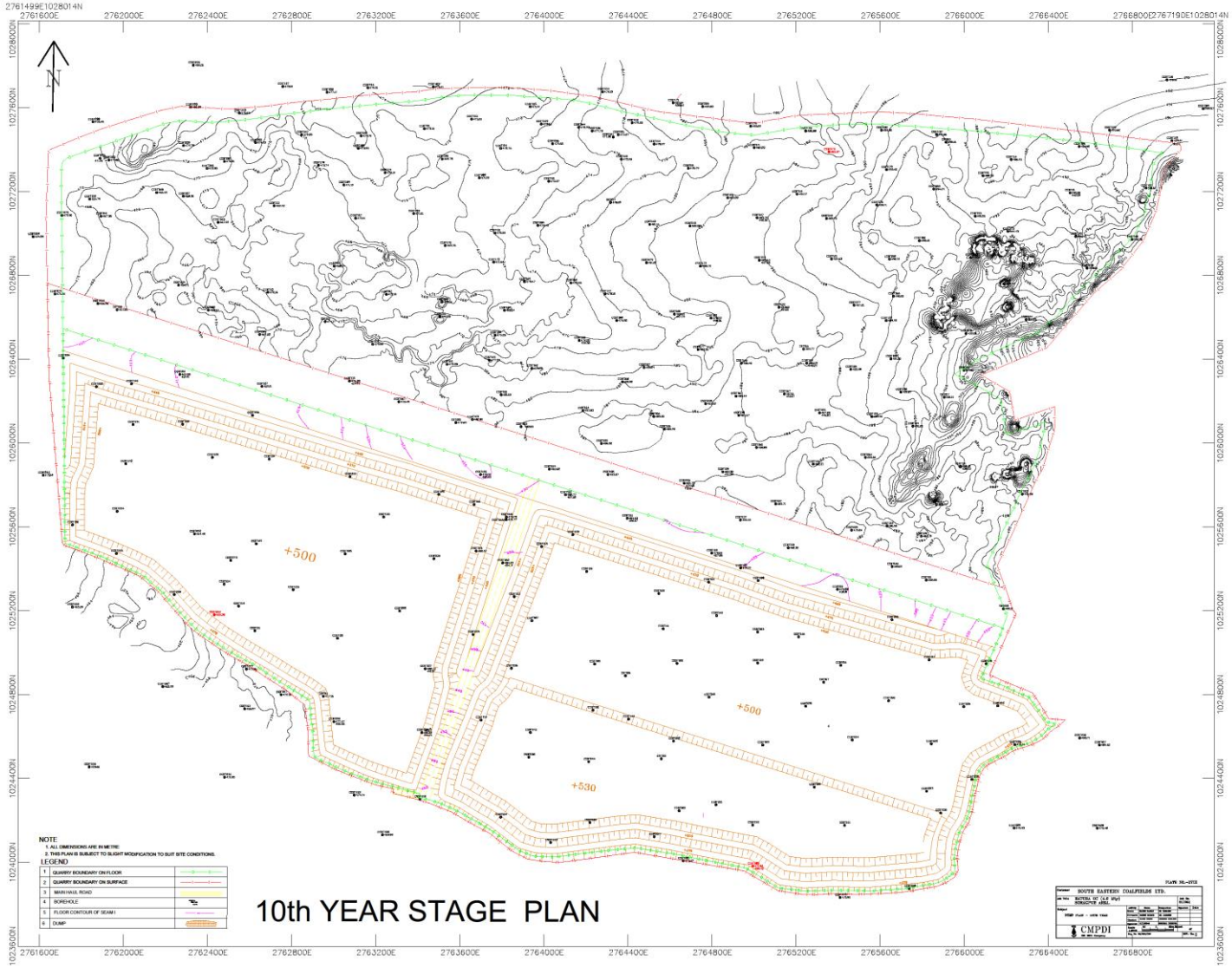


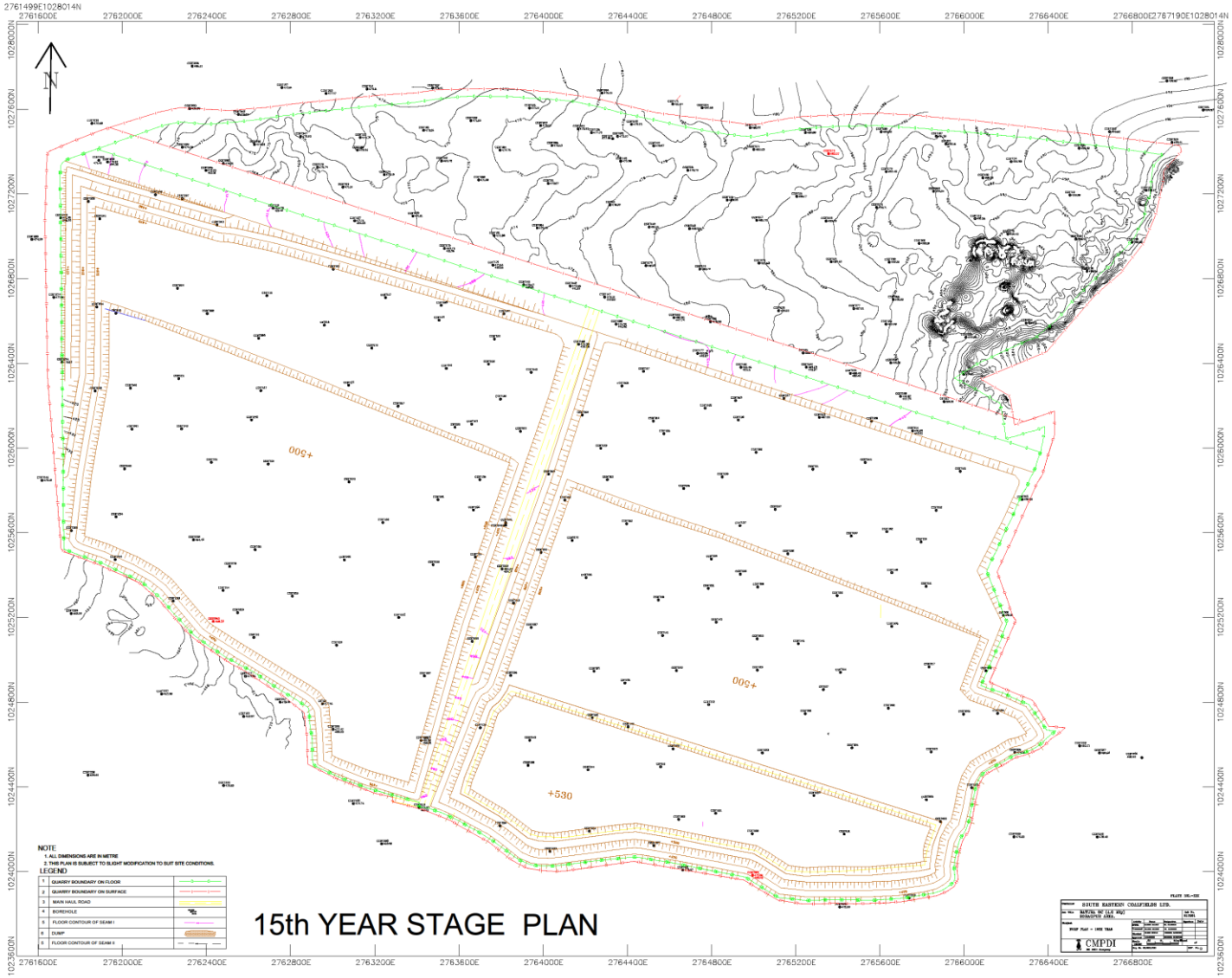

TOPO GEOLOGICAL PLAN
BATURA WEST EXTN. BLOCK
UNEXPLORED AREA
NOTE
1. ALL DIMENSIONS ARE IN METRE
2. THIS PLAN IS SUBJECT TO SLIGHT MODIFICATION TO SUIT SITE CONDITIONS.
LEGEND
1 QUARRY BOUNDARY ON FLOOR
2 QUARRY BOUNDARY ON SURFACE
3 FOREST
4 BOREHOLE
5 SURFACE CONTOUR
6 INCROP OF SEAM
7 VILLAGE BOUNDARY
8 ROAD
9 POND
SOUTH EASTERN COALFIELDS LTD.
CMPDI

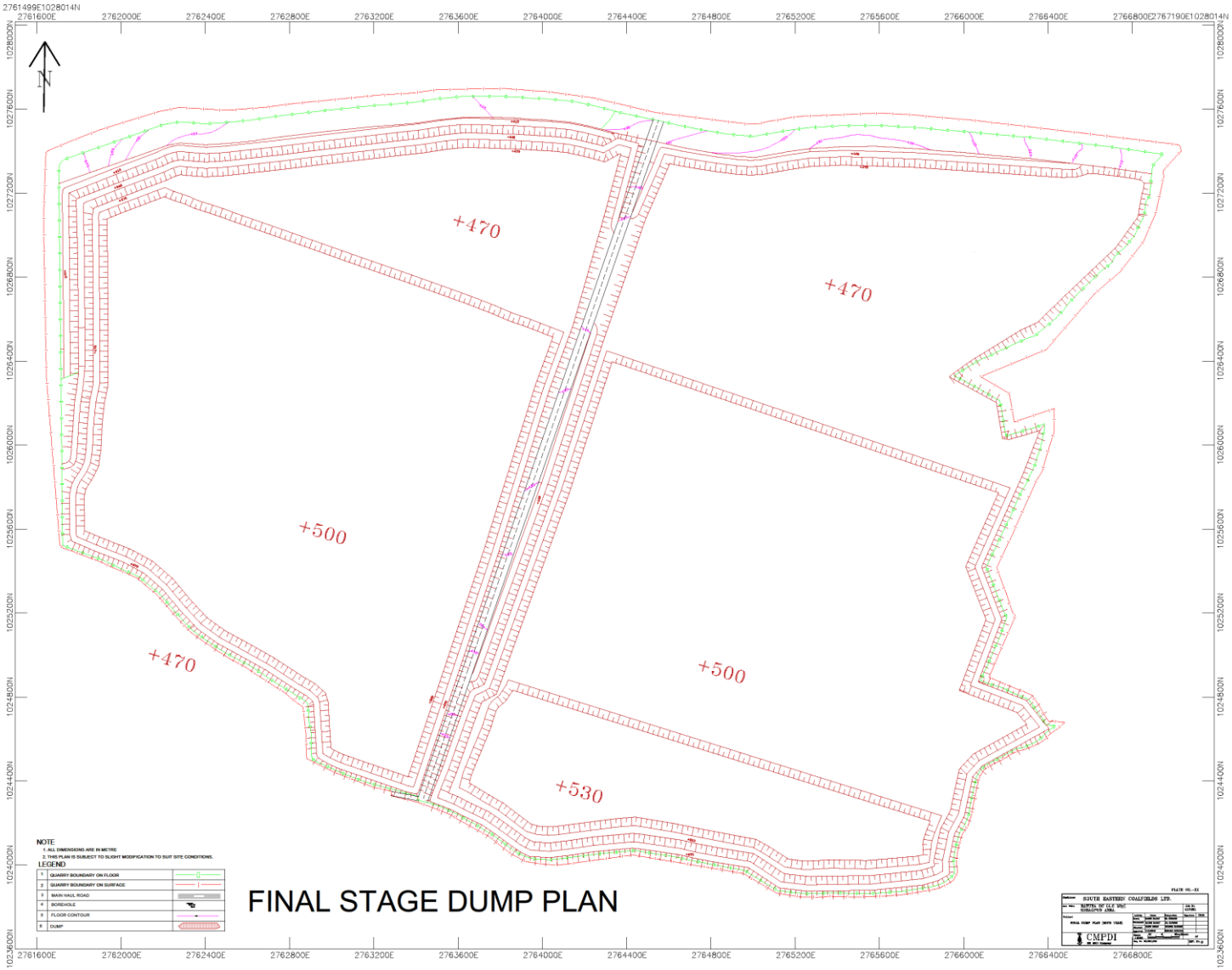

CSBT007
R.L.: 482.71 m
Depth (m)
Thick. (m)
Recov Thick. (m)
Str. Feat./ Dip
Coal Thick. (m)
Dirt. Thick. (m)
Seam Name
4.25
W.M.
0.75
0.15
0.75
0.00
III
29.21
30.68
32.00
33.75
0.54
42
1.75
0.52
1.59
0.54
1.75
0.00
0.00
L1
II
45.37
49.04
51.27
52.13
0.50
2.23
25
0.40
2.11
0.50
2.23
0.00
0.00
L2
I
57.44
58.81
61.52
63.32
63.94
10
19
21
25
17
77.65
08
Closed At: 125.00 m
CSBT299
R.L.: 472.33 m
Depth (m)
Thick. (m)
Recov Thick. (m)
Str. Feat./ Dip
Coal Thick. (m)
Dirt. Thick. (m)
Seam Name
8.00
W.M.
14.65
17.00
0.35
0.34
0.20
0.30
0.35
0.34
0.00
0.00
IIIT
IIIB
44.00
45.30
1.30
1.30
1.30
0.00
II
65.20
0.20
0.20
0.20
0.00
I
Closed At: 71.00 m
LITHOLOGS

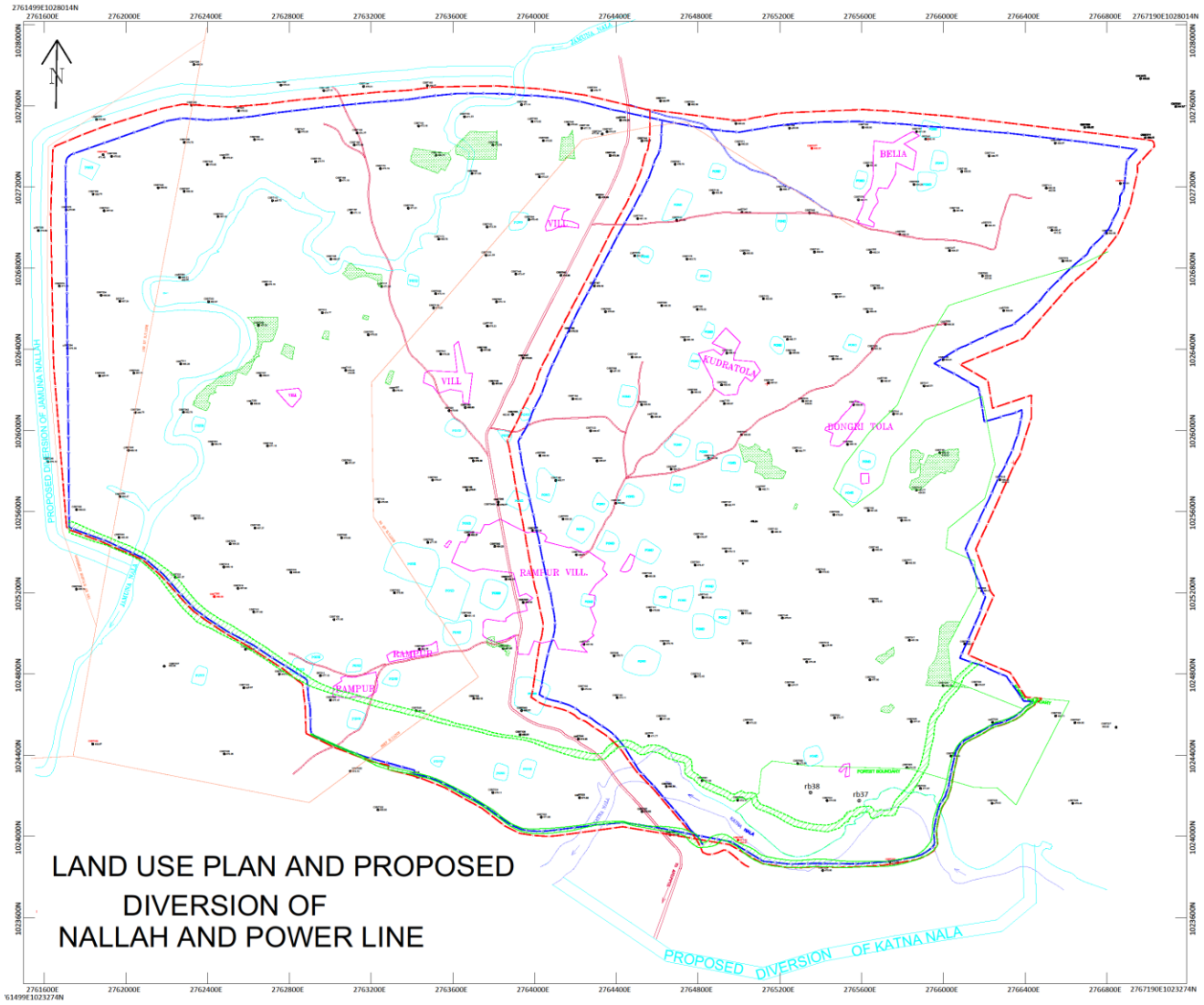

FINAL STAGE QUARRY PLAN
SEC.-I
SEC.-II
SEC.-III
SEC.-IV
SEC.-V
SEC.-VI
SEC.-VII
SEC.-VIII
SEC.-IX
SEC.-X
SEC.-XI
SEC.-XII
SEC.-XIII
SEC.-XIV
SEC.-XV
SEC.-XVI
SEC.-XVII
SEC.-XVIII
SEC.-XIX
SEC.-XX
NOTE
1. ALL DIMENSIONS ARE IN METRE
2. THIS PLAN IS SUBJECT TO SLIGHT MODIFICATION TO SUIT SITE CONDITIONS.
LEGEND
1 QUARRY BOUNDARY ON FLOOR
2 QUARRY BOUNDARY ON SURFACE
3 MAIN HAUL ROAD
4 BOREHOLE
5 SECTOR
SOUTH EASTERN COALFIELDS LTD.
CMPDI


2761499E1028014N
2761600E
2762000E
2762400E
2762800E
2763200E
2763600E
2764000E
2764400E
2764800E
2765200E
2765600E
2766000E
2766400E
2766800E2767190E1028014N
1028000N
1027600N
1027200N
1026800N
1026400N
1026000N
1025600N
1025200N
1024800N
1024400N
1024000N
1023600N
+490
+480
+500
+530
NOTE
1. ALL DIMENSIONS ARE IN METRE
2. THIS PLAN IS SUBJECT TO SLIGHT MODIFICATION TO SUIT SITE CONDITIONS.
LEGEND
1 QUARRY BOUNDARY ON FLOOR
2 QUARRY BOUNDARY ON SURFACE
3 MAIN HAUL ROAD
4 BOREHOLE
5 FLOOR CONTOUR OF SEAM I
6 DUMP
7 FLOOR CONTOUR OF SEAM II
5th YEAR STAGE PLAN
SOUTH EASTERN COALFIELDS LTD.
CMPDI


10th YEAR STAGE PLAN
+500
+500
+530
NOTE
1. ALL DIMENSIONS ARE IN METRE
2. THIS PLAN IS SUBJECT TO SLIGHT MODIFICATION TO SUIT SITE CONDITIONS.
LEGEND
QUARRY BOUNDARY ON FLOOR
QUARRY BOUNDARY ON SURFACE
MAIN HAUL ROAD
BOREHOLE
FLOOR CONTOUR OF SEAM I
DUMP
SOUTH EASTERN COALFIELDS LTD.
CMPDI


15th YEAR STAGE PLAN
NOTE
1. ALL DIMENSIONS ARE IN METRE
2. THIS PLAN IS SUBJECT TO SLIGHT MODIFICATION TO SUIT SITE CONDITIONS.
LEGEND
1 QUARRY BOUNDARY ON FLOOR
2 QUARRY BOUNDARY ON SURFACE
3 MAIN HAUL ROAD
4 BOREHOLE
5 FLOOR CONTOUR OF SEAM I
6 DUMP
5 FLOOR CONTOUR OF SEAM II
+500
+500
+530
CMPDI


+470
+470
+500
+470
+500
+530
FINAL STAGE DUMP PLAN
NOTE
1. ALL DIMENSIONS ARE IN METRE
2. THIS PLAN IS SUBJECT TO SLIGHT MODIFICATION TO SUIT SITE CONDITIONS.
LEGEND
1 QUARRY BOUNDARY ON FLOOR
2 QUARRY BOUNDARY ON SURFACE
3 MAIN HAUL ROAD
4 BOREHOLE
5 FLOOR CONTOUR
6 DUMP
CMPDI


LAND USE PLAN AND PROPOSED
DIVERSION OF
NALLAH AND POWER LINE
PROPOSED DIVERSION OF KATNA NALA
PROPOSED DIVERSION OF JAMUNA NALLAH
BELIA
VILL
KUDRATOLA
DONGRI TOLA
RAMPUR VILL.
RAMPUR
FOREST BOUNDARY
rb38
rb37

****