SUMMARISED DATA

Sl. No.	PARTICULARS	UNIT	Partial Hiring Option
A.	**GENERAL**		
1	Name of Project	Name	Hindustan Lalpeth Expn. OC
2	Name of Area / Company	Name	Chandrapur Area / WCL
3	Nearest Railway Station from project	Name km	Chandrapur Rly. Stn. 4 km
4	Nearest National / State Highway / Approach road	Name km	State Highway No.-19 3 km
B.	**GEOLOGICAL**		
1	Name of geological blocks considered	Name	Hindustan Lalpeth OC Block
2	Area of the geological blocks	sq. km	1.18
3	Borehole Density within blocks	BHs / km^2	27
4	Description of all coal seams within block		

	Name of Seam (Top to Bottom)	**General Thickness Range (m)**	**Balance Geological Reserves (Mt)**
	Composite Coal Seam	13.15 – 19.30	6.523 (as on 1.4.2015)
	TOTAL		**6.523**

C.	**TECHNICAL**							
1	Area of the proposed mine block (with break-up of different geological blocks)				sq. km		1.18 (Including existing mine area)	
2	Borehole density within mine area (surface area)				BHs/km^2		27	
3	Mine parameters a) Extent along strike b)Extent along dip (at floor)				km km		2.310 0.425 – 0.880	
4	Description of coal seams proposed to be worked **(EXPANSION AREA ONLY)**							
	Name of Seam (As per CMPDI)	Mining Area (sq. km)	Thickness Range (m)	Av. Seam/ Parting Thickness (m)	GCV Range (kCal/kg) (Without contamination at roof and floor)	Av. Gradient	Mineable reserves (Mt)	Volume of OB (Mm^3)
	RE-HANDLING OF BACKFILLED OB FROM THE SOUTHERN PART OF EXISTING HINDUSTAN LALPETH OC MINE (SOLID)							13.85
	TOP OB	0.4583	75 - 175	125	-	-	-	44.153
	Composite Coal Seam	0.2857	13.15-19.30	16	4105-4527 (AVG 4328)	1 in 4 to 1 in 6	5.87	-
	TOTAL						**5.87**	**58.003**

Sl. No.	PARTICULARS	UNIT	Partial Hiring Option
5.1	Av. Stripping Ratio (without re-handling of OB)	m^3/t	7.522
5.2	Av. Stripping Ratio (with re-handling of OB)	m^3/t	9.881
6	Method of Mining		Inclined Slicing, Shovel-Dumper Combination
7	Target Output		
	Nominal Production Capacity (at 100%)	Mt	1.00
	Peak Production Capacity (at 125%)	Mt	1.25
	Production Capacity (at 85%)	Mt	0.85
8	Year of achieving Target Production (from zero date)	Year	5th Year
9	Year of start of Internal Dumping	Year	1st Year
10	Production Phasing (from zero date upto target year)	Zero date is 01.04.2014	1st Year – 0.65 Mty 2nd Year – 0.65 Mty 3rd Year - 0.65 Mty 4th Year – 0.70 Mty 5th Year – 1.00 Mty
11	Total Mine Life (at Nominal Production Capacity)	Year	8
	Pre-Construction Period	Year	NIL
	Construction Period	Year	NIL
	Production build-up period	Year	4
	Production period	Year	3
	Tapering / mine closure period	Year	1
12	Major HEMM Deployed for Coal (Addl/Upgraded)	Capacity / Unit	
	Shovel	4-5 m^3 dies. hyd. B/H	1
	Dumper	60T RD Dumper	4
	Drill	160 mm dia.	1
	Dozer	320 HP	1
13	Major HEMM Deployed for Top OB		
	Shovel	5-6 m^3 Dies. hyd.Shovel	1
	Dumper	60T RD Dumper	11
	Drill	160 mm dia.	2
	Dozer	320 HP	2
14	Total Manpower Req. (incl welfare manpower)		518
	Existing manpower as on 01.04.2015 (projected)	Nos.	563
	Additional Requirement (+) / Surplus (-)		(-)45
15	Overall OMS (Output per Man Shift)	t	7.313
	Existing OMS (HLOC)	t	2.56

Sl. No.	PARTICULARS	UNIT	Partial Hiring Option

16	Seam-wise weighted average grade of coal (non-coking / coking)		G-10 (4328 kCal/kg) Non-Coking
17	Presence of Major Surface Constraints		Acquisition of All Right of Forest Land, Shifting of houses from encroached area, Diversion of Overhead HT & LT Lines & Roads, Dismantling of Quarters & Service Bldg. Etc.
18	Coal Transport within the mine In-pit belt conveying system or by Truck)		By Truck
19	Surface Coal Transport to Siding		By Road
20	Any Railway Siding		
21	Name of any Specific Customer / Industry		Misc.
D.	**ENVIRONMENTAL & OTHERS**		
1	Civil Construction Residential houses Housing satisfaction	 Nos. %	No additional residential houses have been proposed in the report.
2	Water demand Colony *Industrial	 KL KL	 NIL 270
*Note : Industrial Water Demand includes the water requirement of out-sourcing agency.			
3	Total land to be acquired Government land Tenancy land Forest Land (type of forest)	 Ha Ha Ha	NIL Diversion of 36.98 ha from Mining Right to Surface Right
4	Land to be acquired within minetake area (excavation area)	Ha	Diversion of 36.98 ha from Mining Right to Surface Right for Excavation purpose and Safety Zone
5	Land to be acquired outside minetake area (for service & residential purposes)	Ha	NIL
6	Land to be acquired for external dumping	Ha	NIL
7	Net Present Value of Forest Land a) Total Area b) Total value	 Ha Rs. Crores	 36.98 2.3149
8	Habitation & Rehabilitation No. of villages within mine boundary No. of land oustees No. of PAFs to be rehabilitated	Nos	300 houses built up in the encroached area on WCL / Forest Land to be shifted

Sl. No.	PARTICULARS	UNIT	Partial Hiring Option

9	Cost of land (As per Appendix-A1) a) WDV of existing land b) Additional Cost	Rs. Crores Rs. Crores Rs. Crores	13.2861 NIL 13.2861
10	Capital for Env. Pollution Control measures	Rs. Crores	WDV of existing EMP Capital – 0.1097
11	Average annual rainfall	mm	1250
12	Make of water	lps	402
13	Total installed pumping capacity	lps	480
14	Drainage of the Area	River/Nala	Erai river
15	Any proposed diversion of nala or power line	Diversion of two feeders of Overhead Power lines (11kV and 440V) has been proposed in this report.	
E.	**FINANCIAL**		
1.	Total Capital Investment WDV of Existing Capital as on 01.04.2015 Additional Capital	Rs. crores	57.6626 17.5956 40.0670
2	Specific Investment (Total)	Rs./tonne Rs./m^3 (Incl.RH)	576.63 54.89
3	Total Capital Investment on P&M (Total incl. WDV)	Rs. Crores	27.8700
4	Specific Investment on P&M (Total incl. WDV)	Rs./tonne Rs./m^3 (with RH)	278.70 26.53
5	Capital Requirement upto target year (Additional)	Rs. crores	40.0670
6	Year of opening of Revenue Account (from zero date)	Year	1st Year
7	Earnings per manshift (EMS)	Rs.	2725.19
8	Estimated Cost of Production At 100% production level At 85% production level	Rs./t	 1907.05 2095.69
9	Estimated average selling price (at 95% sales realization) i) For Power Sector ii) For Non-Power Sector	Rs./t	 991.99 1324.11
10.1	Estimated Profit For Power Sector At 100% production level At 85% production level	Rs./t	 (-) 915.06 (-) 1103.70

Sl. No.	**PARTICULARS**	**UNIT**	**Partial Hiring Option**

10.2	Estimated Profit For Non-Power Sector			
	At 100% production level		Rs./t	(-) 582.94
	At 85% production level			(-) 771.58
11	Financial Internal Rate of Return			
	At 100% production level		%	-ve
	At 85% production level			-ve
12.1	Desired average selling price to yield 12% FIRR			
	At 100% production level			2183.39
	At 85% production level		Rs./t	2414.70
13	Cost of Outsourcing (average)			
	OB		Rs./m^3	75.09
	Re-handling of OB		Rs./m^3	66.80
14	Mine Closure Cost (for corpus fund)		Rs./t	58.59
15	Expected Completion Capital		Rs. crores	66.5341
16	Diff. between notified selling price and desired selling price to yield 12% IRR at 85% capacity			
	a) For Power Sector	Rs/t		(-) 1422.71
	b) For Non-Power Sector			(-) 1090.59

PRE – PLANNING INTERACTIVE PROCESSING

Hindustan Lalpeth OC Mine is located in Wardha valley Coalfield and is surrounded by Mana UG mine in the west, Hindustan Lalpeth colliery in the east and Nandgaon UG mine in the South. This mine lies 4 km south of Chandrapur district headquarter which is about 170 Km from Nagpur in Maharashtra State.

Project Report of Hindustan Lalpeth OC mine was prepared in March 1979 for target capacity of 0.59 Mty. The total mineable reserves and total volume of OB were 11.22 Mt and 34.92 Mm3 respectively at an average stripping ratio of 1:3.11. The PR was approved by WCL Board for the total initial capital of Rs. 1188.60 lakhs. The excavation work was started in August, 1985.

After the exhaustion of coal reserves upto the dip side limit of the above PR, a Scheme was prepared to extract 2.53 Mt coal in the dip side beyond PR limit at an average Stripping Ratio of 1:6.13. The present HLOC mine is being operated as per the approved Scheme of 2008. The balance coal and OB of the approved Scheme

are 0.588 Mt and 2.084 Mm3 respectively as on 1.4.2013 which will be completely extracted upto 31.03.2014. Recently, a proposal has been given administrative approval to extract 0.38 Mt coal in 2014-15 without any capital expenditure by extending the quarry in the dip side beyond the PR/Scheme limit (upto the limit of forest land) after exhaustion of coal reserves of the approved Scheme.

Coal reserves are available in the dip side of the mine upto major fault F4-F4 (Throw-100m). A part of the dip side reserve has been partly extracted by underground method of mining through Nandgaon UG mine. It is not possible to extract balance coal over stowed goaf in some panels and also in standing pillars in other panels by underground method of mining. It is therefore proposed to extract the dip side coal reserves upto fault F4-F4 (virgin as well as partly worked out panels) by extending the existing Hindustan Lalpeth OC mine in dip side area. This will provide additional 6.25 Mt coal beyond approved PR/Scheme limit. Excluding 0.38 Mt coal proposed to be extracted beyond PR/Scheme limit in 2014-15 through administrative approval, the balance coal reserve available for extraction by HLOC Expansion mine works out to **5.87 Mt** and the life be **8 years** from 01.04.2015.

All the existing infra-structure as well as manpower of existing mine will be utilized by the proposed Hindustan Lalpeth Expansion OC mine.

The Project Report of Hindustan Lalpeth Expansion OC mine was submitted to WCL in March, 2013 for a target production of 1.0 Mty. The above PR was discussed in the meeting of Technical Sub-Committee of WCL Board on 26.06.2013 at WCL (HQ), Nagpur. During the deliberations, the Committee directed to update the PR considering the following for placement to WCL Board :

1. Capital cost related to Haul Road, CHP, Residential Buildings should be reviewed with an objective of optimization of additional capital required for the project.

2. 1.8m^3 hydraulic shovel to be provided in place of 2.7m^3 Diesel hydraulic backhoe.

3. 30 - 40 Te Crane to be provided in place of 18 – 20 Te Crane and 5.7 m^3 Front End Loader.

4. GM (IR) to indicate scope of deployment of surplus from existing manpower in the other mines of WCL having requirement duly approved by competent authority. Otherwise the cost of this surplus manpower to be charged to this project.

Subsequently, GM (IR), WCL, vide his letter no. WCL/IR/MP/1939 dated 11.10.2013 addressed to CGM (P&p), WCL has communicated that 45 surplus manpower of the mine can be gainfully utilized in other Units/Areas where there is requirement.

Accordingly, the Final PR of Hindustan Lalpeth Expansion OC mine was updated for Partial Hiring Option in the month of October, 2013 incorporating the decisions taken by TSC of WCL Board on 26.06.2013

The PR was discussed in WCL Board and it was sent back to Technical Sub-Committee of WCL Board for Projects for review. Accordingly, the PR was again discussed in the Technical Sub-Committee of WCL Board held on 16.01.2014 at WCL (HQ), Nagpur. During the deliberations, the committee directed to review the

PR Capital Cost related to Excavation Workshop, Water Supply, Sub-station etc. with an objective to optimize additional capital requirement for the project before placement to WCL Board.

After detailed deliberation, the Committee recommended to WCL Board after incorporating the above for the following :

1. Approval for the Project Report of Hindustan Lalpeth Expansion OC mine with a capacity of 1.00 Mty (Obtaining EC for a Peak capacity of 1.25 Mty) with updated Capital requirement on Partial Hiring of Equipment at a desired selling price which will yield 12% IRR at 85% capacity.

2. Permission to identify prospective customer for entering into Coal Supply Agreement on Cost Plus Basis as the PR is not yielding the requisite 12% IRR at 85% capacity.

Accordingly, the Final PR of Hindustan Lalpeth Expansion OC mine has been updated **for Partial Hiring Option** in the month of January, 2014 incorporating the decisions taken by TSC of WCL Board as follows :

Sl. No.	Points to be considered in the Updation of PR	Compliance in the Updated PR of October, 2013
A)	**as per the direction of TSC of WCL Board on 26.06.2013**	
1	Capital cost related to Excavation Haul Road, CHP, residential Buildings should be reviewed with an objective of optimization of additional capital required for the project.	The capital cost related to CHP has been optimized. No provision of residential buildings has been made in the updated PR in lieu of dismantled 160 quarters. The capital provision for haul road has been optimized.
2	1.8 m^3 hydraulic shovel to be provided in place of 2.7 m^3 Diesel hydraulic Backhoe.	Incorporated in the updated PR of October, 2013

Sl. No.	Points to be considered in the Updation of PR	Compliance in the Updated PR of October, 2013
3	30-40 Te crane to be provided in place of 18-20 Te crane and 5.7 m^3 Front end loader.	Incorporated in the updated PR of October, 2013

4	GM (IR) to indicate scope of deployment of surplus from existing manpower in the other mines of WCL having requirement duly approved by competent authority. Otherwise the cost of this surplus manpower to be charged to this project.	GM (IR), WCL, vide his letter no. WCL/IR/MP/1939 dated 11.10.2013 addressed to CGM (P&p), WCL has communicated that 45 surplus manpower of the mine can be gainfully utilized in other Units/Areas where there is requirement. Hence, the updated PR has been prepared for Partial Hiring option considering 518 manpower as the surplus 45 manpower (exising 563 manpower as on 1.4.2015-actual requirement of 518 manpower) will be gainfully utilized in other Units/Areas.
B)	**as per the direction of TSC of WCL Board on 16.01.2014**	
1	To review the PR Capital Cost related to Excavation Workshop, Water Supply, Sub-Station with an objective to omtimise additional capital requirement for the project	1. The capital cost related to Excavation Workshop and Water Supply has been optimized. 2. The existing Sub-Station at new location has been maintained in the PR and proposal of new 33 kV Sub-station has been withdrawn. However, to keep the contract demand of electricity within the permissible limit, the Electric Shovel proposed for OB has been changed to diesel shovel.

Sl. No.	**Points to be considered in the Updation of PR**	**Compliance in the Updated PR of October, 2013**
		3. To optimise the capital requirement, some proposed new common HEMM including 30/40T Crane, 28 kL Water

		Sprinkler etc. have been removed in updated PR as the existing common HEMM will serve the purpose for remaining 8 years. , 4. Capital provision on Service Buildings as well as service roads has been withdrawn.

The important milestone dates involved in the preparation of PR are as follows :

1.	Exploration of Block		
	by MECL	---	July' 1976 – March' 1978
	by CMPDI	---	June' 1978 – Nov' 1980, June'1986, July'09 to Oct'09
2.	Preparation of Geological Report & Note	---	Feb'80 (MECL), Feb'84 CMPDI) March' 2002 (GN by CMPDI)
3.	Preparation of PR of Hindustan Lalpeth OC mine for target production of 0.59 Mty	---	March, 1979
4.	Preparation of Scheme to extract 2.53 Mt coal beyond the PR limit (after exhaustion of coal reserves of PR of 1979)	---	2008
5.	Administrative approval to extract 0.38 Mt Coal beyond PR/Scheme Limit.	---	2013
6.	PREPARATION OF PR OF HINDUSTAN LALPETH EXPANSION OC MINE		
6.1	Preparation of Draft Project report for all the three Options namely Departmental, Partial Hiring and Total Hiring Option	---	October, 2012
6.2	Presentation of Draft Project Report at CMPDI (HQ), Ranchi	---	10.01.2013
6.3	Presentation of Draft Project Report in Planning Committee meeting, WCL (HQ)	---	18.02.2013

6.4	Preparation of Project Report of Hindustan Lalpeth Expansion OC mine	---	March, 2013
7.	Meeting of Technical Sub-Committee of WCL Board to discuss the Expansion PR	---	26.06.2013
8.	Updation of PR of Hindustan Lalpeth Expansion OC after incorporating the decision taken in TSC meeting on 26.6.2013	---	October, 2013
10.	Meeting of Technical Sub-Committee of WCL Board to again discuss the Expansion PR	---	16.01.2014
11.	Updation of PR of Hindustan Lalpeth Expansion OC after incorporating the decision taken in TSC meeting on 16.01.2014	---	January 2014

The Project Report of Hindustan Lalpeth Expansion OC mine has been prepared under the guidance of Regional Director, CMPDI, RI-IV, Nagpur with the co-operation and assistance of various departments of CMPDI, RI-IV, WCL (HQ), Chandrapur Area and Hindustan Lalpeth OC mine.

BRIEF OF CHAPTERS

1.0 INTRODUCTION

1.1 Background of the Expansion Project Report

Hindustan Lalpeth OC Mine extending over an area of about 1.18 sq. km, is located in Wardha valley Coalfield and is surrounded by Mana UG mine in the west, Hindustan Lalpeth colliery in the east and Nandgaon UG mine in the South. This mine lies 4 km south of Chandrapur district headquarter which is about 170 Km from Nagpur in Maharashtra – State (Survey of India Toposheet No.56 M/5).

Project Report of Hindustan Lalpeth OC mine was prepared in March 1979 for target capacity of 0.59 Mty. The total mineable reserves and total volume of OB were 11.22 Mt and 34.92 Mm3 respectively at an average stripping ratio of 1:3.11. The PR was approved by WCL Board for the total initial capital of Rs. 1188.60 lakhs. The excavation work was started in August, 1985.

After the exhaustion of coal reserves upto the dip side limit of the above PR, a Scheme was prepared to extract 2.53 Mt coal in the dip side beyond PR limit at an average Stripping Ratio of 1:6.13. The present HLOC mine is being operated as per the approved Scheme of 2008. The balance coal and OB of the approved Scheme are 0.588 Mt and 2.084 Mm3 respectively as on 1.4.2013 which will be completely extracted upto 31.03.2014. Recently, a proposal has been given administrative approval to extract 0.38 Mt coal in 2014-15 without any capital expenditure by extending the quarry in the dip side beyond the PR/Scheme limit (upto the limit of forest land) after exhaustion of coal reserves of the approved Scheme.

Coal reserves are available in the dip side of the mine upto major fault F4-F4 (Throw-100m). A part of the dip side reserve has been partly extracted by underground method of mining through Nandgaon UG mine. It is not possible to extract balance coal over stowed goaf in some panels and also in standing pillars in other panels by underground method of mining. It is therefore proposed to extract the dip side coal reserves upto fault F4-F4 (virgin as well as partly worked out panels) by extending the existing Hindustan Lalpeth OC mine in dip side area. This will provide additional 6.25 Mt coal beyond approved PR/Scheme limit. Excluding 0.38 Mt coal proposed to be extracted beyond PR/Scheme limit in 2014-15 through administrative approval, the balance coal reserve available for extraction by HLOC Expansion mine works out to **5.87 Mt** and the life of mine will be extended by **8 years** starting from 01.04.2015.

All the existing infra-structure as well as manpower of existing mine will be utilized by the proposed Hindustan Lalpeth Expansion OC mine.

1.2 Present Status of the Mine

The brief status of the existing opencast mine are as follows:

a) Production

The total coal reserves and OB removal anticipated in the approved Scheme of Hindustan Lalpeth OC mine were 2.53 Mt and 15.50 Mm3 respectively. Out of this, 1.942 Mt coal and 13.416 Mm3 OB have been extracted from the mine upto 31.03.2013. The total balance coal and OB of the Scheme as on 1.4.2013 are 0.588 Mt and 2.084 Mm3 respectively which will be excavated till 31.03.2014.

The production of coal and OB re4moval from Hindustan Lalpeth OC mine in last five years are tabulated below :

Particulars	2008-09	2009-10	2010-11	2011-12	2012-13	Balance as on 1.4.2013
Coal Production (Mt)	0.2923	0.905	0.618	0.511	0.454	0.588
OB Removal (Mm3)	2.2574	7.1011	1.946	1.672	2.715	2.084
Stripping ratio (m3/t)	7.723	7.846	3.149	3.272	5.980	3.544

Recently, a proposal has been given administrative approval to extract 0.38 Mt coal in 2014-15 without any capital expenditure by extending the quarry in the dip side beyond the PR/Scheme limit (upto the limit of forest land) after exhaustion of coal reserves of the approved Scheme.

b) Land

Total land acquired for Hindustan Lalpeth OC including Hindustan Lalpeth Extension Phase-I & Phase-II and Mana Incline is 633.10 ha. Out of this 633.10 ha land, the land acquired for Hindustan Lalpeth OC mine is **311.66** ha comprising of 145.93 ha tenancy land, 93.89 ha Govt land and 71.84 ha forest land. This 311.66 ha land of Hindustan Lalpeth OC mine has been acquired under All Right (253.71 ha) and under Mining Right (57.95 ha).

c) Manpower

Existing manpower in Hindustan Lalpeth OC mine as on 16.3.2013 is as follows :

Executives	-	37
Monthly rated	-	101
Daily Rated	-	462
Total	-	600

d) Financial Performance in Last Three Years

The Financial Performance of the mine for last three years is as follows :

Sl. No.	Particulars	2010-11	2011-12	2012-13
1.	Coal Production (Mt)	0.618	0.511	0.454
2.	OB Removal (Mm3)	1.946	1.672	2.715
3.	OMS (t)	2.82	2.56	1.62
4.	EMS (Rs.)	1703.08	2151.89	2655.58
5.	Cost of Production (Rs./t) :	1365.06	1976.29	2296.49
6.	Sale Value of coal (Rs./t)	1636.10	1257.36	1449.72
7.	Profit (+) / Loss (-) (Rs./t)	+271.04	(-) 718.93	(-) 846.77
8.	Total Profit (Rs. in crores)	16.7604	(-) 36.735	(-) 38.4378

1.3 JUSTIFICATION OF PREPARATION OF EXPANSION PR

1.3.1 The present Hindustan Lalpeth OC mine is being operated as per the approved Scheme of 2008 and the entire coal reserves of the Scheme will be extracted upto 31.03.2014. A proposal has been given administrative approval to extract 0.38 Mt coal in 2014-15 without any capital expenditure in the dip side beyond the PR/Scheme limit after exhaustion of coal reserves of the approved Scheme. However, beyond 31.03.2015, further extraction of coal from dip side area will require many capital activities and hence prepararion and approval of the Expansion PR is necessary to work the coal reserves from dip side property.

1.3.2 Coal reserves is available in the dip side of the mine upto major fault F4-F4 (Throw-100m). A part of the dip side reserve has been partly extracted by underground method of mining through Nandgaon UG mine. It is not possible to extract balance coal over stowed goaf in some panels and also in standing pillars in other panels by underground method of mining. It is therefore proposed to extract the dip side coal reserves upto fault F4-F4 (virgin as well as partly worked out panels) by extending the existing Hindustan Lalpeth OC mine in dip side area. This will provide additional 5.87 Mt coal (excluding 0.38 Mt coal to be extracted in 2014-15) for extraction by HLOC Expansion mine and the life of mine will be extended by 8 years from 1.4.2015.

1.3.3 All the existing infra-structure as well as manpower of existing mine will be utilized by the proposed Hindustan Lalpeth Expansion OC mine.

1.4 SALIENT FEATURES OF PRESENT EXPANSION PR

1.4.1 The Project Report of Hindustan Lalpeth Expansion OC mine has envisaged expansion of existing Hindustan Lalpeth OC in the dip side (eastern side) upto fault F4-F4. The existing OC mine has already reached upto fault F4-F4 in the northern part and therefore it is proposed in this report to expand the mine in the central and southern side and the northern part of the mine will be used for internal OB dumping. Delhi-Chennai broad gauge main railway line passes in the eastern dip side of the Hindustan Lalpeth OC mine and therefore the dip eastern side quarry surface boundary of the Expansion mine is limited upto 45m distance of the Railway acquired land.

1.4.2 The existing mine has a total strike length of about 2.3 km and about half of the existing quarry from southern end has been completely filled with internal dumping and this dump has been heightened upto 30 to 45m from the surface level. The proposed Expansion area lies in the dip side of this internal dump area and therefore a major portion of the rise side internal OB dump will have to be re-handled.

There is very limited land available in the adjoining area for external OB dumping and therefore, it has been proposed in this PR to accommodate

maximum possible OB dumping in the northern side of the de-coaled void of the existing mine as the dip side limit of northern side quarry has reached upto major fault F4-F4 and there is no scope for further extension of quarry in this area because of no coal zone beyond this fault.

However, to maximize internal dumping, haul road has been planned through the present internal dump area in the southern side to approach the expansion area. This haul road has been planned along the benches to be formed in the backfilled OB in the rise side of proposed expansion area to minimize the re-handling of the existing backfilled OB. Formation of proper benches as well as haul road in the existing backfilled OB requires re-handling of 13.85 Mm3 OB (solid). The total in-situ OB excavation proposed in the Expansion area works out to 44.153 Mm3 (solid) and thus total dump capacity required to accommodate both in-situ OB and re-handling OB is 44.153 + 13.85 = 58.003 Mm3. In addition to this, balance OB excavation (as on 1.4.2013) in the existing mine upto 01.04.2015 will be about 4.443 Mm3 (balance 2.084 Mm3 as per approved Scheme + 2.359 Mm3 for 0.38 Mt coal extraction in 2014-15) which is presently being dumped internally in the northern side quarry. Thus the total volume of OB dump of the proposed Expansion mine including the OB of existing mine upto 31.03.2015 works out to 62.446 Mm3 which will be accommodated in the following dumps :

Sl. No.	OB DUMP	In-situ Volume (Mm3) (Solid)
OB DUMP FOR 2013-2015		
1	Internal Dump	4.443
	Sub-Total	
OB DUMP FOR EXPANSION MINE BEYOND 1.4.2015		
1	Internal Dump	48.003
2	External Dump	10.000
	Sub-Total	**58.003**
	TOTAL	**62.446**

The total extractable reserves, OB removal and stripping ratio in different Cuts/Sectors of the proposed Expansion mine are tabulated below :

Sl. No.	Cut / Sector	Position of Cut / Sector	Extrac-table Reserves (Mt)	In-Situ OB (Mm3)	Stripping Ratio without Rehandling (m3/t)	Rehan-dling OB (Mm3) (Solid)	Stripping Ratio with Rehandling (m3/t)
1	Cut - I	Dip Side of Existing Mine (110m FRL) to 85m FRL	2.18	16.401	7.523		
2	Cut - II	85m FRL to 60m FRL	1.89	16.432	8.694		
3	Cut - III	60m FRL to 28m FRL	1.80	11.320	6.289		
	TOTAL		**5.87**	**44.153**	**7.522**	**13.850**	**9.881**

A target production of 1.00 Mty has been considered for the proposed Hindustan Lalpeth Expansion OC mine which will be achieved in the 5th year. The life of the proposed Expansion mine works out to 8 years.

1.4.3 The existing Hindustan Lalpeth OC mine is being implemented with partial outsourcing of HEMM for part of OB removal. The PR of Hindustan Lalpeth Expansion OC mine was prepared by CMPDI in March 2013 for three options namely Departmental, Partial Hiring and Total Hiring option. The PR was discussed in the meeting of Technical Sub-Committee of WCL Board on 26.06.2013. During the deliberations, the Committee directed to update the PR for placement to WCL Board:

Accordingly, the Final PR of Hindustan Lalpeth Expansion OC mine was updated for Partial Hiring Option in the month of October, 2013 incorporating the decisions taken by TSC of WCL Board on 26.06.2013

The PR was discussed in WCL Board and it was sent back to Technical Sub-Committee of WCL Board for Projects for review. Accordingly, the PR was again discussed in the Technical Sub-Committee of WCL Board held on 16.01.2014 at WCL (HQ), Nagpur. During the deliberations, the committee

directed to review the PR Capital Cost related to Excavation Workshop, Water Supply, Sub-station etc. with an objective to optimize additional capital requirement for the project before placement to WCL Board.

After detailed deliberation, the Committee recommended to WCL Board after incorporating the above for the following :

3. Approval for the Project Report of Hindustan Lalpeth Expansion OC mine with a capacity of 1.00 Mty (Obtaining EC for a Peak capacity of 1.25 Mty) with updated Capital requirement on Partial Hiring of Equipment at a desired selling price which will yield 12% IRR at 85% capacity.

4. Permission to identify prospective customer for entering into Coal Supply Agreement on Cost Plus Basis as the PR is not yielding the requisite 12% IRR at 85% capacity.

Accordingly, the Final PR of Hindustan Lalpeth Expansion OC mine has been updated **for Partial Hiring Option** in the month of January, 2014 incorporating the decisions taken by TSC of WCL Board as follows :

Sl. No.	**Points to be considered in the Updation of PR**	**Compliance in the Updated PR of October, 2013**
A)	**as per the direction of TSC of WCL Board on 26.06.2013**	
1	Capital cost related to Excavation Haul Road, CHP, residential Buildings should be reviewed with an objective of optimization of additional capital required for the project.	The capital cost related to CHP has been optimized. No provision of residential buildings has been made in the updated PR in lieu of dismantled 160 quarters. The capital provision for haul road has been optimized.
2	1.8 m^3 hydraulic shovel to be provided in place of 2.7 m^3 Diesel hydraulic Backhoe.	Incorporated in the updated PR of October, 2013

3	30-40 Te crane to be provided in place of 18-20 Te crane and 5.7 m^3 Front end loader.	Incorporated in the updated PR of October, 2013
4	GM (IR) to indicate scope of deployment of surplus from existing manpower in the other mines of WCL having requirement duly approved by competent authority. Otherwise the cost of this surplus manpower to be charged to this project.	GM (IR), WCL, vide his letter no. WCL/IR/MP/1939 dated 11.10.2013 addressed to CGM (P&p), WCL has communicated that 45 surplus manpower of the mine can be gainfully utilized in other Units/Areas where there is requirement. Hence, the updated PR has been prepared for Partial Hiring option considering 518 manpower as the surplus 45 manpower (exising 563 manpower as on 1.4.2015-actual requirement of 518 manpower) will be gainfully utilized in other Units/Areas.

Sl. No.	**Points to be considered in the Updation of PR**	**Compliance in the updated PR of January 2014**
B)	**as per the direction of TSC of WCL Board on 16.01.2014**	
1	To review the PR Capital Cost related to Excavation Workshop, Water Supply, Sub-Station with an objective to omtimise additional capital requirement for the project	5. The capital cost related to Excavation Workshop and Water Supply has been optimized. 6. The existing Sub-Station at new location has been maintained in the PR and proposal of new 33 kV Sub-station has been withdrawn. However, to keep the contract demand of electricity within the permissible limit, the Electric Shovel proposed for OB has been changed to diesel shovel. 7. To optimise the capital requirement, some

		proposed new common HEMM including 30/40T Crane, 28 kL Water Sprinkler etc. have been removed in updated PR as the existing common HEMM will serve the purpose for remaining 8 years. , 8. Capital provision on Service Buildings as well as service roads has been withdrawn.

1.4.4 In Partial option, it is proposed to maintain the existing departmental capacity of the mine to extract the entire coal production and balance capacity will be used to remove OB by departmental equipment. Rest entire OB and re-handling of OB will be done by hiring of HEMM. The total capital investment proposed in this option is **Rs 57.6626** including WDV of existing capital items of **Rs. 17.5956 crores** and the IRR of the Project is negative at 85% capacity utilization. The desired selling price to yield 12% IRR at 85% production capacity works out to **Rs. 2414.70/t.**

1.4.5 The Project Report of Hindustan Lalpeth Expansion OC mine has been planned for annual production target of 1.00 Mty. However, in favourable conditions in some of the years of mine life, the peak production may go upto 125% of the target production, i.e. upto 1.25 Mty. The existing EMP of the mine has been approved for 1.00 Mty and fresh EMP clearance for the mine would be required for ther peak production capacity of 1.25 Mty.

1.4.6 <u>Points to be considered under FLEXIBILITY</u>

The Project Report of Hindustan Lalpeth Expansion OC mine has been planned with the resources, information and technology available at the time of preparation of PR. However, during the implementation phase or in future, some variations from the Expansion Project Report because of availability of more information and/or better technology, are allowed provided these variations are beneficial for the project from economical point of view and are within the approved capital of the Project.

Following variations from the approved Expansion Project Report are allowed during implementation of the project or in future :

a) The land details of the leasehold area given in the PR is based on the data given in the Scheme prepared by the Mine/Area for Expansion of Hindustan Lalpeth OC mine. This has not been checked by the actual Govt. land records because of non-availability of these records. Any variation in land details given by Mine/Area in the Scheme from actual Govt land records will have to be adjusted accordingly.

b) The proposed method of mining in the Project Report of Hindustan Lalpeth Expansion OC is Inclined Slicing with shovel dumper combination. The project has a revenue life of 8 years from 01.04.2015 onwards. In future better technology or equipment may be available with cost and other benefits. Under such circumstances, the technology and or equipment proposed in the Expansion PR alongwith other facilities may be changed provided they are beneficial for the mine from economical point of view and are within the sanctioned capital of the project.

c) No specific linkage or fuel supply agreement exists for the existing Hindustan Lalpeth OC mine as well as for the proposed Hindustan Lalpeth Expansion OC mine.

1.5 DIFFICULTIES AND CONSTRAINTS IN MINING WITH ASSOCIATED RISK

Following are the difficulties and constraints with associated risk in the proposed Hindustan Lalpeth Expansion OC mine :

1. Diversion of Forest Land from Mining Right to All Right

For the proposed Hindustan Lalpeth Expansion OC mine, about 36.98 ha forest land acquired earlier under Mining Right is required to be diverted under All Right for opencast mining. This diversion of forest land from Mining Right to All Right is the most critical activity for expansion of mine.

2. Re-habilitation for Encroachment in WCL Land and Forest Land at HLC

About 300 houses exist in the dip side of existing Hindustan Lalpeth OC mine as Encroachment on WCL land and Forest land. This land will be required for the proposed Expansion mine partially for excavation and partially for 100m safety zone. Shifting and rehabilitation of these families are critical activities for proposed Expansion OC mine.

3. Construction of coal Transportation Road (2.10 km) and Public Approach Road (1.20 km)

The existing coal transportation road as well as public approach road to Nandgaon, Mana and Hindustan Lalpeth OC mine will have to be diverted because of proposed expansion of mine. About 2.10 km diversion road for coal transportation and 1.20 km diversion road for public approach road will have to be constructed in further eastern dip side beyond the surface boundary of Expansion quarry. This is one of the essential activities for the Expansion of mine

4. Diversion of Power Transmission Line

Two feeders of 11 kV overhead lines each of 3.00 km length (one HT Line and another LT Line) pass through the proposed Expansion area of Hindustan Lapeth OC mine which are required to be diverted. The provision for diversion has been made in the Expansion PR and this is one of the major activities to be done for mine development.

5. Re-handling of OB Dump of Existing Hindustan Lalpeth OC mine

The existing mine has a total strike length of about 2.3 km and about half of the existing quarry from southern end has been completely filled with internal dumping and this dump has been heightened upto 30 to 45m from the surface level. The proposed Expansion area lies in the dip side of this internal dump area and therefore the rise side internal OB dump will have to be re-handled.

There is very limited land available in the adjoining area for external OB dumping and therefore, it has been proposed in this PR to accommodate maximum possible OB dumping in the northern side of the de-coaled void of the existing mine as the dip side limit of northern side quarry has reached upto major fault F4-F4 and there is no scope for further extension of quarry in this area because of no coal zone beyond this fault.

However, to maximize internal dumping, haul road has been planned along the benches to be formed in the backfilled OB in the rise side of proposed expansion area to minimize the re-handling of the existing backfilled OB. Formation of proper benches as well as haul road in the existing backfilled OB requires re-handling of 13.85 Mm3 OB (solid). Rehandling of this much OB is one of the most critical activities for the proposed Expansion mine.

2.0 MARKETABILITY

Following table shows the deficit in availability of coal, including middlings, from the various Existing, Completed, On-going, and Future Projects of WCL:

(Fig. in Mt)

Sl. No.	Sector	Projections of Surplus / Deficit of Coal			
		2016-17	2021-22	2026-27	2031-32
1	Demand for coal	62.686	62.737	62.662	62.726
2	Availability of coal	45.000	44.500	44.136	43.358
3	Surplus / Deficit (+/-)	**(-) 17.686**	**(-) 18.237**	**(-) 18.526**	**(-) 19.368**

From the above table, it is clear that the deficit in supply of coal from WCL as a whole is increasing every year. New mines/ projects have to be opened or expansion of existing operating mines has to be done by WCL in order to meet the ever increasing demand of coal. There is a deficit in supply of coal from the mines of WCL and therefore a ready market exists for the additional coal to be produced from proposed Hindustan Lalpeth Expansion OC mine. In

view of the readily available market for coal and huge gap in demand and supply of coal from WCL, the Expansion PR of Hindustan Lalpeth OC mine is fully justified. At present the Hindustan Lalpeth OC mine has target capacity of 0.633 Mty and there will not be any difficulty in marketing of increased production upto level of 1.00 Mty from proposed Hindustan Lalpeth Expansion OC mine.

3.0 PROJECT SITE INFORMATION

3.1 Location

3.1.1 Hindustan Lalpeth OC Mine extending over an area of about 1.18 sq. km is located in Wardha valley Coalfield and is surrounded by Mana UG mine in the west, Hindustan Lalpeth colliery in the east and Nandgaon UG mine in the South. This mine lies 4 km south of Chandrapur district headquarter which is about 170 Km from Nagpur in Maharashtra State. The block falls in Survey of India Topo Sheet No. 56 M/5.

3.2 Accessibility & Communication

Hindustan Lalpeth OC mine is located about 4 km south of Chandrapur district headquarter and is well connected by road. Chandrapur is about 170 km from Nagpur and connected by all weather road and rail. Nearest railway head is Chandrapur which is on Delhi- Chennai broad gauge main line.

3.3 Physiography & Drainage

Most of the area in the block is covered under blanket of Soil & alluvium. This area is slightly undulating plains. The nearby Erai River flows from North to South at the western end about 1 km from mine. HFL recorded in the area is 180.267m on 15th Sept.1959. Climate is of extreme nature with temperature varying from 10 deg.C to 48 deg.C.

4.0 GEOLOGY AND DEPOSIT APPRAISAL

4.1 Hindustan Lalpeth OC area has been explored in different phases by MECL & CMPDI. Following reports have been submitted on the basis of regional, detailed and production drilling :

i) Geological Report on exploration of Coal in Hindustan Lalpeth – Mahakali- Rayatwari Colliery Area, Wardha Valley Coalfield, Dist. Chandrapur (MECL-Feb 1980)

ii) Geological Report on Babupeth Block, Wardha valley Coalfield, Dist: Chandrapur (CMPDI-Feb 1984)

iii) Geological Note on Production Support drilling in a part of Hindustan Lalpeth OC, Distt. Chandrapur (MS), CMPDI, March 2002.

4.2 Details of Drilling

MECL and CMPDIL have drilled 51 boreholes in & around Hindustan Lalpeth OC area involving a total meterage of 5694.64m as detailed below :

Borehole Series	Within Mining Block Boundary		Outside Mining Block Boundary		Total		Remarks
	No. of Boreholes	Metreage	No. of Boreholes	Metreage	No. of Boreholes	Metreage	
WHL	7	676.60	4	733.60	11	1410.20	MECL, July'76 to March'78
CMWH	17	1480.30	12	1596.70	29	3077.00	CMPDI, June'78 to Nov'80
CMWHL	4	503.00	2	185.80	6	688.80	CMPDI, June'86 & July'09 to Oct'09
WCL	4	403.64	1	115.00	5	518.64	WCL Colliery Borehole
Total	**32**	**3063.54**	**19**	**2631.10**	**51**	**5694.64**	

Borehole Density

The density of the boreholes for the whole of Hindustan Lalpeth OC mine including Expansion area under report is about 27 Bhs/sq.km. (No. of BHs 32, Area 1.18 Sq.Kms)

4.3 Geological Structure of Hindustal Lalpeth OC Block

4.3.1 Hindustan Lalpeth OC block is narrow wedge shaped area lying between one major fault and sub crop. It is narrow in the Northern part and broad in the southern part. Structure of the Block is mainly based on the sub-surface data obtained from the boreholes drilled in the area. Spot levels at the floor of composite seam are not available. The coal is being extracted from this Hindustan Lalpeth OC mine and there is no report of any structural disturbance during mining.

4.3.2 Dip and Strike

The general strike in the proposed block area varies from NNW-SSE in the north to NW-SE in the south. Seam is dipping easterly. The gradient of seam varies from 1 in 4 to 1 in 6 with approximate corresponding dip 9^0 to 14^0.

4.3.3 Faults :

Two major faults forms the boundary of HLOC. However, no other fault is encountered in the mine working or in the boreholes drilled in the area. Occurrence of minor faults cannot be ruled out.

4.4 Description of Coal Seams

4.4.1 Detailed exploration in HLOC area has proved the existence of composite seam of Wardha Valley Coalfield. The composite seam has been split into three sections- Section 1, Section 2 and Section 3 from top to bottom. These sections have been delineated on the basis of thickness, nature of roof/floor and intervening parting. However, in this Project, composite seam thickness and quality has been calculated including all bands irrespective of their thickness and nature as the entire Composite Seam including all in-seam bands is being extracted in the existing mine.

The thickness of composite seam varies from **13.15m to 19.30m.** The details of the Composite Coal Seam including all Seam Sections and Parting are detailed below :

Parameters	Range	
	Minimum	Maximum
Depth Range of floor (m)	14.05 (CMWH 23)	172.00 (WHL 38)
Thickness Range (m)	13.15 (CMWH 65)	19.30 (WCL 02)
No. of Bands (No.)	4 (CMWH 18)	11 (WHL 28)
Thickness of individual bands (m)	0.06 (CMWH 10)	1.65 (CMWH 18)
Cumulative thickness of bands (m)	2.82 (CMWH 12)	5.05 (CMWHL 05)
Immediate Roof	Mostly sandstone, sometimes carb.shale/shale/clay	
Immediate Floor	Mostly sandstone, sometimes shale/carb.shale/l.Cal.	

4.4.2 Quality Parameters

The quality parameters of the composite coal seam on Air Dried basis are tabulated below :

Quality Parameters	Without Dilution (Roof to Floor)		With Dilution (0.05m dilution in roof and floor)	
	Minimum	Maximum	Minimum	Maximum
Moisture %	3.3 (WHL-28)	11.1 (WHL-34 & 38)	3.3 (WHL-28)	11.1 (WHL-38)
Ash %	28.9 (WHL-37)	42.2 (CMWHL-05)	29.2 (WHL-37)	42.4 (CMWHL-05)
GCV (kCal/kg)	3784 (CMWHL-05)	4880 (CMWH-25)	3779 (CMWHL-05)	4867 (CMWH-25)
UHV (kCal/kg)	2317 (CMWHL-05)	3835 (CMWH-25)	2304 (CMWHL-05)	3808 (CMWH-25)

4.5 Geological Reserves

Occurrence of Composite Seam of Wardha Valley Coalfield has been well established in Hindustan Lalpeth OC area. In the present assessment, In-situ reserves have been estimated for the composite seam i.e. roof to floor including all bands irrespective of their thickness and nature for the entire Hindustan Lalpeth mining block (including already extracted reserves). All reserves have been classified under proved category. Depth-wise, GCV-wise and thickness-wise in-situ coal reserves of Composite Seam in Hindustan Lalpeth OC mining block in the sub-crop zone and between sub-crop to dip side mine boundary are given below :

Fig. in '000 tonnes

GCV Range (kCla/kg)	Thickness Range of Composite Coal Seam (m)				
	12-14	14-16	16-18	18-20	Total
Depth Range 15m – 50m (Sub-Crop Zone)					
3700 - 4000					**0.000**
4000 - 4300		38.773	519.669		558.442
4300 - 4600		130.779	196.139		326.916
4600 - 4900			200.157		200.157
Sub-Total		**169.552**	**915.965**		**1085.517**

Depth Range 15m – 50m (Sub-Crop to Mine Boundary)					
3700 - 4000					**0.000**
4000 - 4300		56.022	406.323		**462.345**
4300 - 4600		129.548	321.040		**450.588**
4600 - 4900			293.281		**293.281**
Sub-Total		**185.570**	**1020.644**		**1206.214**
Depth Range 50m – 100m (Sub-Crop Zone)					
3700 - 4000					**0.000**
4000 - 4300			21.505		**21.505**
4300 - 4600					
4600 - 4900			7.347		**7.347**
Sub-Total			**28.852**		**28.852**

GCV Range (kCla/kg)	**Thickness Range of Composite Coal Seam (m)**				
	12-14	**14-16**	**16-18**	**18-20**	**Total**
Depth Range 50m – 100m (Sub-Crop to Mine Boundary)					
3700 - 4000					**0.000**
4000 - 4300		103.983	4277.574		**4381.557**
4300 - 4600	165.422	1074.347	4247.904	82.829	**5570.502**
4600 - 4900		68.752	2026.857		**2095.609**
Sub-Total	**165.422**	**1247.082**	**10552.335**	**82.829**	**12047.668**
Depth Range 100m – 150m (Sub-Crop to Mine Boundary)					
3700 - 4000			543.484		**543.484**
4000 - 4300		210.333	3105.180		**3315.513**
4300 - 4600		848.216	2378.434	169.687	**3396.337**
4600 - 4900			1648.344	16.278	**1664.622**
Sub-Total		**1058.549**	**28.852**	**185.965**	**8919.956**
Depth Range 150m – 200m (Sub-Crop to Mine Boundary)					
3700 - 4000			1868.516		**1868.516**
4000 - 4300		179.573	1035.279		**1214.852**
4300 - 4600			79.534		**79.534**
4600 - 4900			93.223		**93.223**
Sub-Total		**179.573**	**3076.552**		**3256.125**
GRAND TOTAL					

3700 - 4000			2412.000		**2412.000**
4000 - 4300		588.684	9365.530		**9954.214**
4300 - 4600	165.422	2182.890	7223.051	252.516	**9823.879**
4600 - 4900		68.752	4269.209	16.278	**4354.239**
TOTAL	**165.422**	**2840.326**	**23269.790**	**268.794**	**26544.331**

Total 26.544 Mt in-situ coal reserves (including already extracted reserves) have been estimated under proved category in Hindustan Lalpeth OC mining block.

5.0 MINE BOUNDARY, RESERVES AND MINE LIFE

5.1 Mine Boundaries

North : In the northern side, the quarry surface edge of existing Hindustan Lalpeth OC mine define the northern quarry boundary of proposed Hindustan Lalpeth Expansion OC mine.

South : The southern side boundary between the proposed Hindustan Lalpeth Expansion OC mine and Nandgaon UG mine is an arbitrary line passes beyond the southern quarry surface limit of proposed Hindustan Lalpeth Expansion OC mine maintaining a safety zone from the quarry.

East : The eastern dip side quarry floor limit of Expansion mine has been limited upto Fault F4-F4 (in northern and central part) and accordingly quarry surface limit has been planned with proper angle of batter.

In the southern part of the mine, the eastern dip side quarry surface limit has been demarcated leaving safe distance from Delhi-Chennai railway line (45m from Railway acquired land and after leaving space to accommodate Coal transportation road) and accordingly quarry floor limt has been planned with proper angle of dip side batter.

West : The western quarry surface and floor limit of existing Hindustan Lalpeth OC mine define the western quarry boundary of proposed Hindustan Lalpeth Expansion OC mine.

5.2 Mineable Reserves

The total net in-situ geological reserves in the entire Hindustan Lalpeth block has been assessed as 26.544 Mt. Out of this, 20.021 Mt geological reserves are either worked out or being worked through existing mine or blocked under various heads like railway acquired land, batter of opencast mine, small triangular patch in nortehern side, coal transportation road, Nandgaon Basti etc. The existing Hindustan Lalpeth OC mine is being operated under approved Scheme and the total mineable reserves of the Scheme (2.53 Mt) will be exhausted by 2013-14. Recently, a proposal has been given administrative approval to extract 0.38 Mt coal in 2014-15 without any capital expenditure in the dip side beyond the PR/Scheme limit after exhaustion of coal reserves of the approved Scheme. These reserves (2.53 Mt + 0.38 Mt) are also included in the above 20.021 Mt geological reserves. Balance 26.544Mt – 20.021 Mt = 6.523 Mt geological reserves are proposed to be worked by this Hindustan Lalpeth Expansion OC mine after complete exhaustion of mineable reserves of the approved Scheme of existing Hindustan Lalpeth OC mine including 0.38 Mt coal reserves proposed to be extracted beyond PR/Scheme limit upto 31.03.2015.

Considering 10% mining losses, the net mineable reserves in proposed Hindustan Lalpeth Expansion OC mine work out to 6.523 Mt x 0.9 = 5.87 Mt. This includes mineable reserves in virgin area as well as in partly developed / depillared pillars previously worked through Nandgaon UG mine. The break-up of mineable reserves in virgin area and in partly developed/ depillared pillars is tabulated below:

Sl. No.	Particulars	Mineable Reserves (Mt)
1	Virgin Area	3.62
2	In Developed Pillars	1.97
3	In Partly Depillared & Stowed Pillars	0.28
	Total	**5.87**

5.3 Target Output & Mine Life

5.3.1 Target Production

Keeping in view the prevailing geomining conditions, rate of advance as prevalent in WCL mines, average strike length of the quarry and re-handling of OB from southern part of existing quarry to expose coal face, the target production of the Expansion mine has been envisaged as 1.00 Mty. The target production of the existing Hindustan Lalpeth OC mine as per the

approved Scheme is 0.633 Mty. Since, the expansion area lies in dip side of the southern part of existing quarry which is completely filled with OB, initially the production from the expansion mine has been kept as 0.65 Mty for first three years and 0.70 Mty in fourth year as the rehandling of backfilled OB will continue in these four years. The target production (1.00 Mty) will be achieved in 5th year.

The mine is proposed for normal production of 1.00 Mty and peak production of 1.25 Mty.

Zero Date

The zero date of the project is defined as the date of land acquisition (physical possession), PR and EMP approval and other necessary clearance whichever is later. It is envisaged that the first stage approval, cost plus agreement with customer and final approval of PR of Hindustan Lalpeth Expansion OC mine will be completed upto 31st March 2015. The first year of the Expansion project will be 2015-16. No fresh land acquisition is involved in this project and only diversion of forest land from Mining Right to All Right is required which is already under process. Thus, production from proposed Hindustan Lalpeth Expansion OC will start from 2015-16 and therefore, the Zero date of the proposed Expansion project will be 01.04.2015.

5.3.2 Mine Life

The total production life of the proposed Expansion opencast mine is estimated as 8 years staring from zero date i.e., 1.4.2015.

6.0 METHOD OF MINING

6.1 The proposed Hindustan Lalpeth Expansion OC mine is extension of existing Hindustan Lalpeth OC mine, which is presently being worked with Shovel-Dumper combination. It is proposed to work the extension area also with Shovel Dumper combination. The target production has been envisaged as 1.0 Mty.

6.2 Mine Parameters

The geo-mining parameters of the proposed Hindustan Lalpeth Expansion OC mine (including existing quarry) is given below :

Sl. No.	Particulars	Expansion OC including Existing mine area
1	Area of the Quarry	
(a)	Floor (Ha.)	84.19
(b)	Surface (Ha.)	146.77
2.	Quarry Depth	
(a)	Initial (m)	40
(b)	Final (m)	175
3.	Average Gradient of Seam	1 in 4
4.	Composite Seam Thickness	
(a)	Minimum (m)	13.15
(b)	Maximum (m)	19.30
(c)	Average (m)	16.00
5.	Strike Length (m)	2310
6.	Width on Surface - (Dip Rise)	
(a)	Maximum(m)	880
(b)	Minimum(m)	425
7	Wt. Average Quality, GCV kcal/kg	G-10, 4328
8.	Mineable / Extractable Reserves (Mt)	**5.87**
(a)	Cut-I	2.18
(b)	Cut-II	1.89
(c)	Cut-III	1.80

9.	Total OB	**58.003**
(a)	Insitu OB (M.m3) (Sector-I : 16.401) (Sector-II : 16.432) (Sector-III : 11.320)	44.153
(b)	Rehandling OB (Mm3) (Solid)	13.85
Sl. No.	**Particulars**	**Expansion OC including Existing mine area**
10.	Average Stripping Ratio (m3/t) a) Without Rehandling b) With Rehandling	 **7.522** **9.881**
11.	Total OB Dump	**58.003* (as on 1.4.15)**
(a)	Internal Dump (M.m3)	48.003* (as on 1.4.15)
(b)	External Dump (M.m3)	10.00
*** Note –** 4.443 Mm3 OB will be removed in the existing mine upto 2014-15 (2.084 Mm3 of balance OB of the approved Scheme to be removed in 2013-14 + 2.359 Mm3 OB for extraction of 0.38 Mt coal in 2014-15) which will be dumped internally in the existing de-coaled void of the quarry. The total OB dump capacity available as on 1.4. 2013 is 62.446 Mm3, out of which 58.003 Mm3 dump capacity (48.003 Mm3 in internal dump and 10.00 Mm3 in external dump) will be available as on 1.4.2015.		

Note : The strike and dip rise length as well as quarry area on surface and floor given in the above table includes existing Hindustan Lalpeth OC Mine.

6.3 Choice of Technology

Total mineable reserve in the proposed Hindustan Lalpeth Expansion OC mine is only 5.87 Mt which will be extracted in 8 years. Due to limited mineable reserve and life of the mine, the application of dragline method of working is ruled out. Application of Surface Miner is also ruled out in the

proposed mine due to steep gradient of the coal seam (1 in 4 to 1 in 6). Shovel-Dumper system has been considered to be the most suitable method of opencast mining under the prevailing geo-mining conditions. With Shovel-Dumper system, two stripping methods are possible :

1. Inclined slicing method &
2. Horizontal slicing method

In Seam gradient upto 1 in 4, positioning of HEMM is not difficult in inclined slicing method where benches in coal are made parallel to the seam. Hence this method has been proposed in this report. In horizontal slicing, coal and OB are to be excavated in same bench and there is chance of mixing of parting OB with coal thus deteriorating the quality of coal. Since, the gradient of seams in the proposed Expansion mine is 1 in 4 to 1 in 6, the shovel dumper system of mining with Inclined slicing method is recommended for the proposed mine.

6.4 Equipment Selection

The shovel dumper combination technology has been envisaged in the proposed Hindustan Lalpeth Expansion OC mine considering the gradient of coal seam and presence of same technology in the existing opencast mine. Since it is an expansion of existing Hindustan Lalpeth OC mine, it is proposed in this report to absorb the WDV of all the capital items of the existing mine as on 01.04.2015 when the mineable reserves of existing mine (including 0.38 Mt coal proposed to be extracted beyond PR/Scheme limit) will exhaust and production as per the expansion report will start.

Existing Equipment

As per the data supplied by Hindustan Lalpeth OC mine, the details of existing HEMM available in HLOC mine are tabulated below :

Sl. No.	Existing HEMM	Quantity		
		As on Feb'2013	Likely to be added in 2013-14	Total (as on 01.04.2014)
1.	5 m3 Elect. Rope Shovel	2	-	**2**
2.	Hyd. Shovel, BE-300	2	-	**2**
3	Hyd. Shovel, BE-1000	-	1	**1**
3.	60T Dumper	2	2	**4**
4.	50T Dumper	5	-	**5**
5.	35T Dumper	12	-	**12**
6.	160mm Drill	3	-	**3**
7.	250 mm Drill	2	-	**2**
8.	Dozer	7	-	**7**

It is proposed that the existing equipment available in the mine as on 1.4.2015 will be utilized in the Expansion project till their balance life. Thereafter, some of them will be replaced and remaining HEMM will be upgraded to higher sizes HEMM as per the present norms. The details of existing HEMM to be replaced as well as new / upgraded HEMM to be procured in Partial Hiring option have been detailed in Appendix A.3.1.

The major HEMM proposed in Partial Hiring option in Hindustan Lalpeth Expansion OC mine are detailed below.

HEMM FOR PARTIAL HIRING OPTION

Sl. No.	EXISTING HEMM	Qty.	PROPOSED UPGRADATION / REPLACEMENT / ADDITIONAL HEMM (After completion of life of existing HEMM)	Qty.
A	**FOR OB**			
1	5 m3 Rope Shovel	2	Upgraded to 5-6 m3 Dies. Hyd. Shovel	1
2	Hydraulic Shovel (BE-300)	1		
3	Hydraulic Shovel (BE-1000)	1	Hydraulic Shovel (BE-1000	1
4	160 mm Diesel Drill	2	160 mm Diesel Drill	2
5	50T RD Dumpers	5	Upgraded to 60 T RD Dumpers	11
6	35 T RD Dumpers	10		
7	250 mm Drill	2		
8	320 HP Dozer	5	320 HP Dozer	2
B	**FOR COAL**			
1	Hydraulic Shovel (BE-300)	1	Upgraded to 4-5 m3 diesel Hyd. Backhoe	1
2	60T RD Dumpers	4	60T RD Dumpers	4
3	160mm Diesel Drill	1	160mm Diesel Drill	1
4	320 HP Dozer	1	320 HP Dozer	1
5	320 HP Dozer	1	320 HP Dozer	1
C	**FOR COMMON & RECLAMATION**			
1			Water Sprinkler, 28 kL	1
2			Fire Fighting Truck	1
3			Mobile Maintenance Van	2
4			Diesel Bowser, 6-9 kL	1
5			1.8m3 Diesel Hyd. Backhoe	1

6.5 Mining System & System Parameters

6.5.1 Width and Height of Benches

The bench width considered in this report is 20m and 30m for non-working and working benches respectively for planning purpose. The maximum height of benches in overburden considered is 10m, which will be drilled and blasted

in one go. In unconsolidated strata/alluvium soil, the bench height is kept as 5m. In coal, the height of the bench will depend on the thickness of the seam.

In final batter of the quarry, the height of the benches in consolidated strata is 10m and a berm of 5m width will be maintained between two benches. However, in unconsolidated strata/alluvium soil, the bench height considered in final batter is 5m and the bench width (berm) is 10m. Four to five transport horizons will be maintained in the batter at an interval of 30m.

6.5.2 Slope of Benches

a) <u>During Mining Operation</u>

The slope of individual benches depends on the type of strata. In this report, the slope of individual bench is proposed as 45^o in soil, alluvium and clay whereas it is 70^o in hard strata as well as in coal.

The overall slope of the quarry benches during mining operation varies from 15^o to 20^o (from horizontal plane).

Rise side batter remains same in the quarry during mining operation or at the end of the quarry. The overall angle of the rise side batter varies from 30^o to 40^o.

a) <u>At the end of the quarry</u>

The slope of individual benches in the batter at the end of quarry remains same as that during mining operations i.e, 45^o in soil, alluvium and clay and 70^o in hard strata and coal. The overall slope of the quarry benches at the end of the quarry (including transport horizons at intervals of 30m) varies from 35^o to 40^o (from horizontal plane).

6.6 Scientific Study

The height & width and slope of benches discussed in para 6.5.1 and 6.5.2 are for planning purpose. It is proposed in this report to undertake scientific study for determining suitable height & width and slope of benches during operation time as well as in final dip, rise and side batters. Suffiecient capital provision has been made in this Report for above Scientific Study.

7.0 MINING AND DUMPING STRATEGY

7.1 MINING STRATEGY

7.1.1 Volume Regime

Following Cuts/Sectors have been envisaged in Hindustan Lalpeth Expansion OC mine :

Cut-I : Cut-I starts from the limit boundary of approved Scheme with an initial depth of 75m. Seam FRL varies from 115m to 85m in Cut-I.

Cut-II : Cut – II lies between Cut-I & Cut-III where the depth varies from 110m to 137m. Seam FRL varies from 85m to 60m.

Cut-III : It is the last Cut where depth varies from 137m to175m. Seam FRL varies from 60m to 28m.

Cut-wise extractable reserves, OB removal and stripping ratio in proposed Hindustan Lalpeth Expansion OC mine are tabulated below :

Cut / Sector	Depth (m)		Mineable Reserves (Mt)	Total OB (Mm^3)	Stripping Ratio (m^3/t) (Excluding Rehandled OB)	Re-handled OB (Mm3) (Solid)	Stripping Ratio (m^3/t) (Including Rehandled OB)
	From	To					
Cut-I	75	110	2.18	16.401	7.523	13.85	13.877
Cut-II	110	137	1.89	16.432	8.694	-	8.694
Cut-III	137	175	1.80	11.320	6.289	-	6.289
TOTAL			**5.87**	**44.153**	**7.522**	**13.85**	**9.881**

7.1.2 Mine Transport

Shovel Dumper system has been proposed in this report and the coal will be transported by 60 T Rear Discharge Dumpers. 100T and 60T Rear Discharge Dumpers have been proposed for transportation of OB in Departmental and Partial Hiring option respectively.

Haul roads with proper gradient have been proposed separately for coal and Top OB. Coal will be transported by 60 T dumpers from quarry to surface through the haul roads and access trench and thereafter to the existing CHP through surface road. The gradient of haul roads is proposed as 1:16.

For the transportation of OB in Departmental Option, transport horizons (benches) have been proposed in the dip side & side benches/batter at the RLs of 80m, 110m, 140m and 170m. The OB from benches will be transported by 100 T dumpers in departmental option (by 60T dumpers in Partial Hiring option) through these transport horizons and ramps/haul road at suitable intervals will be made to join other benches with the transport benches.

7.1.3 Sequence of Mining

The proposed expansion area lies in the dip side of southern part of existing Hindustan Lalpeth OC mine and this area has been divided into three Sectors/Cuts namely Cut-I, Cut-II & Cut-III from rise to dip. At present, the entire southern part of existing quarry is completely backfilled and heightened upto 30-40m above surface level. Thus, to extract the coal reserves from the expansion area, the rise side backfilled OB will have to be re-handled.

Presently, the existing Hindustan Lalpeth OC mine is being worked in the central part near dip side PR/Scheme limit and the haul road to access the working area lies in the northern part of the quarry. However, in the proposed Hindustan Lalpeth Expansion OC, internal dupming has been proposed in the northern part of the quarry where mine has reached its dip side limit upto fault F4-F4. There is hardly any space available near the mine for external dumping and therefore, it is envisaged in this Expansion PR to accommodate maximum OB dumping in the northern side decoaled void of the quarry and to merge it with the adjoining External Dump and heighten it about 60-90m above surface. Therefore, the present haul road in the northern part of the quarry to access the dip side area can not be maintained because of above internal dumping.

It is, therefore, proposed in this PR to make another haul road in the southern side of the quarry along the benches to be formed in the backfilled OB by rehandling. The re-handled OB will be dumped partly in external dump and partly in the decoaled void of northern side quatrry.

The rehandling of backfilled OB and construction of new haul road in the southern side will take some time and during this period the mine may be worked with existing haul road and the coal reserves of the expansion area will be extracted from northern end (central part of the quarry). The haul road will be completed and re-handling of backfilled OB will be done in first 4 years during complete extraction of Cut-I.

Cut-II of the expansion area will be worked from 4^{th} year to 6^{th} year and thereafter last Cut-III will be worked from 6^{th} year to 8^{th} year.

Year-wise sequence of working of different Cuts is as follows:

Sector/Cut	Year of Operation
Cut – I & OB Rehandling	1st to 4th Year
Cut - II	4th to 6th Year
Cut - III	6th to 8th Year

7.2 DUMPING STRATEGY

In the proposed Hindustan Lalpeth expansion OC mine, total volume of OB works out to 58.003 Mm3 (44.153 Mm3 in-situ OB + 13.850 Mm3 rehandled OB). There is hardly any space available in the adjoining area of proposed

Hindustan Lalpeth Expansion OC mine for external OB dumping. Therefore, planning of the proposed mine has been done to ensure maximum internal dumping so that external dumping could be minimized as far as possible. It is envisaged in this report to utilize the northern side de-coaled void of existing quarry for internal dumping as there is no scope of further expansion of northern part of quarry in dip side as it has reached the major fault F4-F4. The existing haul road lies in the northern side quarry and therefore new haul road

is proposed in the southern side of quarry after rehandling of backfilled OB. With this arrangement, 48.003 Mm3 (82.76%) OB can be accommodated in the internal dumps with heightening upto 60-90m above surface level. Thus, out of total 58.003 Mm3 OB, only 10.00 Mm3 (58.003 Mm3 – 48.003 Mm3) is required to be dumped externally (17.24%).

The existing external OB dump lies around the periphery of the northern side of Hindustan Lalpeth quarry and it has been proposed in this report to merge it with internal dump and then heighten it upto 60-90 m from surface level.

About 7.42 Mm3 OB will be accommodated in this external dump (Dump-A).

In addition to this, 2.58 Mm3 OB will be dumped in external OB Dump-B in the western side of mine boundary of Mana UG mine. The proposed External Dump has been shown in Final Stage Dump Plan in Volume-III of this report.

The different External and Internal Dumps and their capacity in terms of in-situ OB is tabulated below. The total dump capacity as on 1.4.2013 works out to 62.446 Mm3. Presently, the OB of existing Hindustan Lalpeth OC mine is

being dumped internally and total balance OB excavation (as on 1.4.2013) in the existing mine upto 01.04.2015 will be about 4.443 Mm3 (balance 2.084 Mm3 as per approved Scheme + 2.359 Mm3 for 0.38 Mt coal extraction in 2014-15) which is presently being dumped internally in the northern side quarry. Thus, the dump capacity available as on 1.4.2015 will be 58.003 Mm3 (62.446 Mm3 – 4.443 Mm3) which will be utilized by the proposed mine.

OB DUMP CAPACITY

Sl. No.	OB Dump	Dump Height (m)		Dump Capacity (Volume of solid OB in Mm3)
		From	To	
A)	**EXTERNAL OB DUMP**			
1	Ext. Dump – A	0	30	6.00
		30	60	1.18
		60	90	0.24
Total (Ext. Dump-A)				**7.42**
2	Ext. Dump – B	0	30	1.96
		30	55	0.62
Total (Ext. Dump-B)				**2.58**
TOTAL (EXTERNAL DUMP)				**10.00**
B)	**INTERNAL DUMP**			
3	Internal Dump (Below Ground)	Below Surface Level		**26.446 (as on 1.4.2013)** **22.003 (as on 1.4.2015)**
4	Internal Dump (Above Ground)	0	30	13.96
		30	60	7.80
		60	90	4.24
Total (Int. Dump Above Ground)				**26.00**
TOTAL (INTERNAL DUMP)				**52.446 (as on 1.4.2013)** **48.003 (as on 1.4.2015)**
TOTAL (EXTERNAL + INTERNAL DUMP)				**62.446 (as on 1.4.2013)** **58.003 (as on 1.4.2015)**

Year-Wise External and Internal Dumping

Year-wise removal of in-situ OB as well as re-handling of OB and its dumping in different external as well as internal dumps have been tabulated below.

Year	OB	Dept. / Hiring	Volume of OB Dumping (Mm3)				
			External Dump-A	External Dump - B	Internal Dump Below Ground	Internal Dump Above Ground	Total
1	Top OB	Dept.	-	-	2.044	-	2.044
	Top OB	Hiring	-	-	2.980	-	2.980
	Re-Handled OB	Hiring	-	2.580	1.240	-	3.820
	Sub-Total (Year-1)		**0.000**	**2.580**	**6.264**	**0.000**	**8.844**
2	Top OB	Dept.	-	-	2.044	-	2.044
	Top OB	Hiring	-	-	2.780	-	2.780
	Re-Handled OB	Hiring	-	-	3.820	-	3.820
	Sub-Total (Year-2)		**0.000**	**0.000**	**8.644**	**0.000**	**8.644**

Year	OB	OB From Cut / Backfilled Area	Volume of OB Dumping (Mm3)				
			External Dump-A	External Dump - B	Internal Dump Below Ground	Internal Dump Above Ground	Total
3	Top OB	Dept.	-	-	2.103	-	2.103
	Top OB	Hiring	-	-	1.479	1.308	2.787
	Re-Handled OB	Hiring	-	-	3.513	-	3.513
	Sub-Total (Year-3)		**0.000**	**0.000**	**7.095**	**1.308**	**8.403**
4	Top OB	Dept.	-	-	-	2.055	2.055
	Top OB	Hiring	-	-	-	3.703	3.703
	Re-Handled OB	Hiring	-	-	-	2.697	2.697
	Sub-Total (Year-4)		**0.000**	**0.000**	**0.000**	**8.455**	**8,455**
5	Top OB	Dept.	-	-	-	1.819	1.819
	Top OB	Hiring	4.522	-	-	2.378	6.900
	Sub-Total (Year-5)		**4.522**	**0.000**	**0.000**	**4.197**	**8.719**
6	Top OB	Dept.	-	-	-	1.765	1.765
	Top OB	Hiring	1.478	-	-	4.122	5.600
	Sub-Total (Year-6)		**1.478**	**0.000**	**0.000**	**5.887**	**7.365**
7	Top OB	Dept.	-	-	-	1.711	1.711
	Top OB	Hiring	1.180	-	-	3.420	4.600
	Sub-Total (Year-7)		**1.180**	**0.000**	**0.000**	**5.131**	**6.311**
8	Top OB	Dept.	0.240	-	-	1.022	1.262
	Sub-Total (Year-8)		**0.240**	**0.000**	**0.000**	**1.022**	**1.262**
TOTAL			**7.420**	**2.580**	**22.003**	**26.000**	**58.003**

8.0 MINING SCHEDULE AND EQUIPMENT PHASING

8.1 Project report for Hindustan Lalpeth Expansion OC mine has envisaged 330 days of working in a year based on 7 days schedule of mine working. As per the prevalent practice in WCL, there will be 3 working shifts in a day in proposed Hindustan Lalpeth Expansion OC mine and every shift will be of 8 hours duration. The excavation category of OB material has been assumed as 50% Category III + 50% Category IV, whereas for Coal it is assumed as Category IV. The insitu volume weight of OB material has been considered as 2.3 t/m^3 whereas for coal it is considered as 1.60 t/m^3.

8.2 Annual Productivity of HEMM

8.2.1 Shovel Productivity

Sl. No.	Particulars	Coal / OB	Annual Productivity (Mm^3)
2.	5 - 6 m^3. Hyd. Shovel with 60 T dumper	Top OB	1.301
3.	4 - 5 m^3 Diesel Hydraulic Backhoe with 60 T dumper	Coal	1.246

8.2.2 Dumper Productivity

Sl. No.	DUMPER COMBINATION	PRODUCTIVITY (Mm^3/year) AT LEAD OF						
		0.5 km	1.0 km	1.5 km	2.0 km	2.5 km	3.0 km	3.5 km
1.	60T Dumper with 5-6 m^3 Hyd. Shovel in **Top OB**	0.3255	0.2585	0.2193	0.1956	0.1797	0.1634	0.1508
2.	60T Dumper with 4 - 5 m^3 Diesel Hyd. Backhoe in **Coal**	0.3318	0.2654	0.2262	0.2023	0.1862	0.1696	0.1567

8.2.3 Annual Average Lead & Lift and System Capacity

The annual average year-wise lead and lift (from quarry upto OB dump/CHP) for Top OB, Rehandled OB and Coal are tabulated below :

Year	Top OB / Rehandled OB / Coal	To Dump Place / CHP	Average Lead (Km)	Average Lift (m)
	Top OB	Int. Dump (BG)	2.279	43

1	Rehandled OB	Ext. Dump-B, Int. Dump (BG)	2.295	30
	Coal	CHP	2.243	103
2	Top OB	Int. Dump (BG)	2.279	43
	Rehandled OB	Int. Dump (BG)	2.296	35
	Coal	CHP	2.243	103
3	Top OB	Int. Dump (BG) Int. Dump(0-30m)	2.297	49
	Rehandled OB	Int. Dump (BG)	2.296	35
	Coal	CHP	2.243	103

Year	Top OB / Rehandled OB / Coal	To Dump Place / CHP	Average Lead (Km)	Average Lift (m)
4	Top OB	Int. Dump (BG), Int. Dump(0-30m)	2.473	69
	Rehandled OB	Int. Dump(0-30m)	2.341	50
	Coal	CHP	2.469	120
5	Top OB	Int. Dump(0-30m), Ext Dump-A(0-30m)	2.720	71
	Coal	CHP	2.580	128
6	Top OB	Ext Dump-A(0-30m), Int. Dump(30-60m)	3.040	103
	Coal	CHP	2.841	144
7	Top OB	Ext Dump-A(30-60m), Int. Dump(30-60m), Int. Dump(60-90m)	3.333	130
	Coal	CHP	3.030	155
8	Top OB	Ext Dump-A(60-90m), Int. Dump(60-90m)	3.524	145
	Coal	CHP	3.030	155

The overall weighted average lead and lift for the entire mine life for Top OB, Rehandled OB and coal are as follows :

Sl. No.	Top OB / Rehandled OB / Coal	Weighted Average Lead (km)	Weighted Average Lift (m)
1	Top OB	2.705	77
2	Rehandled OB	2.304	37
3	Coal	2.593	127

System Capacity

Year-wise volume of coal production and programmed Top OB and Rehandled OB, number and type of Shovel & Dumper and their capacity along-with System Capacity for Partial Hiring Option are detailed in the following tables :

Year-Wise System Capacity (Partial Hiring Option)

Year	Programmed Volume (Mm3) (Coal + Top OB + Rehandlled OB)	Type of Shovel	Existing / Upgraded / New	No. of Shovel	Shovel Capacity (Mm3 / annum)	Type of Dumper	Existing / Upgraded / New	No. of Dumper	Dumper Capacity (Mm3 / annum)	System Capacity (Mm3 / annum)
1	Coal – 0.406 OB – 2.044	BE-300	Existing	2	0.820	50T Dumper	Existing	5	0.769	**2.506**
		BE-1000	Existing	1	1.200	60T Dumper	Existing	4	0.615	
		5m3 Rope Shovel	Existing	2	1.960	60T Dumper	Upgraded	6	1.122	
Total	**2.450**			**5**	**3.980**			**15**	**2.506**	
2	Coal – 0.406 OB – 2.044	BE-300	Existing	2	0.820	50T Dumper	Existing	5	0.769	**2.506**
		BE-1000	Existing	1	1.200	60T Dumper	Existing	4	0.615	
		5m3 Rope Shovel	Existing	2	1.960	60T Dumper	Upgraded	6	1.122	
Total	**2.450**			**5**	**3.980**			**15**	**2.506**	
3	Coal – 0.406 OB – 2.103	BE-1000	Existing	1	1.200	50T Dumper	Existing	3	0.461	**2.564**
		5m3 Rope Shovel	Existing	2	1.960	60T Dumper	Existing	4	0.615	
						60T Dumper	Upgraded	8	1.488	
Total	**2.509**			**3**	**3.160**			**15**	**2.564**	
4	Coal – 0.438 OB – 2.055	BE-1000	Existing	1	1.200	60T Dumper	Existing	4	0.615	**2.616**
		5m3 Rope Shovel	Existing	1	0.980	60T Dumper	Upgraded	11	2.001	
		5-6 m3 Hyd.Shovel	Upgraded	1	1.301					
Total	**2.493**			**3**	**3.481**			**15**	**2.616**	
5	Coal – 0.625 OB – 1.819	BE-1000	Existing	1	1.200	60T Dumper	Existing	4	0.615	**2.555**
		5m3 Rope Shovel	Existing	1	0.980	60T Dumper	Upgraded	11	1.940	
		5-6 m3 Hyd.Shovel	Upgraded	1	1.301					
Total	**2.444**			**3**	**3.481**			**15**	**2.555**	

6	Coal – 0.625 OB – 1.765	BE-1000	Existing	1	1.200	60T Dumper	Existing	2	0.307	**2.465**
		5-6 m3 Hyd.Shovel	Upgraded	1	1.301	60T Dumper	Upgraded	13	2.158	
Total	**2.390**			**2**	**2.501**			**15**	**2.465**	

Year	Programmed Volume (Mm3) (Coal + Top OB + Rehandlled OB)	Type of Shovel	Existing / Upgraded / New	No. of Shovel	Shovel Capacity (Mm3 / annum)	Type of Dumper	Existing / Upgraded / New	No. of Dumper	Dumper Capacity (Mm3 / annum)	System Capacity (Mm3 / annum)
7	Coal – 0.625 OB – 1.711	BE-1000	Existing	1	1.200	60T Dumper	Existing	2	0.307	**2.387**
		5-6 m3 Hyd.Shovel	Upgraded	1	1.301	60T Dumper	Upgraded	13	2.080	
Total	**2.336**			**2**	**2.501**			**15**	**2.387**	
8	Coal – 0.138 OB – 1.262	BE-1000	Existing	1	1.200	60T Dumper	Upgraded	13	2.026	**2.026**
		5-6 m3 Hyd.Shovel	Upgraded	1	1.301					
Total	**1.400**			**2**	**2.501**			**13**	**2.026**	

8.3 Calendar Programme of Excavation

The calendar programme of Excavation showing year-wise coal production (departmental), OB removal (both departmental and hiring) as well as re-handling of OB (hiring) in Partial Hiring Option is tabulated below :

Year	**Coal Production (Mt)**		**Natural OB (Mm3)**		**Programmed OB (Mm3)**							
					Depart-mental	**Hiring**			**Departmental + Hiring**			
			In-Situ OB		**In-situ OB**	**In-Situ OB**	**Rehan-dled OB**	**Total OB**	**In-Situ OB**		**Rehan-dled OB**	**Total OB**
	Yearly	**Cum.**	**Yearly**	**Cum.**	**Yearly**	**Yearly**	**Yearly**	**Yearly**	**Yearly**	**Cum.**	**Yearly**	**Yearly**
1	0.650	0.650	4.890	4.890	2.044	2.980	3.820	6.800	5.024	5.024	3.820	8.844
2	0.650	1.300	4.890	9.780	2.044	2.780	3.820	6.600	4.824	9.848	3.820	8.644
3	0.650	1.950	4.890	14.670	2.103	2.787	3.513	6.300	4.890	14.738	3.513	8.403
4	0.700	2.650	5.817	20.487	2.055	3.703	2.697	6.400	5.758	20.496	2.697	8.455
5	1.000	3.650	8.694	29.181	1.819	6.900	0.00	6.900	8.719	29.215	0.00	8.719
6	1.000	4.650	7.300	36.481	1.765	5.600	0.00	5.600	7.365	36.580	0.00	7.365
7	1.000	5.650	6.289	42.770	1.711	4.600	0.00	4.600	6.311	42.891	0.00	6.311
8	0.220	5.870	1.383	44.153	1.262	0.00	0.00	0.00	1.262	44.153	0.00	1.262
TOTAL	**5.870**		**44.153**		**14.803**	**29.350**	**13.850**	**43.200**	**44.153**		**13.850**	**58.003**

8.4 Equipment Schedule

The major equipment proposed to be procured departmentally and their phasing in Partial Hiring Option are tabulated below. Since, the mineable reserves of existing Scheme of Hindustan Lalpeth OC mine will be completely exhausted in 2014-15, all the equipments of the existing mine will be utilized in the proposed Hindustan Lalpeth Expansion OC mine. The list of existing HEMM as on 1.4.2015 is also given in the tables.

SL NO.	HEMM	Quantity	UPGRADED HEMM	PHASING				
				1st Year	2nd Year	3rd Year	4th Year	5th Year
A	**OVERBURDEN (IN-SITU & REHANDLING)**							
A.1	**EXISTING HEMM**							
1	5m3 Rope Shovel	2	Upgraded to 1 no. of 5-6 m3 Dies. Hyd. Shovel				1	
2	Hydraulic Shovel (BE-300)	1						
3	Hydraulic Shovel (BE-1000)	1		Not to be replaced after bal. life				
4	160mm Diesel Drill	2		To be Replaced after balance life				
5	50T R D Dumpers	5	Upgraded to 11 nos. of 60T Dumpers with float assembly	6		2		3
6	35t Dumpers	10						
7	250mm Drill	2						
8	320 HP Dozer	2		To be Replaced after balance life				
B	**COAL**							
B.1	**Existing HEMM**							
1	Hydraulic Shovel (BE-300)	1	Upgraded to 4-5 m3 Diesel hyd. Backhoe			1		
2	Dozer	3						
3	60 T R D Dumpers	4		To be Replaced after balance life				
4	160 mm Diesel Drill	1		To be Replaced after balance life				
5	320 HP Dozer	1		To be Replaced after balance life				
C	**LAND RECLAMATION**							
C.1	**EXISTING HEMM**							
1	320 HP Dozer	1		To be Replaced after balance life				
C.2	**ADDITIONAL HEMM**							
2	Water Sprinkler, 28 KL	1		1				
	SUB-TOTAL (C)							

SL NO.	HEMM	Quantity	UPGRADED HEMM	PHASING				
				1st Year	2nd Year	3rd Year	4th Year	5th Year
D	COMMON							
D.1	ADDITIONAL HEMM							
1	Fire-Fighting Truck	1		1				
2	Mobile Maint. Van	2		1	1			
3	Diesel Bowzer 6 / 9 KL	1		1				
4	1.8 M3 Diesel Hyd B/H	1		1				

8.5 Drilling & Blasting

The degree of fragmentation in opencast mine has to be optimized so that total cost of drilling, blasting, excavation, transport and crushing as total system is minimized. In order to reduce the excessive vibrations at nearby surface structure, river, road, village, etc and also to achieve satisfactory blasting results, an optimized control blasting system depending upon rock formations using combination of delays and relays will have to be evolved. Based on the experience in the existing Hindustan Lalpeth OC mine, a powder factor of 3.0 m^3/kg has been considered in OB in all the three options for planning purpose. A powder factor of 7 t/kg has been considered for blasting in coal. The existing arrangement of magazine for Hindustan Lalperth OC mine will serve the purpose for the proposed Expansion mine also.

9.0 QUALITY

9.1 The quality parameters of the composite coal seam on Air Dried basis are tabulated below :

Quality Parameters	Without Dilution (Roof to Floor)		With Dilution (0.05m dilution in roof and floor)	
	Minimum	Maximum	Minimum	Maximum
Moisture %	3.3 (WHL-28)	11.1 (WHL-34 & 38)	3.3 (WHL-28)	11.1 (WHL-38)
Ash %	28.9 (WHL-37)	42.2 (CMWHL-05)	29.2 (WHL-37)	42.4 (CMWHL-05)
GCV (kCal/kg)	3784 (CMWHL-05)	4880 (CMWH-25)	3779 (CMWHL-05)	4867 (CMWH-25)
UHV (kCal/kg)	2317 (CMWHL-05)	3835 (CMWH-25)	2304 (CMWHL-05)	3808 (CMWH-25)

9.2 Projected Coal Quality

9.2.1 Cut-Wise Quality (GCV)

The proposed Expansion area of Hindustan Lalpeth Expansion OC mine has been divided in three Cuts namely Cut-I, Cut-II & Cut-III. The weighted average Quality of coal (GCV) in these Cuts including all in-seam bands without dilution at contact points with roof and floor are tabulated below :

CUT NO.	BOREHOLE No.	THICKNESS (incl. in-seam bands) (m)	BOREHOLE WISE GCV (kCal/kg)	CUT-WISE GCV kCal/kg
CUT-I	WHL-37	17.96	4235	4341
	WHL-28	15.74	4461	
CUT-II	CMWH-25	17.35	4880	4527
	WHL-34	16.85	4164	
CUT-III	CMWHL-6	16.9	4625	4105
	CMWHL-5	16.4	3784	
	CMWH-03	16.58	3892	

9.2.2 Year-Wise Quality (GCV) of Coal

The year-wise weighted average quality (GCV) of coal without dilution at contact points with roof and floor are as follows :

YEAR	CUT No.	MINEABLE RESERVES (Mt)		WEIGHTEDE AVERAGE GCV (kCal/kg)	
		Cut-Wise	Year-Wise	Cut-Wise	Year-Wise
1	Cut-I	0.65	0.65	4341	4341
2	Cut-I	0.65	0.65	4341	4341
3	Cut-I	0.65	0.65	4341	4341
4	Cut-I	0.23	0.70	4341	4466
	Cut-II	0.47		4527	
5	Cut-II	1.00	1.00	4527	4527
6	Cut-II	0.42	1.00	4527	4282
	Cut-III	0.58		4105	
7	Cut-III	1.00	1.00	4105	4105
8	Cut-III	0.22	0.22	4105	4105
TOTAL		**5.87**	**5.87**		**4328**

10.0 PUMPING AND DRAINAGE

10.1 Pumping Capacity

The Pumping capacity required at the mine has been calculated as under :-

S.No.	DISCRIPTIONS	CALCULATED DATA
1	Exposed area considered (ha)	77.12
2	Backfilled area (ha)	68.29
3	Surface area of mine considered for excavation (ha)	77.12
4	Area beyond excavation (ha),5% of item (3)	3.856
5	Run-off co-efficient for	
	Open excavation	0.70
	Area beyond excavation	0.10
6	Rainfall infiltration co-efficient for backfilled area	0.20
7	Probable max. rainfall in a day (mm)	185
8	Water collected in the quarry due to exposed area and area beyond excavation (cum/day)	125851
9	Required pumping capacity to handle the whole water of the rain water in 100 hrs (lps)	350
10	Seepage due to strata (15% of Item 9)	52
11	Total pumping capacity	402
12	Depth in target plus five years (m)	170

Pumping system has been designed for the volume of water accumulated in the mine at the target plus five year production considering maximum rainfall in a day as 185mm. Peak pumping capacity worked out as 144729 cum. Above volume of water will be dewatered in 5 days at the rate of 20 hrs pumping per day.

Pumping capacity per day thus worked out as 28946 cum

10.2 Selection of Pumps And Delivery Ranges

(i) Seven pumps of 80 lps x 200m head have been proposed. Out of seven pumps, two pumps are standby.

(ii) Four existing pumps of 80 lps x 150m head have been used for initial and auxiliary pumping.

(iii) One diesel pumps of 80 lps x 60m head have been proposed.

(iv) Four face pumps of 11 lps x 30 m head have been envisaged in this report and out of four pumps, one is standby.

(v) Five delivery ranges of 219 mm dia. have been proposed for main pumps of 80lps x 250m head and maximum one pump will be connected in each delivery.

(vi) Four existing delivery ranges has been used for pumps of 80lps x 150m head.

(vii) 80 mm dia. HDPE pipe will be used for face pumps.

(viii) No piping provision has been made for standby pumps.

Note :- Stainless steel pumps & HDPE pipes are provided due to acidic water.

10.3 Sump

The sumps shall be made at the one end of strike in the dip side. The working benches shall be graded suitably, so that the entire water flows down to the sump.

10.4 Drainage of Water on Surface

Fresh garland drains shall be made before every monsoon at the peripherally of active edge of the quarry to prevent the surface rain water to enter the quarry. A sedimentation pond/ lagoon shall be made between the quarries and mine water will be discharged into it. After sedimentation of suspended particles, the fresh water will be discharged into river/ nallah.

10.5 The details of pumps, pipes, pipe fittings and estimated capital requirement including installation, foundation cost and service tax of above have been given in Appendix – A.3.4.

11.0 COAL HANDLING AND DESPATCH ARRANGEMANT

11.1 A small coal handling plant exists near access trench of the quarry. It is proposed in this PR to augment the existing CHP to handle the entire production from mine. The total additional capital requirement for the proposed changes in the existing CHP is given in Appendix – A.3.5.

12.0 WORKSHOP & STORES

12.1 Workshop

To provide maintenance and repair of various HEMM, CHP, equipment, pumps, LMVs, electrical etc of the mine, the existing unit workshop of the project will be augmented. Tthe workshop will consist of two types of maintenance and repair shops. These maintenance and repair shops will be as follows: -

i) **Excavation workshop: -** This workshop would extend basic engineering support in respect of maintenance and repair of various HEMM deployed in the mine. Capital repair of HEMM and other equipment would be carried out at central workshop, Tadali.

ii) **E & M workshop: -** Separate E & M workshop facilities have also been provided to carry out maintenance & repair of the CHP, equipment, pumps, LMVs, electrical etc.

These workshops are essentially a unit workshop and will depend on central/regional workshop for major repair and part manufacture. Shovel and drill maintenance & minor repairs will be carried out at site and components/assemblies requiring running repair will be dismantled from the machine and transported to the workshop for necessary repairs. Provision of dumper repair and maintenance facilities has been made taking into account 60t dumpers will be deployed in the project.

Total capital investment requirement has been given in appendix A.3.3.

13.0 POWER SUPPLY, ILLUMINATION & COMMUNICATION

13.1 Source of Power

The proposed Hindustann Lalpeth Expansion OC Mine is located at a distance of approximately 4 kms south from Chandrapur district headquarter.. Hindustan Lalpeth OC Mine receives power at 11kV from Hindustan Lalpeth

Sub Area Main substation through a 4 kms long overhead line. The Hindustan Lalpeth Sub Area Main substation receives power from Shastri Nagar Substation through 33kv over head line. The present capacity of Hindustan Lalpeth Sub Area Main substation is 2 X 3.15MVA, 33kV/ 11kV and 1X3.0MVA, 33/11kV. This substation feeds power to Manna UG Mines, HL OC Mine, Nandgaon mine and HLC -I UG mine (only for pumping) through one 11kV feeder. It is having a contract demand of 5MVA, whereas at present, its maximum demand is already exceeding 4.8 MVA. Therefore no further loading is admissible at this substation.

The existing 11 kV/3.3 kVsub-station of Hindustan Lalpeth OC mine which receives power from HLC sub-area 33 kV sub-station will be utilized for the proposed Hindustan Lalpeth Expansion OC mine. This was discussed with the mine and area officials and they agreed that the existing mine sub-station after shifting to a new location will serve the purpose of power supply of the project and the contract demand of HLC 33 kV sub-station will be contained within the limit of contract demand. As only additional diesel shovel has been provided in the report, there will not be any substantial increase in the maximum demand of the mine sub-station.

13.2 Salient Electrical Features

The salient features of Power Supply for the proposed Hindustan Lalpeth Expansion OC mine are tabulated below :

S.No.	ITEM HEAD	PARTIAL HIRING OPTION
1.	SPECIFIC ENERGY CONSUMPTION (Including township)	5.28 kWh/t
2.	SPECIFIC POWER COST (Including township)	Rs.45.90 /t
3.	FIXED PERCENTAGE OF POWER COST	68.99 %
4.	VARIABLE PERCENTAGE OF POWER COST	31.01 %
5.	SPECIFIC DEMAND	1.747 MVA/Mt.
6.	CAPACITOR BANK PROVIDED	
	a) Only mine	750 kVAR
	b) Only township	125kVAR

	c) Total	875 kVAR
7.	AVERAGE COST OF PURCHASED POWER	Rs. 8.69 /kWh

The details of capital of electrical P & M and estimated capital required are given at Appendix-A.3.2.

14.0 CIVIL CONSTRUCTION

14.1 Service Buildings

Hindustan Lalpeth OC is an existing mine and all the existing service buildings will be utilized for the proposed Expansion OC mine also which has a life of 8 years. Hence, no new service buildings have been provided in the PR.

14.3 Residential Buildings

Hindustan Lalpeth OC is an existing mine and hence, no new residential quarters have been proposed in this report.

About 160 nos. of existing quarters of Hindustan Lalpeth OC mine located in the dip side area of the mine will have to be dismantled due to extension of quarry in dip side. However, no new quarters have been proposed in lieu of these quarters proposed for dismantling.

14.4 Roads and Culverts

14.4.1 Diversion of Approach Road

A part of existing Approach Road to Nandgaon, Manna & HLOC mine will fall in the proposed quarry area of Expansion mine and hence a diversion of 1.20 Km length of sectoral road of stratum ‘D’ has been provided in in the report.

14.4.2 Haul Roads & Heavy Duty Roads with Culverts

Haul Road of for 60t dumpers has been proposed for transportation of coal.

14.4.3 Diversion of Coal Transportation Road

A part of existing coal transportation road is falling in the proposed extension area of Hindustan Lalpeth Extension OC mine and therefore a Diversion of road for 2.10 km length has been proposed as additional provision for coal transportation.

The estimated amount and other details of Diversion of Approach Road, Haul road, and Diversion of Coal Transportation road are given in Appendix-A.8.1.

14.5 Water Supply Arrangement

Water supply arrangements have been envisaged for only project and the total water requirement for project site has been worked out to 230 kl for Partial Hiring option. However, considering the requirement of water for out-sourcing agency in Partial Hiring option, water demand of 270 Kl has been proposed in this report. However, considering the existing water supply arrangement , only 50% additional capital for water supply arrangement has been considered in this PR.

Sub-soil water has been envisaged as the source. Accordingly, bore-well provisions have been made. However, it is suggested that the source of water may be ascertained after carrying out hydro-geological investigations as regards the quality and quantity of water.

14.6 Sewage Disposal Arrangement

To avoid any discharge of effluent into natural watercourses, sewage disposal arrangement has been envisaged. Considering the existing sewage disposal arrangement, 50% of estimated amount for sewage disposal arrangement for project site along with required surface drains is given in the PR.

15.0 SAFETY & CONSERVATION

15.1 The project report has been drawn in conformity with the prevailing statutory provisions as per Mines Act 1952, CMR 1957 etc applicable for safety in mines. However all statutory rules, regulations, applicable laws etc & statutory

requirements shall be strictly adhered to and implemented in order to maintain day to day safety as per statute.

15.2 The nearby Erai River flows from North to South at about 1 km from the north-western end of the proposed Hindustan Lalpeth quarry. HFL of Erai river recorded in the area is 180.267m on 15th Sept.1959. An embankment / OB dump exist along the periphery of nortern and western part of the quarry to protect the quarry area from inundation. This embankment along the river will be maintained in the proposed Hindustan Lalpeth Expansion OC mine and proper drainage arrangement and garland drain will be maintained around the quarry and OB dumps to carry the rain water away. Prior to onset of monsoon, the embankment should be inspected by competent person to ensure that there is no breach in embankment.

15.3 For suppression of dust, water sprinkler has been provided in the Expansion PR. Suppression of dust may be done by using package bond & dust bond, for methodology of application DGMS Circular No.8 of 1997 may be referred.

15.4 The standards of lighting to be provided in opencast coal mines during working at different places or areas where natural light is not sufficient has been specified in DGMS circular GSR 804 dated 18.6.1975 (cir. (legis) 1/1976).They have to be strictly adhered to for efficient and safe working.

15.5 It is proposed to lay water pipeline along the strike length on the dip side of quarry for immediate quenching of the fire in coal seams. Also fire fighting trucks have been provided in this report to fight fire locally. Wild or herbaceous plants shall be removed from the mine. No person shall deposit heated material or ashes on any opencast working. Also no person shall light a fire or permit a fire to be lighted in any OC working except by the permission in writing of the Manager and only for a special purpose specified therein. No coal shall be left exposed in coal benches more than its incubation period to avoid fire due to spontaneous heating. Proper type of the extinguisher should be kept in each HEMM ready for use in case of emergency. In coal stock, coal shall be dispatched on the basis of first in first out.

15.6 To ensure slope stability, vulnerable area may be identified and marked on quarry plan. Observation of actual alignment of fault, its throw, joints, etc. may be recorded during the process of exploitation. Water drainage system may be properly implemented to prevent accumulation of water in cracks. Also dumps shall be leveled to prevent accumulation of water over it. Proper drainage in dumps shall be also provided to prevent erosion of toe of dump. Regular monitoring of tension cracks, horizontal and vertical movement of strata in critical area may be done. Rise side slope to be reinforced if required because it has to stand through out quarry life. No dumps/surface structures to be located within 15m of quarry edge as it will act as surcharge there by destabilizing the slope. No undercutting of slopes to be done. Proper hydro-geological studies should be done and if water table is at level of slope it should be brought down by using submersible pumps to prevent hydrostatic pressure. It is proposed in this report to cut trench (160m width) to remove black cotton soil along the periphery of the dumping place and to fill it with boulders etc. This will prevent slope failure due to bulging of black cotton soil. Before dumping, place of dumping should be made free from loose material. Dumping shall not be done at an angle more than the angle of repose of material being dumped. After completion of dumping operations, dumps should be stabilized by growing vegetation.

15.7 Every person deployed by leaser of HEMM must be trained & briefed about aspects related to slope stability. Adequate care must be taken for proper construction and maintenance of haul road as per the existing guidelines. The gradient of haul road should not be steeper than 1 in 16.

15.8 At the time of operation of mine, drilling parameters have to be optimized on the basis of actual field trial depending upon joint pattern, bedding plane, type of rock and local geology of the blast site. Suitable precautions would be taken as per statute before and after blasting operations. While working near infrastructure, buildings etc., controlled blasting technique has to be practiced to minimize fly-off rocks and ground vibrations and to keep them within safe limits. Provision for conducting scientific studies has been made in this report.

15.9 Conservation of Coal

A portion of the proposed Expansion area has already been worked by underground method of mining through Nandgaon Incline. It is not possible to extract balance coal over stowed goaf in some panels and also in standing pillars in other panels by underground method of mining. It is therefore proposed to extract the balance coal reserve in partly worked out panels by extending the existing Hindustan Lalpeth OC mine in dip side area. Thus the proposed opencast mining is beneficial from conservation point of view. Although for calculation of mineable coal reserves, 10% mining losses has been taken into account, but in practice all efforts would be made to minimise the losses. All efforts shall be made to reduce carpet loss on floor of quarry, loss of coal in each contact zones and to reduce pilferage of coal while transporting it from coal face to coal stockyard/CHP.

15.10 It is proposed to carry out scientific study on slope stability of external and internal OB dumps as well as for final slope of quarry batter. Based on the findings of scientific research the proposed slope of dumps and batter in the In addition to this, various other parameters like drilling and blasting, soil testing, etc. need scientific study. Adequate capital provision has been made in this report for these miscellaneous studies also.

16.0 ENVIRONMENT MANAGEMENT

The impact of proposed opencast mining in Hindustan Lalpeth OC mine on air, water, noise, soil, flora and fauna etc. and the environmental management plan to minimize these impacts are detailed below :

161 Air Quality management

Air pollution is likely to be generated due to dust, exhaust from vehicles, blasting fumes etc. In opencast mines, dust is likely to be produced during blasting, crushing of coal, handling of overburden and coal, drilling and operation of HEMM. The following measures have been proposed to control air pollution :

i) Water spraying is to be carried out on haul road at regular interval during each shift.

ii) Water spraying arrangement at dust generating points in CHP, feeder breaker, conveyor transfer points etc.

iii) Proper maintenance of all internal combustion engines to reduce smoke and exhaust fumes.

iv) Dust extractors in working condition in all the drills

v) Tree plantation in rows and blocks along the approach road of the mine and also along the coal transportation road on both sides.

vi) Perimeter tipping of external overburden dumps. Tree plantation on the slope of the perimeter dump.

vii) Water spraying mixed with safe and non-toxic dust suppression chemicals on haul roads during dry months.

viii) Coal transportation in trucks covered with tarpaulin.

ix) Avoiding overloading of trucks.

x) Frequent cleaning of coal transportation road.

16.2 Water Quality Management

The quantity of mine water pumped out would vary according to the season. The mine water may contain various impurities like coal dust, traces of grease, oil etc. in various proportions. The mine water would be allowed to collect in the quarry sump where primary settling would take place. The mine water would then be pumped into secondary settling tanks on the surface. Here the water would be allowed to settle and thereafter part of treated water will be utilized for meeting IN-HOUSE water requirement (like dust suppression, watering of plants, washing of HEMM, potable use etc). Peripheral trenching is recommended near external OB dumps for coursing the run-off and leached water from the dumps. If required, the water may be sent to surface settling tanks before discharging it into the drainage channels.

The used water from the industrial area comprising CHP, Workshop, Garage etc may be contaminated with grease, oil, coal dust, dirt etc. This water will be allowed to settle and suitable treatment will be carried out in oil and grease trap. Thereafter the treated water will be mostly recycled.

16.3 Noise And Ground Vibration Management

The following measures are being suggested to reduce noise and ground vibration effects :

i) With judicious use of explosives and correct blasting techniques, ground vibration and noise pollution would be reduced.

ii) Structures prone to vibration or those with moving parts are suggested to be inspected periodically and source of vibration should be damped to minimize noise and vibration.

iii) Proper maintenance of HEMM and exhaust silencers.

iv) Vegetation barrier around the service buildings will act as effective acoustic barrier.

v) Ground vibration and fly rock can be controlled by proper use of delay detonators. This will help to reduce the noise pollution.

16.4 Flora and Fauna Management

Adequate plantation has been proposed with native species to maintain the diversity and also to attract the fauna.

16.5 Land Resource Management

Regarding land use during mining, in addition to excavation of quarry for coal, overburden dump will be created along with development of other mine related infrastructures. Overburden dump is proposed to be technically and biologically reclaimed and sufficient greenery will be developed.

16.6 Re-Habilitation for Encroachment In WCL Land And Forest Land At HLC

About 300 houses exist in the dip side of existing Hindustan Lalpeth OC mine as Encroachment on WCL land and Forest land. This land will be required for the proposed Expansion mine partially for excavation and partially for 100m

safety zone. Adequate capital provision has been made in this report for the rehabilitation.

16.7 Environment Management System

To have a close watch on the environmental condition and implementation of various measures suggested, a multi- disciplinary approach is essential. At present WCL headquarter acts as apex body which supervises the activities relating to environment at project level through the General Manager. General Manager of the area coordinates the activities of various disciplines in the area to render all necessary assistance at the implementing level i.e. the project. Area Nodal Officer (Environment) monitors all aspects of environment on behalf of the General Manager. He also takes suitable steps for generation of environment data alongwith its analysis and interpretations. As far as plantation is concerned horticulturist with suitable backup staff is provided in the area for undertaking the plantation jobs including raising of a nursery. Sub-Area Manager is responsible for mechanical reclamation of the area. He is also responsible for biological reclamation with assistance of GM's office.

17.0 LAND REQUIREMENT

17.1 Total land acquired for Hindustan Lalpeth OC including Hindustan Lalpeth Extension Phase-I & Phase-II and Mana Incline is 633.10 ha. After excluding the land involved in Mana Incline (85.54 ha), Hindustan Lalpeth Phase-I (69.53 ha) and Hindustan Lalpeth Phase-II (166.37 ha), the balance land of proposed Hindustan Lalpeth Expansion OC is **311.66 ha.**

The break-up of Lease Hold Area of Hindustan Lalpeth OC including Hindustan Lalpeth Extension Phase-I & Phase-II and Mana Incline is tabulated below :

Project	Tenancy Land (ha)	Govt. Land (ha)	Forest Land (ha)	Total Lease Hold Area (ha)
Hindustan Lalpeth OC mine	137.21	79.43	0	216.64
	8.72	14.46	71.84	95.02
Sub-Total	**145.93**	**93.89**	**71.84**	**311.66**
Mana OC project	85.54	0	0	85.54

Hindustan Lalpeth Phase-I	69.53	0	0	69.53
Hindustan Lalpeth Phase-II	166.37	0	0	166.37
Total	**467.37**	**93.89**	**71.84**	**633.10**

The break-up of Lease Hold area acquired in different Rights is as follows :

Project	All Right (ha)	Only Mining Right (ha)	Total (ha)
Hindustan Lalpeth OC mine	216.64	-	216.64
	37.07	57.95	95.02
Sub-Total	**253.71**	**57.95**	**311.66**
Mana OC project	85.54	-	85.54
Hindustan Lalpeth Phase-I	69.53	-	69.53
Hindustan Lalpeth Phase-II	52.50	113.87	166.37
Total	**461.28**	**171.82**	**633.10**

17.2 Land Use of the Project

The total land of proposed Hindustan Lalpeth Expansion OC after excluding the land involved in Mana Incline (85.54 ha), Hindustan Lalpeth Phase-I (69.53 ha) and Hindustan Lalpeth Phase-II (166.37 ha) is **311.66 ha.** The land use of the above 311.66 ha is tabulated below :

Sl. No.	Particulars	Area (ha)
1.	Quarry Area (including existing OC)	150.65
2.	External Dump Area (Dump A & B) including Embankment	73.10
3.	Infrastructure like sub-station, workshop, CHP and other Sevice Buildings	4.00
4.	Diversion of Roads & Overhead Power lines, garland drains, Blasting Zone etc.	6.36
5.	Deforested Area (Dharamshala Tukum)	6.07
6.	Deforested Area (Siddartha Nagar & Central Rly.)	16.73
7.	Land for Rationalisation	60.82
	TOTAL	**311.66**

17.3 Cost of land, Compensation & Rehabilitation

No acquisition of additional land is involved in the proposed Hindustan Lalpeth Expansion OC mine. Only diversion of 36.98 ha land from Mining Right to All Right is required for the extension of quarry in dip side as well as for safety

zone. 100% **NPV @ Rs. 6.26 lakh/ha** (as communicated by mine/Area) has been considered in this report for payment to forest department for acquiring All Right of forest land. In addition to this, cost of compensatory afforestation has been taken as **Rs. 2.53 lakh/ha for afforestation of 2 x 36.98ha** land as communicated by the mine/Area management. About 300 houses exist in the dip side of existing Hindustan Lalpeth OC mine as Encroachment on WCL land and Forest land. This land will be required for the proposed Expansion mine partially for excavation and partially for 100m safety zone. As communicated by mine/Area management, a lump sum provision of **Rs. 9.00 Crores (Rs. 3.00 lakh/family)** for shifting and rehabilitation of the above 300 families has been made in this report.

18.0 MINE CLOSURE PLANNING

18.1 Mine closure planning has to be carried out at the starting of the mine and needs periodic reviewing and revision during its life cycle to cope with the geo-technical constraints, safety and economic risks, social & environmental challenges. Various other objectives of Mine Closure Planning are as follows:

a) To allow a productive and sustainable after-use of the site which is acceptable to the mine owner and the regulatory authority.

b) To protect public health and safety.

c) To alleviate or eliminate environmental damage and thereby encourage environmental sustainability.

d) To minimise adverse socio-economic impacts.

18.2 Technical Aspects

The proposed Hindustan Lalpeth Expansion OC mine has been planned upto around 170m depth at the floor of Composite seam. For the proposed Hindustan Lalpeth Expansion OC mine, following technical aspects would be reviewed in the final mine closure planning. Details can be worked in closure plans envisaged to be prepared 4-5 years before completion of coal mining.

i) Safety Hazards Including Management of Fire

ii) Management of Pit Slopes and Waste Dumps

iii) Management of hydrology and hydro-geology

iv) Details of De-commissioning of the Infrastructure and P&M

v) Fencing around Mined Out Areas

18.3 Environmental Aspects

Following Environmental aspects would be dealt in the Final Mine Closure planning :

i) Management of Final Voids

ii) Reclamation of forest / vegetation

iii) Management of Recharge Areas

iv) Acceptable Ground Water Flows

v) Alternative use of land

18.4 Social Aspects

i) Re-deployment of Workforce

ii) Management of Community Facilities

iii) Channelisation of available water

iv) Emancipation from PAPs

18.5 Financial Aspects

Following Financial aspects would be detailed in the Final Mine Closure Plan to be prepared 4-5 years before the scheduled date of mine closure.

i) Cost of Closure Activities

ii) Cost of Organisation for executing the closure activities

iii) Cost of the Post Project Monitoring

iv) Bond/Insurance for the closure cost

While working out the economics of the project, Rs. 6.00 lakhs/ha of the total project area has been considered for Mine Closure activities, which works out to Rs. **58.59/t**. This fund may be utilized for purchasing Bonds / Insurance to meet the Mine Closure obligations in future.

19.0 MANPOWER, PRODUCTIVITY AND TRAINING

19.1 Manpower Assessment

The manpower requirement for Hindustan Lalpeth Expansion OC Mine has been calculated on the basis of 3 shift operation for 330 days in a year. The manpower requirement of this project in Partial Hiring Option has been summarised as follows :

Sl. No.	Particulars	Partial Hiring Option
1.	Executives	27
2	Monthly rated staff	121
3	Daily rated staff	370
	Total	**518**

19.2 Productivity

The annual capacity of the proposed Hindustan Lalpeth Expansion OC mine has been rated as 1.0 Mt of coal. The productivity calculated on the basis of only departmental manpower for Partial Hiring Option including and excluding the welfare manpower are tabulated below:

SL. NO.	INCLUDING/EXCLUDING WELFARE MANPOWER	STRENGTH	MANSHIFT	O.M.S. (t)
1.	INCLUDING WELFARE MANPOWER	518	136752	7.313
2.	EXCLUDING WELFARE MANPOWER	491	129624	7.715

19.3 The total manpower requirement in this report in Partial hiring option is 518. However, the total manpower in the existing Hindustan Lalpeth OC mine is 600 as on 16.03.2013 and this will be reduced to 563 only as on 1.4.2015 due to retirement of employees. Thus, there will be 45 surplus manpower.

GM (IR), WCL, vide his letter no. WCL/IR/MP/1939 dated 11.10.2013 addressed to CGM (P&p), WCL has communicated that 45 surplus manpower of the mine can be gainfully utilized in other Units/Areas where there is requirement.

20.0 PROJECT IMPLEMENTATION SCHEDULE

20.1 The proposed Hindustan Lalpeth Expansion OC mine is expansion of existing Hindustan Lalpeth OC mine in eastern dip side and hence many infrastructural facilities of existing mine would be gainfully utilized in this mine. The existing Hindustan Lalpeth OC mine will continue to produce upto 2014-15 and thereafter production from proposed Hindustan Lalpeth Expansion OC mine will start from 2015-16. Thus about two years are available before start of production from proposed Hindustan Lalpeth Expansion OC mine and this time period can be utilized for preparation and approval of Project Report, for cost plus agreement with the customer and for transfer of forest land from Mining right to All right.

20.2 Project Schedule

The major project implementation activities and their schedule of completion for the proposed Hindustan Lalpeth Expansion OC mine are detailed below :

Sl. No.	Activities	Completion Schedule
1.	Preparation of PR, First Stage Approval, Cost Plus Agreement with customer and Final Approval of PR	Upto 31st March, 2015
2.	**Post Sanction Activities Before Start of Production:**	
2a)	Transfer of 36.98 ha forest land from Mining Right to All Right.	01.04.2013 to 31.03.2015
2b)	Preparation of budgetary estimates for construction / modification of various infrastructural	

	facilities like Workshop, Buildings etc.	
2c)	Detailed surveying of the area to locate various infrastructural facilities.	01.04.2013 to 31.03.2015
2d)	Soil investigation for construction work.	
3	**Development Activities After Start of Production:**	
3a)	Procurement and Commissioning of HEMM	1^{st} -4^{th} year
3b)	Procurement, Erection and Commissioning of Electrical and Power Supply equipment	1^{st} - 4^{th} year
3c)	Procurement and Commissioning of Pumps, Pipes etc.	1^{st} – 5^{th} year
3d)	Selection, recruitment and training of manpower for the project as per manpower budget	1^{st} year
3e)	Completing construction of all infrastructural facilities like Workshop, Office, Garage, Stores etc.	1^{st} - 2^{nd} year
3f)	Construction of Service and Residential buildings	1^{st} - 2^{nd} year
3g)	Construction of Road, Water Supply & Sewerage	1^{st} - 2^{nd} year
3h)	Construction of new Haul Road in southern side	1^{st} – 4^{th} year
3i)	Diversion of Coal Transportation roads	1^{st} - 2^{nd} year
3j)	Diversion of H.T. and L.T. Overhead Lines	1^{st} - 2^{nd} year
3k)	Shifting and Rehabilitation of Encroachment in WCL and forest land	1^{st} – 2^{nd} year

21.0 FINANCIAL EVALUATION

21.1 The Project Report has been prepared for Partial Hiring Option considering leasing/out sourcing of HEMM for excavation, transport, drilling, dozing, etc for part of Top OB. It is envisaged in this report that the existing departmental capacity of Hindustan Lalpeth OC mine (about 2.42 Mm3) will be maintained in the Expansion mine in Partial Hiring Option and entire coal and part of Top OB will be worked by departmental equipment. Rest Top OB and entire re-handling of backfilled OB will be removed by hiring of HEMM. Blasting and surface illumination, pumping, coal handling at CHP etc. would be done departmentally.

The scope of work include excavation, transport, drilling, dozing at dumps, haul road construction for OB dump & maintenance, water spraying and land reclamation charges etc. have been considered for planning purpose only.

Extraction of coal and part of Top OB removal, CHP, Pumping, Blasting and surface illumination, Supervision etc. would be done departmentally.

21.2 Annual Work Load For External Agency

The annual workload for external agency for in-situ OB removal and rehandling of OB are tabulated below:

ANNUAL WORKLOAD FOR OUTSOURCING AGENCY

YEAR	IN-SITU OB (Mm^3)	REHANDLING OB (Mm^3) (solid)	TOTAL OB (Mm^3)
1	2.980	3.820	6.800
2	2.780	3.820	6.600
3	2.787	3.513	6.300
4	3.703	2.697	6.400
5	6.900	-	6.900
6	5.600	-	5.600
7	4.600	-	4.600
8	-	-	-
Total	**29.350**	**13.850**	**43.200**

21.3 Outsourcing Rates

The year-wise lead and lift, outsourcing rates and expenditure on hiring of HEMM for removal of Top OB and rehandling of backfilled OB including service tax for planning purpose are as follows:

ANNUAL EXPENDITURE ON HIRING OF HEMM FOR REHANDLING OF OB

Yr.	REHANDLING OF OB BY HIRING					
	Ann. Total OB (Mm3) (solid)	Cum. (Mm3)	Ann. Av. Lead (Km)	Ann. Av. Lift (m)	Hiring Rate (Rs./m3)	Annual Expdt. (Rs. In Crores)
1	3.820	3.820	2.295	30	66.72	**25.487**
2	3.820	7.640	2.296	35	66.73	**25.491**

3	3.513	11.153	2.296	35	66.73	**23.442**
4	2.697	13.850	2.341	50	67.10	**18.097**
5	-	13.850				
6	-	13.850				
7	-	13.850				
8	-	13.850				
TOTAL	**13.850**					**92.517**
Average Cost of OB Rehandling by Hiring/Out-Sourcing (Rs./m3) =						**66.80**

ANNUAL EXPENDITURE ON HIRING OF HEMM FOR IN-SITU OB REMOVAL

Year	IN-SITU OB BY HIRING					
	Annual In-situ OB (Mm3)	**Cum. (Mm3)**	**Ann. Av. Lead (Km)**	**Ann. Av. Lift (m)**	**Hiring Rate (Rs./m3)**	**Annual Expdt. (Rs'000's)**
1	2.980	2.980	2.279	43	71.34	**21.259**
2	2.780	5.760	2.279	43	71.34	**19.833**
3	2.787	8.547	2.297	49	71.49	**19.924**
4	3.703	12.250	2.500	69	73.18	**27.099**
5	6.900	19.150	2.743	71	75.20	**51.888**
6	5.600	24.750	3.045	103	77.72	**43.523**
7	4.600	29.350	3.337	130	80.16	**36.874**
8	-	29.350	-	-	-	**-**
TOTAL	**29.350**					**220.400**
Average Cost of Top OB Removal by Hiring/Out-Sourcing =						**75.09**

21.4 PROJECT ECONOMICS

21.4.1 Total Capital Investment

The capital expenditure in Partial Hiring Option is summarized below:

Sl. No.	Particulars	CAPITAL (Rs. in Lakhs)		
		WDV of Existing Capital as on 1.4.2015	Additional Capital	Total Capital (WDV + Additional)
A.1	Land	0.00	1328.61	1328.61
A.2.1	Service Buildings	83.98	0.00	83.98
A.2.2	Residential Buildings	119.48	0.00	119.48
A.3	Plant & Machinery	1282.45	1504.55	2787.00
A.4	Furniture & Fittings	0.87	5.00	5.87
A.5	Railway Siding	0.00	0.00	0.00
A.6	Vehicles	5.09	0.00	5.09
A.7	Prospecting & Boring	0.00	0.00	0.00
A.8	Mine Development			
A.8.1	Capital Outlay in Mines	0.00	863.16	863.16
A.8.2	Roads & Culverts	251.32	0.00	251.32
A.8.3	Water Supply & Sewerage	5.40	139.11	144.51
A.8.4	EMP	10.97	0.00	10.97
A.8.4A	Scientific Research	0.00	20.00	20.00
A.8.5	PR & GR Preparation Cost	0.00	146.27	146.27
A.9	Revenue Expnd. Capitalised	0.00	0.00	0.00
	Total	**1759.56**	**4006.70**	**5766.26**

From above table, it is clear that the total additional capital required for the project in Partial Hiring option works out to **Rs. 40.0670 crores** in addition to the written down value of **Rs. 17.5956 crores** of existing capital as on 1.4.2015 of Hindustan Lalpeth OC mine.

21.4.2 Basis of Price of P&M, Civil Works & Hiring Rate

The price of P&M has been considered based on price list supplied by CMPDI (HQ) as on June, 2013 and it has been escalated upto January, 2014. The price of civil works has been taken based on civil index 480 (Maharashtra) as on 1st half of year 2014 with a base of 100 in Nagpur on 1.1.1992.

In proposed Hindustan Lalpeth Expansion OC mine, the rates for OB removal by hiring equipment has been estimated on the basis of hiring rate decided in the meeting of Functional Directors of WCL and taking into consideration the change in price of diesel and change in lead and lift. The rates of hiring of HEMM for in-situ OB removal and rehandling of OB are tabulated below :

OB	Annual Average LEAD (km)	Annual Average LIFT (m)	Hiring Rate for OB (Rs./m^3)

In-situ OB	2.279 – 3.337	43-130	71.34 – 80.16
Rehandling of OB	2.295– 2.341	30 - 50	66.72 – 67.10

21.4.3 Manpower and OMS

The total requirement of manpower in Partial Hiring option works out to **518** giving OMS of **7.313 t**. This includes provision for leave & sick. Details of manpower requirement and manpower analysis are given in Appendix -B and B.1. However, the total manpower in the existing Hindustan Lalpeth OC mine is 600 as on 16.03.2013. The proposed Hindustan Lalpeth Expansion OC mine will start from 01.04.2015 and by that time 37 manpower will retire and the available manpower would be 563. As communicated by GM (IR), WCL, vide his letter no. WCL/IR/MP/1939 dated 11.10.2013, the 45 nos. (563-518) of surplus manpower in Partial Hiring Option can be gainfully utilized in other Units/Areas where there is requirement. Hence, the economics in this option has been worked out for actual requirement of 518 manpower.

21.4.4 EMS

The overall EMS based on CMPDI norms works out to **Rs. 2725.19.**

21.4.5 Cost of Production for Different Level of Production

The cost of production works out to **Rs. 1907.05/ t** and **Rs. 2095.69/ t** at 100% and 85 % of production capacity respectively. The different components of cost of production at 100% and 85% production capacity (based on 0% discount) are tabulated below :

Sl. No.	Particulars	At 100% Capacity			At 85% Capacity
		Fixed Cost (Rs./t)	Variable Cost (Rs./t)	Total Cost (Rs./t)	Total Cost (Rs./t)
1	Salaries & Wages	458.39	0.00	458.39	539.28
2	Stores	200.95	237.19	438.14	473.60
3	Power	43.16	14.23	57.39	65.01

4	Env. Pollution Control	6.00	0.00	6.00	7.06
5	Misc. Expenses incl. W.D.	31.29	20.80	52.09	57.61
6	Mine Closure	58.59	0.00	58.59	68.92
7	Corporate Social Responsibility	0.00	5.00	5.00	5.00
8	Administrative Charges	160.07	0.00	160.07	188.32
9	Hiring Charges of Equipment	0.00	533.08	533.08	533.08
9	Depreciation	60.99	0.00	60.99	71.75
10	Interest on Working Capital @ 14.5%	36.61	27.70	64.31	70.77
11	Interest on Loan Capital @ 11.5%	13.00	0.00	13.00	15.29
	Total Cost of production	**1069.05**	**838.00**	**1907.05**	**2095.69**

21.4.6 Weighted Average Selling Price

The weighted average selling price of the coal works out to **Rs. 991.99/t** for Power, Fertilizer and Defence Sector and **Rs. 1324.11/t** for Other than Power, Fertilizer and Defence Sector.

21.4.7 Profitability [Profit(+)/Loss(-)] at 100% and 85% Level of Production

For Power, Fertilizer and Defence Sector - The loss with weighted average sale value of coal (Rs. 898.43/t) for Power, Fertilizer and Defence Sectors works out to **Rs. (-) 915.06/t** and Rs. **(-) 1103.70/t** at 100% and 85% of total production capacity respectively.

For Other than Power, Fertilizer and Defence Sector - The loss with weighted average sale value of coal (Rs. 1200.09/t) for Other than Power, Fertilizer and Defence Sector works out to **Rs. (-) 582.94/t** and **Rs. (-) 771.58/t** at 100% and 85% of total production capacity respectively.

21.4.8 IRR

For Power, Fertilizer and Defence Sector - The IRR of the project works out to **– ve** for both 100% and 85% of target capacity.

For Other than Power, Fertilizer and Defence Sector - The IRR of the project works out to **– ve** for both 100% and 85% of target capacity.

21.4.9 Desired Selling Price to achieve 12% IRR

The desired selling price to achieve 12% IRR at 100% and 85% level works out to **Rs. 2183.39/t** and **Rs. 2414.70/t** respectively.

21.4.10 Completion Cost

Capital expenditure has been estimated / increased for forward escalation on the phasing of initial estimated capital. The escalation rate is based on W.P.I. / Civil Index of preceding 36 months. The total completion cost has been estimated as **Rs. 66.5341 crores**.

21.5 Conclusion

In the Partial Hiring Option, the project has been planned for 1.0 Mty production. It is envisaged in this report that the existing departmental capacity of Hindustan Lalpeth OC mine (about 2.42 Mm3) will be maintained in the Expansion mine in Partial Hiring Option and entire coal and part of Top OB will be worked by departmental equipment. Rest Top OB and entire re-handling of backfilled OB will be removed by hiring of HEMM.

Total Cost of Production in Partial Hiring option at 85% target capacity works out to **Rs. 2095.69/t**. The average notified Sale Price of coal is **Rs. 991.99/t** for Power Sector and **Rs. 1324.11/t** for Other than Power Sector. The IRR is negative for both the selling prices of coal. The desired Selling Price of coal to yield 12% IRR at 85% of target capacity is **Rs. 2414.70/t.**

This option may be considered for approval only if customer agrees to pay the price to yield 12 % IRR at 85% of target capacity for coal produced.

CHAPTER - I

INTRODUCTION

1.1 BACKGROUND OF THE EXPANSION PROJECT REPORT

Hindustan Lalpeth OC Mine extending over an area of about 1.18 sq. km, is located in Wardha valley Coalfield and is surrounded by Mana UG mine in the west, Hindustan Lalpeth colliery in the east and Nandgaon UG mine in the South. This mine lies 4 km south of Chandrapur district headquarter which is about 170 Km from Nagpur in Maharashtra – State (Survey of India Toposheet No.56 M/5).

Project Report of Hindustan Lalpeth OC mine was prepared by CMPDIL, RI-IV, Nagpur in March 1979 for target capacity of 0.59 Mty at an average stripping ratio of 1:3.11 and this report was approved by WCL Board for the total initial capital of Rs. 1188.60 lakhs. The excavation work was started in August, 1985.

After the exhaustion of coal reserves upto the dip side limit of the above PR, a Scheme was prepared to extract 2.53 Mt coal in the dip side beyond PR limit at an average Stripping Ratio of 1:6.13. The present HLOC mine is being operated as per the approved Scheme of 2008 and the entire coal reserves of the Scheme will be extracted upto 31.03.2014. A proposal has been initiated by the mine management for the administrative approval to extract 0.38 Mt coal in 2014-15 without any capital expenditure by extending the quarry in the dip side beyond the PR/Scheme limit (upto the limit of forest land) after exhaustion of coal reserves of the approved Scheme.

Coal reserves are available in the dip side of the mine upto major fault F4-F4 (Throw-100m). A part of the dip side reserve has been partly extracted by underground method of mining through Nandgaon UG mine. It is not possible to extract balance coal over stowed goaf in some panels and also in standing pillars in other panels by underground method of mining. It is therefore

proposed to extract the dip side coal reserves upto fault F4-F4 (virgin as well as partly worked out panels) by extending the existing Hindustan Lalpeth OC mine in dip side area. This will provide additional 6.25 Mt coal beyond approved PR/Scheme limit. Excluding 0.38 Mt coal proposed to be extracted

beyond PR/Scheme limit in 2014-15 through administrative approval, the balance coal reserve available for extraction by HLOC Expansion mine works out to **5.87 Mt** and the life of mine will be extended by **8 years** starting from 01.04.2015.

All the existing infra-structure as well as manpower of existing mine will be utilized by the proposed Hindustan Lalpeth Expansion OC mine.

1.1.1 Salient Features of the approved Scheme of Hindustan Lalpeth OC mine

Project Report of Hindustan Lalpeth OC mine was prepared by CMPDIL, RI-IV, Nagpur in March 1979 for target capacity of 0.59 Mty at an average stripping ratio of 1:3.11 and this report was approved by WCL Board for the total initial capital of Rs. 1188.60 lakhs. The excavation work was started in August, 1985. The coal reserves of the above PR exhausted in 2007-08. Thereafter, a Scheme was prepared to extract 2.53 Mt coal in the dip side beyond PR limit at an average Stripping Ratio of 1:6.13. Presently, the existing Hindustan Lalpeth OC mine is being operated under this Scheme.

The salient features of the Scheme are as follows :

Sl. No.	Particulars	Quantity/Provision
1	Total Coal Reserve	2.53 Mt
2	Total OB	15.50 Mm3
3	Av. Stripping Ratio	6.13 m3/t
4	Life	4 years
5	HEMM (same as PR)	Following Existing Equipment were proposed in the Scheme and no additional capital was provided for HEMM

Sl. No.	Particulars	Quantity/Provision
		a) Elect. Rope Shovel (5 m3) - 2 nos. b) Excavators - 4 nos. c) Dumpers (35T) - 22 nos.

		d) Dozer (D-155) - 5 nos.
6	Manpower	Existing Manpower (686) as on 1.4.2008
7	Dumping	Internal Dumping (entire 15.50 Mm3)
8	Service Buildings	The existing Buildings for offices, Pit office, Workshop, Store, Sub-station, Canteen etc. were adequate and no additional investment was required in the Scheme.
9	Residential Buildings	Following Existing Residential Building were adequate. No additional capital was provided in the Scheme for Residential Buildings. MQ-160, A Type- 32, B Type- 92, C Type-34, D Type – 6, Total - 324
10	Capital Investment	Rs. 100 lakhs. 2. Rs. 50 lakhs for 2 pumps (2500 GPM, 150m head. 3. Rs. 50 lakhs for shifting of HEMM & E&M Workshop, Stores, Manager's office, Pumps etc.

The above Scheme had been prepared for 4 years life (2008-2012) but it is still under operation. The total balance coal and OB of the Scheme as on 1.4.2012 are 1.042 Mt and 4.799 Mm3 respectively which will be excavated till 31.03.2014. Thus, the balance life of the mine as per the Scheme is only upto 31.03.2014. A proposal has been initiated by the mine management for the administrative approval to extract 0.38 Mt coal in 2014-15 without any capital expenditure in the dip side beyond the PR/Scheme limit after exhaustion of coal reserves of the approved Scheme.

1.2 EXPLORATION STATUS

Hindustan Lalpeth OC area has been explored in different phases by MECL & CMPDI. Following reports have been submitted on the basis of regional, detailed and production drilling :

i) Geological Report on exploration of Coal in Hindustan Lalpeth – Mahakali- Rayatwari Colliery Area, Wardha Valley Coalfield, Dist: Chandrapur (MECL-Feb 1980)

ii) Geological Report on Babupeth Block, Wardha valley Coalfield, Dist: Chandrapur (CMPDI-Feb 1984)

iii) Geological Note on Production Support drilling in a part of Hindustan Lalpeth OC, Distt. Chandrapur (MS), CMPDI, March 2002.

MECL and CMPDIL have drilled 51 boreholes in & around Hindustan Lalpeth OC area involving a total meterage of 5694.64m as detailed below :

Borehole Series	Within Mining Block Boundary		Outside Mining Block Boundary		Total		Remarks
	No. of Boreholes	Metreage	No. of Boreholes	Metreage	No. of Boreholes	Metreage	
WHL	7	676.60	4	733.60	11	1410.20	MECL, July'76 to March'78
CMWH	17	1480.30	12	1596.70	29	3077.00	CMPDI, June'78 to Nov'80
CMWHL	4	503.00	2	185.80	6	688.80	CMPDI, June'86 & July'09 to Oct'09
WCL	4	403.64	1	115.00	5	518.64	WCL Colliery Borehole
Total	**32**	**3063.54**	**19**	**2631.10**	**51**	**5694.64**	

1.4 MINING ACTIVITIES

1.4.1 PRESENT STATUS OF THE MINE

The brief status of the existing opencast mine are as follows:

a) <u>Production</u>

The total coal reserves and OB removal anticipated in the approved Scheme of Hindustan Lalpeth OC mine were 2.53 Mt and 15.50 Mm3 respectively. Out of this, 1.488 Mt coal and 10.701 Mm3 OB have been extracted from the mine upto 31.03.2012. The total balance coal and OB of the Scheme as on 1.4.2012 are 1.042 Mt and 4.799 Mm3 respectively which will be excavated till 31.03.2014.

The production of coal and OB from Hindustan Lalpeth OC mine in last four years is tabulated below :

Particulars	2008-09	2009-10	2010-11	2011-12	Balance as on 1.4.2012
Coal Production (Mt)	0.2923	0.905	0.618	0.511	1.042
OB Removal (Mm3)	2.2574	7.1011	1.946	1.672	4.799
Stripping ratio (m3/t)	7.723	7.846	3.149	3.272	4.605

Recently, as per the decision taken in Planning Committee Meeting held at WCL (HQ) on 18.02.2013 to discuss the draft PR of Hindstan Lalpeth Expansion OC mine, a proposal has been initiated by the mine management for the administrative approval to extract 0.38 Mt coal in 2014-15 without any capital expenditure by extending the quarry in the dip side beyond the PR/Scheme limit (upto the limit of forest land) after exhaustion of coal reserves of the approved Scheme.

e) Land

Total land acquired for Hindustan Lalpeth OC including Hindustan Lalpeth Extension Phase-I & Phase-II and Mana Incline is 633.10 ha. Out of this 633.10 ha land, 467.37 ha is tenancy land, 93.89 ha is Govt. land and rest 71.84 ha is forest land. The break-up of Lease Hold Area is tabulated below :

Project	Tenancy	Govt.	Forest	Total Lease

	Land (ha)	Land (ha)	Land (ha)	Hold Area (ha)
Hindustan Lalpeth OC	137.21	79.43	0	216.64
mine	8.72	14.46	71.84	95.02
Sub-Total	**145.93**	**93.89**	**71.84**	**311.66**
Mana OC project	85.54	0	0	85.54
Hindustan Lalpeth Phase-I	69.53	0	0	69.53
Hindustan Lalpeth Phase-II	166.37	0	0	166.37
Total	**467.37**	**93.89**	**71.84**	**633.10**

The break-up of Lease Hold area acquired in different Rights is as follows :

Project	All Right (ha)	Only Mining Right (ha)	Total (ha)
Hindustan Lalpeth OC	216.64	-	216.64
mine	37.07	57.95	95.02
Sub-Total	**253.71**	**57.95**	**311.66**
Mana OC project	85.54	-	85.54
Hindustan Lalpeth Phase-I	69.53	-	69.53
Hindustan Lalpeth Phase-II	52.50	113.87	166.37
Total	**461.28**	**171.82**	**633.10**

f) Capital Expenditure

Hindustan Lalpeth OC mine is being operated since 1985 and the total capital expenditure incurred in the mine since its inception (including replacement capital) alongwith Written Down Value (WDV) as on 1.4.2012 is tabulated below :

Sl. No.	**Particulars**	**Capital Expenditure (Rs. In Lakhs)**	**WDV as on 01.04.2012**
A.1	Land	0.00	0.00
A.2.1	Service Buildings	170.32	94.01
A.2.2	Residential Buildings	198.45	129.19

A.3	Plant & Machinery	5449.99	1623.17
A.4	Furniture & Fittings	10.78	1.77
A.5	Railway Siding	0.00	0.00
A.6	Vehicles	102.92	4.85
A.7	Prospecting & Boring	0.00	0.00
A.8	Development		
A.8.1	Capital Outlay in Mines	96.28	0.00
A.8.2	Roads & Culverts	348.74	284.66
A.8.3	Water Supply & Sewerage	70.89	13.69
A.8.4A	Environment Pollution Control	17.83	13.09
TOTAL		**6466.20**	**2164.43**

g) Manpower

Existing manpower in Hindustan Lalpeth OC mine as on 16.3.2013 is as follows :

Executives	-	37
Monthly rated	-	101
Daily Rated	-	462
Total	-	600

h) **Financial Performance in Last Two Years**

The salient features of the Financial Performance of the mine for last two years is as follows :

Sl. No.	Particulars	2010-11	2011-12
1.	Coal Production (Mt)	0.618	0.511
2.	OB Removal (Mm3)	1.946	1.672
3.	OMS (t)	2.82	2.56
4.	EMS (Rs.)	1703.08	2151.89
5.	Cost of Production (Rs./t) :	1365.06	1976.29

6.	Sale Value of coal (Rs./t)	1636.10	1257.36
7.	Profit (+) / Loss (-) (Rs./t)	+271.04	(-) 718.93
8.	Total Profit (Rs. in crores)	16.7604	(-) 36.735

1.5 JUSTIFICATION OF PREPARATION OF EXPANSION PR

1.5.1 The present Hindustan Lalpeth OC mine is being operated as per the approved Scheme of 2008 and the entire coal reserves of the Scheme will be extracted upto 31.03.2014. A proposal has been initiated by the mine management for the administrative approval to extract 0.38 Mt coal in 2014-15 without any capital expenditure in the dip side beyond the PR/Scheme limit after exhaustion of coal reserves of the approved Scheme. However, beyond 31.03.2015, further extraction of coal from dip side area will require many capital activities and hence prepararion and approval of the Expansion PR is necessary to work the coal reserves from dip side property.

1.4.2 Coal reserves is available in the dip side of the mine upto major fault F4-F4 (Throw-100m). A part of the dip side reserve has been partly extracted by underground method of mining through Nandgaon UG mine. It is not possible to extract balance coal over stowed goaf in some panels and also in standing pillars in other panels by underground method of mining. It is therefore proposed to extract the dip side coal reserves upto fault F4-F4 (virgin as well as partly worked out panels) by extending the existing Hindustan Lalpeth OC mine in dip side area. This will provide additional 5.87 Mt coal (excluding 0.38 Mt coal to be extracted in 2014-15) for extraction by HLOC Expansion mine and the life of mine will be extended by 8 years from 1.4.2015.

1.4.3 All the existing infra-structure as well as manpower of existing mine will be utilized by the proposed Hindustan Lalpeth Expansion OC mine.

1.5 SALIENT FEATURES OF PRESENT EXPANSION PR

1.5.1 The Project Report of Hindustan Lalpeth Expansion OC mine has envisaged expansion of existing Hindustan Lalpeth OC in the dip side (eastern side) upto fault F4-F4. The existing OC mine has already reached upto fault F4-F4 in the

northern part and therefore it is proposed in this report to expand the mine in the central and southern side and the northern part of the mine will be used for internal OB dumping. Delhi-Chennai broad gauge main railway line passes in the eastern dip side of the Hindustan Lalpeth OC mine and therefore the dip eastern side quarry surface boundary of the Expansion mine is limited upto 45m distance of the Railway acquired land.

1.5.2 The existing mine has a total strike length of about 2.3 km and about half of the existing quarry from southern end has been completely filled with internal dumping and this dump has been heightened upto 30 to 45m from the surface level. The proposed Expansion area lies in the dip side of this internal dump area and therefore a major portion of the rise side internal OB dump will have to be re-handled.

There is very limited land available in the adjoining area for external OB dumping and therefore, it has been proposed in this PR to accommodate maximum possible OB dumping in the northern side of the de-coaled void of the existing mine as the dip side limit of northern side quarry has reached upto major fault F4-F4 and there is no scope for further extension of quarry in this area because of no coal zone beyond this fault.

However, to maximize internal dumping, haul road will have to be planned through the present internal dump area in the southern side to approach the expansion area. This haul road has been planned along the benches to be formed in the backfilled OB in the rise side of proposed expansion area to minimize the re-handling of the existing backfilled OB. Formation of proper

benches as well as haul road in the existing backfilled OB requires re-handling of 13.85 Mm3 OB (solid). The total in-situ OB excavation proposed in the Expansion area works out to 44.153 Mm3 (solid) and thus total dump capacity required to accommodate both in-situ OB and re-handling OB is 44.153 + 13.85 = 58.003 Mm3. In addition to this, balance OB excavation (as on 1.4.2012) in the existing mine upto 01.04.2015 will be about 7.158 Mm3 (balance 4.799 Mm3 as per approved Scheme + 2.359 Mm3 for 0.38 Mt coal

extraction in 2014-15) which is presently being dumped internally in the northern side quarry.

Thus the total volume of OB dumping of the proposed Expansion mine including the OB of existing mine upto 31.03.2015 works out to 65.161 Mm3 which will be accommodated in the following dumps :

Sl. No.	OB DUMP	In-situ Volume (Mm3) (Solid)
1	Internal Dump	55.161
2	External Dump	10.000
	TOTAL	**65.161**

The total extractable reserves, OB removal and stripping ratio in different Cuts/Sectors of the proposed Expansion mine are tabulated below :

Sl. No.	Cut / Sector	Position of Cut / Sector	Extrac-table Reserves (Mt)	In-Situ OB (Mm3)	Stripping Ratio without Rehandling (m3/t)	Rehan-dling OB (Mm3) (Solid)	Stripping Ratio with Rehandling (m3/t)
1	Cut - I	Dip Side of Existing Mine (110m FRL) to 85m FRL	2.18	16.401	7.523		
2	Cut - II	85m FRL to 60m FRL	1.89	16.432	8.694		
3	Cut - III	60m FRL to 28m FRL	1.80	11.320	6.289		
	TOTAL		**5.87**	**44.153**	**7.522**	**13.850**	**9.881**

A target production of 1.00 Mty has been considered for the proposed Hindustan Lalpeth Expansion OC mine which will be achieved in the 5th year. The life of the proposed Expansion mine works out to 8 years.

1.5.3 The existing Hindustan Lalpeth OC mine is being implemented with partial outsourcing of HEMM for part of OB removal. However, the PR of Hindustan Lalpeth Expansion OC has been prepared for the following three options :

Departmental Option :

In this option it is proposed to extract the coal seam and top OB as well as re-handling of OB by departmental equipment. The total capital investment proposed in this option is **Rs. 251.5119 crores** including WDV of existing capital items of **Rs. 17.5956 crores** as on 1.4.2015. The IRR of the Project is negative at 85% capacity utilization. The desired selling price to yield 12% IRR at 85% production capacity works out to Rs. **3140.58/t**

Partial Hiring Option

In this option, it is proposed to maintain the existing departmental capacity of the mine to extract the entire coal production and balance capacity will be used to remove OB by departmental equipment. Rest entire OB and re-handling of OB will be done by hiring of HEMM. The total capital investment proposed in this option is **Rs 105.4839 crores** including WDV of existing capital items of **Rs. 17.5956 crores** and the IRR of the Project is negative at 85% capacity utilization. The desired selling price to yield 12% IRR at 85% production capacity works out to **Rs. 2519.68/t**

Total Hiring Option :

In this option it is proposed to extract the entire coal, OB and re-handling of OB by hiring of HEMM. However, provision of electricity, pumping, CHP, water supply, supervision etc. are the responsibility of WCL. The total capital investment proposed in this option is **Rs. 82.5941 crores** including WDV of existing capital items of **Rs. 17.5956 crores** and the IRR of the Project is negative at 85% capacity utilization. The desired selling price to yield 12% IRR at 85% production capacity works out to **Rs. 1872.19/t.**

1.5.4 The Project Report of Hindustan Lalpeth Expansion OC mine has been planned for annual production target of 1.00 Mty. However, in favourable conditions in some of the years of mine life, the peak production may go upto 125% of the target production, i.e. upto 1.25 Mty. The existing EMP of the mine has been approved for 1.00 Mty and fresh EMP clearance for the mine would be required for ther peak production capacity of 1.25 Mty.

1.5.5 Points to be considered under FLEXIBILITY

The Project Report of Hindustan Lalpeth Expansion OC mine has been planned with the resources, information and technology available at the time of preparation of PR. However, during the implementation phase or in future, some variations from the Expansion Project Report because of availability of more information and/or better technology, are allowed provided these variations are beneficial for the project from economical point of view and are within the approved capital of the Project.

Following variations from the approved Expansion Project Report are allowed during implementation of the project or in future :

c) The land details of the leasehold area given in the PR is based on the data given in the Scheme prepared by the Mine/Area for Expansion of Hindustan Lalpeth OC mine. This has not been checked by the actual Govt. land records because of non-availability of these records. Any variation in land details given by Mine/Area in the Scheme from actual Govt land records will have to be adjusted accordingly.

d) The proposed method of mining in the Project Report of Hindustan Lalpeth Expansion OC is Inclined Slicing with shovel dumper combination. The project has a revenue life of 8 years from 01.04.2015 onwards. In future better technology or equipment may be available with cost and other benefits. Under such circumstances, the technology and or equipment proposed in the Expansion PR alongwith other facilities may be changed provided they are beneficial for the mine from economical point of view and are within the sanctioned capital of the project.

c) No specific linkage or fuel supply agreement exists for the existing Hindustan Lalpeth OC mine as well as for the proposed Hindustan Lalpeth Expansion OC mine.

1.6 DIFFICULTIES AND CONSTRAINTS IN MINING WITH ASSOCIATED RISK

Following are the difficulties and constraints with associated risk in the proposed Hindustan Lalpeth Expansion OC mine :

1. Diversion of Forest Land from Mining Right to All Right

   For the proposed Hindustan Lalpeth Expansion OC mine, about 36.98 ha forest land acquired earlier under Mining Right is required to be diverted under All Right for opencast mining. This diversion of forest land from Mining Right to All Right is the most critical activity for expansion of mine.

2. Re-habilitation for Encroachment in WCL Land and Forest Land at HLC

   About 300 houses exist in the dip side of existing Hindustan Lalpeth OC mine as Encroachment on WCL land and Forest land. This land will be required for the proposed Expansion mine partially for excavation and partially for 100m safety zone. Shifting and rehabilitation of these families are critical activities for proposed Expansion OC mine.

3. Construction of coal Transportation Road (2.10 km) and Public Approach Road (1.20 km)

   The existing coal transportation road as well as public approach road to Nandgaon, Mana and Hindustan Lalpeth OC mine will have to be diverted because of proposed expansion of mine. About 2.10 km diversion road for coal transportation and 1.20 km diversion road for public approach road will have to be constructed in further eastern dip side beyond the surface boundary of Expansion quarry. This is one of the essential activities for the Expansion of mine

4. Shifting of WCL Quarters, Manager's Office, School, Sub-Station, Worker's Institute etc.

   160 nos. of quarters (80 nos. of Double Storey Miner's quarters and 80 nos. LCH quarters) including Post office and UCO bank, School, Worker's Institute, Manager's Office, Sub-Station etc. lying in the dip side of existing Hindustan Lalpeth OC mine will have to dismantled due to the proposed expansion of mine. It is proposed to construct above Residential and Service buildings at new location in the western side of Mana colliery within the

leasehold boundary of Hindustan lalpeth OC mine. Dismantling and construction of new buildings are critical activities for the proposed Expansion mine.

5. Diversion of Power Transmission Line

Two feeders of 11 kV overhead lines each of 3.00 km length (one HT Line and another LT Line) pass through the proposed Expansion area of Hindustan Lapeth OC mine which are required to be diverted. The provision for diversion has been made in the Expansion PR and this is one of the major activities to be done for mine development.

6. Re-handling of OB Dump of Existing Hindustan Lalpeth OC mine

The existing mine has a total strike length of about 2.3 km and about half of the existing quarry from southern end has been completely filled with internal dumping and this dump has been heightened upto 30 to 45m from the surface level. The proposed Expansion area lies in the dip side of this internal dump area and therefore the rise side internal OB dump will have to be re-handled.

There is very limited land available in the adjoining area for external OB dumping and therefore, it has been proposed in this PR to accommodate maximum possible OB dumping in the northern side of the de-coaled void of the existing mine as the dip side limit of northern side quarry has reached upto major fault F4-F4 and there is no scope for further extension of quarry in this area because of no coal zone beyond this fault.

However, to maximize internal dumping, haul road will have to be planned through the present internal dump area in the southern side to approach the expansion area. This haul road has been planned along the benches to be formed in the backfilled OB in the rise side of proposed expansion area to minimize the re-handling of the existing backfilled OB. Formation of proper benches as well as haul road in the existing backfilled OB requires re-handling of 13.85 Mm3 OB (solid). Rehandling of this much OB is one of the most critical activities for the proposed Expansion mine.

1.7 PROJECT OBJECTIVES AND TARGET BENEFICIARIES

1.7.1 Objective of the Project

The main objectives of the proposed Hindustan Lalpeth Expansion OC mine are as follows:

b) to increase the life of existing Hindustan Lalpeth OC mine by further 8 years from 20015-16 onwards and to enhance the production of coal from existing mine from 0.65 Mty to 1.00 Mty to meet the demand of coal.

b) to achieve the complete customer satisfaction in respect to quantity and quality of coal.

c) to achieve the desired productivity in respect to HEMM and manpower deployment.

d) Socio-economic development of the area.

1.7.2 Target Beneficiaries

The target beneficiaries of the proposed Hindustan Lalpeth Expansion OC project are the following stakeholders.

a) Company :

This includes the employees, management and stake holders. The company including its employees, management and stake holders will be benefited by this project.

b) The Community

The community is one of the major stakeholders and it includes landholders, local business and service providers, neighbours and nearby residents, local government and NGOS and community groups. The proposed project will bring development in the area and its neighbourhood and nearby residents will be benefited by the job opportunities created by the project. The local business and service providers will also be benefited due to several ancilliary activities generated due to this project.

c) The State

The State Government, the Central Government and various concerned Government agencies are also the target beneficiaries of the proposed project. The State Govt. will get royalty for the coal produced. The creation of various job opportunities and various development activities carried out under the project will ultimately benefit the State Govt.

The Central Govt. being the owner of CIL & WCL, the profit earned by the project will ultimately be the profit of Central Govt. Moreover, the tax paid on the income will add the revenue income of the Central Government.

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CHAPTER - II

MARKETABILITY

2.0 GENERAL

Western Coalfields Limited is the premier coal producing Company catering to the energy needs of Central and Western India. This Company has a variety of consumers in the organized and unorganised sectors although its main consumers are power houses of MAHAGENCO and MPPGCL. In order to meet the ever-increasing demand for non-coking coal, WCL must expand within its command area and lead the industry by successfully introducing new and viable technology for underground and opencast mines.

2.1 SECTOR-WISE DEMAND OF COAL ON COMPANY

The following table shows the sector-wise demand for coal on WCL:

(Fig. in Mt)

Sl. No.	Sector	Projections of Demand of Coal				
		2012-13	2016-17	2021-22	2026-27	2031-32
1	Steel	0.381	0.451	0.502	0.477	0.577
2	Private Cokeries / Coke Oven / Others	0.039	0.039	0.039	0.039	0.039
Sub-Total (Coking)		**0.420**	**0.489**	**0.541**	**0.516**	**0.616**
1	Power (Utilities)-Raw Coal	48.343	48.318	48.300	48.309	48.273
2	Power (Utilities) - Middling	0.116	0.162	0.180	0.171	0.207
3	Power (Captive)	3.866	3.866	3.866	3.866	3.866
4	Sponge Iron / CDI	0.571	0.571	0.571	0.571	0.571
5	BRK and others/LTC/SSF	6.7671	6.8761	6.8761	6.8262	6.7897
6	Cement	2.380	2.380	2.380	2.380	2.380
7	Colliery consumption	0.023	0.023	0.023	0.023	0.023
Sub-Total (Non-Coking)		**62.0871**	**62.1961**	**62.1961**	**62.1462**	**62.1097**
Total (Coking + Non-Coking)		**62.5071**	**62.6861**	**62.7371**	**62.6622**	**62.7257**

Source: Long Term Plan Document for 2011-12 of WCL prepared by WCL Planning Department in September 2011.

2.2 AVAILABILITY OF COAL FROM WCL

The following table shows the availability of coal from the mines of WCL:

(Fig. in Mt)

Sl. No.	Sector	Projections of Availability of Coal				
		2012-13	2016-17	2021-22	2026-27	2031-32
1	Existing mines	0.670	0.480	0.410	0.200	0.200
2	Completed projects	22.070	11.961	4.910	3.698	3.178
3	On-going projects	19.870	17.421	13.685	7.998	3.843
4	Future projects	1.300	15.138	25.201	29.516	31.213
5	Additional Blocks applied for Retention	0.000	0.000	0.294	2.724	4.924
	Total Availability	**43.910**	**45.000**	**44.500**	**44.136**	**43.358**

Source: Long Term Plan Document for 2011-12 of WCL prepared by WCL Planning Department in September 2011.

2.3 DEFICIT IN AVAILABILITY OF COAL FROM WCL

Following table shows the deficit in availability of coal, including middlings, from the various Existing, Completed, On-going, and Future Projects of WCL:

(Fig. in Mt)

Sl. No.	Sector	Projections of Surplus / Deficit of Coal				
		2012-13	2016-17	2021-22	2026-27	2031-32
1	Demand for coal	62.507	62.686	62.737	62.662	62.726
2	Availability of coal	43.910	45.000	44.500	44.136	43.358
3	Surplus / Deficit (+/-)	**(-) 18.597**	**(-) 17.686**	**(-) 18.237**	**(-) 18.526**	**(-) 19.368**

2.4 UTILITY / MARKET FOR THE COAL FROM THE MINE

The marketing of non-coking coal produced from proposed Hindustan Lalpeth Expansion OC mine will not be a problem as there is a readily available market. There is huge demand of coal from power sector and the coal may be supplied to the power houses of MPPGCL / MSEDCL / NTPC or captive power houses subject to agreement on cost-plus basis. Also there are many miscellaneous industries which can utilize the coal produced from Hindustan Lalpeth Expansion OC mine.

2.5 AVAILABLE LINKAGE OR FIRM FUEL SUPPLY AGREEMENT

There is no firm linkage available from existing Hindustan Lalpeth OC mine to either power house or any miscellaneous industries. The financial analysis of proposed Expansion PR of Hindustan Lalpeth OC mine reveals that the project is not generating 12% IRR at 85% target capacity. Therefore the coal produced from Hindustan Lalpeth Expansion OC mine has

to be offered to a prospective consumer who will be ready to take the coal on cost-plus basis by making firm and long term fuel supply agreement.

2.6 JUSTIFICATION AND MARKETABILITY

From the tables given in para no. 2.1 to 2.3, it is clear that the deficit in supply of coal from WCL as a whole is increasing every year. New mines/ projects have to be opened or expansion of existing operating mines has to be done by WCL in order to meet the ever increasing demand of coal. There is a deficit in supply of coal from the mines of WCL and therefore a ready market exists for the additional coal to be produced from proposed Hindustan Lalpeth Expansion OC mine. In view of the readily available market for coal and huge gap in demand and supply of coal from WCL, the Expansion PR of Hindustan Lalpeth OC mine is fully justified. At present the Hindustan Lalpeth OC mine has target capacity of 0.633 Mty and there will not be any difficulty in marketing of increased production upto level of 1.00 Mty from proposed Hindustan Lalpeth Expansion OC mine.

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CHAPTER - III

PROJECT SITE INFORMATION

3.3 LOCATION

3.1.1 Hindustan Lalpeth OC Mine extending over an area of about 1.18 sq. km is located in Wardha valley Coalfield and is surrounded by Mana UG mine in the west, Hindustan Lalpeth colliery in the east and Nandgaon UG mine in the South. This mine lies 4 km south of Chandrapur district headquarter which is about 170 Km from Nagpur in Maharashtra State. The block falls in Survey of India Topo Sheet No. 56 M/5.

3.1.2 Limiting boundaries of the projectised area

The projectised boundaries of Hindustan Lalpeth Expansion OC mine including existing Hindustan Lalpeth OC mine are detailed below :

Project Quarry Boundaries :

North : Major fault F4-F4 and Sub-crop of the Composite Coal Seam meet in the northernh end and they define the northern limit of the block. The existing Hindustan Lalpeth OC mine has completed the coal extraction upto the northern boundary except a small triangular portion which is difficult to work due to narrow triangular shape. Thus, the existing quarry floor and quarry surface of Hindustan Lalpeth OC mine in the northern side define the project quarry boundaries in north side.

South : Nandgaon UG mine exists in the South-Eastern side of Hindustan Lalpeth OC mine. It is proposed in this report to include some part of Nandgaon UG mine (partly developed and partly depillared) lying in the dip side (eastern side) of southern part of Hindustan Lalpeth OC in the proposed Hindustan Lalpeth Expansion OC mine for extraction of

balance coal reserves through opencast mining. Thus, the southern side project boundary of the proposed Expansion mine is an arbitrary line between Nandgaon UG mine and Hindustan Lalpeth Expansion OC mine. It is proposed to construct Water Dams in the underground galleries to separate the carved out area of Nandgaon UG mine from rest of Nandgaon UG workings.

East : Major Fault F4-F4 (south-east to north-west) defines the eastern quarry floor boundary of proposed Hindustan Lalpeth Expansion OC in northern and central part. Accordingly, the eastern dip side quarry surface limit has been planned with proper angle of batter.

In the southern part of the mine, the eastern quarry surface boundary of the proposed Expansion mine has been envisaged along Delhi-Chennai Railway line leaving 45m distance from the railway acquired land and space for coal treansportation road. In the south eastern corner, the quarry surface edge has been demarcated leaving safety barrier against Nandgaon Basti. Accordingly, quarry floor limit has been planned considering the proper angle of batter.

West : The Sub-Crop of Coal Seam was the western quarry floor limit of existing Hindustan Lalpeth OC mine. Presently, the rise side western quarry floor and surface boundary of Hindustan Lalpeth OC mine will be the project quarry boundary of proposed Expansion mine.

<u>Boundaries of Dump / Infrastrucure :</u>

The external OB dump of existing Hindustan Lalpeth OC mine is located in the rise western side particularly in the northern part of the mine area. In addition to this, OB dumping has also been done along the periphery of the quarry in the north-eastern side. Moreover, the entire southern part of the quarry has been backfilled and heightened about 35-45m above surface.

In the proposed Hindustan Lalpeth Expansion OC mine, it is proposed to access the expansion area by making haul road in the southern side of quarry along the benches formed in the backfilled OB after re-handling of backfilled OB. This re-handled OB as well as entire in-situ OB will be accommodated in the internal backfilling in the northern part of decoaled void and raising the dump height 60m to 90m above the surface after merging the backfilled dump to the adjoining external dump in north-west and north-east side.

The existing as well as proposed infra-structure for the mine e.g. CHP, Workshop, Manager's office, Sub-station etc. are located in the rise side of the quarry partly on external OB dump. Therefore, further heightening of external OB dump has been proposed leaving safe distance from the above infra-structure.

Thus, in the western rise side, infra-structure and external OB dump are bounded by Mine boundary of Mana Incline in the west and south side, PWD road and Erai river in the north side and Hindustan Lalpeth Oc in the east side.

Similarly, the peripheral OB dump in the north-eastern side of the quarry is bounded by coal transportation road in the east and south side and by Hindustan Lalpeth quarry in the west side. In addition to this, some OB dumping has been proposed in the western side of Mana UG mine partly over the existing dump and partly on fresh ground. This area lies within the leasehold boundary of Hindustan Lalpeth OC mine and is bounded by lease hold boundary of HLOC in southern and western side and by the western mine boundary of Mina UG mine in the eastern side.

3.2 ACCESSIBILITY & COMMUNICATION

Hindustan Lalpeth OC mine is located about 4 km south of Chandrapur district headquarter and is well connected by road. Chandrapur is about 170 km from Nagpur and connected by all weather road and rail. Nearest railway head is Chandrapur which is on Delhi- Chennai broad gauge main line.

3.3 PHYSIOGRAPHY & DRAINAGE

Most of the area in the block is covered under blanket of Soil & alluvium. This area is slightly undulating plains. The nearby Erai River flows from North to South at the western end about 1 km from mine. HFL recorded in the area is 180.267m on 15th Sept.1959. Climate is of extreme nature with temperature varying from 10 deg.C to 48 deg.C.

3.4 PRESENT LAND USE PATTERN

Total land acquired for Hindustan Lalpeth OC including Hindustan Lalpeth Extension Phase-I & Phase-II and Mana Incline is 633.10 ha. Out of this 633.10 ha land, 467.37 ha is tenancy land, 93.89 ha is Govt. land and rest 71.84 ha is forest land. The break-up of Lease Hold Area is tabulated below :

Project	Tenancy Land (ha)	Govt. Land (ha)	Forest Land (ha)	Total Lease Hold Area (ha)
Hindustan Lalpeth OC	137.21	79.43	0	216.64
mine	8.72	14.46	71.84	95.02
Sub-Total	**145.93**	**93.89**	**71.84**	**311.66**
Mana OC project	85.54	0	0	85.54
Hindustan Lalpeth Phase-I	69.53	0	0	69.53
Hindustan Lalpeth Phase-II	166.37	0	0	166.37
Total	**467.37**	**93.89**	**71.84**	**633.10**

The break-up of Lease Hold area acquired in different Rights is as follows :

Project	All Right (ha)	Only Mining Right (ha)	Total (ha)
Hindustan Lalpeth OC	216.64	-	216.64
mine	37.07	57.95	95.02
Sub-Total	**253.71**	**57.95**	**311.66**
Mana OC project	85.54	-	85.54
Hindustan Lalpeth Phase-I	69.53	-	69.53
Hindustan Lalpeth Phase-II	52.50	113.87	166.37
Total	**461.28**	**171.82**	**633.10**

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CHAPTER - IV

GEOLOGY AND DEPOSIT APPRAISAL

4.1 BACKGROUND

4.1.1 Geological Reports

Hindustan Lalpeth OC area has been explored in different phases by MECL & CMPDI. Following reports have been submitted on the basis of regional, detailed and production drilling :

i) Geological Report on exploration of Coal in Hindustan Lalpeth – Mahakali- Rayatwari Colliery Area, Wardha Valley Coalfield, Dist. Chandrapur (MECL-Feb 1980)

ii) Geological Report on Babupeth Block, Wardha valley Coalfield, Dist: Chandrapur (CMPDI-Feb 1984)

iii) Geological Note on Production Support drilling in a part of Hindustan Lalpeth OC, Distt. Chandrapur (MS), CMPDI, March 2002.

4.2 EXPLORATION STATUS

4.2.1 Details of Drilling

MECL and CMPDIL have drilled 51 boreholes in & around Hindustan Lalpeth OC area involving a total meterage of 5694.64m as detailed below :

Borehole Series	Within Mining Block Boundary		Outside Mining Block Boundary		Total		Remarks
	No. of Boreholes	Metreage	No. of Boreholes	Metreage	No. of Boreholes	Metreage	
WHL	7	676.60	4	733.60	11	1410.20	MECL, July'76 to March'78
CMWH	17	1480.30	12	1596.70	29	3077.00	CMPDI, June'78 to Nov'80
CMWHL	4	503.00	2	185.80	6	688.80	CMPDI, June'86 & July'09 to Oct'09
WCL	4	403.64	1	115.00	5	518.64	WCL Colliery Borehole
Total	**32**	**3063.54**	**19**	**2631.10**	**51**	**5694.64**	

4.2.2 Borehole Density

The density of the boreholes for the whole of Hindustan Lalpeth OC mine including Expansion area under report is about 27 Bhs/sq.km. (No. of BHs 32, Area 1.18 Sq.Kms)

4.2.3 Analytical Status

Analytical details from Roof to floor (including all partings) of the combined coal seam are furnished in the following table :

Analytical Parameters	Analysis Available for Boreholes (No.)
Band-by band	15
Proximate Analysis	02
Ultimate Analysis	NA
AFT Range	NA
Ash Analysis	NA
Sulphur Distribution	NA

4.3 GEOLOGY AND STRUCTURE OF HINDUSTAL LALPETH OC BLOCK

4.3.1 Geological formations – Kamthis, Barakars and Talchirs are found to be occurring in block. Since thick layer of soil covers the block, different formations are not exposed anywhere in the block. Based on the available sub-surface data, the following succession has been established in Hindustan Lalpeth OC mining block.

GEOLOGICAL SUCCESSION IN HINDUSTAN LALPETH OC MINING BLOCK

Age	Formation	Lithology	Thickness Range (m) (Borehole)
Sub-Recent to Recent	Soil / Alluvium	Black Cotton and Sandy Soil	Upto 16.75 (CMWH 25)
Lower Triassic to Upper Permian	Kamthi	Fine to coarse-grained ferruginous, yellowish brown to reddish brown SST with variegated Clays.	11.10 - 44.50 (CMWH 25 - CMWH 12)
Lower Permian	Upper Barakar	Medium to coarse grained, grey white SST with subordinate grey shale and carbonaceous streaks and thin coal bands	6.40 – 199.85 (CMWHL 02 – CMWH 20)
	Middle Barakar	Composite Coal Seam, generally banded with grey shale and carbonaceous shale partings.	
	Lower Barakar	Medium to coarse grained, grey to dirty white gritty SST, with subordinate grey shale and intercalation of shale and SST.	
Upper Carboniferous	Talchir	Fine grained argillaceous sandstones and green shales	(+) 2.40 – 3.60 (WHL 43 – WHL 30)

4.3.2 Geological Formations and Their General Behaviour

Different formations as encountered in Hindustan Lalpeth OC area are briefly described below (on the basis of sub surface data obtained from the boreholes) :

Talchir Formation

Talchirs are not exposed any where in the block but have encountered in two nearby boreholes. They are generally composed of greenish shale and silt stones. The encountered thickness in nearby boreholes varies from (+) 2.40m to 3.60m.

Barakar Formation

The main coal bearing Barakar formation conformably overlies Talchirs with a gradational contact. Thick combined coal seam occurs almost in the middle of the Barakar column known as Middle Barakar. These are generally composed of medium to coarse grained and occasionally gritty sandstone. The maximum thickness of Barakar column intersected in borehole CMWH – 20 is 199.85m. The Barakars occurring above and below the coal seam is described as upper and lower Barakar. Barakar formations are exposed in the working quarry.

Kamthi Formation

Kamthis are not exposed any where in the block. They are generally composed of fine to coarse-grained ferruginous, yellowish brown to reddish brown sandstone with variegated clays. The encountered thickness varies from 11.10m (CMWH 25) to 44.50m (CMWH 12). Kamthis are exposed in the working quarry.

4.3.3 Composite Coal Seam

Detailed exploration in Hindustan Lalpeth OC mining block has proved the existence of composite coal seam of Wardha Valley Coalfield. The composite coal seam has been split into three sections- Section 1, Section 2 and Section 3 from top to bottom. These sections have been delineated on the basis of thickness, nature of roof/floor and intervening parting. However, in this Project, composite seam thickness and quality has been calculated including all bands irrespective of their thickness and nature as the entire Composite Seam including all in-seam bands is being extracted in the existing mine.

The thickness of composite seam varies from **13.15m to 19.30m**

4.3.4 Structural Set up within the Project area

Hindustan Lalpeth OC block is narrow wedge shaped area lying between one major fault and sub crop. It is narrow in the Northern part and broad in the southern part. Structure of the Block is mainly based on the sub-surface data obtained from the boreholes drilled in the area. Spot levels at the floor of composite seam are not available. The coal is being extracted from this Hindustan Lalpeth OC mine and there is no report of any structural disturbance during mining.

4.3.5 Dip and Strike :

The general strike in the proposed block area varies from NNW-SSE in the north to NW-SE in the south. Seam is dipping easterly. The gradient of seam varies from 1 in 4 to 1 in 6 with approximate corresponding dip 9^0 to 14^0.

4.3.6 Faults :

Two major faults forms the boundary of HLOC. However, no other fault is encountered in the mine working or in the boreholes drilled in the area. Occurrence of minor faults cannot be ruled out.

4.4 DESCRIPTION OF COAL SEAMS

4.4.1 Detailed exploration in HLOC area has proved the existence of composite seam of Wardha Valley Coalfield. The composite seam has been split into three sections- Section 1, Section 2 and Section 3 from top to bottom. These sections have been delineated on the basis of thickness, nature of roof/floor and intervening parting. However, in this Project, composite seam thickness and quality has been calculated including all bands irrespective of their thickness and nature as the entire Composite Seam including all in-seam bands is being extracted in the existing mine.

The thickness of composite seam varies from **13.15m to 19.30m.** The details of the Composite Coal Seam including all Seam Sections and Parting are detailed below :

Parameters	Range	
	Minimum	Maximum
Boreholes intersections (Full seam)	20 Boreholes (CMWH 02, 03, 04, 10, 12, 18, 22, 25, 65 & 66 ; WHL 27, 28, 34, 37 & 38 ; CMWHL 05 & 06 ; WCL 01, 02 & 06)	
Boreholes where seam is faulted	01 BH (CMWH 20)	
Borehole with Part Thickness due to faulting	02 BHs (CMWHL 03 & WCL 05)	
Borehole with Part Thickness due to subcrop.	09 Boreholes (CMWH 05, 07, 15, 17, 21, 23 ; WHL 39 & 40 ; CMWHL 02)	
Depth Range of floor (m)	14.05 (CMWH 23)	172.00 (WHL 38)
Thickness Range (m)	13.15 (CMWH 65)	19.30 (WCL 02)
No. of Bands (No.)	4 (CMWH 18)	11 (WHL 28)

Parameters	**Range**	
	Minimum	**Maximum**

Thickness of individual bands (m)	0.06 (CMWH 10)	1.65 (CMWH 18)
Cumulative thickness of bands (m)	2.82 (CMWH 12)	5.05 (CMWHL 05)
Immediate Roof	Mostly sandstone, sometimes carb.shale/shale/clay	
Immediate Floor	Mostly sandstone, sometimes shale/carb.shale/l.Cal.	

4.4.2 Quality Parameters

The quality parameters of the composite coal seam on Air Dried basis are tabulated below :

Quality Parameters	Without Dilution (Roof to Floor)		With Dilution (0.05m dilution in roof and floor)	
	Minimum	Maximum	Minimum	Maximum
Moisture %	3.3 (WHL-28)	11.1 (WHL-34 & 38)	3.3 (WHL-28)	11.1 (WHL-38)
Ash %	28.9 (WHL-37)	42.2 (CMWHL-05)	29.2 (WHL-37)	42.4 (CMWHL-05)
GCV (kCal/kg)	3784 (CMWHL-05)	4880 (CMWH-25)	3779 (CMWHL-05)	4867 (CMWH-25)
UHV (kCal/kg)	2317 (CMWHL-05)	3835 (CMWH-25)	2304 (CMWHL-05)	3808 (CMWH-25)

4.4.3 Petrographic Analysis

Petrographic analysis is not available for Composite coal seam.

4.5 PHYSICO-MECHANICAL, GEO-PHYSICAL AND HYDRO-GEOLOGICAL INFORMATION

The existing Hindustan Lalpeth OC mine is being operated since 1985 and most of the information is available as past experience of opencast working. As such, no Physico-Mechanical, Geo-Physical and Hydro-geological studies have been carried out for this mine.

4.6 GEOLOGICAL RESERVES

4.6.1 General

Occurrence of Composite Seam of Wardha Valley Coalfield has been well established in Hindustan Lalpeth OC area. In the present assessment, In-situ reserves have been estimated for the composite seam i.e. roof to floor including all bands irrespective of their thickness and nature for the entire Hindustan Lalpeth mining block (including already extracted reserves).

4.6.2 Norms for Reserve Estimation

Following norms have been adopted while estimating reserves :

i) Method of law of gradual change has been adopted and it has been assumed that for each borehole intersection, change from one borehole to another is gradual.

ii) Reserves have been calculated separately for the sub-crop zone and zone between sub-crop to mine boundary.

iii) The reserves have been estimated separately for depth ranges i.e. upto 15m, 15-50m, 50-100m, 100-150m and 150-200m depth from surface.

iv) Reserves have been estimated for different GCV ranges (kCal/kg).

v) In-situ reserves have been calculated through Minex Software without taking mine workings into consideration.

4.6.3 Method of Reserve Estimation

i) Detailed in-situ reserves estimation has been done through Minex software.

ii) Following specific gravity have been considered for reserve estimation:

GRADE	UHV (kCal/kg)	Sp. Gravity
A	Above 6200	1.40
B	5600 - 6200	1.45
C	4940 - 5600	1.50
D	4200 - 4940	1.55
E	3360 - 4200	1.60
F	2400 - 3360	1.68
G	1300 - 2400	1.76

iii) The net in-situ proved reserves have been arrived at by giving an allowance of 10% from the gross reserves for unidentified geological variables.

4.6.4 Category of Reserves

All reserves have been classified under proved category. Depth-wise, GCV-wise and thickness-wise in-situ coal reserves of Composite Seam in Hindustan Lalpeth OC mining block in the sub-crop zone and between sub-crop to dip side mine boundary are given below :

Fig. in '000 tonnes

GCV Range (kCla/kg)	Thickness Range of Composite Coal Seam (m)				
	12-14	14-16	16-18	18-20	Total
Depth Range 15m – 50m (Sub-Crop Zone)					
3700 - 4000					**0.000**
4000 - 4300		38.773	519.669		558.442
4300 - 4600		130.779	196.139		326.916
4600 - 4900			200.157		200.157
Sub-Total		**169.552**	**915.965**		**1085.517**

Fig. in '000 tonnes

GCV Range (kCla/kg)	Thickness Range of Composite Coal Seam (m)				
	12-14	14-16	16-18	18-20	Total
Depth Range 15m – 50m (Sub-Crop to Mine Boundary)					

3700 - 4000					**0.000**
4000 - 4300		56.022	406.323		**462.345**
4300 - 4600		129.548	321.040		**450.588**
4600 - 4900			293.281		**293.281**
Sub-Total		**185.570**	**1020.644**		**1206.214**
Depth Range 50m – 100m (Sub-Crop Zone)					
3700 - 4000					**0.000**
4000 - 4300			21.505		**21.505**
4300 - 4600					
4600 - 4900			7.347		**7.347**
Sub-Total			**28.852**		**28.852**
Depth Range 50m – 100m (Sub-Crop to Mine Boundary)					
3700 - 4000					**0.000**
4000 - 4300		103.983	4277.574		**4381.557**
4300 - 4600	165.422	1074.347	4247.904	82.829	**5570.502**
4600 - 4900		68.752	2026.857		**2095.609**
Sub-Total	**165.422**	**1247.082**	**10552.335**	**82.829**	**12047.668**
Depth Range 100m – 150m (Sub-Crop to Mine Boundary)					
3700 - 4000			543.484		**543.484**
4000 - 4300		210.333	3105.180		**3315.513**
4300 - 4600		848.216	2378.434	169.687	**3396.337**
4600 - 4900			1648.344	16.278	**1664.622**
Sub-Total		**1058.549**	**28.852**	**185.965**	**8919.956**
Depth Range 150m – 200m (Sub-Crop to Mine Boundary)					
3700 - 4000			1868.516		**1868.516**
4000 - 4300		179.573	1035.279		**1214.852**
4300 - 4600			79.534		**79.534**
4600 - 4900			93.223		**93.223**
Sub-Total		**179.573**	**3076.552**		**3256.125**

GCV Range (kCla/kg)	**Thickness Range of Composite Coal Seam (m)**				
	12-14	**14-16**	**16-18**	**18-20**	**Total**
GRAND TOTAL					
3700 - 4000			2412.000		**2412.000**

4000 - 4300		588.684	9365.530		**9954.214**
4300 - 4600	165.422	2182.890	7223.051	252.516	**9823.879**
4600 - 4900		68.752	4269.209	16.278	**4354.239**
TOTAL	**165.422**	**2840.326**	**23269.790**	**268.794**	**26544.331**

Total 26.544 Mt in-situ coal reserves (including already extracted reserves) have been estimated under proved category in Hindustan Lalpeth OC mining block.

4.7 Recommendation

Hindustan Lalpeth OC mining area is explored in detail and also covered by extensive mine workings, proving its structure and reserves.

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CHAPTER - V

MINE BOUNDARY, RESERVES AND MINE LIFE

5.1 INTRODUCTION

The existing Hindustan Lalpeth OC mine is being worked in Hindustan Lalpeth mining block. This block is bounded by Sub-Crop in the western side and major fault F4-F4 and Delhi-Chennai Railway line in the eastern side and is separated from Nandgaon UG Block in the south side by an arbitrary line. Some portion of southern part of Hindustan Lalpeth block lying between the dip side of existing quarry and Fault F4-F4 has been worked by underground method of mining through Nandgaon Incline. In the northern side, Sub-Crop of composite coal seam and fault F4-F4 has joined making a narrow wedge like shaped (narrow in the northern part and broad in the southern part).

The Project Report of Hindustan Lalpeth OC mine was prepared by CMPDIL, RI-IV, Nagpur in March 1979 for target capacity of 0.59 Mty at an average stripping ratio of 1:3.11. The excavation work was started in August, 1985. After the exhaustion of coal reserves upto the PR limit, a Scheme was prepared to extract 2.53 Mt coal in the dip side beyond PR limit at an average Stripping Ratio of 1:6.13. Presently, the existing Hindustan Lalpeth OC mine is being operated under this Scheme and the coal reserves envisaged in the Scheme will be exhausted in 2013-14. A proposal has been initiated by the mine management for the administrative approval to extract 0.38 Mt coal in 2014-15 without any capital expenditure in the dip side beyond the PR/Scheme limit after exhaustion of coal reserves of the approved Scheme.

This Expansion PR has been prepared to work the dip side property of existing Hindustan Lalpeth OC mine upto fault F4-F4 and railway line in the eastern side. This will include the area already worked (partly developed and

depillared) by Nandgaon UG mine. Thus, the southern boundary of the proposed expansion mine will be an arbitrary line separating it from Nandgaon UG workings and Water Dams will be prepared to close the entries between UG workings of Nandgaon UG mine and proposed Expansion OC area.

5.2 PIT FORMULATION STRATEGY

The existing Hindustan Lalpeth OC mine is being worked in Hindustan Lalpeth mining block. The following strategy has been adopted for the formulation of Pit for Hindustan Lalpeth Expansion OC mine :

North : In the northern side, Sub-Crop of composite coal seam and fault F4-F4 have joined making a narrow wedge like shaped. The existing mine has already reached this northern block boundary. Only a small triangular patch at the northern end (near the meeting point of fault F4-F4 and Sub-crop of Composite seam) has been left due to odd shape. Thus, in the northern side, the quarry surface edge of existing Hindustan Lalpeth OC mine define the northern quarry boundary of proposed Hindustan Lalpeth Expansion OC mine.

South : Nandgaon UG mine is located in the southern and south-eastern side of the existing Hindustan Lalpeth OC mine. Some portion of south eastern part of Hindustan Lalpeth block lying between the dip side of existing quarry and Fault F4-F4 has been worked by underground method of mining through Nandgaon Incline. It is proposed in this RPR to work this partly developed/depillared reserves by opencast method and therefore this dip side property upto fault F4-F4 has been included in the proposed Hindustan Lalpeth Expansion OC mine. It is proposed to make Water Dams in the galleries connecting the southern side U/G workings of Nandgaon colliery to the proposed expansion area to be worked by opencast mining.

Thus, the southern side boundary between the proposed Hindustan Lalpeth Expansion OC mine and Nandgaon UG mine is an arbitrary line passes beyond the southern quarry surface limit of proposed Hindustan Lalpeth Expansion OC mine maintaining a safety zone from the quarry.

East : In the eastern side, the proposed Hindustan Lalpeth geological block is bounded by major Fault F4-F4 (in northern and central part) and Delhi-Chennai Railway line (in southern part). Therefore, the eastern dip side quarry floor limit of Expansion mine has been limited upto Fault F4-F4 (in northern and central part) and accordingly quarry surface limit has been planned with proper angle of batter. However, in the southern part of the mine, the eastern dip side quarry surface limit has been demarcated leaving safe distance from Delhi-Chennai railway line (45m from Railway acquired land and after leaving space to accommodate Coal transportation road) and accordingly quarry floor limt has been planned with proper angle of dip side batter.

West : Hindustan Lalpeth mining block was bounded by Sub-Crop in the western side which had already been worked by the existing quarry. Therefore, the western quarry surface and floor limit of existing Hindustan Lalpeth OC mine define the western quarry boundary of proposed Hindustan Lalpeth Expansion OC mine.

5.3 MINE BOUNDARIES

5.3.1 Delineation of Sectors as per GR

Two major faults exist in Hindustan Lalpeth block and they form the boundary faults. No other fault is encountered in the mine working or in the boreholes drilled in the area. The structure of the block has been made using Minex Software and the block has not been demarcated into Sectors. It is proposed in this Expansion PR to work the entire block upto dip side limit (upto major

fault F4-F4) except some eastern dip side area in the southern part of mine because of Delhi-Chennai Railway line and Nandgaon Basti. Some coal reserves are blocked in this area below Railway line, railway acquired land, Nandgaon basti, coal transportation road and in the dip side quarry batter.

5.3.2 Reasons for selecting/omitting seams/sections

Detailed exploration in HLOC area has proved the existence of composite seam of Wardha Valley Coalfield. The composite seam has been split into three sections- Section 1, Section 2 and Section 3 from top to bottom. These sections have been delineated on the basis of thickness, nature of roof/floor and intervening parting. However, in this Project, composite seam thickness and quality has been calculated including all bands irrespective of their thickness and nature as the entire Composite Seam including all in-seam bands is being extracted in the existing mine. The thickness of composite seam varies from **13.15m to 19.30m**

5.3.3 Reasons for additional area annexed

Coal reserves is available in the dip side of the mine upto major fault F4-F4 (Throw-100m). A part of the dip side reserve has been partly extracted by underground method of mining through Nandgaon UG mine. It is not possible to extract balance coal over stowed goaf in some panels and also in standing pillars in other panels by underground method of mining. It is therefore proposed to extract the dip side coal reserves upto fault F4-F4 (virgin as well as partly worked out panels) by extending the existing Hindustan Lalpeth OC mine in dip side area. This will provide additional 5.87 Mt coal (excluding 0.38 Mt coal proposed to be worked by the mine in 2014-15 beyond approved Scheme limit) for extraction by HLOC Expansion mine and the life of mine will be extended by further 8 years from 01.04.2015 onwards

5.3.4 Brief Details of adjoining blocks and reasons for not considering the same

The proposed Hindustan Lalpeth Expansion OC Mine is surrounded by Mana UG mine in the west, Hindustan Lalpeth colliery in the east and Nandgaon UG mine in the South. Mana UG mine and Nandgaon UG mine are presently in operation. Hindustan Lalpeth Colliery (HLC-I UG) is presently not in operation, but it is not possible to work the underground property of HLC-I mine by the proposed Hindustan lalpeth Expansiopn OC mine because major fault F4-F4 (throw – 100m) separates the two blocks.

5.3.5 Mine Boundary

North : In the northern side, the quarry surface edge of existing Hindustan Lalpeth OC mine define the northern quarry boundary of proposed Hindustan Lalpeth Expansion OC mine.

South : Thus, the southern side boundary between the proposed Hindustan Lalpeth Expansion OC mine and Nandgaon UG mine is an arbitrary line passes beyond the southern quarry surface limit of proposed Hindustan Lalpeth Expansion OC mine maintaining a safety zone from the quarry.

East : The eastern dip side quarry floor limit of Expansion mine has been limited upto Fault F4-F4 (in northern and central part) and accordingly quarry surface limit has been planned with proper angle of batter.

In the southern part of the mine, the eastern dip side quarry surface limit has been demarcated leaving safe distance from Delhi-Chennai railway line (45m from Railway acquired land and after leaving space to accommodate Coal transportation road) and accordingly quarry floor limt has been planned with proper angle of dip side batter.

West : The western quarry surface and floor limit of existing Hindustan Lalpeth OC mine define the western quarry boundary of proposed Hindustan Lalpeth Expansion OC mine.

5.3.6 Vertical Mine Boundary

The floor of the Composite Coal Seam defines the vertical boundary of the proposed Hindustan Lalpeth Expansion OC mine.

5.4 MINEABLE RESERVES

5.4.1 The total net in-situ geological reserves in the entire Hindustan Lalpeth block has been assessed as 26.544 Mt. Out of this, 20.021 Mt geological reserves are either worked out or being worked through existing mine or blocked under various heads like railway acquired land, batter of opencast mine, small triangular patch in nortehern side, coal transportation road, Nandgaon Basti etc. The existing Hindustan Lalpeth OC mine is being operated under approved Scheme and the total mineable reserves of the Scheme (2.53 Mt) will be exhausted by 2013-14. A proposal has been initiated by the mine management for the administrative approval to extract 0.38 Mt coal in 2014-15 without any capital expenditure in the dip side beyond the PR/Scheme limit after exhaustion of coal reserves of the approved Scheme. These reserves (2.53 Mt + 0.38 Mt) are also included in the above 20.021 Mt geological reserves. Balance 26.544Mt – 20.021 Mt = 6.523 Mt geological reserves are proposed to be worked by this Hindustan Lalpeth Expansion OC mine after complete exhaustion of mineable reserves of the approved Scheme of existing Hindustan Lalpeth OC mine including 0.38 Mt coal reserves proposed to be extracted beyond PR/Scheme limit upto 31.03.2015.

Considering 10% mining losses, the net mineable reserves in proposed Hindustan Lalpeth Expansion OC mine work out to 6.523 Mt x 0.9 = 5.87 Mt. This includes mineable reserves in virgin area as well as in partly developed / depillared pillars previously worked through Nandgaon UG mine. The break-up of mineable reserves in virgin area and in partly developed/ depillared pillars is tabulated below:

Sl. No.	Particulars	Mineable Reserves (Mt)
1	Virgin Area	3.62
2	In Developed Pillars	1.97
3	In Partly Depillared & Stowed Pillars	0.28
	Total	**5.87**

5.4.2 Sector/Cut Wise Mineable Reserves:

Hindustan Lalpeth Expn OC mine area consists of three Sectors / Cuts namely Cut-I, II & III. Cut-I starts from the limit boundary of approved Scheme with an initial depth of 75m leaving the area of 0.38 Mt coal reserves proposed to be extracted beyond Scheme limit in 2014-15. Seam FRL varies from 115m to 85m in Cut-I. Coal reserve & OB in this Cut is 2.18 Mt & 16.401 Mm3 respectively.

Cut-II lies between Cut-I & Cut-III where the depth varies from 110m to 137m. Seam FRL varies from 85m to 60m. Coal reserve & OB in this Cut is 1.89 Mt & 16.432 M.m3 respectively

Cut-III is the last Cut where initial depth is from 137m and final depth is 175 m. Seam FRL varies from 60m to 28m. Coal reserve & OB in this Cut is 1.80 Mt & 11.32 M.m3 respectively.

SECTOR/CUT-WISE MINEABLE COAL RESERVES (Mt) AND IN-SITU OB (Mm3)

SECTOR/CUT	SECTOR/CUT DESCRIPTION	MINEABLE RESERVES (Mt)	IN-SITU OB (Mm3)
CUT- I	From Dip side Floor Boundary of Existing mine to 85m FRL	2.18	16.401
CUT -II	From 85m FRL to 60m FRL	1.89	16.432
CUT- III	From 60m FRL to 28m FRL	1.80	11.320
TOTAL		**5.87**	**44.153**

5.5 TARGET OUTPUT & MINE LIFE:

5.5.1 Target Output

Keeping in view the prevailing geomining conditions, rate of advance as prevalent in WCL mines, average strike length of the quarry and re-handling of OB from southern part of existing quarry to expose coal face, the target production of the Expansion mine has been envisaged as 1.00 Mty. The target production of the existing Hindustan Lalpeth OC mine as per the approved Scheme is 0.633 Mty. Since, the expansion area lies in dip side of the southern part of existing quarry which

is completely filled with OB, initially the production from the expansion mine has been kept as 0.65 Mty for first three years and 0.70 Mty in fourth year as the rehandling of backfilled OB will continue in these four years. The target production (1.00 Mty) will be achieved in 5th year.

The mine is proposed for normal production of 1.00 Mty and peak production of 1.25 Mty.

Zero Date :

The zero date of the project is defined as the date of land acquisition (physical possession), PR and EMP approval and other necessary clearance whichever is later. It is envisaged that the first stage approval, cost plus agreement with customer and final approval of PR of Hindustan Lalpeth Expansion OC mine will be completed upto 31st March 2015. The first year of the Expansion project will be 2015-16. No fresh land acquisition is involved in this project and only diversion of forest land from Mining Right to All Right is required which is already under process. Thus, production from proposed Hindustan Lalpeth Expansion OC will start from 2015-16 and therefore, the Zero date of the proposed Expansion project will be 01.04.2015.

5.5.2 Mine Life :

The total production life of the proposed Expansion opencast mine is estimated as 8 years staring from zero date i.e., 1.4.2015. The break-up of mine life is as under:

Construction Period:

Since the proposed Hindustan Lalpeth Expansion OC mine is extension of existing Hindustan Lalpeth OC mine, the production will start from zero date and hence no construction period prior to production has been envisaged in this report.

Production Build-Up Period:

The proposed mine will achieve target production in 5th production year i.e. 2019-20 and therefore first four production years i.e. 2015-16 to 2018-19 will be Production Build-up period.

Production Period at Target Capacity

Production period for the mine at target capacity will be 3 years i.e. from 2019-20 to 2021-22.

Tapering Production Period

The proposed mine will produce less than target production in last one year (2022-23) due to exhaustion of coal reserves

Total Period

Total production period for the mine will be 8 years from zero date.

5.6 FUTURE EXPANSION POTENTIAL, IF ANY

The proposed mine has been planned upto major Fault F4-F4 in dip eastern side (in northern and central part of the block) and there is no scope of further expansion in dip side. In the southern part of the mine, the eastern dip side boundary of the mine has been limited due to Delhi-Chennai Railway Line and here also future expansion of mine is ruled out. In the southern side, Nandgaon Inclines are located which are presently in operation. Thus, there is no further scope for the expansion of the proposed Hindustan Lalpeth Expansion OC mine.

5.7 ANY FURTHER EXPLORATION REQUIRED WITH TOTAL METERAGE AND NUMBER OF BOREHOLES TO BE DRILLED AND AREA OF FURTHER DRILLING

The proposed project is an expansion of existing quarry and the dip side area has also been worked by underground method of mining, no structural

surprise is anticipated in the mine. Hence, no provision for further exploration has been made in this PR.

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CHAPTER - VI

METHOD OF MINING

6.1 GENERAL

The proposed Hindustan Lalpeth Expansion OC mine is extension of existing Hindustan Lalpeth OC mine, which is presently being worked with Shovel-Dumper combination. It is proposed to work the extension area also with Shovel Dumper combination. The target production has been envisaged as 1.0 Mty.

6.4 GEO-MINING CHARACTERISTICS

6.4.1 Seam Gradient

The Seam is dipping easterly and the gradient of seam varies from 1 in 4 to 1 in 6 (9^0 to 14^0).

6.4.2 Geological Disturbances

Hindustan Lalpeth OC block is narrow wedge shaped area lying between one major fault and sub crop. Structure of the Block is mainly based on the sub-surface data obtained from the boreholes drilled in the area. The coal is being extracted from existing Hindustan Lalpeth OC mine and there is no report of any structural disturbance during mining. Two major faults forms the boundary of Hindustan Lalpeth OC. However, no other fault is encountered in the mine working or in the boreholes

6.2.3 Details of Sequence of Coal Seams and Parting

Detailed exploration in HLOC area has proved the existence of composite seam of Wardha Valley Coalfield. The composite seam has been split into three sections- Section 1, Section 2 and Section 3 from top to bottom. These

sections have been delineated on the basis of thickness, nature of roof/floor and intervening parting. However, in this Project, composite seam thickness and quality has been calculated including all bands irrespective of their thickness and nature as the entire Composite Seam including all in-seam bands is being extracted in the existing mine. The thickness of composite seam varies from 13.15m to 19.30m.

6.5 MINE PARAMETERS

The geo-mining parameters of the proposed Hindustan Lalpeth Expansion OC mine (including existing quarry) is given below :

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Sl. No.	Particulars	Expansion OC including Existing mine area
1	Area of the Quarry	
(a)	Floor (Ha.)	84.19
(b)	Surface (Ha.)	146.77
2.	Quarry Depth	
(a)	Initial (m)	40
(b)	Final (m)	175
3.	Average Gradient of Seam	1 in 4
4.	Composite Seam Thickness	
(a)	Minimum (m)	13.15
(b)	Maximum (m)	19.30
(c)	Average (m)	16.00
5.	Strike Length (m)	2310
6.	Width on Surface - (Dip Rise)	
(a)	Maximum(m)	880
(b)	Minimum(m)	425
7	Wt. Average Quality, GCV kcal/kg	G-10, 4328

Sl. No.	Particulars	Expansion OC including Existing mine area
8.	Mineable / Extractable Reserves (Mt)	**5.87**
(a)	Cut-I	2.18
(b)	Cut-II	1.89
(c)	Cut-III	1.80
9.	Total OB	**58.003**
(a)	Insitu OB (M.m3) (Sector-I : 16.401) (Sector-II : 16.432) (Sector-III : 11.320)	44.153
(b)	Rehandling OB (Mm3) (Solid)	13.85
10.	Average Stripping Ratio (m3/t) a) Without Rehandling b) With Rehandling	 **7.522** **9.881**
11.	Total OB Dump	**58.003* (as on 1.4.15)**
(a)	Internal Dump (M.m3)	48.003* (as on 1.4.15)
(b)	External Dump (M.m3)	10.00
*** Note -** 7.158 Mm3 OB will be removed in the existing mine upto 2014-15 (4.799 Mm3 of balance OB of the approved Scheme to be removed in 2012-13 & 2013-14 + 2.359 Mm3 OB for extraction of 0.38 Mt coal in 2014-15) which will be dumped internally in the existing de-coaled void of the quarry. The total OB dump capacity available as on 1.4. 2012 is 65.161 Mm3, out of which 58.003 Mm3 dump capacity (48.003 Mm3 in internal dump and 10.00 Mm3 in external dump) will be available as on 1.4.2015.		

Note : The strike and dip rise length as well as quarry area on surface and floor given in the above table includes existing Hindustan Lalpeth OC Mine.

6.6 CHOICE OF TECHNOLOGY

Total mineable reserve in the proposed Hindustan Lalpeth Expansion OC mine is only 5.87 Mt which will be extracted in 8 years. Due to limited mineable reserve and life of the mine, the application of dragline method of working is ruled out. Application of Surface Miner is also ruled out in the

proposed mine due to steep gradient of the coal seam (1 in 4 to 1 in 6). Shovel-Dumper system has been considered to be the most suitable method of opencast mining under the prevailing geo-mining conditions. With Shovel-Dumper system, two stripping methods are possible :

1. Inclined slicing method &
2. Horizontal slicing method

In Seam gradient upto 1 in 4, positioning of HEMM is not difficult in inclined slicing method where benches in coal are made parallel to the seam. Hence this method has been proposed in this report. In horizontal slicing, coal and OB are to be excavated in same bench and there is chance of mixing of parting OB with coal thus deteriorating the quality of coal. Since, the gradient of seams in the proposed Expansion mine is 1 in 4 to 1 in 6, the shovel dumper system of mining with Inclined slicing method is recommended for the proposed mine.

6.5 EQUIPMENT SELECTION

The shovel dumper combination technology has been envisaged in the proposed Hindustan Lalpeth Expansion OC mine considering the gradient of coal seam and presence of same technology in the existing opencast mine. Since it is an expansion of existing Hindustan Lalpeth OC mine, it is proposed in this report to absorb the WDV of all the capital items of the existing mine as on 01.04.2015 when the mineable reserves of existing mine (including 0.38 Mt coal proposed to be extracted beyond PR/Scheme limit) will exhaust and production as per the expansion report will start.

Existing Equipment

As per the data supplied by Hindustan Lalpeth OC mine, the details of existing HEMM available in HLOC mine are tabulated below :

Sl. No.	Existing HEMM	Quantity	
		As on Feb'2013	Likely to be added in 2013-14
1.	5 m3 Elect. Rope Shovel	2	-
2.	Hyd. Shovel, BE-300	2	-

3	Hyd. Shovel, BE-1000	-	1
3.	60T Dumper	2	2
4.	50T Dumper	5	-
5.	35T Dumper	12	-
6.	160mm Drill	3	-
7.	250 mm Drill	2	-
8.	Dozer	7	-

It is proposed that the existing equipment available in the mine as on 1.4.2015 will be utilized in the Expansion project till their balance life. Thereafter, some of them will be replaced and remaining HEMM will be upgraded to higher sizes HEMM as per the present norms. The details of existing HEMM to be replaced as well as new / upgraded HEMM to be procured in different options have been detailed in Appendix A.3.1 of these options.

The major HEMM proposed in different options in Hindustan Lalpeth Expansion OC mine are detailed below.

Departmental Option :

The details of existing HEMM, replacement as well as proposed upgradation of existing HEMM and procurement of new HEMM for Departmental Option are tabulated below :

HEMM FOR DEPARTMENTAL OPTION

Sl. No.	HEMM	For OB / Coal / Common/ Reclamation	Quantity	Proposed Upgradation / Replacement of HEMM
A	**EXISTING HEMM**			
1	5 m3 Rope Shovel	OB	2	Upgraded to 3 nos. of 10/12 m3 Elect. Hyd. Shovel
2	Hydraulic Shovel (BE-1000)		1	
3	Hydraulic Shovel (BE-300)		1	
4	250 mm Drill		2	To be replaced
5	160 mm Diesel Drill		2	Upgraded to 1 no. of 250mm Elect. Drill
6	50T RD Dumpers		5	Upgraded to 15 nos. of 100 T RD Dumpers
7	35 T RD Dumpers		10	

8	Dozer		2	
9	320 HP Dozer		3	To be replaced
10	Hydraulic Shovel (BE-300)		1	Upgraded to 1 no. of 4-5 m3 diesel Hyd. Backhoe
11	60T RD Dumpers	COAL	4	To be replaced
12	160mm Diesel Drill		1	To be replaced
13	320 HP Dozer		1	To be replaced
14	320 HP Dozer	Land Reclamation	1	To be replaced
B	**ADDITIONAL HEMM**			
1	100 T RD Dumpers	OB	10	New Additional Procurement
2	Water Tanker, 28 kL	Land Reclamation	1	
3	30-40 t Crane	COMMON	1	
4	10-12 t Mobile Service Crane		1	
5	Fire Fighting Truck		1	
6	28 kL Water Sprinkler		2	
7	280 HP Motor Grader		2	
8	Mobile Maintenance Van		2	
9	Diesel Bowser, 6-9 kL		2	
10	Tyre Handler		1	
11	2.7m3 Diesel Hyd. Backhoe		1	
12	5.7 m3 Front End Loader		1	
11	Float Assembly, 100T		10	

Partial Hiring Option :

The details of existing HEMM, replacement as well as proposed upgradation of existing HEMM and procurement of new HEMM for Partial Hiring Option are tabulated below :

HEMM FOR PARTIAL HIRING OPTION

Sl. No.	HEMM	For OB / Coal / Common/ Reclamation	Quantity	Proposed Upgradation / Replacement of HEMM
A	**EXISTING HEMM**			
1	5 m3 Rope Shovel	OB	2	Upgraded to 1 no. of 5-6 m3 Elect. Hyd. Shovel
2	Hydraulic Shovel (BE-300)		1	
3	Hydraulic Shovel (BE-1000)		1	To be used upto bal. life
4	160 mm Diesel Drill		2	To be replaced
6	50T RD Dumpers		5	Upgraded to 11 nos. of 60 T RD Dumpers
7	35 T RD Dumpers		10	
8	250 mm Drill		2	
9	320 HP Dozer		2	To be replaced

10	Hydraulic Shovel (BE-300)	COAL	1	Upgraded to 1 no. of 4-5 m3 diesel Hyd. Backhoe
11	Dozer		3	
11	60T RD Dumpers		4	To be replaced
12	160mm Diesel Drill		1	To be replaced
13	320 HP Dozer		1	To be replaced
14	320 HP Dozer	Land Reclamation	1	To be replaced
B	**ADDITIONAL HEMM**			
1	Water Tanker, 28 kL	Land Reclamation	1	New Additional Procurement
2	18-20 t Crane	COMMON	1	
3	Truck mounted Crane with Tyre Handler attachment		1	
4	Fire Fighting Truck		1	
5	28 kL Water Sprinkler		1	
6	280 HP Motor Grader		1	
7	Mobile Maintenance Van		2	
8	Diesel Bowser, 6-9 kL		1	
9	2.7m3 Diesel Hyd. Backhoe		1	
10	5.7 m3 Front End Loader		1	

Total Hiring Option :

The details of existing HEMM, replacement as well as proposed upgradation of existing HEMM and procurement of new HEMM for Partial Hiring Option are tabulated below :

HEMM FOR TOTAL HIRING OPTION

Sl. No.	HEMM	For OB / Coal / Common/ Reclamation	Quantity	Proposed Upgradation / Replacement of HEMM
A	**EXISTING HEMM**			
1	5 m3 Rope Shovel	OB	2	To be shifted to some other mine.
2	Hydraulic Shovel (BE-300)		1	
3	Hydraulic Shovel (BE-1000)		1	
4	160 mm Diesel Drill		2	
6	50T RD Dumpers		5	
7	35 T RD Dumpers		10	
8	250 mm Drill		2	

9	320 HP Dozer		5	
10	Hydraulic Shovel (BE-300)	COAL	1	
11	Dozer		1	
11	60T RD Dumpers		4	
12	160mm Diesel Drill		1	
14	320 HP Dozer	Land Reclamation	1	
B	**ADDITIONAL HEMM**			
1	Water Tanker, 28 kL	Land Reclamation	1	New Additional Procurement
2	10-12 t Mobile service Crane	COMMON	1	
3	Fire Fighting Truck		1	
4	Mobile Maintenance Van		1	
5	Diesel Bowser, 6-9 kL		1	
6	2.7m3 Diesel Hyd. Backhoe		1	
7	5.7 m3 Front End Loader		1	

6.6 MINING SYSTEM & SYSTEM PARAMETERS

6.6.1 Width of Working & Non-Working Benches

The bench width considered in this report is 20m and 30m for non-working and working benches respectively for planning purpose.

6.6.2 Height of Benches

The maximum height of benches in overburden considered in this report is 10m, which will be drilled and blasted in one go. In unconsolidated strata/alluvium soil, the bench height is kept as 5m. In coal, the height of the bench will depend on the thickness of the seam.

In final batter of the quarry, the height of the benches in consolidated strata is 10m and a berm of 5m width will be maintained between two benches. However, in unconsolidated strata/alluvium soil, the bench height considered in final batter is 5m and the bench width (berm) is 10m. Four to five transport horizons will be maintained in the batter at an interval of 30m.

6.6.3 Slope of Benches

a) During Mining Operation

The slope of individual benches depends on the type of strata. In this report, the slope of individual bench is proposed as 45^o in soil, alluvium and clay whereas it is 70^o in hard strata as well as in coal.

The overall slope of the quarry benches during mining operation varies from 15^o to 20^o (from horizontal plane).

Rise side batter remains same in the quarry during mining operation or at the end of the quarry. The overall angle of the rise side batter varies from 30^o to 40^o.

c) At the end of the quarry

The slope of individual benches in the batter at the end of quarry remains same as that during mining operations i.e, 45^o in soil, alluvium and clay and 70^o in hard strata and coal. The overall slope of the quarry benches at the end of the quarry (including transport horizons at intervals of 30m) varies from 35^o to 40^o (from horizontal plane).

6.6.4 Scientific Study

The height & width and slope of benches discussed in para 6.6.2 and 6.6.3 are for planning purpose. It is proposed in this report to undertake scientific study for determining suitable height & width and slope of benches during operation time as well as in final dip, rise and side batters. Suffiecient capital provision has been made for above Scientific Study in appendix A.8.4(A) of this Project Report.

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CHAPTER - VII

MINING AND DUMPING STRATEGY

7.1 CONSTRAINTS ON MINE DEVELOPMENT

Following are the major constraints on mine development:

1. Diversion of Forest Land from Mining Right to All Right

   For the proposed Hindustan Lalpeth Expansion OC mine, about 36.98 ha forest land acquired earlier under Mining Right is required to be diverted under All Right for opencast mining. This diversion of forest land from Mining Right to All Right is the most critical activity for expansion of mine.

2. Re-habilitation for Encroachment in WCL Land and Forest Land at HLC

   About 300 houses exist in the dip side of existing Hindustan Lalpeth OC mine as Encroachment on WCL land and Forest land. This land will be required for the proposed Expansion mine partially for excavation and partially for 100m safety zone. Shifting and rehabilitation of these families are critical activities for proposed Expansion OC mine.

3. Construction of coal Transportation Road (2.10 km) and Public Approach Road (1.20 km)

   The existing coal transportation road as well as public approach road to Nandgaon, Mana and Hindustan Lalpeth OC mine will have to be diverted because of proposed expansion of mine. About 2.10 km diversion road for coal transportation and 1.20 km diversion road for public approach road will have to be constructed in further eastern dip side beyond the surface boundary of Expansion quarry. This is one of the essential activities for the Expansion of mine

4. Shifting of WCL Quarters, Manager's Office, School, Sub-Station, Worker's Institute etc.

160 nos. of existing quarters (80 nos. of Double Storey Miner's quarters and 80 nos. LCH quarters) including Post office and UCO bank, School, Worker's Institute, Manager's Office, Sub-Station etc. lying in the dip side of existing Hindustan Lalpeth OC mine will have to dismantled due to the proposed expansion of mine. It is proposed to construct above Residential and Service buildings at new location in the western side of Mana colliery within the leasehold boundary of Hindustan lalpeth OC mine. Dismantling and construction of new buildings are critical activities for the proposed Expansion mine.

5. Diversion of H.T. Line

Two feeders of 11 kV overhead lines each of 3.00 km (one HT and another LT) pass through the proposed Expansion area of Hindustan Lapeth OC mine which are required to be diverted. The provision for diversion has been made in the Expansion PR and this is one of the major activities to be done for mine development.

6. Re-handling of OB Dump of Existing Hindustan Lalpeth OC mine

The existing mine has a total strike length of about 2.3 km and about half of the existing quarry from southern end has been completely filled with internal dumping and this dump has been heightened upto 30 to 45m from the surface level. The proposed Expansion area lies in the dip side of this internal dump area and therefore the rise side internal OB dump will have to be re-handled.

There is very limited land available in the adjoining area for external OB dumping and therefore, it has been proposed in this PR to accommodate maximum possible OB dumping in the northern side of the de-coaled void of the existing mine as the dip side limit of northern side quarry has reached upto major fault F4-F4 and there is no scope for further extension of quarry in this area because of no coal zone beyond this fault.

However, to maximize internal dumping, haul road will have to be planned through the present internal dump area in the southern side to approach the expansion area. This haul road has been planned along the benches to be formed in the backfilled OB in the rise side of proposed expansion area to minimize the re-handling of the existing backfilled OB. Formation of proper benches as well as haul road in the existing backfilled OB requires re-handling of 13.85 Mm3 OB (solid). Rehandling of this much OB is one of the most critical activities for the proposed Expansion mine.

7.2 MINING STRATEGY

7.2.1 Volume Regime

The Project Report of Hindustan Lalpeth Expansion OC mine has envisaged expansion of existing Hindustan Lalpeth OC in dip eastern side upto fault F4-F4 and safe distance from railway line. The total mineable coal reserve in the expansion area is estimated as 5.87 Mt and total in-situ OB is 44.153 Mm3 and the stripping ratio works out to 7.522 m3/t for in-situ OB only. In addition to this, 13.85 Mm3 OB is required to be re-handled from backfilled area in the southern part of existing quarry to approach the proposed expansion area through new haul road. Thus, the total OB required to be handled in the proposed mine is 58.003 Mm3 (44.153 Mm3 insitu OB + 13.85 Mm3 rehandling OB) and the stripping ratio works out to 9.881 m3/t including rehandling OB. Out of 58.003 Mm3 OB, 10.00 Mm3 OB will be dumped externally within the leasehold boundary of Hindustan Lalpeth OC and 48.003 Mm3 OB will be accommodated in internal dumps in the northern side void of the quarry.

Following Cuts/Sectors have been envisaged in Hindustan Lalpeth Expansion OC mine :

Cut-I : Cut-I starts from the limit boundary of approved Scheme with an initial depth of 75m. Seam FRL varies from 115m to 85m in Cut-I.

Cut-II : Cut – II lies between Cut-I & Cut-III where the depth varies from 110m to 137m. Seam FRL varies from 85m to 60m.

Cut-III : It is the last Cut where depth varies from 137m to175m. Seam FRL varies from 60m to 28m.

Cut-wise extractable reserves, OB removal and stripping ratio in proposed Hindustan Lalpeth Expansion OC mine are tabulated below :

Cut / Sector	Depth (m)		Mineable Reserves (Mt)	Total OB (Mm^3)	Stripping Ratio (m^3/t) (Excluding Rehandled OB)	Re-handled OB (Mm3) (Solid)	Stripping Ratio (m^3/t) (Including Rehandled OB)
	From	To					
Cut-I	75	110	2.18	16.401	7.523	13.85	13.877
Cut-II	110	137	1.89	16.432	8.694	-	8.694
Cut-III	137	175	1.80	11.320	6.289	-	6.289
TOTAL			**5.87**	**44.153**	**7.522**	**13.85**	**9.881**

7.2.2 Mine Transport

Shovel Dumper system has been proposed in this report and the coal will be transported by 60 T Rear Discharge Dumpers. 100T and 60T Rear Discharge Dumpers have been proposed for transportation of OB in Departmental and Partial Hiring option respectively.

Haul roads with proper gradient have been proposed separately for coal and Top OB. Coal will be transported by 60 T dumpers from quarry to surface through the haul roads and access trench and thereafter to the existing CHP through surface road. The gradient of haul roads is proposed as 1:16.

For the transportation of OB in Departmental Option, transport horizons (benches) have been proposed in the dip side & side benches/batter at the RLs of 80m, 110m, 140m and 170m. The OB from benches will be

transported by 100 T dumpers in departmental option (by 60T dumpers in Partial Hiring option) through these transport horizons and ramps/haul road at suitable intervals will be made to join other benches with the transport benches.

7.2.3 Sequence of Mining

The proposed expansion area lies in the dip side of southern part of existing Hindustan Lalpeth OC mine and this area has been divided into three Sectors/Cuts namely Cut-I, Cut-II & Cut-III from rise to dip. At present, the entire southern part of existing quarry is completely

backfilled and heightened upto 30-40m above surface level. Thus, to extract the coal reserves from the expansion area, the rise side backfilled OB will have to be re-handled.

Presently, the existing Hindustan Lalpeth OC mine is being worked in the central part near dip side PR/Scheme limit and the haul road to access the working area lies in the northern part of the quarry. However, in the proposed Hindustan Lalpeth Expansion OC, internal dupming has been proposed in the northern part of the quarry where mine has reached its dip side limit upto fault F4-F4. There is hardly any space available near the mine for external dumping and therefore, it is envisaged in this Expansion PR to accommodate maximum OB dumping in the northern side decoaled void of the quarry and to merge it with the adjoining External Dump and heighten it about 60-90m above surface. Therefore, the present haul road in the northern part of the quarry to access the dip side area can not be maintained because of above internal dumping.

It is, therefore, proposed in this PR to make another haul road in the southern side of the quarry along the benches to be formed in the backfilled OB by rehandling. The re-handled OB will be dumped partly in external dump and partly in the decoaled void of northern side quatrry.

The rehandling of backfilled OB and construction of new haul road in the southern side will take some time and during this period the mine may be worked with existing haul road and the coal reserves of the expansion area will be extracted from northern end (central part of the quarry). The haul road will be completed and re-handling of backfilled OB will be done in first 4 years during complete extraction of Cut-I.

Cut-II of the expansion area will be worked from 4^{th} year to 6^{th} year and thereafter last Cut-III will be worked from 6^{th} year to 8^{th} year.

Year-wise sequence of working of different Cuts is as follows:

Sector/Cut	Year of Operation
Cut – I & OB Rehandling	1st to 4^{th} Year
Cut - II	4^{th} to 6^{th} Year
Cut - III	6^{th} to 8^{th} Year

7.3 DUMPING STRATEGY

- **Year of Starting Internal Dumping**

  Since, the existing mine has reached its dip side limit upto fault F4-F4 in the northern part and proposed Expansion area lies in the dip side of southern part of existing quarry, internal dumping has been proposed from 1st year in the northern side decoaled void of the quarry.

- **The External Dumping Area is Coal Bearing / Non-Coal Bearing.**

  Some external OB dumping has been done from the existing Hindustan Lalpeth OC mine in the rise western side of the northern part of quarry, which is No-Coal Bearing area. In addition to this, some external OB dumping has been done along the dip side periphery of the northern part of quarry beyond fault F4-F4 which is also No-Coal Bearing area. In the proposed Expansion mine, 7.42 Mm3 external OB dumping has been envisaged on these existing OB dumps by heightening it after merging with internal OB dump. In addition to this, 2.58 Mm3 external OB dumping has been proposed over existing OB dump in the western side of mine boundary of Mana UG mine. This area is also No-Coal Bearing area. Thus total 10.00 Mm3 (7.42 Mm3 + 2.58 Mm3) external OB dumping has been proposed in the PR of Hindustan Lalpeth Expansion OC mine.

Year-Wise External and Internal Dumping and Stage Plan

Year-wise removal of in-situ overburden as well as re-handling of OB and its dumping in different external as well as internal dumps for all the three options have been tabulated below.

Departmental Option

Year	OB	Dept. / Hiring	Volume of OB Dumping (Mm3)				
			External Dump-A	External Dump - B	Internal Dump Below Ground	Internal Dump Above Ground	Total
1	Top OB	Dept.	-	-	5.168	-	5.168
	Re-Handled OB	Dept.	-	2.580	1.240	-	3.820
	Sub-Total (Year-1)		**0.000**	**2.580**	**6.408**	**0.000**	**8.988**
2	Top OB	Dept.	-	-	5.168	-	5.168
	Re-Handled OB	Dept.	-	-	3.820	-	3.820
	Sub-Total (Year-2)		**0.000**	**0.000**	**8.988**	**0.000**	**8.988**
3	Top OB	Dept.	-	-	3.094	2.058	5.152
	Re-Handled OB	Dept.	-	-	3.513	-	3.513
	Sub-Total (Year-3)		**0.000**	**0.000**	**6.607**	**2.058**	**8.665**
4	Top OB	Dept.	-	-	-	5.909	5.909
	Re-Handled OB	Dept.	-	-	-	2.697	2.697
	Sub-Total (Year-4)		**0.000**	**0.000**	**0.000**	**8.606**	**8.606**
5	Top OB	Dept.	4.719	-	-	3.296	8.015
	Sub-Total (Year-5)		**4.719**			**3.296**	**8.015**

Year	OB	Dept. / Hiring	Volume of OB Dumping (Mm3)				
			External Dump-A	External Dump - B	Internal Dump Below Ground	Internal Dump Above Ground	Total
6	Top OB	Dept.	1.281	-	-	6.001	6.001
	Sub-Total (Year-6)		**1.281**	**0.000**	**0.000**	**6.001**	**7.282**
7	Top OB	Dept.	1.180	-	-	4.979	6.159
	Sub-Total (Year-7)		**1.180**	**0.000**	**0.000**	**4.979**	**6.159**
8	Top OB	Dept.	0.240	-	-	1.060	1.300
	Sub-Total (Year-8)		**0.240**	**0.000**	**-**	**1.060**	**1.300**
TOTAL			**7.420**	**2.580**	**22.003**	**26.000**	**58.003**

Partial Hiring Option

Year	OB	Dept. / Hiring	Volume of OB Dumping (Mm3)				
			External Dump-A	External Dump - B	Internal Dump Below Ground	Internal Dump Above Ground	Total
1	Top OB	Dept.	-	-	2.044	-	2.044
	Top OB	Hiring	-	-	2.980	-	2.980
	Re-Handled OB	Hiring	-	2.580	1.240	-	3.820
	Sub-Total (Year-1)		**0.000**	**2.580**	**6.264**	**0.000**	**8.844**
2	Top OB	Dept.	-	-	2.044	-	2.044
	Top OB	Hiring	-	-	2.780	-	2.780
	Re-Handled OB	Hiring	-	-	3.820	-	3.820
	Sub-Total (Year-2)		**0.000**	**0.000**	**8.644**	**0.000**	**8.644**
3	Top OB	Dept.	-	-	2.103	-	2.103
	Top OB	Hiring	-	-	1.479	1.308	2.787
	Re-Handled OB	Hiring	-	-	3.513	-	3.513
	Sub-Total (Year-3)		**0.000**	**0.000**	**7.095**	**1.308**	**8.403**
4	Top OB	Dept.	-	-	-	2.055	2.055
	Top OB	Hiring	-	-	-	3.703	3.703
	Re-Handled OB	Hiring	-	-	-	2.697	2.697
	Sub-Total (Year-4)		**0.000**	**0.000**	**0.000**	**8.455**	**8,455**
5	Top OB	Dept.	-	-	-	1.819	1.819
	Top OB	Hiring	4.522	-	-	2.378	6.900
	Sub-Total (Year-5)		**4.522**	**0.000**	**0.000**	**4.197**	**8.719**

Year	OB	OB From Cut / Backfilled Area	Volume of OB Dumping (Mm3)				
			External Dump-A	External Dump - B	Internal Dump Below Ground	Internal Dump Above Ground	Total
6	Top OB	Dept.	-	-	-	1.765	1.765
	Top OB	Hiring	1.478	-	-	4.122	5.600
	Sub-Total (Year-6)		**1.478**	**0.000**	**0.000**	**5.887**	**7.365**
7	Top OB	Dept.	-	-	-	1.711	1.711
	Top OB	Hiring	1.180	-	-	3.420	4.600
	Sub-Total (Year-7)		**1.180**	**0.000**	**0.000**	**5.131**	**6.311**
8	Top OB	Dept.	0.240	-	-	1.022	1.262
	Sub-Total (Year-8)		**0.240**	**0.000**	**0.000**	**1.022**	**1.262**
TOTAL			**7.420**	**2.580**	**22.003**	**26.000**	**58.003**

Total Hiring Option

Year	OB	Dept. / Hiring	Volume of OB Dumping (Mm3)				
			External Dump-A	External Dump - B	Internal Dump Below Ground	Internal Dump Above Ground	Total
1	Top OB	Hiring	-	-	4.980	-	4.980
	Re-Handled OB	Hiring	-	2.580	1.240	-	3.820
Sub-Total (Year-1)			**0.000**	**2.580**	**6.220**	**0.000**	**8.800**
2	Top OB	Hiring	-	-	4.880	-	4.880
	Re-Handled OB	Hiring	-	-	3.820	-	3.820
Sub-Total (Year-2)			**0.000**	**0.000**	**8.700**	**0.000**	**8.700**
3	Top OB	Hiring	-	-	3.570	1.317	4.887
	Re-Handled OB	Hiring	-	-	3.513	-	3.513
Sub-Total (Year-3)			**0.000**	**0.000**	**7.083**	**1.317**	**8.400**
4	Top OB	Hiring	-	-	-	5.803	5.803
	Re-Handled OB	Hiring	-	-	-	2.697	2.697
Sub-Total (Year-4)			**0.000**	**0.000**	**0.000**	**8.500**	**8.500**
5	Top OB	Hiring	4.557	-	-	4.143	8.700
Sub-Total (Year-5)			**4.557**			**4.143**	**8.700**

Year	OB	Dept. / Hiring	Volume of OB Dumping (Mm3)				
			External Dump-A	External Dump - B	Internal Dump Below Ground	Internal Dump Above Ground	Total
6	Top OB	Hiring	1.443	-	-	5.857	7.300
Sub-Total (Year-6)			**1.443**	**0.000**	**0.000**	**5.857**	**7.300**
7	Top OB	Hiring	1.180	-	-	5.120	6.300
Sub-Total (Year-7)			**1.180**	**0.000**	**0.000**	**5.120**	**6.300**
8	Top OB	Hiring	0.240	-	-	1.063	1.303
Sub-Total (Year-8)			**0.240**	**0.000**	**-**	**1.063**	**1.303**
TOTAL			**7.420**	**2.580**	**22.003**	**26.000**	**58.003**

7.4 SEQUENCE OF DUMPING OPERATIONS AND STAGE-WISE DETAILS

SL. NO.	PARTICULARS OF WORKING	AT THE END OF 5TH YEAR	AT THE END OF QUARRY (8th Year)
1.	Coal Mined (Mt)	3.650	5.870
2.	In-Situ OB Removed (Mm^3) a) Departmental b) Partial Hiring c) Total Hiring	 29.412 29.215 29.250	 44.153 44.153 44.153
3	Re-handled OB (Mm3) (All Options)	13.850	13.850
4.	Total OB (Mm3) a) Departmental b) Partial Hiring c) Total Hiring	 43.262 43.065 43.100	 58.003 58.003 58.003
5.	Stripping Ratio (m^3/t) (excluding rehandled OB) a) Departmental b) Partial Hiring c) Total Hiring	 8.058 8.004 8.014	 7.522 7.522 7.522
6.	Stripping Ratio (m^3/t) (including rehandled OB) a) Departmental b) Partial Hiring c) Total Hiring	 11.853 11.799 11.808	 9.881 9.881 9.881

SL. NO.	PARTICULARS OF WORKING	AT THE END OF 5TH YEAR	AT THE END OF QUARRY (8th Year)
7.	Excavated Quarry Area on surface (ha) (including existing mine area)	146.77	146.77
8.	Internal Dump (Mm^3) a) Departmental b) Partial Hiring c) Total Hiring	 35.963 35.963 35.963	 48.003 48.003 48.003
9.	External Dump (Mm^3) a) Departmental b) Partial Hiring c) Total Hiring	 7.299 7.102 7.137	 10.000 10.000 10.000

7.5 DUMPING ARRANGEMENTS

In the proposed Hindustan Lalpeth expansion OC mine, total volume of OB works out to 58.003 Mm3 (44.153 Mm3 in-situ OB + 13.850 Mm3 rehandled OB). There is hardly any space available in the adjoining area of proposed Hindustan Lalpeth Expansion OC mine for external OB dumping. Therefore, planning of the proposed mine has been done to ensure maximum internal dumping so that external dumping could be minimized as far as possible. It is envisaged in this report to utilize the northern side de-coaled void of existing quarry for internal dumping as there is no scope of further expansion of northern part of quarry in dip side as it has reached the major fault F4-F4. The existing haul road lies in the northern side quarry and therefore new haul road is proposed in the southern side of quarry after rehandling of backfilled OB. With this arrangement, 48.003 Mm3 (82.76%) OB can be accommodated in the internal dumps with heightening upto 60-90m above surface level. Thus, out of total 58.003 Mm3 OB, only 10.00 Mm3 (58.003 Mm3 – 48.003 Mm3) is required to be dumped externally (17.24%).

The existing external OB dump lies around the periphery of the northern side of Hindustan Lalpeth quarry and it has been proposed in this report to merge it with internal dump and then heighten it upto 60-90 m from surface level.

About 7.42 Mm3 OB will be accommodated in this external dump (Dump-A).

In addition to this, 2.58 Mm3 OB will be dumped in external OB Dump-B in the western side of mine boundary of Mana UG mine. The proposed External Dump has been shown in Final Stage Dump Plan in Volume-III of this report.

The different External and Internal Dumps and their capacity in terms of in-situ OB is tabulated below. The total dump capacity as on 1.4.2012 works out to 65.161 Mm3. Presently, the OB of existing Hindustan Lalpeth OC mine is being dumped internally and total balance OB excavation (as on 1.4.2012) in the existing mine upto 01.04.2015 will be about 7.158 Mm3 (balance 4.799 Mm3 as per approved Scheme + 2.359 Mm3 for 0.38 Mt coal extraction in 2014-15) which is presently being dumped internally in the northern side quarry. Thus, the dump capacity available as on 1.4.2015 will be 58.003 Mm3 (65.161 Mm3 – 7.158 Mm3) which will be utilized by the proposed mine.

OB DUMP CAPACITY

Sl. No.	OB Dump	Dump Height (m)		Dump Capacity (Volume of solid OB in Mm3)
		From	To	
A)	EXTERNAL OB DUMP			
		0	30	6.00

1	Ext. Dump - A	30	60	1.18
		60	90	0.24
Total (Ext. Dump-A)				**7.42**
2	Ext. Dump - B	0	30	1.96
		30	55	0.62
Total (Ext. Dump-B)				**2.58**
TOTAL (EXTERNAL DUMP)				**10.00**
B)	**INTERNAL DUMP**			
3	Internal Dump (Below Ground)	Below Surface Level		**29.161 (as on 1.4.2012)** **22.003 (as on 1.4.2015)**
4	Internal Dump (Above Ground)	0	30	13.96
		30	60	7.80
		60	90	4.24
Total (Int. Dump Above Ground)				**26.00**
TOTAL (INTERNAL DUMP)				**55.161 (as on 1.4.2012)** **48.003 (as on 1.4.2015)**
TOTAL (EXTERNAL + INTERNAL DUMP)				**65.161 (as on 1.4.2012)** **58.003 (as on 1.4.2015)**

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CHAPTER - VIII

MINING SCHEDULE AND EQUIPMENT PHASING

8.1 DESIGN CRITERIA

8.1.1 Working Regime

Project report for Hindustan Lalpeth Expansion OC mine envisages following working regime :-

8.1.2 Number of Days of Working in a Year

330 days of working has been assumed in a year based on 7 days schedule of mine working.

8.1.3 Number of Shifts

As per the prevalent practice in WCL, there will be 3 working shifts in a day in proposed Hindustan Lalpeth Expansion OC mine.

8.1.4 Number of Hours in Every Shift

It has been envisaged in the PR that every shift will be of 8 hours duration.

8.1.5 Excavation Category Assumed

The excavation category of OB material has been assumed as 50% Category III + 50% Category IV, whereas for Coal it is assumed as Category IV.

8.1.6 Insitu Volume Weight (t/m^3)

The insitu volume weight of OB material has been considered as 2.3 t/m^3 whereas for coal it is considered as 1.60 t/m^3.

8.1.7 Strength Parameters of Coal and Rock If any - Compressive, Tensile,

Shear Strength, Young Modules Etc.

The existing Hindustan Lalpeth OC mine is being operated since 1985 and most of the information is available as past experience of opencast working. As such, no Physico-Mechanical, Geo-Physical and Hydro-geological studies have been carried out for this mine.

8.2 ANNUAL PRODUCTIVITY OF HEMM (DEPARTMENTAL OPTION)

8.2.1 Shovel Productivity

10 m^3 Elect. Hyd. Shovel with 100 T dumper has been proposed in Departmental Option whereas 5 - 6 m^3 Elect. Hyd. Shovel with 60 T dumper has been proposed in Partial Hiring Option for removal of Top OB. For extraction of coal, 4 - 5 m^3 Diesel Hyd. Backhoe with 60 T dumper has been proposed in both Departmental and Partial Hiring Option. The annual productivity of the shovels considered in this report for 330 working days per annum is as under:

Sl. No.	Particulars	Option	Coal / OB	Annual Productivity (Mm^3)
1.	10/12 m^3 Elect. Hyd. Shovel with 100 T dumper	Departmental	Top OB & Rehandling	2.81
2.	5 - 6 m^3 Elect. Hyd. Shovel with 60 T dumper	Partial Hiring	Top OB	1.301
3.	4 - 5 m^3 Diesel Hydraulic Backhoe with 60 T dumper	Departmental & Partial Hiring	Coal	1.246

8.2.2 Dumper Productivity

The productivity of dumpers with a particular shovel depends on the lead. The productivity of 100T rear discharge dumpers with 10/12 m^3 Elect. Hyd. Shovel in Top OB (Departmental option), 60T rear discharge dumpers with 5 - 6 m^3 Elect. Hyd. Shovel in Top OB (Partial Hiring option) and 60T rear discharge dumpers with 4 - 5 m^3 Diesel Hyd. Backhoe in coal (Both Deparmental and Partial Hiring option) are tabulated below :

Sl. No.	DUMPER COMBINATION	PRODUCTIVITY (Mm^3/year) AT LEAD OF						
		0.5 km	1.0 km	1.5 km	2.0 km	2.5 km	3.0 km	3.5 km
1.	100T Dumper with 10 m^3 Elect. Hyd. Shovel in **Top OB (Departmental Option)**	0.5812	0.4546	0.3824	0.3393	0.3106	0.2814	0.2590
2.	60T Dumper with 5-6 m^3 Elect. Hyd. Shovel in **Top OB (Partial Hiring Option)**	0.3255	0.2585	0.2193	0.1956	0.1797	0.1634	0.1508
2.	60T Dumper with 4 - 5 m^3 Diesel Hyd. Backhoe in **Coal (Both Departmental &**	0.3318	0.2654	0.2262	0.2023	0.1862	0.1696	0.1567

	Partial Hiring Option)							

8.2.3 Annual Average Lead & Lift and System Capacity

The annual average year-wise lead and lift (from quarry upto OB dump/CHP) for Top OB, Rehandled OB and Coal are tabulated below which are same in all the three Options :

Year	Top OB / Rehandled OB / Coal	To Dump Place / CHP	Average Lead (Km)	Average Lift (m)
1	Top OB	Int. Dump (BG)	2.279	43
	Rehandled OB	Ext. Dump-B, Int. Dump (BG)	2.295	30
	Coal	CHP	2.243	103
2	Top OB	Int. Dump (BG)	2.279	43
	Rehandled OB	Int. Dump (BG)	2.296	35
	Coal	CHP	2.243	103
3	Top OB	Int. Dump (BG) Int. Dump(0-30m)	2.297	49
	Rehandled OB	Int. Dump (BG)	2.296	35
	Coal	CHP	2.243	103
4	Top OB	Int. Dump (BG), Int. Dump(0-30m)	2.500	69
	Rehandled OB	Int. Dump(0-30m)	2.341	50
	Coal	CHP	2.469	120

Year	Top OB / Rehandled OB / Coal	OB In Mm3 & Coal In Mt	To Dump Place / CHP	Average Lead (Km)	Average Lift (m)
5	Top OB	8.338	Int. Dump(0-30m), Ext Dump-A(0-30m)	2.743	71
	Coal	1.000	CHP	2.580	128
6	Top OB	7.614	Ext Dump-A(0-30m), Int. Dump(30-60m)	3.045	103
	Coal	1.000	CHP	2.841	144
7	Top OB	6.164	Ext Dump-A(30-60m), Int. Dump(30-60m), Int. Dump(60-90m)	3.337	130
	Coal	1.000	CHP	3.030	155

8	Top OB	3.109	Ext Dump-A(60-90m), Int. Dump(60-90m)	3.524	145
	Coal	0.9375	CHP	3.030	155

The overall weighted average lead and lift for the entire mine life for Top OB, Rehandled OB and coal are as follows :

Sl. No.	Top OB / Rehandled OB / Coal	Weighted Average Lead (km)	Weighted Average Lift (m)
1	Top OB	2.705	77
2	Rehandled OB	2.304	37
3	Coal	2.593	127

System Capacity

Depending upon the coal, OB and stripping ratio of different cuts/sectors of quarry, the natural OB to be excavated to get the target output of coal has been calculated for each year. The lead and lift for this natural OB and target output of coal have been calculated based on sequence of dumping. Subsequently, the productivity of HEMM has been calculated for this lead and lift and number of HEMMs required has been assessed. The total capacity of these HEMM in OB decides the year-wise programmed OB. However, it is ascertained that the cumulative programmed OB in any year is always more than or equal to the cumulative natural OB in that year. In case of coal, the target output remains same and the extra capacity of selected HEMM provides cushion.

Year-wise volume of coal production and programmed Top OB and Rehandled OB, number and type of Shovel & Dumper and their capacity along-with System Capacity for both Departmental Option and Partial Hiring Option are detailed in the following tables :

YEAR-WISE SYSTEM CAPACITY (DEPARTMENTAL OPTION)

Year	Programmed Volume (Mm3) (Coal + Top OB + Rehandlled OB)	Type of Shovel	Existing / Upgraded / New	No. of Shovel	Shovel Capacity (Mm3 / annum)	Type of Dumper	Existing / Upgraded / New	No. of Dumper	Dumper Capacity (Mm3 / annum)	System Capacity (Mm3 / annum)
1	Coal – 0.406 OB – 5.168 Rehandled OB – 3.820	BE-300	Existing	2	0.820	50T Dumper	Existing	5	0.769	**9.450**
		BE-1000	Existing	1	1.200	60T Dumper	Existing	4	0.615	
		5m3 Rope Shovel	Existing	2	1.960	100T Dumper	New	25	8.066	
		10/12m3 Elec. Hyd.Shovel	New	2	5.620					
Total	**9.394**			**7**	**9.600**			**34**	**9.450**	
2	Coal – 0.406 OB – 5.168 Rehandled OB – 3.820	BE-300	Existing	2	0.820	50T Dumper	Existing	5	0.769	**9.450**
		BE-1000	Existing	1	1.200	60T Dumper	Existing	4	0.615	
		5m3 Rope Shovel	Existing	2	1.960	100T Dumper	New	25	8.066	
		10/12m3 Elec. Hyd.Shovel	New	2	5.620					
Total	**9.394**			**7**	**9.600**			**34**	**9.450**	
3	Coal – 0.406 OB – 5.152 Rehandled OB – 3.513	BE-1000	Existing	1	1.200	50T Dumper	Existing	3	0.582	**9.247**
		5m3 Rope Shovel	Existing	2	1.960	60T Dumper	Existing	4	0.615	
		10/12m3 Elec. Hyd.Shovel	New	2	5.620	100T Dumper	New	25	8.050	
		4-5 m3 Hyd. B/H	Upgraded	1	1.246					
Total	**9.071**			**6**	**10.026**			**32**	**9.247**	

Year	Programmed Volume (Mm3) (Coal + Top OB + Rehandlled OB)	Type of Shovel	Existing / Upgraded / New	No. of Shovel	Shovel Capacity (Mm3 / annum)	Type of Dumper	Existing / Upgraded / New	No. of Dumper	Dumper Capacity (Mm3 / annum)	System Capacity (Mm3 / annum)
4	Coal – 0.438 OB – 5.909 Rehandled OB – 2.697	BE-1000	Existing	1	1.200	60T Dumper	Existing	4	0.615	**9.325**
		5m3 Rope Shovel	Existing	1	0.980	60T Dumper	Upgraded	4	0.748	
		10/12m3 Elec. Hyd.Shovel	New	2	5.620	100T Dumper	New	25	7.838	
			Upgraded	1	2.810					
		4-5 m3 Hyd. B/H	Upgraded	1	1.246					
Total	**9.044**			**6**	**11.856**			**33**	**9.201**	

5	Coal – 0.625 OB – 8.015	BE-1000	Existing	1	1.200	60T Dumper	Existing	4	0.615	**8.751**
		5m3 Rope Shovel	Existing	1	0.980	60T Dumper	Upgraded	4	0.736	
		10/12m3 Elec. Hyd.Shovel	New	2	5.620	100T Dumper	New	25	7.400	
			Upgraded	1	2.810					
		4-5 m3 Hyd. B/H	Upgraded	1	1.246					
Total	**8.640**			**6**	**11.856**			**33**	**8.751**	
6	Coal – 0.625 OB – 7.282	BE-1000	Existing	1	1.200	60T Dumper	Existing	2	0.307	**7.982**
		10/12m3 Elec. Hyd.Shovel	New	2	5.620	60T Dumper	Upgraded	4	0.700	
			Upgraded	1	2.810	100T Dumper	New	25	6.975	
		4-5 m3 Hyd. B/H	Upgraded	1	1.246					
Total	**7.907**			**5**	**10.876**			**31**	**7.982**	
7	Coal – 0.625 OB – 6.159	BE-1000	Existing	1	1.200	60T Dumper	Existing	2	0.307	**6.835**
		10/12m3 Elec. Hyd.Shovel	New	2	5.620	60T Dumper	Upgraded	4	0.676	
			Upgraded	1	2.810	100T Dumper	New	22	5.852	
		4-5 m3 Hyd. B/H	Upgraded	1	1.246					
Total	**6.784**			**5**	**10.876**			**28**	**6.835**	
8	Coal – 0.138 OB – 1.300	4-5 m3 Hyd. B/H	Upgraded	1	1.246	60T Dumper	Upgraded	1	0.169	**1.459**
		10/12m3 Elec. Hyd.Shovel	Upgraded	1	2.810	100T Dumper	New	5	1.290	
Total	**1.438**			**2**	**4.056**			**28**	**1.459**	

YEAR-WISE SYSTEM CAPACITY (PARTIAL HIRING OPTION)

Year	Programmed Volume (Mm3) (Coal + Top OB + Rehandlled OB)	Type of Shovel	Existing / Upgraded / New	No. of Shovel	Shovel Capacity (Mm3 / annum)	Type of Dumper	Existing / Upgraded / New	No. of Dumper	Dumper Capacity (Mm3 / annum)	System Capacity (Mm3 / annum)
1	Coal – 0.406 OB – 2.044	BE-300	Existing	2	0.820	50T Dumper	Existing	5	0.769	**2.506**
		BE-1000	Existing	1	1.200	60T Dumper	Existing	4	0.615	
		5m3 Rope Shovel	Existing	2	1.960	60T Dumper	Upgraded	6	1.122	
Total	**2.450**			**5**	**3.980**			**15**	**2.506**	
2	Coal – 0.406	BE-300	Existing	2	0.820	50T	Existing	5	0.769	**2.506**

						Dumper				
	OB – 2.044	BE-1000	Existing	1	1.200	60T Dumper	Existing	4	0.615	
		5m3 Rope Shovel	Existing	2	1.960	60T Dumper	Upgraded	6	1.122	
Total	**2.450**			**5**	**3.980**			**15**	**2.506**	
3	Coal – 0.406 OB – 2.103	BE-1000	Existing	1	1.200	50T Dumper	Existing	3	0.461	**2.564**
		5m3 Rope Shovel	Existing	2	1.960	60T Dumper	Existing	4	0.615	
						60T Dumper	Upgraded	8	1.488	
Total	**2.509**			**3**	**3.160**			**15**	**2.564**	
4	Coal – 0.438 OB – 2.055	BE-1000	Existing	1	1.200	60T Dumper	Existing	4	0.615	**2.616**
		5m3 Rope Shovel	Existing	1	0.980	60T Dumper	Upgraded	11	2.001	
		5-6 m3 Hyd.Shovel	Upgraded	1	1.301					
Total	**2.493**			**3**	**3.481**			**15**	**2.616**	
5	Coal – 0.625 OB – 1.819	BE-1000	Existing	1	1.200	60T Dumper	Existing	4	0.615	**2.555**
		5m3 Rope Shovel	Existing	1	0.980	60T Dumper	Upgraded	11	1.940	
		5-6 m3 Hyd.Shovel	Upgraded	1	1.301					
Total	**2.444**			**3**	**3.481**			**15**	**2.555**	
6	Coal – 0.625 OB – 1.765	BE-1000	Existing	1	1.200	60T Dumper	Existing	2	0.307	**2.465**
		5-6 m3 Hyd.Shovel	Upgraded	1	1.301	60T Dumper	Upgraded	13	2.158	
Total	**2.390**			**2**	**2.501**			**15**	**2.465**	

Year	Programmed Volume (Mm3) (Coal + Top OB + Rehandlled OB)	Type of Shovel	Existing / Upgraded / New	No. of Shovel	Shovel Capacity (Mm3 / annum)	Type of Dumper	Existing / Upgraded / New	No. of Dumper	Dumper Capacity (Mm3 / annum)	System Capacity (Mm3 / annum)
7	Coal – 0.625 OB – 1.711	BE-1000	Existing	1	1.200	60T Dumper	Existing	2	0.307	**2.387**
		5-6 m3 Hyd.Shovel	Upgraded	1	1.301	60T Dumper	Upgraded	13	2.080	
Total	**2.336**			**2**	**2.501**			**15**	**2.387**	
8	Coal – 0.138 OB – 1.262	BE-1000	Existing	1	1.200	60T Dumper	Upgraded	13	2.026	**2.026**
		5-6 m3 Hyd.Shovel	Upgraded	1	1.301					
Total	**1.400**			**2**	**2.501**			**13**	**2.026**	

8.3 CALENDAR PROGRAMME OF EXCAVATION

The proposed Hindustan Lalpeth Expansion OC is expansion of existing Hindustan Lalpeth OC mine and assuming that the stage-I approval of the project, cost plus agreement with the customer and thereafter final approval of Expansion project will be done and transfer of forest land from mining right to All Right will be completed upto 31st March, 2015, the production from Expansion mine will start from 01.04.2015. The mineable reserves of existing Hindustan Lalpeth OC mine (including 0.38 Mt beyond approved Scheme limit) is likely to exhaust till 31.03.2015. The total mineable reserves of proposed Hindustan Lalpeth Expansion OC works out to 5.87 Mt and it will be extracted in 8 years from 2015-16 onwards.

The proposed expansion area of Hindustan Lalpeth Expansion OC mine lies in the dip side of the southern part of existing quarry which is completely backfilled with OB and OB dump is heightened about 30-40m above surface level. It is proposed in this report to rehandle 13.85 Mm3 (solid) of backfilled OB to work the expansion area. Since, the northern part of decoaled void of existing quarry will be utilized for internal dumping, it is proposed to make new haul road in the southern side of the quarry by rehandling the backfilled OB. The proposed expansion area of Hindustan Lalpeth Expansion OC mine has

been divided in three Sectors/Cuts. It is proposed in the report to rehandle the proposed 13.85 Mm3 (solid) backfilled OB alongwith extraction of coal from Cut-I in first four years. Cut-II will be worked from 4th to 6th year and finally Cut-III will be extracted from 6th year to 8th year. The target production of 1.00 Mty will be achieved in 5th year after rehandling of OB is completed in first four years. In first three years, 0.65 Mty and in fourth year 0.70 Mty production has been envisaged.

The Calendar Programme showing year-wise as well as cumulative coal production, natural OB and programmed OB is tabulated below separately for all the three options. In Departmental Option, entire coal production and removal of in-situ OB and rehandling of OB will be done by departmental HEMM whereas entire these activities will be done by Out-sourcing of HEMM

in Total Hiring Option. In Partial Hiring Option, it is proposed to maintain the existing departmental capacity of the mine (about 2.4 to 2.5 Mm3 per annum) to extract the entire coal and removal of part of in-situ OB whereas removal of balance in-situ OB as well as entire re-handling of OB will be done by hiring of HEMM.

CALENDAR PROGRAMME OF EXCAVATION

(DEPARTMENTAL OPTION)

YEAR	COAL PRODUCTION (Departmental) (Mt)		NATURAL TOP OB (Mm3) (EXCL. RE-HANDLING)		PROGRAMMED OB (Mm3) (Departmental)					
					In-Situ OB		Rehandled OB		Total OB	
	Yearly	Cum.	Yearly	Cum.	Yearly	Cum.	Yearly	Cum.	Yearly	Cum.
1	0.650	0.650	4.890	4.890	5.168	5.168	3.820	3.820	8.988	8.988
2	0.650	1.300	4.890	9.780	5.168	10.336	3.820	7.640	8.988	17.976
3	0.650	1.950	4.890	14.670	5.152	15.488	3.513	11.153	8.665	26.641
4	0.700	2.650	5.817	20.487	5.909	21.397	2.697	13.850	8.606	35.247
5	1.000	3.650	8.694	29.181	8.015	29.412	0.00	13.850	8.015	43.262
6	1.000	4.650	7.300	36.481	7.282	36.694	0.00	13.850	7.282	50.544
7	1.000	5.650	6.289	42.770	6.159	42.853	0.00	13.850	6.159	56.703
8	0.220	5.870	1.383	44.153	1.300	44.153	0.00	13.850	1.300	58.003
TOTAL	**5.870**		**44.153**		**44.153**		**13.850**		**58.003**	

CALENDAR PROGRAMME OF EXCAVATION

(PARTIAL HIRING OPTION)

Year	Coal Production (Mt)		Natural OB (Mm3)		Programmed OB (Mm3)							
					Depart-mental	Hiring			Departmental + Hiring			
			In-Situ OB		In-situ OB	In-Situ OB	Rehan-dled OB	Total OB	In-Situ OB		Rehan-dled OB	Total OB
	Yearly	Cum.	Yearly	Cum.	Yearly	Yearly	Yearly	Yearly	Yearly	Cum.	Yearly	Yearly
1	0.650	0.650	4.890	4.890	2.044	2.980	3.820	6.800	5.024	5.024	3.820	8.844
2	0.650	1.300	4.890	9.780	2.044	2.780	3.820	6.600	4.824	9.848	3.820	8.644
3	0.650	1.950	4.890	14.670	2.103	2.787	3.513	6.300	4.890	14.738	3.513	8.403
4	0.700	2.650	5.817	20.487	2.055	3.703	2.697	6.400	5.758	20.496	2.697	8.455
5	1.000	3.650	8.694	29.181	1.819	6.900	0.00	6.900	8.719	29.215	0.00	8.719
6	1.000	4.650	7.300	36.481	1.765	5.600	0.00	5.600	7.365	36.580	0.00	7.365
7	1.000	5.650	6.289	42.770	1.711	4.600	0.00	4.600	6.311	42.891	0.00	6.311
8	0.220	5.870	1.383	44.153	1.262	0.00	0.00	0.00	1.262	44.153	0.00	1.262
TOTAL	**5.870**		**44.153**		**14.803**	**29.350**	**13.850**	**43.200**	**44.153**		**13.850**	**58.003**

CALENDAR PROGRAMME OF EXCAVATION

(TOTAL HIRING OPTION)

YEAR	COAL PRODUCTION (HIRING) (Mt)		NATURAL TOP OB (Mm3) (EXCL. RE-HANDLING)		PROGRAMMED OB (Mm3) (HIRING)					
					In-Situ OB		Rehandled OB		Total OB	
	Yearly	Cum.	Yearly	Cum.	Yearly	Cum.	Yearly	Cum.	Yearly	Cum.
1	0.650	0.650	4.890	4.890	4.980	4.980	3.820	3.820	8.800	8.800
2	0.650	1.300	4.890	9.780	4.880	9.860	3.820	7.640	8.700	17.500
3	0.650	1.950	4.890	14.670	4.887	14.747	3.513	11.153	8.400	25.900
4	0.700	2.650	5.817	20.487	5.803	20.550	2.697	13.850	8.500	34.400
5	1.000	3.650	8.694	29.181	8.700	29.250	0.00	13.850	8.700	43.100
6	1.000	4.650	7.300	36.481	7.300	36.550	0.00	13.850	7.300	50.400
7	1.000	5.650	6.289	42.770	6.300	42.850	0.00	13.850	6.300	56.700
8	0.220	5.870	1.383	44.153	1.303	44.153	0.00	13.850	1.303	58.003
TOTAL	**5.870**		**44.153**		**44.153**		**13.850**		**58.003**	

8.4 EQUIPMENT SCHEDULE

The major equipment proposed to be procured departmentally and its phasing for all the three options are tabulated below. Since, the mineable reserves of existing Scheme of Hindustan Lalpeth OC mine will be completely exhausted in 2014-15, all the equipments of the existing mine will be utilized in the proposed Hindustan Lalpeth Expansion OC mine. The list of existing HEMM as on 1.4.2015 is also given in the tables.

8.4.1 Phasing of Major Equipment (Departmental Option)

SL NO.	HEMM	Quantity	UPGRADED HEMM	PHASING				
				1st Year	2nd Year	3rd Year	4th Year	5th Year
A	**OVERBURDEN (IN-SITU & REHANDLING)**							
A.1	**EXISTING HEMM**							
1	5m3 Rope Shovel	2	Upgraded to **3** nos. of 10/12 m3 Elect. Hyd. Shovel	2			1	
2	Hydraulic Shovel (BE-1000)	1						
3	Hydraulic Shovel (BE-300)	1						
4	250mm Drill	2		To be Replaced				
5	160mm Diesel Drill	2	Upgraded to **1** no. 250mm Elect. Drill	1				
5	50T R D Dumpers	5	Upgraded to **15** nos. of 100T Dumpers with float assembly	15				
6	35t Dumpers	10						
7	Dozer	2						
8	320 HP Dozer	3		To be Replaced				
A.2	**ADDITIONAL HEMM**							
9	100T R D Dumpers	10		10				
B	**COAL**							
B.1	**Existing HEMM**							
1	Hydraulic Shovel (BE-300)	1	Upgraded to **1** no. of 4-5 m3 Diesel hyd. Backhoe			1		
2	60 T R D Dumpers	4		To be Replaced				
3	160 mm Diesel Drill	1		To be Replaced				
4	320 HP Dozer	1		To be Replaced				

SL NO.	HEMM	Quantity	UPGRADED HEMM	PHASING				
				1st Year	2nd Year	3rd Year	4th Year	5th Year

C	**LAND RECLAMATION**							
C.1	**EXISTING HEMM**							
1	320 HP Dozer	1		To be Replaced				
C.2	**ADDITIONAL HEMM**							
2	Water Tanker, 28 KL	1		1				
	SUB-TOTAL (C)							
D	**COMMON**							
D.1	**ADDITIONAL HEMM**							
1	30-40 t Crane	1		1				
2	10 - 12 t Mobile Service Crane	1		1				
3	Fire-Fighting Truck	1		1				
4	28 KL Water Sprinkler	2		1	1			
5	280 HP Motor Grader	2		1	1			
6	Mobile Maint. Van	2		1	1			
7	Diesel Bowzer 6 / 9 KL	2		2				
8	Tyre Handler	1		1				
9	2.7 M3 Diesel Hyd B/H	1		1				
10	5.7 m3 Front-End Loader	1		1				
12	Float Assembly 100T etc	10		10				

8.4.2 Phasing of Major Equipment (Partial Hiring Option)

SL NO.	HEMM	Quantity	UPGRADED HEMM	PHASING				
				1st Year	2nd Year	3rd Year	4th Year	5th Year
A	**OVERBURDEN (IN-SITU & REHANDLING)**							
A.1	**EXISTING HEMM**							
1	5m3 Rope Shovel	2	Upgraded to 1 no. of 5-6 m3 Elect. Hyd. Shovel				1	
2	Hydraulic Shovel (BE-300)	1						
3	Hydraulic Shovel (BE-1000)	1		Not to be replaced after bal. life				
5	160mm Diesel Drill	2		To be Replaced after balance life				
5	50T R D Dumpers	5	Upgraded to 11 nos. of 60T Dumpers with float assembly	6	2	3		
6	35t Dumpers	10						
7	250mm Drill	2						
8	320 HP Dozer	2		To be Replaced after balance life				

SL NO.	HEMM	Quantity	UPGRADED HEMM	PHASING				
				1st Year	2nd Year	3rd Year	4th Year	5th Year

B	**COAL**							
B.1	**Existing HEMM**							
1	Hydraulic Shovel (BE-300)	1	Upgraded to 4-5 m3 Diesel hyd. Backhoe			1		
2	Dozer	3						
3	60 T R D Dumpers	4		To be Replaced after balance life				
4	160 mm Diesel Drill	1		To be Replaced after balance life				
5	320 HP Dozer	1		To be Replaced after balance life				
C	**LAND RECLAMATION**							
C.1	**EXISTING HEMM**							
1	320 HP Dozer	1		To be Replaced after balance life				
C.2	**ADDITIONAL HEMM**							
2	Water Tanker, 28 KL	1		1				
	SUB-TOTAL (C)							
D	**COMMON**							
D.1	**ADDITIONAL HEMM**							
1	18-20 t Crane	1		1				
2	Truck mounted Crane with Tyre Handler attachment	1		1				
3	Fire-Fighting Truck	1		1				
4	28 KL Water Sprinkler	1		1				
5	280 HP Motor Grader	1		1				
6	Mobile Maint. Van	2		1	1			
7	Diesel Bowzer 6 / 9 KL	1		1				
8	2.7 M3 Diesel Hyd B/H	1		1				
9	5.7 m3 Front-End Loader	1		1				

8.4.3 Phasing of Major Equipment (Total Hiring Option)

SL NO.	HEMM	Quantity	PHASING				
			1st Year	2nd Year	3rd Year	4th Year	5th Year
A	**OVERBURDEN (IN-SITU & REHANDLING**						
A.1	**Existing HEMM**						
1	5m3 Rope Shovel	2	To be Shifted to some other mine. However WDV of these HEMM has been absorbed in the PR				
2	Hyd. Shovel (BE-1000)	1					
3	Hyd. Shovel (BE-300)	1					

SL NO.	HEMM	Quantity	UPGRADED HEMM				
			1st Year	2nd Year	3rd Year	4th Year	5th Year
4	50T R D Dumpers	5	To be Shifted to some other mine.				

5	35T R D Dumpers	10	However WDV of these HEMM has been absorbed in the PR				
6	160 mm diesel Drill	2					
7	250 mm Drill	2					
8	320 HP Dozer	5					
B	**COAL**						
B.1	**Existing HEMM**						
1	Hydraulic Excavator, BE-300	1	To be Shifted to some other mine. However WDV of these HEMM has been absorbed in the PR				
2	60 T R D Dumpers	4					
3	160 mm diesel Drill	1					
4	320 HP Dozer	1					
C	**LAND RECLAMATION**						
C.1	**Existing HEMM**						
1	320 HP Dozer	1	To be replaced after balance life				
C.2	**Additional HEMM**						
2	Water Tanker, 28 KL		1				
D	**COMMON**						
D.1	**Additional HEMM**						
1	10 - 12 t Mobile Service Crane	1	1				
2	Fire-Fighting Truck	1	1				
3	Mobile Maint. Van	1	1				
4	Diesel Bowzer 6 / 9 KL	1	1				
5	2.7 M3 Diesel Hyd B/H	1	1				
6	5.7 m3 Front-End Loader	1	1				

8.5 DRILLING & BLASTING

The degree of fragmentation in opencast mine has to be optimized so that total cost of drilling, blasting, excavation, transport and crushing as total system is minimized. In order to reduce the excessive vibrations at nearby surface structure, river, road, village, etc and also to achieve satisfactory blasting results, an optimized control blasting system depending upon rock formations using combination of delays and relays will have to be evolved. It is further recommended that at the time of actual excavation, proper study on ground vibration should be made with scientific methods.

Based on the experience in the existing Hindustan Lalpeth OC mine, a powder factor of 3.0 m^3/kg has been considered in OB in all the three options for planning purpose. A powder factor of 7 t/kg has been considered for blasting in coal. The existing arrangement of magazine for Hindustan Lalperth OC mine will serve the purpose for the proposed Expansion mine also.

However at the time of operation of mine, drilling parameters have to be optimized on the basis of actual field trial and accordingly powder factor for OB & coal may deviate after final trial of blasting.

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CHAPTER – IX

QUALITY

9.1 INTRODUCTION

Detailed exploration in HLOC area has proved the existence of composite seam of Wardha Valley Coalfield. The composite seam has been split into three sections- Section 1, Section 2 and Section 3 from top to bottom. However, in this Project Report, composite seam thickness and quality has been calculated including all bands irrespective of their thickness and nature as the entire Composite Seam including all in-seam bands is being extracted in the existing mine. The thickness of composite seam varies from 13.15m to 19.30m.

9.2 QUALITY ANALYS

The quality parameters of the composite coal seam on Air Dried basis are tabulated below :

Quality Parameters	Without Dilution (Roof to Floor)		With Dilution (0.05m dilution in roof and floor)	
	Minimum	Maximum	Minimum	Maximum
Moisture %	3.3 (WHL-28)	11.1 (WHL-34 & 38)	3.3 (WHL-28)	11.1 (WHL-38)
Ash %	28.9 (WHL-37)	42.2 (CMWHL-05)	29.2 (WHL-37)	42.4 (CMWHL-05)
GCV (kCal/kg)	3784 (CMWHL-05)	4880 (CMWH-25)	3779 (CMWHL-05)	4867 (CMWH-25)
UHV (kCal/kg)	2317 (CMWHL-05)	3835 (CMWH-25)	2304 (CMWHL-05)	3808 (CMWH-25)

9.3 PROJECTED COAL QUALITY

9.3.1 Cut-Wise Quality (GCV)

The proposed Expansion area of Hindustan Lalpeth Expansion OC mine has been divided in three Cuts namely Cut-I, Cut-II & Cut-III. The weighted average Quality of coal (GCV) in these Cuts including all in-seam bands without dilution at contact points with roof and floor are tabulated below :

CUT NO.	BOREHOLE No.	THICKNESS (incl. in-seam bands) (m)	BOREHOLE WISE GCV (kCal/kg)	CUT-WISE GCV kCal/kg
CUT-I	WHL-37	17.96	4235	4341
	WHL-28	15.74	4461	
CUT-II	CMWH-25	17.35	4880	4527
	WHL-34	16.85	4164	
CUT-III	CMWHL-6	16.9	4625	4105
	CMWHL-5	16.4	3784	
	CMWH-03	16.58	3892	

9.3.2 Year-Wise Quality (GCV) of Coal

The year-wise weighted average quality (GCV) of coal without dilution at contact points with roof and floor are as follows :

YEAR	CUT No.	MINEABLE RESERVES (Mt)		WEIGHTEDE AVERAGE GCV (kCal/kg)	
		Cut-Wise	Year-Wise	Cut-Wise	Year-Wise
1	Cut-I	0.65	0.65	4341	4341
2	Cut-I	0.65	0.65	4341	4341
3	Cut-I	0.65	0.65	4341	4341
4	Cut-I	0.23	0.70	4341	4466
	Cut-II	0.47		4527	
5	Cut-II	1.00	1.00	4527	4527
6	Cut-II	0.42	1.00	4527	4282
	Cut-III	0.58		4105	
7	Cut-III	1.00	1.00	4105	4105
8	Cut-III	0.22	0.22	4105	4105
TOTAL		**5.87**	**5.87**		**4328**

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CHAPTER - X

PUMPING AND DRAINAGE

10.1 GENERAL :

The proposed project is expansion of existing Hindustan Lalpeth OC, located at Chandrapur Area. In absence of sufficient hydro-geological data and actual make of water of the mine, ground seepage is assumed 15% of maximum rainfall water accumulated in a day. Pumping provision made in this report is sufficient to sustain the production for target plus five years.

10.2 THE SOURCE OF WATER :

The source of water accumulation in the quarry area as follows :

(i) Ground water flow to the quarry
(ii) Rain water falling directly within the excavated area
(iii) Rain water from beyond excavated area.
(iv) Rain water from backfilled area.

10.3 PREDICTION OF MAXIMUM RAINFALL IN A DAY :

Table – I

Based on data collected from Hindustan Lalpeth OC

S.No.	Year	Max. prev. Filation in a day(h_n)in mm	Modal Coeff. $K=h_n/ h_{am}$	(K-1)	$(K-1)^2$	$P\%=\frac{(N-0.3)}{(M+0.4)}\times 100$
1	2006	221	1.570	0.570	0.325	6.73
2	2005	178	1.264	0.264	0.07	16.35
3	2008	161	1.143	0.143	0.02	25.96
4	2010	159	1.129	0.129	0.017	35.58
5	2011	147	1.044	0.044	0.002	45.19
6	2002	140	0.994	-0.006	0	54.81
7	2007	120	0.852	-0.148	0.022	64.42
8	2001	103	0.732	-0.268	0.072	74.04
9	2003	100	0.710	-0.290	0.084	83.65
10	2007	79	0.561	-0.439	0.193	93.27
TOTAL		**1408**			**0.805**	

Calculated Rainfall in mm (h):

i) Mean value of recorded max. rainfall ham = $\sum$ hn / 10 = 1408 /10
= 140.80 mm

ii) Co-efficient of variation

$$Cv = \sqrt{\frac{\sum(K-1)^2}{(M-1)}} = \sqrt{0.805/9} = 0.299$$

iii) Co-efficient of Asymetrical ratio (Cs) = 3 C_V = 3 x 0.299 = 0.897

Table –II

S.N.	Probability %	F (Cs) = φ	Ms= φ x Cv	Ks = Ms +1	h= Ksxham
1	0.1	4.38	1.31	2.31	325.2
2	1	2.96	0.89	1.89	265.4
3	5	1.86	0.56	1.56	219.1
4	10	1.34	0.40	1.40	197.2
5	30	0.4	0.12	1.12	157.6
6	50	-0.15	-0.04	0.96	134.5
7	75	-0.73	-0.22	0.78	110.1
8	95	-1.35	-0.40	0.60	84.0
9	99	-1.68	-0.50	0.50	70.1
10	99.9	-1.9	-0.57	0.43	60.8

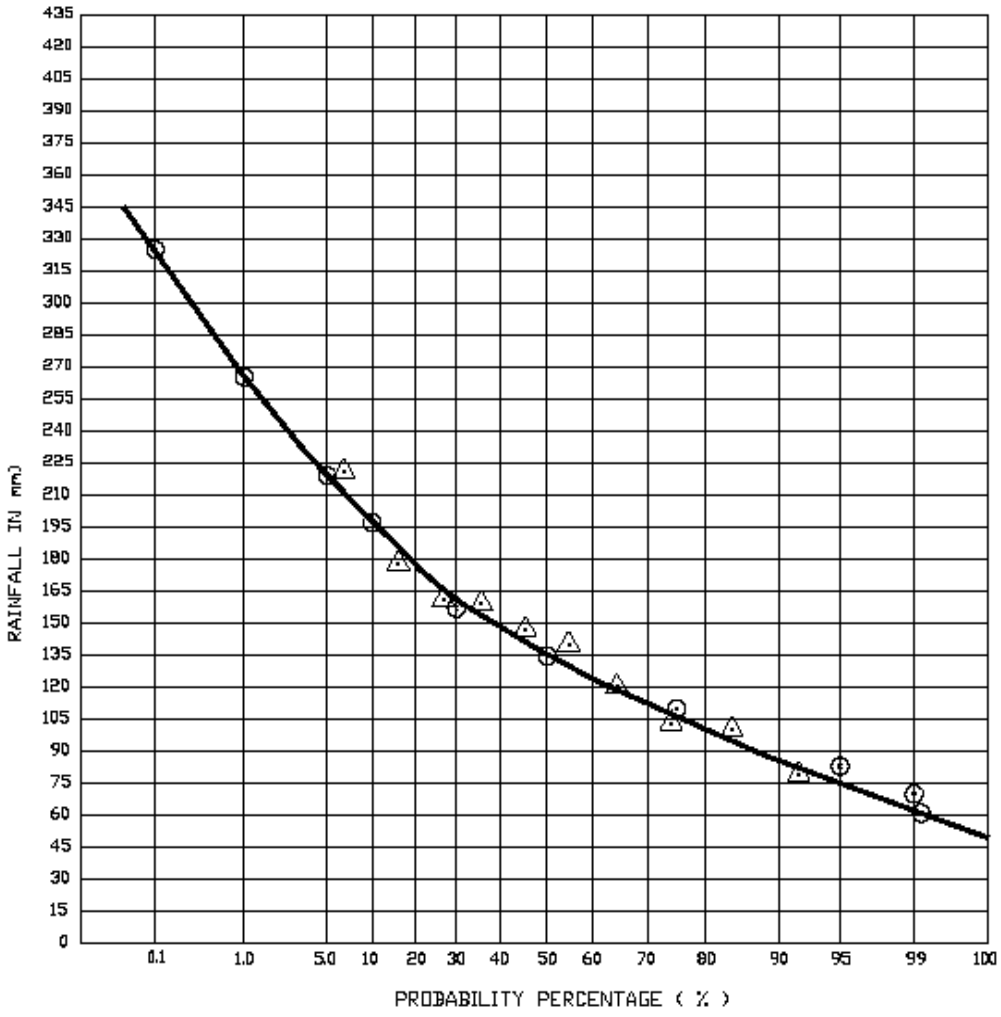
Calculation of probability :

Life of the mine : 8 years

Probability % : $\frac{1}{\text{Life of mine (Yrs.)}} \times 100 = 12.5$

The probability curve was drawn as shown in **fig. 1** from the probability curve, it was found that the maxm. Probable rainfall at 12.5% probability will be to the tune of 185mm.

DO NOT SCALE, ASK IF IN DOUBT



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△ THEORRETICAL VALUE OF PROBABILITY

⊙ ACTUAL VALUE OF PROBABILITY

Customer:– **Western Coalfields Ltd, Nagpur**

Job Title:– **DPR HINDUSTHAN LALPETH EXPANSION OC**

Job No. 4021620

Subject:– **PERCENTAGE (%) PROBABILITY CURVE**

Activity	Name	Designation	Signature	Date
Designed	S.K.Singh	Manager(E&M)		
Drawn	P.S.Dahiwal	Ch.O'Man(Mech.)		
Checked	S.K.Tapadar	G.M.(E&M)		
Approved	S.K.Tapadar	HOD(E&M)		

CMPDI ISO 9001 Company

Scale:– N.T.S.

Sheet

Drg.No. R4 E&M 401246

Rev.No.

10.4 CALCULATION OF PUMPING CAPACITY :

The Pumping capacity required at the time of five years after reaching the target has been calculated as under:-

S.No.	DISCRIPTIONS	CALCULATED DATA
1	Maximum exposed area (ha)	77.12
2	Maximum backfilled area (ha)	68.29
3	Surface area of mine considered for excavation (ha)	77.12
4	Area beyond excavation (ha),5% of item (3)	3.856
5	Run-off co-efficient for	
	(a) Open excavation	0.70
	(b) Area beyond excavation	0.10
6	Rainfall infiltration co-efficient for backfilled area	0.20
7	Probable max. rainfall in a day (mm)	185
8	Water collected in the quarry due to exposed area and area beyond excavation (cum/day)	125851
9	Required pumping capacity to handle the whole water of the rain water in 100 hrs (lps)	350
10	Seepage due to strata (15% of Item 9)	52
11	Total pumping capacity	402
12	Depth in target plus five years (m)	170

Pumping system has been designed for the volume of water accumulated in the mine at the target plus five year production considering maximum rainfall in a day as 185mm

Peak pumping capacity worked out as 144729 cum

Above volume of water will be dewatered in 5 days at the rate of 20 hrs pumping per day.

Pumping capacity per day thus worked out as 28946 cum

10.5 SELECTION OF PUMPS DELIVERY RANGES

(ix) Seven pumps of 80 lps x 200m head have been proposed. Out of seven pumps, two pumps are standby.

(x) Four existing pumps of 80 lps x 150m head have been used for initial and auxiliary pumping.

(xi) One diesel pumps of 80 lps x 60m head have been proposed.

(xii) Four face pumps of 11 lps x 30 m head have been envisaged in this report and out of four pumps, one is standby.

(xiii) Two delivery ranges of 324 mm dia. have been proposed for main pumps of 80lps x 250m head and maximum two pumps will be connected in each delivery.

(xiv) One delivery range of 219mm dia. has been proposed for main pumps of 80lps x 250m head and maximum one pump will be connected in this delivery.

(xv) Four existing delivery ranges has been used for pumps of 80lps x 150m head.

(xvi) 80 mm dia. G.I. pipe will be used for face pumps.

(xvii) No piping provision has been made for standby pumps.

10.6 SUMP

The sumps shall be made at the one end of strike in the dip side. The working benches shall be graded suitably, so that the entire water flows down to the sump.

10.7 DRAINAGE OF WATER ON SURFACE

Fresh garland drains shall be made before every monsoon at the peripherally of active edge of the quarry to prevent the surface rain water to enter the quarry. A sedimentation pond/ lagoon shall be made between the quarries and mine water will be discharged into it. After sedimentation of suspended particles, the fresh water will be discharged into river/ nallah.

10.8 PROCUREMENT, INSTALLATION AND OPERATION

In mines the pump has to be shifted from one location to another to suit the working conditions, as such the performance of the pump is greatly effected. The following points should be kept in mind to get satisfactory results :

(i) The pump should be procured multistage.

(ii) The pump characteristic curves (H vs Q) should be steep and the rating of the motor should be 10% more than power required at cut off point.

(iii) 10% increase in rated head should give 25% decrease in rated discharge

(iv) 10% decrease in rated head should give 15% increase in rated discharge

(v) The pump shall be installed as close to the sump as possible and difference of sump water level and pump center line should not be more than 4-4.45 m. The length of suction pipe should not be increased unnecessarily.

(vi) As far as possible the pump should be allowed to operate at rated head.

(vii) The pumps of same make, same specifications and same characteristic shall be used for parallel operation of pumps.

10.9 The details of pumps, pipes, pipe fittings and estimated capital requirement including installation, foundation cost and service tax of above have been given in Appendix – A.3.4.

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CHAPTER - XI

COAL HANDLING AND DESPATCH ARRANGEMANT

11.1 INTRODUCTION

A small coal handling plant is proposed near access trench of the quarry to handle entire production from mine. The CHP will have facilities like crushing, storage truck loading facility and weighment. Mode of despatch of coal from CHP to customer will be by road. Details are given in subsequent paragraphs.

11.2 DESIGN PARAMETERS

11.2.1 Basic Data

a) Target production from mine - 1.00 Mty.

b) Mine Operation - 3 Shifts/Day

c) CHP Operation - 3 Shifts/Day

d) Life of the mine - 8 Years

e) Grade of coal - G-10

f) Mode of Despatch - By road

g) Customer - Power plants

11.2.2 CHP Working Schedule

CHP will work for 330 days in a year. There will be 3 shifts in a day. It will work 4 hours per shift.

11.2.3 System Capacity of CHP

System capacity of each stream of CHP is around 400 t/Day.

11.2.4 Salient Features of CHP

a) One no. of existing feeder breaker for crushing of coal

b) Conveying of coal by belt conveyors(C1 existing & C2 proposed)

c) Storage of coal in 2 x 50t capacity twin truck loading hopper - Proposed

d) Reclaimation of coal from below main hopper- Proposed

e) Loading of reclaimed coal by hydraulic gate to trucks - Proposed

f) Dust suppression and fire extinguisher system in the proposed modification.

g) Power supply, illumination and control systems - Existing

h) Civil and structural cost – Proposed modification portion and strengthening of the existing CHP.

i) Weighment of coal with the help of electronic weighbridge - Existing

11.2.5 System Description

11.2.5.1 Coal Receipt Section and crushing Section

Rear discharge dumpers of 35/50T capacity or equivalent type / tipping trucks will carry coal from mine and discharge in a receiving pit. Bigger size lump particles will be broken with the help of a feeder breaker and discharge coal to (-) 200 mm size.

11.2.5.2 Conveyor

A existing conveyor C1 of 1200 mm wide has been envisaged below the feeder breaker to collect (-)200 mm size crushed coal from feeder breaker along with dust and mucks from below the chain of feeder breaker and it will discharge coal to a proposed conveyor C2 of 1200 mm wide and conveyor C2 will discharge coal on to truck loading twin hoppers of 2 x50t capacity. Coal from this hopper will be reclaimed with the help of hydraulic

gates provided below twin hoppers and loaded directly onto tripping trucks.

11.2.5.3 Storage

2 x 50t capacity bunker will be proposed. This bunker will be used for storage of coal from mine.

11.2.5.4 Weighment

The truck will be weighed with the help of electronic weighbridge of 100t capacity, before and after loading to assess the correct quantity of coal being despatched and for preparation of dispatch, statements and bills.

11.2.5.5 Dust Suppression System

Coal dust will be created at all transfer points where there is a fall of coal. The dust, if escapes into atmosphere, creates environmental pollution. Environmental pollution can be reduced by suppressing dust at the point of dust generation. Dust suppression system will be used for suppression of dust. Dust suppression system will be provided in all proposed conveyors.

11.2.5.6 Fire extinguisher System

Fire extinguisher system will be used for immediate action on electrical fire.

11.2.5.7 Plant Cleaning System

Four nos of general mazdoor, one in each shift has been provided for cleaning of coal handling plant.

11.2.5.8 Plant Maintenance System

Proper maintenance of the plant is necessary for smooth operation of the plant. For this purpose, mechanical fitters and electrical fitters have been provided.

11.3 POWER SUPPLY, ILLUMINATION AND CONTROL(for all three option)

11.3.1 Source of Power and Supply Voltage:

Total additional load including illumination for CHP at Hidusthan Lalpeth OC Mine has been estimated at around 70 kW due to installation of the additional belt and hydraulic sector gate.

The proposed CHP substation for the additional load shall receive power at 3.3 kV from existing CHP substation through cable for partial hiring and total hiring option. While in case of departmental option supply shall be received at 6.6 kV. An independent new substationsubstation, located at a suitable location near CHP, will supply power to the proposed additional equipment operating in the CHP. The proposed additional CHP substation will have following one no. of transformer:-

i) 1 no. 500 kVA, 3.3 kV / 440 V transformer, (for partial hiring and total hiring option)

In case of departmental option as only provision of 6.6 kV supply has been given, therefore transformer provided shall be of 500 kVA, 6.6kV/440 V with all accessories like cable, switchgear etc. Will be used as per the requirement of 6.6 kV system.

The 500 kVA transformers shall supply power to all the additional industrial loads through a 10 panels sectionalized distribution board, 3 phase, 440 V motor control center. All the lighting loads shall receive power from the existing lighting transformer through a lighting distribution board. Suitable provision has been made for capacitor bank for reactive power compensation. The incomer ACB in the MCC will be provided with short circuit (S/C) over current (O/C) and earth fault (E/F) protections. All the D.O.L. starters in the M.C.C. will have protective gears for overload and single phasing prevention.

13.3.2 Lighting distribution scheme:

Illumination of conveyor gantries, drive houses, transfer houses, platforms below the loading hoppers will be done with the help of industrial type dust proof well glass, 125 W HPL-N lamps having integral control gear. The indoor of the substation building, CHP office, pump house will be illuminated with the help of 2 x 40 W industrial type dust proof jet proof fluorescent lamps. High-pressure sodium vapour lamps of 250 W will be used for outdoor yard lighting. Provision of 250 W HPSV luminaries have been kept for miscellaneous outdoor installations.

13.3.3 Earthing:

The plant earthing shall be in accordance with IS: 3043, IS: 737 and as per IE rules in vogue.

13.3.4 Interlocking of starters for sequence operation:

Each drive will have facility to be controlled manually by the respective starters in the motor control centre. Starters of various drives in the motor control centre will be interlocked in such a way that they can be operated in a definite sequence. However, for repair, maintenance and inspection work, interlock defeat switches will be provide

11.4 CIVIL AND STRUCTURAL WORKS:

11.4.1 Conveyor Structures C2 & Transfer House of C1:

The existing conveyor C1 is supported on the ground over PCC Pedestals and this portion is covered with roof by an arrangement of column and truss positioned at maximum 3 m c/c and ht. of 2.5 m to 3 m. Above ground the conveyor is supported on gantries, which are in turn supported on trestles. The trestles are old and needs strengthening for lump sum amount of Rs. 10.00 lakhs.

It is proposed that a transfer house(TH1) ,size 6.2m x 6.0m x10m ht shall be provided on the existing conveyor C1.The conveyor C2 supported by gantries is supported at the other end on the truck loading house, TLH1 and the proposed transfer house. This transfer house TH1 shall be provided with monorail beam to carry a chain pulley block of 5t capacity for repair and maintenance.The drive is supported on a platform inside the transfer house TH1 that is made of structural steel.

11.4.2 Truck Loading house:

The conveyor C2 discharges coal to the truck loading house TH2 that is a structural in steel structural's of size 10 m x 5 m x 18 m ht. This house consists of two different floors at various levels. The floor at the top which is proposed at the level 13.4 m above G.L. supports in addition to the gantry for conveyor C2, the discharge drum also. The second platform is located below the 2 x 100 t capacity ROM coal hopper at the level 4.2 m above G.L. which supports the reciprocating feeder for truck loading. A separate access to the feeder floor is provided from the G.L. This house TH2 shall be provided with a monorail beam at 17.4 m levels to carry a chain pulley block of 3 t capacity for repair and maintenance of discharge of drive drum. The entire structure shall be adequately braced in all directions against wind and belt tension.

11.4.3 Allied Structures:

Provision for hardstand below the truck loading hoppers and also for a distance of 8 m up and down the approach are included in the cost estimate. The estimate also includes a sump of 21 cum. Capacity with a pump house over it for dust suppression arrangements, a CHP office and a sub station building with an open yard for transformer, which is provided with barbed wire fencing, concrete pavement for truck movement, drains in the CHP area. General land development of the entire CHP area, soil

investigations and provisions for foundations in poor soil etc. has also been kept in the cost estimate.

11.5 CAPITAL REQUIREMENTS AND OPERATING COST:

The total capital requirement for provision made in this report (as on August 2013) works out to Rs. 362.26 lakhs. The details are given in Appendix – A.3.5.

The details of manpower as per the provision of the project report is given in Appendix-B

The estimates of Plant & Machinery are based on 'Standard Price List of Mining Machinery', May 2013 (**escalated to August 2013**) circulated by CMPDI (HQ), and the latest supply order of the equipment. The civil & structural costs are based on cost index 459 (in 2nd half of 2013) with reference 100 base at Nagpur as on 1.1.92.

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CHAPTER – XII

WORKSHOP, STORES & MAGAZINE

12.1 DEPARTMENTAL OPTION

12.1.1 INTRODUCTION

To provide maintenance and repair of various HEMM, CHP, equipment, pumps, LMVs, electrical etc of the mine, independent full fledge unit workshop has been envisaged for the project. Proposed workshop will consist of two types of maintenance and repair shops. These maintenance and repair shops will be as follows: -

i) **Excavation workshop: -** This workshop would extend basic engineering support in respect of maintenance and repair of various HEMM deployed in the mine. Capital repair of HEMM and other equipment would be carried out at central workshop, Tadali.

ii) **E & M workshop: -** Separate E & M workshop facilities have also been provided to carry out maintenance & repair of the CHP, equipment, pumps, LMVs, electrical etc.

These workshops are essentially a unit workshop and will depend on central/regional workshop for major repair and part manufacture. Shovel and drill maintenance & minor repairs will be carried out at site and components/assemblies requiring running repair will be dismantled from the machine and transported to the workshop for necessary repairs. Provision of dumper repair and maintenance facilities has been made taking into account that 100t/60t dumpers will be deployed in the project.

12.1.2 MAINTENANCE FACILITIES

Work load, equipments, electrical load and manpower of the workshop have been assessed on the basis of population of HEMM, CHP, equipment, pumps, LMVs, electrical etc and fulfill their running repairs and maintenance.

12.1.3 SCOPE OF WORK

Following activities are proposed to be carried out in the respective workshop:

12.1.3.1 Unit Excavation workshop:

i) Daily cleaning, by weekly washing of dumpers and other HEMM. daily inspection, checking of air system, hydraulic system, electrical & mechanical system of dumpers.
ii) Daily oiling, greasing, lubrication of assemblies/ sub-assemblies of various HEMM.
iii) Replacement of leaky hoses, tubes, filters, air cleaners etc.
iv) Tyre replacement and tyre inflation.
v) Incidental minor repairs/ replacement of assemblies/ sub- assemblies.
vi) Changing of piston rings, valves, crankshaft bearings, packing, parts of transmission, axles, differentials etc.
vii) Battery charging, repairs of self-starters, dynamos, coil of HEMM.
viii) Machinery/ minor repairs/ limited manufacture of various parts of HEMM as per the requirement.
ix) Welding on dumper bodies, shovels, buckets etc.
x) Miscellaneous structural works.
xi) Scheduling for repair needs at central workshop.

12.1.3.2 Main Workshop :

Central/Regional workshops are envisaged main workshop for this project. These workshop will provide all the support to unit workshop under their scope.

12.1.3.3 Unit E&M Workshop:

Following activities are proposed to be carried out in the respective workshop:

i) Maintenance and repair of CHP equipment, Pumps, LMVs, Electrical etc of the Project.

ii) Manufacture of spares to a limited extent

iii) Transformer oil filtration

12.1.4 PROPOSED FACILITIES

In order to carry out the above activities the following facilities are proposed in the workshop:

i) Maintenance and repair sheds for all functional shops.
ii) Stores sheds
iii) POL store
iv) Washing stations
v) Pavement for parking of mining equipment/HEMM
vi) Material handling facilities
vii) Substation
viii) Supporting facilities like pump house, security post, fire fighting etc.
ix) Material handling facilities for workshop and stores.
x) Store yard
xi) Mobile servicing van and mobile refueling facilities
xii) E&M workshop shed consisting of machine shop, Mechanical repair, Electrical repair, welding and structural sections.
xiii) LMVs repair shed
xiv) Washing platform
xv) Workshop office
xvi) Necessary provision for plant and equipments, tools, testing equipment etc has been provided in the respective shops for efficient repair and maintenance of the HEMM and other equipment of the project.

In addition to the above, mobile crane, tyre handler etc. have been proposed in this report for field servicing/ maintenance of HEMM.

12.1.5 WORKSHOP AND STORES LAYOUT

For efficient operation and effective supervision, the layout of facilities in the workshop have been prepared taking into consideration the sequence of operation for maintenance & repair, minimum inter-shop movement of men & material etc. The area of each shop/ shed has been worked out after studying the space requirement and layout design of machines and also providing reasonable working and movement space. The general layout plan of excavation workshop and E& M workshop is provided in this report.

12.1.6 WORKSHOP AND STORE PLANT & MACHINERY

The plant and machinery provided in this workshop is sufficient to meet the requirement of the scope of the workshop. Adequate P& M for main functional shops including stores have been provided. Besides that adequate provision for washing equipment, material handling equipment, floor cleaning equipment, ventilation equipment, general purpose tools, special purpose tools, installation & commissioning, electrical for workshop P & M and initial spares have been provided.

12.1.7 PROJECT STORE

One small and independent unit stores at convenient location has been provided to cater the routine needs of consumables, spares, POLs etc. This will depend on Regional/Central stores for major spares.

12.1.8 CAPITAL INVESTMENT

Total capital investment requirement has been given in appendix A.3.3.

12.1.9 LIST OF WORKSHOP P & M

Details of shop wise P & M requirement for excavation workshop, their cost and phasing have been given in appendix A.3.3.1 and for E & M workshop in appendix A.3.3.2.

12.1.10 DRAWINGS

Location of the workshop and stores will be decided at the time of start of the expansion mine at convenient location for maintenance & repair. Overall area, Covered area, paved area, roads, gates, provision of repair bays, details of workshop complex, functional shops, bracket height, height of different shops, location of washing and fuel delivery station etc are given in appendix A.2.1 & drawing of workshop given in this project. Separate complex of unit store with separate entry have been provided at convenient place. Drawing of unit store has not been provided in this report.

One dozer repair shop has been provided at pit top for maintenance and repair of dozers of the project with facilities of dozer repair shed, washing system with sump and pump house. Drawing of dozer shop is not given in this report

12.2 PARTIAL HIRING OPTION

12.2.1 INTRODUCTION

To provide maintenance and repair of various HEMM, CHP, equipment, pumps, LMVs, electrical etc of the mine, independent full fledge unit workshop has been envisaged for the project. Proposed workshop will consist of two types of maintenance and repair shops. These maintenance and repair shops will be as follows: -

i) **Excavation workshop: -** This workshop would extend basic engineering support in respect of maintenance and repair of various HEMM deployed in the mine. Capital repair of HEMM and other equipment would be carried out at central workshop, Tadali.

ii) **E & M workshop: -** Separate E & M workshop facilities have also been provided to carry out maintenance & repair of the CHP, equipment, pumps, LMVs, electrical etc.

These workshops are essentially a unit workshop and will depend on central/regional workshop for major repair and part manufacture. Shovel and drill maintenance & minor repairs will be carried out at site and components/assemblies requiring running repair will be dismantled from the machine and transported to the workshop for necessary repairs. Provision of dumper repair and maintenance facilities has been made taking into account that 60t dumpers will be deployed in the project.

12.2.2 MAINTENANCE FACILITIES

Work load, equipments, electrical load and manpower of the workshop has been assessed on the basis of population of various HEMM, CHP, equipment, pumps, LMVs, electrical etc and fulfill their running repairs and maintenance.

12.2.3 SCOPE OF WORK

Following activities are proposed to be carried out in the respective workshop:

12.2.3.1 Unit Excavation workshop

i) Daily cleaning, by weekly washing of dumpers and other HEMM. daily inspection, checking of air system, hydraulic system, electrical & mechanical system of dumpers.
ii) Daily oiling, greasing, lubrication of assemblies/ sub-assemblies of various HEMM.
iii) Replacement of leaky hoses, tubes, filters, air cleaners etc.
iv) Tyre replacement and tyre inflation.
v) Incidental minor repairs/ replacement of assemblies/ sub- assemblies.
vi) Changing of piston rings, valves, crankshaft bearings, packing, parts of transmission, axles, differentials etc.
vii) Battery charging, repairs of self-starters, dynamos, coil of HEMM.

viii) Machinery/ minor repairs/ limited manufacture of various parts of HEMM as per the requirement.

ix) Welding on dumper bodies, shovels, buckets etc.

x) Miscellaneous structural works.

xi) Scheduling for repair needs at central workshop.

12.2.3.2 Main Workshop

Central/Regional workshops are envisaged main workshop for this project. These workshop will provide all the support to unit workshop under their scope.

12.2.3.3 Unit E&M Workshop

Following activities are proposed to be carried out in the respective workshop:

i) Maintenance and repair of CHP equipment, Pumps, LMVs, Electrical etc of the Project.

ii) Manufacture of spares to a limited extent

iii) Transformer oil filtration

12.2.4 PROPOSED FACILITIES:

In order to carry out the above activities the following facilities are proposed in the workshop:

i) Maintenance and repair sheds for all functional shops.

ii) Stores sheds

iii) POL store

iv) Washing stations

v) Pavement for parking of mining equipment/HEMM

vi) Material handling facilities

vii) Switch room

viii) Supporting facilities like pump house, security post, fire fighting etc.

ix) Material handling facilities for workshop and stores.

x) Store yard

xi) Mobile servicing van and mobile refueling facilities

xii) E&M workshop shed consisting of machine shop, Mechanical repair, Electrical repair, welding and structural sections.

xiii) LMVs repair shed

xiv) Washing platform

xv) Workshop office

xvii) Necessary provision for plant and equipments, tools, testing equipment etc has been provided in the respective shops for efficient repair and maintenance of the HEMM and other equipment of the project.

In addition to the above, mobile crane, tyre handler etc. have been proposed in this report for field servicing/ maintenance of HEMM.

12.2.5 WORKSHOP AND STORES LAYOUT:

For efficient operation and effective supervision, the layout of facilities in the workshop have been prepared taking into consideration the sequence of operation for maintenance & repair, minimum inter-shop movement of men & material etc. The area of each shop/ shed has been worked out after studying the space requirement and layout design of machines and also providing reasonable working and movement space. The general layout plan of excavation workshop and E&M workshop is provided in this report.

12.2.6 WORKSHOP AND STORE PLANT & MACHINERY :

The plant and machinery provided in this workshop is sufficient to meet the requirement of the scope of the workshop. Adequate P& M for main functional shops including stores have been provided. Besides that adequate provision for washing equipment, material handling equipment, floor cleaning equipment, ventilation equipment, general purpose tools, special purpose tools, installation & commissioning, electrical for workshop P & M and initial spares have been provided.

12.2.7 PROJECT STORE

One small and independent unit stores at convenient location has been provided to cater the routine needs of consumables, spares, POLs etc. This will depend on Regional/Central stores for major spares.

12.2.8 CAPITAL INVESTMENT

Total capital investment requirement has been given in Appendix A.3.3.

12.2.9 LIST OF WORKSHOP P & M

Details of shop wise P & M requirement for excavation workshop, their cost and phasing have been given in Appendix A.3.3.1 and for E & M workshop in Appendix A.3.3.2.

12.2.10 DRAWINGS

Location of the workshop and stores will be decided at the time of start of the mine at convenient location for maintenance & repair. Overall area, Covered area, paved area, roads, gates, provision of repair bays, details of workshop complex, functional shops, bracket height, height of different shops, location of washing and fuel delivery station etc are given in appendix A.2.1 & drawing of workshop given in this project. Separate complex of unit store with separate entry have been provided at convenient place. Drawing of unit store has not been provided in this report.

One dozer repair shop has been provided at pit top for maintenance and repair of dozers of the project with facilities of dozer repair shed, washing system with sump and pump house. Drawing of dozer shop is not given in this report.

12.3 TOTAL HIRING OPTION

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

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

The layout of the facilities in the workshop has been provided in this report. The requirement of plinth area for workshop sheds and other engineering details have been given in appendix A.2.1. The summary of estimated capital investment for workshop plant and machinery has been given in appendix A.3.3. The manpower required for the supervision and operation of the workshop is given in appendix-B

12.3.2 UNIT STORES

One small and independent unit stores has been provided at convenient location to cater the routine needs of consumables, spares, POLs etc. This will depend on Regional/Central stores for major spares. Unit store lay out drawing is not given in this project.

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CHAPTER – XIII

POWER SUPPLY, ILLUMINATION & COMMUNICATION

13.1 SOURCE OF POWER (ALL OPTIONS)

The proposed Hindustann Lalpeth Expansion OC Mine is located at a distance of approximately 4 kms south from Chandrapur district head quarters Town. The Hindustan Lalpeth OC Mine receives power at 11kV from Hindustan Lalpeth Sub Area Main substation through a 4 kms long overhead line. The Hindustan Lalpeth Sub Area Main substation receives power from Shastri Nagar Substation through 33kv over head line. The present capacity of Hindustan Lalpeth Sub Area Main substation is 2 X 3.15MVA, 33kV/ 11kV and 1X3.0MVA, 33/11kV. This substation feeds power to Manna UG Mines, HL OC Mine, Nandgaon mine and HLC -I UG mine (only for pumping) through one 11kV feeder. It is having a contract demand of 5MVA. While at present, its maximum demand is already exceeding 4.8 MVA. Therefore no further loading is admissible at this substation.

At present Hindustan Lalpeth OC mine substation which receives power from Hindustan Lalpeth Sub Area Main substation, is having one 1.6 MVA, 11kV/3.3kV and one 1MVA, 11kV/3.3kV transformer. Both the transformer are fully loaded without having any standby capacity.

As per the demand chart developed for the proposed Hindustann Lalpeth Expansion OC mine, it is seen that the maximum demand of the mine will be 3116kVA / 2524 kVA /1302 kVA for Departmental / Partial Hiring / Total Hiring Option (Including township)

During discussion held with Area Officials, it was pointed out that the existing 33kV substation has no further capacity. Also as per the proposal, 10/12 m^3 / 5-6 m^3 electric hydraulic shovel will be used for OB removal, for operation of

these shovels huge electric power is required. Therefore it is proposed to erect a new 33kV substation for all the three option. This substation shall receive 33kV supply through a new 4.5 KM long over head line from the existing Hindustan Lalpeth Sub Area Main substation.

A provision of Rs. 130.66 lakhs (including service tax @ 12.36% on 40% amount) have been made in Appendix A.8.1 for incoming power supply arrangement of Hindustann Lalpeth Expansion OC Mine. This includes the cost of 33 kV, 4.5 km long OHL from existing HL UG mine substation to the proposed substation location of Hindustan Lalpeth OC Substation, and for diversion of 11kV, 440 V overhead lines and miscellaneous expenditure.

13.1.2 Proposed Stage:

Mine Power Supply:

As per the demand chart developed for the proposed Hindustann Lalpeth Expansion OC mine, it is seen that the maximum demand of the mine will be 3116kVA / 2524 kVA / 1302 kVA for Deprtmental / Partial Hiring / Total Hiring Option (Including township.

Hence, Considering the above, it is proposed to erect a 4.5 kms long OH line from HL UG mine substation to the proposed location of Hindustan Lalpeth OC Substation, where a 33 kV/6.6 kV, 2 x 5 MVA, substation for Departmental Option or a 33 kV/3.4 kV, 2 x 3.0 MVA, substation for Partial Hiring option or a 33 kV/3.4 kV, 2 x 2.0 MVA, substation for Total Hiring option is proposed to be installed which will cater the power requirement of proposed Hindustann Lalpeth Expansion OC Mine.

CONNECTED LOAD, MAXIMUM DEMAND ETC.

Departmental Option

The estimated maximum demand of mine loads of Hindustan Lalpeth expn. OC Mine (as detailed in power demand table) works out to 3116 kVA. In the

departmental option all the HEMM Equipment and the pumps are proposed at 6.6 kV, hence only 33 kV / 6.6 kV substation has been proposed in the departmental option. The necessary transformers at 6.6 kV have been provided for existing infrastructure facilities like workshop, CHP etc.

For cost-economics analysis, the load of the total 311 nos. of quarters has been considered.

The maximum power demand due to township (total 311Nos. of quarters) will be approximately 499 kVA.

Partial Hiring Option

The estimated maximum demand of mine loads of Hindustann Lalpeth Expansion OC Mine (as detailed in power demand table) works out to 2524 kVA.

No additional quarters are provided in the township. For cost-economics analysis, the load of the total 250 nos. of quarters has been considered.

The maximum power demand due to township (total 250 Nos. of quarters) will be approximately 402kVA.

Total Hiring Option

The estimated maximum demand of mine loads of Hindustann Lalpeth Expansion OC Mine (as detailed in power demand table) works out to 1302 kVA.

No additional quarters is provided in the township. For cost-economics analysis, the load of the total 105 nos. of quarters has been considered.

The maximum power demand due to township (total 105 Nos. of quarters) will be approximately 169 kVA.

Township Power Supply :

The existing arrangement for colony power supply will continue as thereof.

13.1.2.1 Main Sub-station:

It is proposed to install the substation at a suitable location near the access trench for Hindustan Lalpeth OC Mine.

Departmental Option

The capacity of the main substation shall be 2 x 5 MVA, 33kV / 6.6kV.

Partial HIRING OPTION

The capacity of the main substation shall be 2 x 3 MVA, 33kV / 3.4kV.

Total Hiring Option

The capacity of the main substation shall be 2 x 2 MVA, 33kV / 3.4kV.

OUTDOOR INSTALLATIONS :

Departmental Option

13.2.1Surface Power Distribution :

A 6.6 kV, 14 panel sectionalized power distribution board with all circuit breakers, will be provided inside the substation building to receive power from the secondary of the two nos. of 5000 kVA, 33 kV/6.6 kV transformers. The power distribution board with all protections provided in the sub station will control power supply to all the installations of the project. The details of the Switch board will be as follows:-

- Incoming feeder control C.B with CT ratio 450/5	2 Nos.
- Sectionalizer control C.B with CT ratio 450/5	1 No.
- Capacitor bank control C.B with CT ratio 100/5	2 Nos.
- Quarry pumping feeder control C.B with CT ratio 200/5	2 Nos.
- Quarry HEMMs feeder control C.B with CT ratio 250/5	2 No.
- Spare C.B with CT ratio 100/5, 150/5 &150/5	3 Nos.
- Workshop feeder control C.B with CT ratio 60/5	1 No.
- CHP feeder control C.B with CT ratio 40/5	1 No.
T o t a l :	**14 Panels**

Partial Hiring Option

A 3.3 kV, 13 panel sectionalized power distribution board with all circuit breakers, will be provided inside the substation building to receive power from the secondary of the two nos. of 3000 kVA, 33 kV/3.4 kV transformers. The power distribution board with all protections provided in the sub station will control power supply to all the installations of the project. The details of the Switch board will be as follows:-

- Incoming feeder control C.B with CT ratio 550/5	2 Nos.
- Sectionalizer control C.B with CT ratio 550/5	1 No.
- Capacitor bank control C.B with CT ratio 100/5	2 Nos.
- Quarry pumping feeder control C.B with CT ratio 300/5	2 Nos.
- Quarry HEMM feeder control C.B with CT ratio 300/5	2 Nos.
- Spare C.B with CT ratio 100/5, 300/5	2 Nos.
- Workshop feeder control C.B with CT ratio 100/5	1 No.
- CHP feeder control C.B with CT ratio 75/5	1 No.
T o t a l :	**13 Panels**

Total Hiring Option

A 3.3 kV, 11 panel sectionalized power distribution board with all circuit breakers, will be provided inside the substation building to receive power from the secondary of the two nos. of 2000 kVA, 33 kV/3.4 kV transformers. The power distribution board with all protections provided in the sub station will control power supply to all the installations of the project. The details of the Switch board will be as follows:-

- Incoming feeder control C.B with CT ratio 350/5	2 Nos.
- Sectionalizer control C.B with CT ratio 350/5	1 No.
- Capacitor bank control C.B with CT ratio 100/5	2 Nos.
- Quarry pumping feeder control C.B with CT ratio 300/5	2 Nos.
- Spare C.B with CT ratio200/5	1 No.
- Spare C.B with CT ratio 300/5	1 No
- Workshop feeder control C.B with CT ratio 25/5	1 No.
- CHP feeder control C.B with CT ratio 75/5	1 No.
T o t a l :	**11 Panels**

COMMON FOR ALL OPTION

- **Lighting Switch Board :**

A station transformer 100 kVA, 33 kV/230(L-L) V will be installed at both the substation to have an independent power supply to meet the lighting loads & other miscellaneous loads of service buildings, service roads, approach roads, area around substation etc. At the secondary of station transformer a 230 V TP power distribution board with 10 panels for control of lighting loads shall be provided. The distribution board receives power through a MCCB of 400 A, 230 V with H.R.C Fuse of 250 Amps.

- **Connected Load, Maximum Demand**

The details of connected load and Maximum Demand of the proposed Hindustann Lalpeth Expansion OC mine and its colony are as given below :-

S.No.	ITEM HEAD	DEPARTMENTAL OPTION	PARTIAL HIRING OPTION	TOTAL HIRING OPTION
1.	CONNECTED LOAD			
	a) Only Mine	5792kW	4587 kW	2522 kW
	b) Only Colony	684kW	550kW	231 kW
	c) Total	6476 kW	5137kW	2753kW
2.	LOAD IN OPERATION			
	a) Only mine	5283 kW	4078kW	2013 kW
	b) Only township	684 kW	550 kW	231 kW
	c) Total	5967 kW	4628 kW	2244 kW
3.	PROJECTED MAXIMUM DEMAND			
	a) Only mine	2618 kVA	2123 kVA	1134kVA
	b) Only township	499kVA	402 kVA	169 kVA
	c) Total	3116 kVA	2524 kVA	1302 kVA

- **Protection of Substation, Control and Signaling, interlocking & Earthing:-**

  Vacuum circuit breakers shall be used for primary control of all the transformers. The operating voltage of the spring charging motor and the tripping device of the VCB shall be fed through the in built rectifier provided in the circuit breaker. The VCB shall in conjunction with current transformer IS: 2705 (current) offer protection of the transformers against over current, short circuit and earth fault. These circuit breakers shall also trip for internal fault of transformers, actuated by differential relay and winding and oil temperature relays. For these, the following protections have been envisaged.

  i) Combined IDMT and high set instantaneous relay consisting of three overload unit (Range 50% to 200%) one earth fault unit (range 10% to 40%) and three high set instantaneous units (range 400% to 1600%).

  ii) Auxiliary relays for oil and winding temperature and alarm.

  The tripping circuit of the transformers shall have provision for connection to the auxiliary contacts of auxiliary relays for oil and winding temperature alarm. Gas –actuated relay like Buchholz Relay (As per IS) shall be provided.

  The live parts of the circuit breakers shall be properly shrouded as per relevant safety rules.

  Remote control of 33 kV circuit breakers will be performed by the control switches built in the control board of the attendant's room.

  Separate and independent 48 V DC source from storage cells for better control circuit operation shall be provided. If necessary, VCB power pack for DC supply may be by-passed if independent source is provided.

  The following system of signaling will be used in substation.

  Signaling to inform personal about automatic tripping of circuit breakers due to fault.

Warning signal about occurrence of abnormality in any particular device.

Signaling to show actuation of automatic and protective relays, flags and pointer on relays. Fault annunciation panel with standard provision of windows along with hooter alarm and blinking etc. shall be provided.

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

Protection Against Lightning :

For protection against lightning, lightning arrestors conforming to IS: 3070 and IS : 4004 are to be provided in the substation yard. For protection against direct strokes 15 m high lightning masts will be erected.

For the protection of the building from lightning an earthing net on the roof of the buildings connected to the earth pits at the four corners of the building will be provided.

Interlocking System :

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

The 6.6 kV sectionaliser circuit breakers in the 6.6 kV switch board panel will have electrical interlock with the incoming 6.6 kV circuit breakers respectively to avoid parallel operation of transformers. Primary and secondary control circuit breakers are to be connected for inter tripping i.e. the secondary control circuit breaker shall trip automatically when the primary control circuit breakers trips.

Safety & Fire Fighting

Permanent boundary wall (2 M height)shall be constructed along the boundary of the substation. The height of the boundary wall shall be extended by wire net fencing up to 1 M. Soak pits shall be provided for each transformer

in order to prevent damages due to oil leakage. Rubbles shall be spreaded in the yard to prevent fire hazard.

Fire fighting facilities should be provided by the help of the following :

Sand bucket
Portable foam type chemical fire extinguisher
CO_2 fire extinguisher
The following safety appliances shall also be provided
Electrician rubber gloves for HT working
Standard discharging rod
Danger notice plate
First aid box complete with necessary content
Electric shock treatment chart
Rubber matting tested for an insulation level of 11000V
Trolley mounted ladder, safety belt etc.

TOOLS AND INSTRUMENTS FOR MAINTENANCE OF ELECTRIC EQUIPMENT :

The following tools & tackles shall be used :

Insulation tester 500 V, 6000 V, 2.5 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.
Oil filtering machine for transformer oil
Analog multi meter
Lux meter
High voltage cable testing apparatus
Hand operated crimping tool
FRP ladder, mine truck mounted ladder etc

Earthing:

The neutrals of the main transformers in the main substation will be earthed through resistance to restrict earth fault current to minimum as per existing IE rules & DGMS guidelines. As per the Indian Electricity Rules, Rule(116), :- In the interest of safety, appropriate equipment shall be suitably placed in the mines for automatically disconnecting supply to any part of the system, where a fault including, an earth fault, occurs. Fault current shall not be more than 50 amps in 3.3KV/6.6KV systems in opencast mines. The magnitude of the earth fault current shall be limited to these specified values by employing suitable designed, RESTRICTRED NEUTRAL SYSTEM of power supply.For 3.3 KV system, an external resistance of suitable rating in ohm should be provided along with monitoring relay between transformer neutral point and earth electrode/pit. Independent earth pits will be constructed as per IS:3043 (current) at the substation for earthing of lightning arrestors, transformer neutrals, substation fencing etc. In addition to the above, adequate number of earth pits would be constructed in the main substation for earthing of various electrical equipment in the substation. Earthing of various equipment in opencast would be provided through overhead G.I wire running along the overhead conductor of the various quarry feeder.Separate earth pits will also be constructed around workshop. All the drives in the workshop. would be properly earthed by G.I strips of adequate size connecting to the main bus laid around the workshop connecting all the earth pits. Separate earth pits will be laid at the service buildings for earthing of various equipment/installations.

13.1.2.2 Energy Consumption :-

The annual energy consumption of the Hindustann Lalpeth Expansion OC mine has been calculated in the enclosed power demand chart.

13.1.2.3 System Voltage :-

The utilization voltages of various equipment/ installations proposed for this project are given below:

Installation	Voltage
- Incoming power supply	33 kV
- Quarry power distribution	6.6 kV (For Departmental), 3.3 kV (For Partial & Total Hiring)
- Workshop Power Supply	6.6 kV/ 415 V (For Departmental), 3.3 kV/ 415 V (For Partial & Total Hiring)
- CHP Power Supply	6.6 kV/ 415 V (For Departmental), 3.3 kV/ 415 V (For Partial & Total Hiring)
- Pumps	6.6 kV/ 440 V (For Departmental), 3.3 kV/ 440 V (For Partial & Total Hiring)
- Surface illumination	230 V (L-L)
- Colony Power Supply	6.6 kV / 3.3 kV / 415 V/ 230 V

13.1.2.4 Power Factor Improvement :

3 phase capacitor banks of 6.6 kV or 3.3 kV, 75/150 KVAR rating of suitable capacity will be provided at main substation (This is shown in the electrical drawing of schematic diagram of power distribution) to achieve a power factor of 0.98 or higher. The capacitor banks will have the facility to connect or disconnect the required number of units.

Departmental Option :

13.1.2.5 Quarry Power Supply Distribution:

It is proposed to draw two numbers of 6.6 kV over head line from the 14 panels switchboard of main substation to & periphery of the quarry for supplying power to HEMMs like Shovels . From the overhead lines, power will be tapped off by means of isolator to energize the field switch of the HEMM.

It is proposed to draw two nos. of 6.6 kV over head line from the14 panels switchboard of main Substation to the pump house inside the quarry for supplying power to pumps . From the overhead lines, power will be tapped off by means of isolator and field switch to energize the power distribution board at pump house.

Power Supply to Pumps:-

Two nos. of 6.6 kV over head line will be drawn from the main substation to the pump house inside the quarry for supplying power to pumps. A 6.6 kV, 14panel, 630 A sectionalized switch board has been provided for power supply to 250 kW, 6.6 kV pumps. One of the 6.6 kV panel shall act as incoming control for the 6.6 kV / 440 V transformer provided for power supply to LT pumps. A transformer 6.6 kV / 440 V, 250 kVA is proposed to be installed for power supply to LT pumps in quarry. A 6-panel LT distribution board with one no. incoming ACB, 630A, 4Nos ACB 630 A for LT Pumps and 5 Nos SFU for Face pumps.

- **Power Supply to Workshop:-**

One number of transformers, 6.6 kV/440V, 630 kVA has been proposed to be installed in the workshop to feed power to workshop equipment. This transformer shall receive power at 6.6 kV from the project main station.

Partial / Total Hiring Option

Quarry Power Supply Distribution

For Partial Hiring Option Only :

It is proposed to draw two numbers of 3.3 kV over head line from the 14panels switchboard of main substation to & periphery of the quarry for supplying power to HEMMs like Shovels and drills. From the overhead lines, power will be tapped off by means of isolator to energize the field switch of the HEMM.

For Partial / Total Hiring Option

The conductors of all the overhead lines will be of 150 sq.mm ACSR conductors. An earth conductor of the same diameter will also be drawn along with the above conductors for facilitating earthing of the equipment and installations

Power Supply to Pumps:

Two nos. of 3.3 kV over head line will be drawn from the main substation to the pump house inside the quarry for supplying power to pumps A 3.3 kV, 14panel, 630 A sectionalized switch board has been provided for power supply to 250 kW, 3.3 kV pumps. One of the 3.3 kV panel shall act as incoming control for the 3.3 kV / 440 V transformer provided for power supply to LT pumps. A transformer 3.3 kV / 440 V, 250 kVA is proposed to be installed for power supply to LT pumps in quarry. A transformer 3.3 kV / 440 V, 630 kVA is proposed to be installed for power supply to LT pumps in quarry. A 6-panel LT distribution board with one no. incoming ACB, 1250A, 5 Nos ACB 800A for LT Pumps and 4 nos SFU for Face pumps.

- **Power Supply to Workshop:**

For Total hiring a 3.3 kV/440V, 250 kVA, and transformer is to be installed in the workshop to feed power to workshop equipment. This transformer shall receive power at 3.3 kV from the project main station.

For Partial hiring one number of transformers, 3.3 kV/440V, 500 kVA is proposed to be installed in the workshop to feed power to workshop equipment. This transformer shall receive power at 3.3 kV from the project main station.

13.2 ILLUMINATION : (ALL OPTIONS)

Illumination of general quarry area/dump area:

Illumination of quarry general area/dump area will be by 400 W, HPSV lamps fitted in flood light luminaries. A cluster of six lamps mounted on 15 m high

lighting towers will be provided. Sufficient nos. of such towers have been provided.

Haul road Illumination :

The illumination of haul road is permanent in nature and will be illuminated by 250 W HPSV lamps fitted in street light fittings. These fittings will be mounted on 12.0 m high poles installed along the length of haul road either on one side or on two sides depending on the width of haul road.

Illumination of production faces :

The production faces will be illuminated by 400 W HPSV lamps fitted in symmetrical flood light fittings and mounted on 5.5 m high towers (self supporting) or may be mounted on HEMM itself.

Service road and approach road illumination :

The service road and part of approach road will be illuminated by 150 W HPSV lamps fitted in street light fittings mounted on 10.5 m high poles along the length of road.

Pole mounted transformers of 25 kVA, 6.6 kVor 3.3 kV/230 V (L-L) lighting transformers along with lighting distribution boards comprising 1 No. incomer control 63 A, 2 pole MCB), 2 nos. out goings (30 A, 2 pole MCB) have been provided for feeding the illumination/lighting loads as mentioned above.

13.3 POWER BALANCE AND ANNUAL ENERGY CONSUMPTION:

The various grous of electrical receivers and their operating loads, the estimated maximum demand, transformer capacity and power consumption are given in the table of Power Demand developed for the Hindustann Lalpeth Expansion OC mine.

Specific energy consumption for the Hindustann Lalpeth Expansion OC mine for Departmental / Partial / Total Hiring options is 12.99 / 10.05 / 4.17 kWh/Te. All other salient electrical parameters are given in 13.4.

13.4 SALIENT ELECTRICAL FEATURES AND COST ESTIMATE:

Cost Estimate

The estimated phased capital investment requirement for electrical plant and machinery and communication along with brief specifications are given in Appendix A.3.2.

The present two part tariff of MSEDCL as applicable for March,2013. is as follows :-

Description	Industrial/Mine load	Township
i) M.D Charges	Rs.190 / kVA / month	Rs.190 / kVA / month(for Industrial feeder)
ii) Energy charges	Rs.7.01 / KWH	Rs.4.82 / KWH
iii) FCA charges+ Infra charges	Rs. 0.09 / kWH	Rs. 0.09 / kWH
iv) Electricity duty	9% of [(i)+(ii)+(iii)]	15% of [(i)+(ii)+(iii)]
v) Additional Supply Charges i.e. ASC	NIL	NIL
vi) TAX ON SALE (on total unit consumed)	Rs. 0.08 / kWH	Rs .0.08 / kWH

Based on the above tariff the power cost estimate of the mine has been calculated and placed in the table given below:-

S.No.	ITEM HEAD	DEPART-MENTAL OPTION	PARTIAL HIRING OPTION	TOTAL HIRING OPTION
1.	SPECIFIC ENERGY CONSUMPTION (Including township)	12.99 kWh/t	10.05 kWh/t	4.17 kWh/t
2.	SPECIFIC POWER COST (Including township)	Rs.107.49/t	Rs.83.37 /t	Rs.35.20 /t
3.	FIXED PERCENTAGE OF POWER COST	37.99 %	43.44 %	73.78%
4.	VARIABLE PERCENTAGE OF POWER COST	62.01 %	56.56 %	26.22 %

S.No.	ITEM HEAD	DEPART-MENTAL OPTION	PARTIAL HIRING OPTION	TOTAL HIRING OPTION
5.	SPECIFIC DEMAND	3.116 MVA/Mt.	2.524 MVA/Mt.	1.302 MVA/Mt.
6.	CAPACITOR BANK PROVIDED			
	a) Only mine	1650 kVAR	1200 kVAR	675 kVAR
	b) Only township	225 kVAR	125kVAR	75kVAR
	c) Total	1875kVAR	1325 kVAR	750 kVAR
7.	AVERAGE COST OF PURCHASED POWER	Rs. 8.28 /kWh	Rs. 8.30 /kWh	Rs. 8.45 /kWh

The details of capital of electrical P & M and estimated capital required are given at Appendix-A.3.2.

13.5 CONSERVATION OF ENERGY :

The under mentioned points have been considered, while making this report, keeping in mind the utmost need for conservation of energy.

i) **Planning and designing of transmission and distribution network.**

While planning / designing of power transmission and distribution network, adequate sizes of cables are selected to minimize line losses and voltage drop. It is also suggested to lay ultimate sizes of cables so that the duplicate work is avoided and line losses are bare minimum during construction stage also.

ii) Improvement of Power Factor :

Capacitor banks at 6.6 kV/ 3.3 kV side in quarry & 415 V side in township have been provided to improve the system power factor to 0.98 and thereby reduce the maximum demand.

iii) Staggering of Pumping Load :

Pumping should not normally be done during peak hours of production. Adequate sump capacity has been provided so that frequent running of pumps are avoided to facilitate staggered pumping. Desilting of main sump is also to be done at regular intervals.

iv) Illumination and Township Power Consumption :

Illumination contributes a substantial percentage of total power consumption. For efficient use of energy as well as to conserve it, high lumen output lamps like HPSV lamps have been proposed for general illumination of township and the areas in the vicinity of the mine, viz. Workshops, yards, roads etc. Other major actions proposed for reducing the lighting energy consumption are :-

a) Use of time limit switches in street lighting circuits to establish control over lighting operations as well as to reduce wastages during daylight hours.

b) Reducing illumination level in non-productive areas ;

c) Switching off departmental lights during lunch periods and other extended off periods :

d) Checking soundness of capacitors, chokes, starters etc.

e) Introduction of Electronic static energy meters in individual quarters to control the energy consumption.

f) Use of electronic chokes for fluorescent lamps.

v) Providing Energy Meters:

To monitor actual consumption of energy in different areas such as pumping feeder, CHP feeder , OCM installations, township, etc. provision of energy meters has been kept on outgoing feeder control circuit breakers.

vi) It is highly recommended to use compact fluorescent lamps (CFL, 1x18 W or 2x18 W) in place of incandescent lamps (100 W) and T-5 type tube lights with electronic chokes (28 W) in place of conventional fluorescent tube lights, (55W) where ever possible in the project or township. This will result in substantial energy savings.

vii) It is also recommended to use hard PVC coated bunch of conductors, in place of ACSR conductors for overhead lines wherever supply is to be given to residential complexes or township to avoid pilferage of electricity in between by unauthorized shops and Jhuggi-Jhopadi .

viii) Selection of Transformers

While selecting number and capacity of transformers in the main substation, care is taken so that transformation losses are minimum.

ix) It is also highly recommended that use of incandescent lamp (bulbs) should be stopped and banned. Latest technology LED light lamps should be used which are 8 to 10 times efficient and having a life of 50000 burning hours. To save electricity wherever is possible use of 5 star BEE marked electric appliances are highly recommended**.**

13.6 COMMUNICATION SYSTEM, SYSTEM PROPOSED AND COST ESTIMATE

13.6.1 Introduction

For effective management of different production, service units and for ensuring safety, the following communication facilities have been envisaged for Hindustann Lalpeth Expansion OC Mine.

Coal production has become highly capital intensive due to large scale mechanization and use of modern technology. To cope up with mechanization and improve the efficiency there is a need to establish efficient means of communication in terms of providing integrated voice and data connectivity. The effectiveness and reliability of decision making process depends on a reliable means of information exchange between different units and establishments of an integrated telecommunication system incorporating both voice and data is of utmost importance.

In order to improve operational efficiency of Hindustann Lalpeth Expansion OC Mine, it is necessary to integrate its operational units, service units,

maintenance units, stores, workshops, administration departmental Road and rail dispatches etc. with efficient and reliable communication links which may provide multimedia facilities to be made available for quick decision making.

13.6.2 Proposed Communication System :

The proposed communication system should cater the need of voice communication among the mobile, fixed personnel related to mine operation, administration and equipment maintenance. The system also takes into account the data communication requirement for the mine operation and planning along with the latest office automation facilities. Suitable provision has also been kept for tracking the critical responsible persons.

While proposing the system due consideration has been given to the state of art networking architecture involving the communication of voice, data and multi-media over the same network path, so as to avoid the duplicated investment in network and proper conservation of bandwidth.

Administrative Communication:

a) IP Enabled Exchange :

In order to cater to the need of surface communication an IP enabled Exchange of 150 lines is proposed for facilitating voice communication between various offices, residential buildings and other strategic points within the mines. This exchange is directly interfaced with the Ethernet layer 3 switch and radio modems so that any subscriber of this exchange can communicate with area office also. The proposed IP enabled exchange should have the following main features:

i) Offered system should be a fully digital system using time division multiplexing/ pulse code modulation with 100% non-blocking architecture.

ii) The main controller card should have CPU of 32-bit microprocessor or more with stored programme controlled technology.

iii) The main system memory should be ROM based for faster booting time, faster initialization etc.

iv) It should be possible to save the data from system memory to the hard disk.

v) The system should be equipped with 1 No. in built-Ethernet LAN port for direct connecting to the office LAN.

vi) The system should be equipped with 2 Nos. RS-232C interfaces for direct connectivity with PCs, printers etc.

vii) It should be possible to maintain the system from any PC in the LAN.

viii) The system should have in built Auto-Diagnostic features for regular & periodic administration, diagnostic maintenance etc. and generation of various reports related to the health of the system.

ix) The system should be able to support simultaneous transmission of voice and data up to 19.2 Kbps in Asynchronous mode and 64 Kbps in synchronous mode.

x) The system should support incoming CL1 facility on Analog lines using CL1 analog phones.

xi) The system should be capable of accommodating the DTMF phones, cordless phone, answering machines, digital nutlike telephone, ISDN phones, DECT wireless phones.

xii) The system should support the following types of signaling as given below :

- CO & P&T trunk lines
- DTMF loop
- 2 Wire E&M
- 4 Wire E&M
- LD-DID lines
- DTMF Analogue subscriber lines
- R2MFC
- 2 Mb E1
- ISDN (BRI & PRI) signaling

- Digital tie lines
- VOIP on trunks
- DECT Wireless

xiii) The system should be able to support unto 16 parting in 1 single conference.

xiv) The system should be able to support in skin IP Gateway card which converts the circuit switched voice into data packets and transmit them across the office LAN & WAN to distant location. The same in skin IP Gateway converts the incoming data packets into circuit switched voice and transfers them to the desired extension during reception.

xv) The system should be able to support in skin card based 8 port Voice Mail System.

xvi) The system should be able to support Computer Telephony Integration (CTI).

xvii) The offered system must be compatible with DSL technology (ADSL) for providing data over the existing copper network.

xviii) The system should be able to provide CL1 (Calling line identification) facility on analog extension with analog CLIP phones.

xix) The EPABX system should support call detailed recording, billing facility.

b) BSNL Communication:

It is proposed to provide 10 Nos. BSNL telephone extensions to the project, in order to facilitate external communication and to link the project with the BSNL's national telephone network. The BSNL telephones shall be provided at the offices and residences of important officials. The BSNL communication facility can be extended by terminating about 4 BSNL lines on the proposed IP enabled EPABX and configuring the same.

c) Point to Point Radio Communication:

To connect mine with Area (HQ), a point to point radio is proposed for voice & data communication.

The IP based Point to Point System shall operate at 2.4 to 2.5 Hz ISM band with data speed unto 11 Mbps. Each MW Radio shall be IP configured and compatible to the proposed VSAT based COAL NET of CIL with following important features:

- Easy configuration
- VOIP gateway with quality voice and Analog Interface with easy configuration
- Should support dynamic polling
- 10/100 Base T Ethernet Interface
- System shall be highly secured
- Enable connectivity with multiple LAN with different IP subnet
- Capable of software up-gradation and configuration of remote radios from any node in the proposed network
- Routing support for all standard IP protocol
- Should work without signal fading out of 10 km from point to Multipoint under LOS
- The system should have high gain antenna for successful performance and safe transmission of data/voice
- The system shall support one point to 300 remote base stations.

Operational Communication

a) VHF/UHF Communication

To facilitate Voice Communication among the moving maintenance and operational persons, walkie-talkie sets are proposed.

VHP dialing type Walkie-talkie sets/ trunked radio will be provided to important personnel for communication in the mine. These will be working in the band 150-174/450-527 MHz with a channel spacing of 12.5 KHz/25 25 KHz, with an

output of 5 W. Type of operation will be FM simplex. The systems shall have telephone patch facility for interfacing with the exchange. It should also have control channels for trunking facilities.

Specifications :

General :

Frequency (on-line programmable)	-	136-174/403-470/450-527 MHz
Channel Capacity	-	Min. 4
Power supply	-	7.5 V +/-20%
Weight	-	Max. 500 grams
Average battery life Ni Cd/Ni MH	-	8- 10 hours
Environment Protection	-	1 P 54, impact resistant, dust & humidity Protection.

Transmitter :

Frequency	-	136-174/403-470/540-527 MHz
Frequency separation	-	Full band split
Channel spacing	-	12.5/20/25 KHz
Frequency stability	-	+/-0.00025% approx.
Power	-	5 W
Modulation	-	FCC or any other
Audio response	-	+1 to – 3 dB
Audio Distortion	-	3 %

Receiver :

Frequency	-	136-174/403-470/540-527 MHz (on-line programmable)
Frequency separation	-	Full band split
Frequency stability	-	+/-0.00025% approx.
Sensitivity	-	0.25 mV
Inter-modulation	-	E1A, 70 dB
Adjacent channel/sensitivity	-	60 dB @12.5 KHz/70 dB @25 KHz
Spurious Rejection	-	70 dB
Rated Audio	-	500 mW
Audio Distortion	-	3 %

Hum and Noise	-	45 dB @ 12.5 KHz
Audio Response	-	+1 to 3 dB

Data Communication :

In view of growing need of information technology and an efficient and reliable means to access data from anywhere, a local area network (LAN) for the whole project is required to share the existing resources. The objective of this proposal is to link all proposed 10 PCs of the Project with each other and with area, in a single network facilitating sharing of information and computing resources amongst different departments/disciplines. The network shall be capable to add more nodes as and when the No. of users grow and it will be equipped with the latest state of art technology.

The PCs will be utilized for the following applications:

i) Personnel Information System (Payroll, bio-data etc.)

ii) Financial accounting

iii) Project Planning & Monitoring

iv) Sales Accounting and Analysis

v) Material Management

vi) HEMM utilization, breakdown analysis, idle-time analysis etc.

vii) Production Planning & Monitoring

viii) Resource Utilizations & MIS

For optimum utilization of hardware and software, a Local Area Networking of 10 PCs is proposed. Through LAN, Data Transfer, Message transfer and Mail Transfer are possible.

Following LAN Components are needed :

Layer 3 Managed Ethernet Switch :

Switches are required to interface the radio modems with the local area networking (LANs) and also with IP enabled exchanges. 24 Port Layer 3 Managed Switches are proposed here for non-blocking routing of voice and data over the network with bandwidth aggregation.

The proposed layer 324 Port Ethernet switches have the following facilities ;

- Non-blocking, wire speed switching and routing for Ethernet, Fast Ethernet and Gigabit Ethernet.
- Support for VOIP (H-323) transcending and gateway capability for 4.729 and 4.711
- Intelligent QOS to clarify the traffic based on application importance nd priority
- Routing & Switching services for IP enabled exchanges
- Support for IEEE 802.3X half and full duplex on all ports.
- Supports for all types of authorization, authentication and security services.

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CHAPTER – XIV

CIVIL CONSTRUCTION

14.1 CIVIL CONSTRUCTION

14.1.1 Life of the project & specifications

The Hindustan Lalpeth Expansion OC mine is proposed to extract the coal reserves lying in the dip side of the Hindustan lalpeth OC mine which falls in Chandrapur Area of Western Coalfields Ltd.

The estimated life of this project is about 8 years, as such all civil works have been envisaged on permanent specifications. It should be ensured that all the service & residential buildings are constructed on non-coal bearing area.

14.1.2 Nature of Soil

The topsoil in this region is predominantly black cotton. Hence provision in the estimate has been made for poor/black cotton soil safeguarding uncertainty of foundation strata. However, provision for soil investigations has also been made in the estimates. Therefore, it is suggested that before undertaking detailed engineering and construction work, geo-engineering investigations of soil should be done.

14.1.3 Building Cost Index

The Building Cost Index for the Maharashtra has been worked out to 459 in 2013 (2^{nd} half) taking the prevalent rates of materials and labours of Maharashtra region. This Building Cost Index is with reference to base 100 in Nagpur as on 1.1.1992. The detailed calculations of Building Cost Index are shown in Appendix-A.2.3. The cost index with reference to 01.10.1976

comes to 2754.

14.1.4 Contingencies & Service tax

Contingencies @ 3% and service tax @ 12.36% of 40% of gross amount have also been taken for all items of Civil Works.

14.1.5 External Services

The details of different External Services viz. Roads, Culverts, Water Supply, and Sewage Disposal etc. are provisional and may vary after detailed layout and engineering as per site requirements.

14.2 SERVICE BUILDINGS

Keeping in view the needs and requirements of this mine, provision for service buildings such as, Manager Office, Excavation workshop, E & M Workshop, Unit Stores, facility outside the work, Sub-stations and other service buildings have been provided.

14.2.1 Excavation Workshop

i) Departmental Option

Excavation workshop building with 11m clear height and 10 bays, closed on sides, have the facility for the daily maintenance, scheduled maintenance and medium and minor repair of dumpers with 25t EOT cranes.

A main workshop building with 6 m height closed from sides consists of engine shop, hydraulic equipment repair shop, radiator repair shop, electrical repair shop, machine shop, tyre repair shop suitable for 10t EOT crane.

In addition to above buildings , excavation workshop consists of washing ramp for 100 t & 60 t dumpers, office and stores, substation building, concrete pavement, cycle/scooter shed, ground water reservoir, pump house, dumper parking space, open parking space , waste oil tank, fuel station and

lavatories as additional provisions.

ii) Partial Hiring Option

Excavation workshop building with 10m clear height and 8 bays, open on sides, have the facility for the daily maintenance, scheduled maintenance and medium and minor repair of dumpers suitable for 15t EOT cranes.

A main workshop building with 6 m height closed from sides consists of engine shop, hydraulic equipment repair shop, radiator repair shop, electrical repair shop, machine shop, tyre repair shop suitable for 10t EOT crane.

In addition to above buildings , excavation workshop consists of washing ramp for 60 t dumpers, office and stores, substation building ,concrete pavement, cycle/scooter shed, ground water reservoir, pump house, dumper parking space, open parking space , waste oil tank, fuel station and lavatories as additional provisions.

14.2.2 E & M workshop (All Options)

i) Departmental & Partial Hiring Option

E & M workshop consists of main workshop building, LMV repair shed, LMV washing ramp, workshop office, workshop stores, switch room, cycle and scooter shed, security post , bituminous pavement, underground water tank, pump house , washing platform and lavatories along with a boundary wall with gate.

ii) Total Hiring Option

E & M workshop consists of main workshop building, workshop office, workshop stores, switch room, cycle and scooter shed, security post, underground water tank, washing platform and lavatories along with a boundary wall with gate.

14.2.3 Unit Stores (All Options)

Unit Store comprises of store shed of 6m height and hard stand surrounded

by a boundary wall with a gate.

14.2.4 Sub-Station (All Options)

Sub-station has been provided for project only. Substation building has been proposed with a clear height of 4.5m, along with barbed wire fencing with a gate.

14.2.5 Estimated amount for Service Building (All Options)

Details and estimated amount of the proposed service buildings are shown in Appendix – A.2.1.

14.3 RESIDENTIAL BUILDINGS

14.3.1 Manpower & Nos. of Quarters (All Options)

New quarters are not proposed as the existing quarters of the HL OC Mine i.e, 324 nos. have been envisaged.

Estimated amount for residential quarters (All Options)

The details of quarters and their unit rates have been given in Appendix A.2.2 & A.2.4 respectively.

14.5 ROADS AND CULVERTS

14.4.1 Approach Roads (All Options)

Approach Road to Nandgaon, Manna & HLOC mine of 1.20 Km length of sectoral road of strata 'D' has been provided in Appendix A.8.2.1

14.4.2 Haul Roads & Heavy Duty Roads with Culverts

i) Departmental Option

For transportation of Coal, Haul Road of 2.70 Km length for 60t dumpers has been proposed as additional provision.

For OB handling, Heavy Duty Road of 1.5 Km length for 100t dumpers has been proposed as additional provision

ii) Partial Hiring Option

For transportation of Coal, only Haul Road of 2.70 Km length for 60t dumpers has been proposed.

ii) Total Hiring Option

For transportation of Coal, only Haul Road of 2.70 Km length for 35t dumpers has been proposed.

14.4.3 Service Roads & Culverts (All Options)

For approaching different Service Buildings, 1.00 km long Sector Road on Stratum `C' specification with culverts, drain, tree guards etc. as sanctioned in earlier Project Report has been continue as additional provision.

14.4.4 Diversion of roads (All Options)

Diversion of road for 1.50 km length only has been proposed as additional provision.

14.4.5 Estimated Amount for Roads and Culverts (All Options)

The estimated amount and other details Haul road, Service road and Diversion of are given in Appendix-A.8.2.

14.5 WATER SUPPLY ARRANGEMENT

14.5.1 Water Demand

Water supply arrangements have been envisaged for only project.

Industrial Water Demand

Water demand for project site includes water to be supplied for dust suppression, fire fighting, water sprinkling on roads, etc.

i) Departmental Option

The total water requirement for project site has been worked out to 270 Kl

ii) Partial Hiring Option

The total water requirement for project site has been worked out to 230 Kl

iii) Total Hiring Option

The total water requirement for project site has been worked out to 170 Kl.

As desired, water **demand of Departmental option i.e. 270 Kl has been proposed for all options.**

(B)	**Industrial Water Demand for Project including Potable Water demand for Persons working in the Project**		
Sl No.	Particulars	Unit	Departmental Option
	For Opencast Projects Capacity: No. of Dumpers = No. of Dozers =	 1 34 8	 Mty
a)	Water requirement for total manpower of Project @ 45 litre/capita/day	Litres	30600
b)	Water requirement for washing of dumpers @ 1800 litre/ dumper/day	Litres	75600
c)	Water requirement for dust suppression in CHP & other industrial premises @22500 litre/ day/million tonne of coal production per year	Litres	22500
d)	Water requirement for fire fighting @45000 litre/ day/million tonne of coal production per year	Litres	45000
e)	Water requirement for road watering @ 67500 litre/ day/million tonne of coal production per year	Litres	67500
f)	Water requirement of Service Buildings @ 10% of item (a) of above	Litres	3060
g)	Allowance for loss & wastage @ 10% (a) to(f)	Litres	24500
	Total Water Demand	Litres	268760
	Say	Litres	**270000**

Source of Water (All Options)

Sub-soil water has been envisaged as the source. Accordingly, bore-well provisions have been made. However, it is suggested that the source of water

may be ascertained after carrying out hydro-geological investigations as regards the quality and quantity of water.

Salient features of Water Supply arrangement (All Options)

Sub-soil water through bore well has been proposed to be conveyed to O.H. reservoirs via ground sumps. Further, water from O.H. reservoir shall be supplied under gravity to different buildings after chlorination.

It is, however, suggested that permanent water supply arrangement should be formulated after carrying out detailed survey, investigations for the adequate source of water and detailed engineering.

Estimated Amount of Water Supply (All Options)

The details and estimated amount for Water supply in colony and industrial use is given in Appendices- A.8.3 (B-II).

14.6 SEWAGE DISPOSAL ARRANGEMENT (All Options)

To avoid any discharge of effluent into natural watercourses, sewage disposal arrangement has been envisaged. Estimated amount for sewage disposal arrangement for project site along with required surface drains is given in Appendices A.8.3 (A-II). However, final economical scheme may be formulated after detailed survey & engineering considering the site parameters.

14.7 CONSTRUCTION MANPOWER

The proposed civil engineering manpower in the project report is for the repair & maintenance works of the project i.e., for repair & maintenance of buildings, roads, water supply, sewage disposal arrangement, etc. Personnel required for the construction period of the project are not included in the total manpower proposed for the project. Following construction manpower has

been proposed for the construction period only.

i) Departmental Option & Partial Hiring Option

Sl. No.	Designation	No.
i)	Sr. Manager(C)/Manager(C)	1
ii)	Deputy Manager (C) / Assistant manager (C)	2
iii)	Sr.Officer (C)	4
iv)	Engineering Asstt./Overseer (C)	6
v)	Accountant	3
vi)	Clerk	3

ii) Total Hiring Option

Sl. No.	Designation	No.
i)	Deputy Manager (C) / Assistant manager (C)	1
ii)	Sr.Officer (C)	2
iii)	Engineering Asstt./Overseer (C)	4
iv)	Accountant	2
v)	Clerk	2

It is proposed to arrange this manpower for the construction period from the total available manpower in WCL under Civil Engineering Discipline.

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CHAPTER – XVI

SAFETY & CONSERVATION

15.0 GENERAL

The project report has been drawn in conformity with the prevailing statutory provisions as per Mines Act 1952, CMR 1957 etc applicable for safety in mines. However all statutory rules, regulations, applicable laws etc & statutory requirements shall be strictly adhered to and implemented in order to maintain day to day safety as per statute.

15.1 DEGREE OF GASSINESS

The CMR 1957 exempts opencast workings from the definition of degree of gassiness.

15.2 INUNDATION

The nearby Erai River flows from North to South at about 1 km from the north-western end of the proposed Hindustan Lalpeth quarry. HFL of Erai river recorded in the area is 180.267m on 15th Sept.1959. An embankment / OB dump exist along the periphery of nortern and western part of the quarry to protect the quarry area from inundation. This embankment along the river will be maintained in the proposed Hindustan Lalpeth Expansion OC mine and proper drainage arrangement and garland drain will be maintained around the quarry and OB dumps to carry the rain water away. Prior to onset of monsoon, the embankment should be inspected by competent person to ensure that there is no breach in embankment.

Suitable alarms, connected to float in Erai river, would be provided at strategic places like Time-Keeper Office, Security Office, Safety Office, Manager's Residence, Pit Office etc. The floats in the river would activate the alarms as

soon as the water level in the river crosses the danger mark. Suitable action can then be taken to investigate the alarm and take other suitable precautions. In addition to this, river side patrolling would also be carried out during monsoon to caution the project authority in case of any sudden rise in the river. Adequate wireless communication sets have been provided for the above purpose.

Rain water falling within the project area would be diverted from quarry area by providing garland drains and shall be collected towards low lying area.

15.3 DUST SUPPRESSION

For suppression of dust, water sprinkler has been provided in the Expansion PR. Suppression of mine dust may be done by using package bond & dust bond, for methodology of application DGMS Circular No.8 of 1997 may be referred.

15.4 GENERAL LIGHTING

The standards of lighting to be provided in opencast coal mines during working at different places or areas where natural light is not sufficient has been specified in DGMS circular GSR 804 dated 18.6.1975 (cir. (legis) 1/1976).They have to be strictly adhered to for efficient and safe working. Lighting near the faces and haul road may be arranged by cluster of high pressure sodium vapour lamps / metal halide / HPMV lamps located on the top of an adjustable telescopic mast, mounted on a platform with rubber tyred wheels or skids and having portable diesel generating sets.

15.5 FIRE AND SPONTANEOUS HEATING

i) It is proposed to lay water pipeline along the strike length on the dip side of quarry so that flexible hoses can be taken out from 'T' points of the pipeline for immediate quenching of the fire in coal seams. Also fire fighting trucks have been provided in this report to fight fire locally.

ii) Wild or herbaceous plants shall be removed from the mine.

iii) No person shall deposit heated material or ashes on any opencast working. Also no person shall light a fire or permit a fire to be lighted in any OC working except by the permission in writing of the Manager and only for a special purpose specified therein.

v) No coal shall be left exposed in coal benches more than its incubation period to avoid fire due to spontaneous heating.

vi) Proper type of the extinguisher should be kept in each HEMM ready for use in case of emergency.

vii) In coal stock, coal shall be dispatched on the basis of first in first out.

15.6 SLOPE STABILITY

It is suggested that following actions may be taken to deal with slope stability problem.

i) Vulnerable area may be identified and marked on quarry plan.

ii) Observation of actual alignment of fault, its throw, joints, etc. may be recorded during the process of exploitation.

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

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

v) Rise side slope to be reinforced if required because it has to stand through out quarry life. No dumps/surface structures to be located within 15m of quarry edge as it will act as surcharge there by destabilizing the slope.

vi) No undercutting of slopes to be done.

vii) Proper hydro-geological studies should be done and if water table is at level of slope it should be brought down by using submersible pumps to prevent hydrostatic pressure.

viii) Proper selection of site for dumping to be done. Before dumping, place of dumping should be made free from loose material. Dumping shall not be done at an angle more than the angle of repose of material being dumped.

ix) After completion of dumping operations, dumps should be stabilized by growing vegetation.

x) Every person deployed by leaser of HEMM must be trained & briefed about aspects related to slope stability.

15.7 HAUL ROAD MAINTENANCE

Adequate care must be taken for proper construction and maintenance of haul road as per the existing guidelines. The gradient of haul road should not be steeper than 1 in 16.

15.8 BLASTING

i) At the time of operation of mine, drilling parameters have to be optimized on the basis of actual field trial depending upon joint pattern, bedding plane, type of rock and local geology of the blast site.

ii) Suitable precautions would be taken as per statute before and after blasting operations. While working near infrastructure, buildings etc., controlled blasting technique has to be practiced to minimize fly-off rocks and ground vibrations and to keep them within safe limits. Provision for conducting such scientific studies has been made in this report.

15.9 CONSERVATION OF COAL

i) A portion of the proposed Expansion area has already been worked by underground method of mining through Nandgaon Incline. It is not possible to extract balance coal over stowed goaf in some panels and also in standing pillars in other panels by underground method of mining. It is therefore proposed to extract the balance coal reserve in partly worked out panels by extending the existing Hindustan Lalpeth OC mine in dip side area. Thus the proposed opencast mining is beneficial from conservation point of view.

ii) Although for calculation of mineable coal reserves, 10% mining losses has been taken into account, but in practice all efforts would be made to minimise the losses. OB benches would be kept sufficiently advanced to avoid mixing of coal & OB.

iii) All efforts shall be made to reduce carpet loss on floor of quarry, loss of coal in each contact zones and to reduce pilferage of coal while transporting it from coal face to coal stockyard/CHP.

15.10 SCIENTIFIC STUDIES

Following areas have been identified in the proposed Hindustan Lalpeth Expansion OC mine for detailed scientific studies:

a) Slope Stability

It is proposed to carry out scientific study on slope stability of external and internal OB dumps as well as for final slope of quarry batter. Based on the findings of scientific research the proposed slope of dumps and batter in the report may change.

b) Drilling & Blasting

For optimum fragmentation of rock and coal to minimize the overall cost of excavation, it is proposed in this report to engage some scientific body to carry out research for optimum drilling and blasting. Accordingly, the powder factor suggested after this study will be followed in the proposed mine.

In addition to this, various other parameters like, soil testing, etc. need scientific study. Adequate capital provision has been made in this report for these miscellaneous studies also.

15.11 ADDITIONAL PERMISSION / RELAXATIONS REQUIRED FROM DGMS

Safety Aspects For Outsourcing/Hiring Of HEMM

Special precaution should be taken while employing contractual labours in the mine. Before employing them to the mine proper vocational 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 contractual labours as well as machineries. Some of the major aspects are as follows :

A) For persons :

i) Records in Form-B & Form-E shall be maintained.

ii) Records of VTC driving licence of operators shall be kept by Operators

and readily available for inspection by management

iii) Salaries shall be distributed in front of management representative

iv) No person shall be employed unless person holds VTC certificate and Management is informed.

v) Adequate supervision shall be maintained by competent person.

B) For Machineries :

i) All the machineries to be deployed in mines should be passed by the management.

ii) RTO certificate photo copies of all vehicles shall be submitted to management.

iii) Daily welding, monitoring, inspection shall be done by contractor's mechanic as directed by management.

iv) Machine manufacturers should be asked to give risk analysis.

C) General :

i) No person/vehicle shall be deployed at any place other than authorised place.

ii) All employees of contractors should obey lawful instruction of mine management.

iii) Risk Management Plan by contractor of tipper/pay loader

iv) Trained Manpower

v) Restricted traffic & traffic control planning.

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CHAPTER – XVI

ENVIRONMENT MANAGEMENT

16.1 EXISTING ENVIRONMENT QUALITY

16.1.1 Ambient Air Quality in Core & Buffer Zone

Ambient air quality monitoring data at existing Hindustan Lalpeth OC mine is generated every quarter. From the monitoring results, it is seen that maximum value of SPM was recorded as 410 µg/m^3 in the actual mining activity area whereas the same for SOX & NOX were recorded as BDL. All these recorded values are well below the threshold limits specified by CPCB.

In addition to the above, in order to assess the quality of ambient air in core zone as well as in buffer zone, six ambient air quality stations are proposed to be fixed and monitored at base line frequency.

16.1.2 Water Quality

The mine effluent quality data and the mine discharge analysis carried out at existing Hindustan Lalpeth OC Mine have been considered. It has been observed from the analysis report that pH value was ranging from 6.85 to 7.59, TSS from 18 to 98 mg/lit, COD from 20 to 140 mg/lit and O&G- BDL (below detection limit) respectively. Thus, it can be concluded that existing mine effluent does not carry significant pollution load so as to affect the natural water courses adversely after mixing.

16.1.3 Noise level

In order to assess the likely level of noise during actual mining, the ambient noise monitoring data collected in the mine premises of existing Hindustan Lalpeth OC Mine indicates values of 64.7 to 70.0 dB (A) during day time and 62.7 to 67.9 dB(A) during night time. All the recorded values are well below

the tolerance limit as per EPA 2000. To assess the noise level in the core and

buffer zone, baseline noise levels are proposed to be recorded at six stations.

16.1.4 Flora & Fauna

Negligible impact is anticipated on the flora & fauna in this area due to mining activity.

16.2 ENVIRONMENT IMPACT

16.2.1 Impact on Air Quality

Air pollution is likely to be generated due to dust, exhaust from vehicles, blasting fumes etc. In opencast mines, dust is likely to be produced during blasting, crushing of coal, handling of overburden and coal, drilling and operation of HEMM.

16.2.2 Impact on Water Quality

Erai river flows along the north-western boundary of Hindustan Lalpeth OC mine at about 1 km from the quarry. Garland drains are proposed to be constructed around the quarry and the pumped out water shall be discharged only after treatment through sedimentation. Mine pumped out water, after sedimentation, will be utilized within mine premises and balance will be used for supplementing any shortage of water in the affected villages. Hence, quality of water pumped out from the proposed project is not likely to have any significant pollution load.

16.2.3 Ground Water Resource

Due to proposed project, it is anticipated that the effect on ground water regime will be pronounced upto around 500 m from mine edge and effect will be pronounced in the down-dip side and milder in the up-dip side. But this effect will be temporary in nature and once the project is over, after 2 – 3 rains, the regime will regain its almost original status.

16.2.4 Noise Impact

Noise pollution is likely to be experienced due to operation of HEMM, in CHP, during Drilling and Blasting, in workshop etc. Ground vibrations likely to be caused due to blasting will be localized by using proper blasting techniques.

16.2.5 Flora and Fauna

No Changes in the diversity of species or number of any species of animal are anticipated.

16.2.6 Land Use

Regarding land use during mining, in addition to excavation of quarry for coal, overburden dump will be created along with development of other mine related infrastructures. Overburden dump is proposed to be technically and biologically reclaimed and sufficient greenery will be developed. As such no significant change in present land use pattern is anticipated.

16.2.7 Socio-Economic Status

Total land acquired for Hindustan Lalpeth OC including Hindustan Lalpeth Extension Phase-I & Phase-II and Mana Incline is 633.10 ha. Out of this 633.10 ha land, 467.37 ha is tenancy land, 93.89 ha is Govt. land and rest 71.84 ha is forest land. After excluding the land involved in Mana Incline (85.54 ha), Hindustan Lalpeth Phase-I (69.53 ha) and Hindustan Lalpeth Phase-II (166.37 ha), the balance land of proposed Hindustan Lalpeth Expansion OC mine works out to 311.66 ha. The break-up of Lease Hold Area is tabulated below :

Project	Tenancy Land (ha)	Govt. Land (ha)	Forest Land (ha)	Total Lease Hold Area (ha)
Hindustan Lalpeth OC mine	137.21	79.43	0	216.64
	8.72	14.46	71.84	95.02
Sub-Total	**145.93**	**93.89**	**71.84**	**311.66**
Mana OC project	85.54	0	0	85.54
Hindustan Lalpeth Phase-I	69.53	0	0	69.53
Hindustan Lalpeth Phase-II	166.37	0	0	166.37
Total	**467.37**	**93.89**	**71.84**	**633.10**

No acquisition of additional land is involved in the proposed Hindustan Lalpeth Expansion OC mine. Only 36.98 ha forest land acquired earlier under Mining Right is required to be diverted under All Right for opencast mining.

About 300 houses exist in the dip side of existing Hindustan Lalpeth OC mine as Encroachment on WCL land and Forest land. This land will be required for the proposed Expansion mine partially for excavation and partially for 100m safety zone. It is proposed in this report to shift these houses and adequate capital provision has been made for this purpose.

16.3 ENVIRONMENT MANAGEMENT

16.3.1 Air Quality Management

The following measures have been proposed to control air pollution :

i) Water spraying is to be carried out on haul road at regular interval during each shift.

ii) Water spraying arrangement at dust generating points in CHP, feeder breaker, conveyor transfer points etc.

iii) Proper maintenance of all internal combustion engines to reduce smoke and exhaust fumes.

iv) Dust extractors in working condition in all the drills

v) Tree plantation in rows and blocks along the approach road of the mine and also along the coal transportation road on both sides.

vi) Perimeter tipping of external overburden dumps. Tree plantation on the slope of the perimeter dump.

vii) Water spraying mixed with safe and non-toxic dust suppression chemicals on haul roads during dry months.

viii) Coal transportation in trucks covered with tarpaulin.

ix) Avoiding overloading of trucks.

x) Frequent cleaning of coal transportation road.

16.3.2 Water Quality

The quantity of mine water pumped out would vary according to the season. The mine water may contain various impurities like coal dust, traces of grease, oil etc. in various proportions. The mine water would be allowed to collect in the quarry sump where primary settling would take place. The mine water would then be pumped into secondary settling tanks on the surface. Here the water would be allowed to settle and thereafter part of treated water will be utilized for meeting IN-HOUSE water requirement (like dust suppression, watering of plants, washing of HEMM, potable use etc). Peripheral trenching is recommended near external OB dumps for coursing the run-off and leached water from the dumps. If required, the water may be sent to surface settling tanks before discharging it into the drainage channels.

The used water from the industrial area comprising CHP, Workshop, Garage etc may be contaminated with grease, oil, coal dust, dirt etc. This water will be allowed to settle and suitable treatment will be carried out in oil and grease trap. Thereafter the treated water will be mostly recycled.

16.3.3 Noise And Ground Vibration Management

The following measures are being suggested to reduce noise and ground vibration effects :

i) With judicious use of explosives and correct blasting techniques, ground vibration and noise pollution would be reduced.

ii) Structures prone to vibration or those with moving parts are suggested to be inspected periodically and source of vibration should be damped to minimize noise and vibration.

iii) Proper maintenance of HEMM and exhaust silencers.

iv) Vegetation barrier around the service buildings will act as effective acoustic barrier.

v) Ground vibration and fly rock can be controlled by proper use of delay detonators. This will help to reduce the noise pollution.

16.3.4 Flora and Fauna Management

Adequate plantation has been proposed with native species to maintain the diversity and also to attract the fauna.

16.3.5 Land Resource Management

Regarding land use during mining, in addition to excavation of quarry for coal, overburden dump will be created along with development of other mine related infrastructures. Overburden dump is proposed to be technically and biologically reclaimed and sufficient greenery will be developed.

16.3.6 Re-Habilitation for Encroachment In WCL Land And Forest Land At HLC

About 300 houses exist in the dip side of existing Hindustan Lalpeth OC mine as Encroachment on WCL land and Forest land. This land will be required for the proposed Expansion mine partially for excavation and partially for 100m safety zone. Adequate capital provision has been made in this report for the rehabilitation.

16.4 ENVIRONMENT MANAGEMENT SYSTEM

To have a close watch on the environmental condition and implementation of various measures suggested, a multi- disciplinary approach is essential. At present WCL headquarter acts as apex body which supervises the activities relating to environment at project level through the General Manager. General

Manager of the area coordinates the activities of various disciplines in the area to render all necessary assistance at the implementing level i.e. the project. Area Nodal Officer (Environment) monitors all aspects of environment on behalf of the General Manager. He also takes suitable steps for generation of environment data alongwith its analysis and interpretations.

As far as plantation is concerned horticulturist with suitable backup staff is provided in the area for undertaking the plantation jobs including raising of a nursery.

Sub-Area Manager is responsible for mechanical reclamation of the area. He is also responsible for biological reclamation with the assistance of GM's office.

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CHAPTER – XVII

LAND REQUIREMENT

17.1 GENERAL

The existing Hindustan Lalpeth OC Mine is located in Wardha valley Coalfield and is surrounded by Mana UG mine, Hindustan Lalpeth OC Phase-I & II in the west, Hindustan Lalpeth colliery (UG) in the east and Nandgaon UG mine in the South. The proposed Hindustan Lalpeth Expansion OC mine is extension of existing OC mine in dip side to extract the maximum coal reserves upto fault F4-F4 leaving safe distance from Delhi - Chennai Railway line. The part of the expansion area has already been worked (partly developed and partly depillared) through adjoining Nandgaon UG mine. The expansion area is mainly forest land whose Mining Right has already been acquired by WCL. However, to work the expansion area by proposed expansion OC mine, the land will have to be transferred from Mining Right to All Right.

17.2 LAND REQUIREMENT

Total land acquired for Hindustan Lalpeth OC including Hindustan Lalpeth Extension Phase-I & Phase-II and Mana Incline is 633.10 ha. Out of this 633.10 ha land, 467.37 ha is tenancy land, 93.89 ha is Govt. land and rest 71.84 ha is forest land. After excluding the land involved in Mana Incline (85.54 ha), Hindustan Lalpeth Phase-I (69.53 ha) and Hindustan Lalpeth Phase-II (166.37 ha), the balance land of proposed Hindustan Lalpeth Expansion OC is 311.66 ha.

The break-up of Lease Hold Area of Hindustan Lalpeth OC including Hindustan Lalpeth Extension Phase-I & Phase-II and Mana Incline is tabulated below :

Project	Tenancy Land (ha)	Govt. Land (ha)	Forest Land (ha)	Total Lease Hold Area (ha)
Hindustan Lalpeth OC mine	137.21	79.43	0	216.64
	8.72	14.46	71.84	95.02
Sub-Total	**145.93**	**93.89**	**71.84**	**311.66**
Mana OC project	85.54	0	0	85.54
Hindustan Lalpeth Phase-I	69.53	0	0	69.53
Hindustan Lalpeth Phase-II	166.37	0	0	166.37
Total	**467.37**	**93.89**	**71.84**	**633.10**

The break-up of Lease Hold area acquired in different Rights is as follows :

Project	All Right (ha)	Only Mining Right (ha)	Total (ha)
Hindustan Lalpeth OC mine	216.64	-	216.64
	37.07	57.95	95.02
Sub-Total	**253.71**	**57.95**	**311.66**
Mana OC project	85.54	-	85.54
Hindustan Lalpeth Phase-I	69.53	-	69.53
Hindustan Lalpeth Phase-II	52.50	113.87	166.37
Total	**461.28**	**171.82**	**633.10**

17.2.1 LAND USE OF THE PROJECT

The total land of proposed Hindustan Lalpeth Expansion OC after excluding the land involved in Mana Incline (85.54 ha), Hindustan Lalpeth Phase-I (69.53 ha) and Hindustan Lalpeth Phase-II (166.37 ha) is **311.66 ha.** The land use of the above 311.66 ha is tabulated below :

Sl. No.	Particulars	Area (ha)

1.	Quarry Area (including existing OC)	150.65
2.	External Dump Area (Dump A & B) including Embankment	73.10
3.	Infrastructure like sub-station, workshop, CHP and other Sevice Buildings	4.00
4.	Diversion of Roads & Overhead Power lines, garland drains, Blasting Zone etc.	6.36
5.	Deforested Area (Dharamshala Tukum)	6.07
6.	Deforested Area (Siddartha Nagar & Central Rly.)	16.73
7.	Land for Rationalisation	60.82
	TOTAL	**311.66**

17.3 STATUS OF LAND ACQUISITION

17.3.1 The total land (633.10 ha) of Lease Hold Area of Hindustan Lalpeth OC including Hindustan Lalpeth Extension Phase-I & Phase-II and Mana Incline was acquired at different time under different Rights which are detailed below

A) Reserve forest land already sanctioned vide MoEF order No. F.No. 8-115/95 FC/1480-F, dated 08-05-2001.

Item of work/purpose	Name of village	Survey Gut	Compt. No.	Length x width In mtrs.	Area		Legal status of land
					Sq.mtrs.	Ha.	
Hindusthan Lalpeth Opencast (Expansion) Project	Chandrapur Division, Chandrapur	-	485	-	-	24.87	Opencast mining
		-	485	-	-	42.30	Underground mining
		-	485	-	-	5.05	Safety zone.
Total Forest land already sanctioned.						**72.22**	

B) Non Forest Area (Deforested Area)

Sl.No.	Name of village	Private/Tenancy	Govt	Forest land	Total
1.	Dharmshal Tukum	6.07	0	0	6.07
2.	Disforested Siddharth Nagar and Central Rly.	0	0	16.73	16.73
	Total	**6.07**	**0**	**16.73**	**22.80**

Total area is B+C = 72.22 Ha. + 22.80 Ha. = **95.02 Ha.**

C) As per Govt. of India, Ministry of Coal, New Delhi, Notification No. S.O. No. 22 dated 28.12.1983 under section 9 (1) of CBA Act. 1957, acquired the land and right of all right 37.07 Ha. & Mining right 57.95 Ha. Govt. Forest land & de-forested land area of Comp. No. 485.

All Right

Sl.No.	Name of Forest	Comp. No.	Tahsil & District	Area in Ha.	Remarks
1	Govt. Forest (Western Zone)	485	Chandrapur	29.92	Part
2	Disforested Area (Dharamsala Tukum and De-forested area)	485	Chandrapur	7.15	Part
	Total			**37.07**	

Mining Right

Sl.No.	Name of Forest	Comp. No.	Tahsil & District	Area in Ha.	Remarks
1	Govt. Forest (Western Zone)	485	Chandrapur	41.92	Part
2	Central Railway	485	Chandrapur	14.46	Part
3	Disforested Area	485	Chandrapur	1.57	Part
	Total			**57.95**	

D Non Forest Land Area

As per Govt. of India, Ministry of Coal, New Delhi, Notified under section 9 (1) of CBA Act. 1957, S.O. No. 2240 dated 31.05.1982 acquired 216.64 Ha. non forest land. Detail given below :-

Sl.No.	Name of village	P.C. No.	Tahsil & District	Area in Ha.	Remarks	
1	Chanda Rayatwari	8	Chandrapur	24.13	Part	Revenue Land
2	Mana	6	Chandrapur	88.28	Part	
3	Nandgaon	6	Chandrapur	24.80	Part	
4	Babupeth	-	Chandrapur	79.43		Govt. land
	Total			**216.64**		

Total lease area is 72.22 Ha. (Forest land) + 239.46 Ha. non forest land (22.80 Ha + 216.64 Ha.) = **311.66 Ha**.

E MANA INCLINE (Non Forest Land Area)

As per Govt. of India, Ministry of Coal, New Delhi, Notified under section 7 (1) of CBA Act. 1957, S.O. No. 2527 dated 27.05.1983 acquired 85.54 Ha. land. Detail given below :-

Sl.No.	Name of village	P.C. No.	Tahsil & District	Area in Ha.	Remarks	
1	Mana	6	Chandrapur	60.23	Part	Revenue Land
2	Nandgaon	6	Chandrapur	25.31	Part	
	Total			**85.54**		**All right**

F New HLOC Extension Block (Phase-I)

As per Govt. of India, Ministry of Coal, New Delhi, Notified under section 7 (1) of CBA (A&D) Act. 1957, S.O. No. 3407 dated 02.12.1996 acquired 69.53 Ha. land. Detail given below :-

Sl.No.	Name of village	P.C. No.	Tahsil & District	Area in Ha.	Remarks

1	Mana	9	Chandrapur	57.63	Part	Tenancy Land
2	Arwat	9	Chandrapur	9.00	Part	
3	Charwat	9	Chandrapur	2.90	Part	
	Total			**69.53**		**All right**

G New HLOC Extension Block (Phase-II)

As per Govt. of India, Ministry of Coal, New Delhi, Notified under section 7 (1) of CBA (A&D) Act. 1957, S.O. No. 2946 dated 23.09.1999 acquired 166.37 Ha. land. Detail given below :-

Tenancy Land

Sl.No.	Name of village	P.C. No.	Tahsil & District	Area in Ha.	Remarks	
1	Arwat	9	Chandrapur	52.50	Part	All right mining right
		9	Chandrapur	17.42	Part	
2	Charwat	9	Chandrapur	43.44	Part	
3	Mana	9	Chandrapur	27.52	Part	
4	Nandgaon	9	Chandrapur	25.49	Part	
	Total			**166.37**	**Tenancy**	

TOTAL LEASE HOLD AREA = A (72.22 ha) +B (22.80 ha) + D (216.64 ha) + E (85.54 ha) + F (69.53 ha) + G (166.10 ha) = 633.10 ha

17.3.2 Compensation & Rehabilitation

No acquisition of additional land is involved in the proposed Hindustan Lalpeth Expansion OC mine. Only diversion of 36.98 ha land from Mining Right to All Right is required for the extension of quarry in dip side as well as for safety zone. 100% **NPV @ Rs. 6.26 lakh/ha** (as communicated by mine/Area) has been considered in this report for payment to forest department for acquiring All Right of forest land. In addition to this, cost of compensatory afforestation has been taken as **Rs. 2.53 lakh/ha for afforestation of 2 x 36.98ha** land as communicated by the mine/Area management.

About 300 houses exist in the dip side of existing Hindustan Lalpeth OC mine as Encroachment on WCL land and Forest land. This land will be required for the proposed Expansion mine partially for excavation and partially for 100m safety zone. As communicated by mine/Area management, capital provision @ **Rs. 3.00 lakh/family** for shifting and rehabilitation of the above 300 families has been made in this report.

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CHAPTER - XVIII

MINE CLOSURE PLANNING

18.1 LEGISLATIVE REQUIREMENTS

Mine closure planning has to be carried out at the starting of the mine and needs periodic reviewing and revision during its life cycle to cope with the geo-technical constraints, safety and economic risks, social & environmental challenges. Various other objectives of Mine Closure Planning are as follows:

a) To allow a productive and sustainable after-use of the site which is acceptable to the mine owner and the regulatory authority.

b) To protect public health and safety.

c) To alleviate or eliminate environmental damage and thereby encourage environmental sustainability.

d) To minimise adverse socio-economic impacts.

There is need to define the liabilities, responsibilities and authorities of the mine management, other regulatory bodies, Central and State Governments after mine closure. Some obligations relating to the Mine Management Companies are as follows :

a) Health & Safety - Regulations 6, 61, 106, 112 of Coal Mines Regulations, 1957 and its related DGMS Circulars.

b) Environment - 1. Water (Prevention and Control of Pollution Act) 1974.

2. Air (Prevention and Control of Pollution) Act 1981

3. Environment (Protection) Act, 1986 and Environment Protection (Amendment) Rule 2000.

4. DGMS Directives on noise and ground vibration.

c) Forest - Forest (Conservation) Act, 1980 – Not applicable in this case.

d) Rehabilitation - CIL's R&R policy applicable for project affected persons

e) Decommissioning / asset disposal, etc.

18.3 TECHNICAL ASPECTS

The proposed Hindustan Lalpeth Expansion OC mine has been planned upto around 170m depth at the floor of Composite seam. For the proposed Hindustan Lalpeth Expansion OC mine, following technical aspects would be reviewed in the final mine closure planning. Details can be worked in closure plans envisaged to be prepared 4-5 years before completion of coal mining.

18.2.1 Safety Hazards Including Management of Fire

There should be provision of surface audit prior to the surface demolition/restoration of all surface structures, spoil heaps, lagoons, etc. to assess whether there are any hazardous materials that could cause problems viz; explosives, chemicals, mine fire etc. A list of surface assets should be prepared and made available to potential purchasers. Prospective purchasers could be invited and asked to submit sealed bids. This could ensure that the sale of assets give better financial gain.

18.2.2 Management of Pit Slopes and Waste Dumps

a) Pit Slopes : The final quarry slopes shall be so designed and then subsequently developed that after the closure of the mine, there is no likelihood of any slope failure. In Hindustan Lalpeth OC mine, the final slope of the quarry has been designed with above consideration. However, strict compliance with the proposed final slope of quarry would be made as given in Quarry & Surface Layout Plan and subsequent slope stability studies.

b) Waste Dumps : The external waste dump must be developed as per the proposed design so that slope failure do not create any safety hazard to the local community. Waste dumps shall be provided with garland drains and vegetational cover on surface of these dumps.

18.2.3 Management of hydrology and hydro-geology

In the mine closure plan, the surface flow pattern of precipitation and mine water would be clearly developed and water channel suitably laid down so that it does not disturb the general hydrology of the area.

In order to identify potential impact, necessary hydro-geological studies into post-mining groundwater recharge should be done. The void of the mine can be proposed as a water resource to be utilised for aquaculture. Keeping in view the rock structure, the ground stability in the periphery of the mine boundary is not likely to be disturbed.

18.2.4 Details of De-commissioning of the Infrastructure and Plant and Machinery

In case further deepening is not considered in future, the decommissioning of various infrastructure developed for the mine like office complex, residential complex, roads, pipelines and transmission line etc. shall be planned in details so that the land occupied by these infrastructure are released. However, before such decommissioning, the possibility of re-use of these infrastructure for the neighbouring mines shall be explored.

As a detailed component of the Final Mine Closure Plan, a Decommissioning Plan is to be developed towards the final stages preferably 5 years prior to tentative closure of mine to take up activities progressively. Once established it may be updated annually.

18.2.5 Fencing around Mined Out Areas

The access trench made for entry to the opencast mine shall be properly closed after mine closure and proper planning shall be made in mine closure plan for closure of access trench. Provision will be made in the mine closure planning to fence the entire mine area including the Access Trench.

18.3 ENVIRONMENTAL ASPECTS

18.3.1 Management of final voids

In the mine closure plan, voids due to mining are to be dealt and the final land use plan will include filling of the voids for land reclamation where possible and for hydro reclamation where feasible.

In internal dumping, the slope of benches has been designed taking into consideration the angle of repose, gradient of seam etc. However the study on slope study will be made by some scientific agency and in final closure plan their suggestions will be incorporated. The backfilling as proposed in the report is shown in Post Mining Land Use Plan.

18.3.2 Reclamation of forest / vegetation

After the management of final voids, reclamation of forest/vegetation shall be included in the mine closure planning. The dumps and other area shall be properly planted as a part of reclamation.

18.3.3 Management of Recharge Areas

The pre-mining and post mining scenario on the hydro-geological recharge system would be included in the closure plan.

18.3.4 Acceptable Ground Water Flows

In the final closure plan of the mine, wherever the mine water is likely to form a reservoir, the quality of water would be assessed in the final plan.

18.3.5 Alternative use of land

In the proposed Hindustan Lalpeth Expansion OC mine, vegetation and afforestation has been planned as a final land use for external OB dump. However, for areas other than OB dumps and voids, the alternative land use would be deliberated in the closure plan. While agriculture is the best land use if it is supported by some irrigation facilities, vegetation will be second utility of the land, which can be planned.

18.4 SOCIAL ASPECTS

18.4.1 Re-deployment of Workforce

The proposed Hindustan Lalpeth Expansion OC mine has total production life of 8 years starting from 01.04.2015 and therefore the re-deployment of existing workforce will be required in the year 2023-24. The manpower lost due to natural retirement in this mine will be compensated in future by surplus manpower of other mines of WCL as well as by fresh

recruitement in future. At the time of closure of this mine, the available manpower will be redeployed based on :

i) Natural retirement

ii) Implementation of VRS schemes for age groups of + 50 years

iii) Retraining and redeployment of younger groups.

iv) Transfer of experienced middle aged groups to other projects.

v) Retirement of people with suitable compensation after exhausting all the above options.

18.4.2 Management of Community Facilities

The community facilities developed during the mine life like educational facilities, health facilities etc. would be continued even after the mine closure. The final closure plan will envisage interaction of mining company with the State or local bodies for running these facilities.

18.4.3 Channelisation of available water

After the closure of mine, it can be a source of water for many useful purposes. The final voids filled with water can be used as a water reservoir. All the aspects of channelisation of water shall be dealt in mine closure plan.

18.4.4 Emancipation from PAPs

The project affected persons (PAPs) are provided many civic facilities on the line of the management of community facilities dealt at point No. 18.4.2.

18.5 FINANCIAL ASPECTS

18.5.1 Cost of Closure Activities

As discussed above, many activities are to be undertaken after the closure of the mine, which involve expenditure. The expenditure on these activities done during mine life will be met

through the revenue of the mine. However, some activities are to be addressed only after completion of coal mining and therefore total cost for meeting such expenses should be assessed in Mine Closure Plan which will be prepared 4 to 5 years prior to completion of mining activities. However, there should be provision of funds in the Project Report to meet such expenses after completion of mining activities. In this Project Report of Hindustan Lalpeth Expansion OC mine, as per guidelines of MOC, Rs. 6.00 lakhs/ha of the total project area has been considered to make a corpus fund, which will be utilized for meeting the expenses of mine closure activities after the completion of coal mining. This closure cost works out to Rs. 57.35/t.

Year-wise Closure Cost

Year	Production (Mt)	Closure cost Rs in '000.)	Closure cost (Rs./t)
1	0.650	35253	54.24
2	0.650	37016	56.95
3	0.650	38866	59.79
4	0.700	40810	58.30
5	1.000	42850	42.85
6	1.000	44993	44.99
7	1.000	47242	47.24
8	0.520	49605	225.48
	5.870	**336635**	**57.35**

18.5.2 Cost of Organisation for executing the closure activities

An organization consisting of persons of different disciplines will be required to undertake and implement the closure activities. Cost of maintaining this organization should be accounted and included in the total cost of the final closure plan of Hindustan Lalpeth Expansion OC mine indicated in point 18.5.1 above.

18.5.3 Cost of the Post Project Monitoring

After implementation of closure activities, a small team comprising of 2-3 technical people may be required to see the efficacy of the closure activities. Cost for 4-5 years for such monitoring team functions should be included in the total Closure Cost for the mine in Mine Closure Plan.

18.5.4 Bond/Insurance for the closure cost

While working out the economics of the project, Rs. 6.00 lakhs/ha of the total project area has been considered for Mine Closure activities, which works out to Rs. **57.35/t**. This fund may be utilized for purchasing Bonds / Insurance to meet the Mine Closure obligations in future.

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CHAPTER - XIX

MANPOWER, PRODUCTIVITY AND TRAINING

19.4 MANPOWER ASSESSMENT

The manpower requirement for Hindustan Lalpeth Expansion OC Mine has been calculated on the basis of 3 shift operation for 330 days in a year. The manpower requirement for this project has been detailed in Appendix-B and B.1 of the project report.

The manpower requirement of this project for all the three options has been summarised as follows :

Manpower Requirement

Sl. No.	Particulars	Departmental Option	Partial Hiring Option	Total Hiring Option
1.	Executives	34	27	20
2	Monthly rated staff	159	121	90
3	Daily rated staff	487	370	104
	Total	**680**	**518**	**214**

19.2 MANPOWER PHASING AS PER PROJECT IMPLEMENTATION SCHEDULE AND BUILDING UP OF PRODUCTION CAPACITY

The existing Hindustan Lalpeth OC mine will continue upto 2014-15 and the production from the proposed Hindustan Lalpeth Expansion OC mine will start from 2015-16 which is the 1st year of the expansion project. The mine will produce 0.65 Mty in first three years, 0.70 Mty in 4th year and target production of 1.00 Mty in 5th year. Rehandling of 13.85 Mm3 backfilled OB is proposed in the project which will be completed in first four years and therefore it is proposed in this PR to achieve target production in 5th year. Although the mine will achieve the target production of 1.0 Mty in 5th year, the entire manpower proposed in the project will be deployed in the 1st year as most of the HEMM will be deployed in the mine from first year.

The manpower phasing in different options and production build-up in the proposed Hindustan Lalpeth Expansion OC mine are given in the following table:

Production Build-up

Sl. NO.	OPTION	PRODUCTION PHASING (Mt))					
		YEAR-1	YEAR-2	YEAR-3	YEAR-4	YEAR-5 to 7	YEAR-8
1	DEPARTMENTAL	0.65	0.65	0.65	0.70	1.00	0.22
2	PARTIAL HIRING	0.65	0.65	0.65	0.70	1.00	0.22
3	TOTAL HIRING	0.65	0.65	0.65	0.70	1.00	0.22

Manpower Phasing

Sl. NO.	OPTION	PHASING OF MANPOWER (Cumulative)					
		YEAR-1	YEAR-2	YEAR-3	YEAR-4	YEAR - 5 to 7	YEAR-8
1	DEPARTMENTAL	680	680	680	680	680	680
2	PARTIAL HIRING	518	518	518	518	518	518
3	TOTAL HIRING	214	214	214	214	214	214

19.3 PRODUCTIVITY

The annual capacity of the proposed Hindustan Lalpeth Expansion OC mine has been rated as 1.0 Mt of coal. The productivity calculated on the basis of only departmental manpower for all the three options including and excluding the welfare manpower are tabulated below:

SL. NO.	OPTION	STRENGTH	MANSHIFT	O.M.S. (t)
A) INCLUDING WELFARE MANPOWER				
1.	DEPARTMENTAL	680	179520	5.570
2.	PARTIAL HIRING	518	136752	7.313
3.	TOTAL HIRING	206	56496	17.700
B) EXCLUDING WELFARE MANPOWER				
1.	DEPARTMENTAL	630	166320	6.013
2.	PARTIAL HIRING	491	129624	7.715
3.	TOTAL HIRING	203	53592	18.660

19.4 The total manpower requirement in this report in departmental, partial hiring and total hiring options is 680, 518 and 214 respectively. However, the total manpower in the existing Hindustan Lalpeth OC mine is 600 as on 16.03.2013 and this will be reduced to 563 only as on 1.4.2015 due to retirement of employees. Thus additional 117 manpower will be required in Departmental option. However, in Partial Hiring and Total Hiring option, there will be 45 and 359 surplus manpower respectively. Depending upon the Option for which the proposed project is approved, either the additional manpower will be arranged from or surplus manpower will be transferred to the other mines of WCL. However, in Partial and Total Hiring option, economics have been worked out after absorbing all the existing manpower.

19.5 TRANSPORT OF PERSONNEL (OPTIONAL)

Suitable number of Vehicles have been provided for transport of personnel in appendix-A.6 of this report.

19.6 TRAINING

The existing manpower will continue to work in the proposed Hindustan Lalpeth Expansion OC mine. These manpower are having experience in opencast working. However, they would be imparted refresher training as per their assigned job in opencast mine. For training of manpower, facilities of existing VTC of Area/Sub-Area, will be utilised for both departmental manpower as well as for workers deployed by out sourcing agency as per recommendation of VIII Safety Conference.

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CHAPTER - XX

PROJECT IMPLEMENTATION SCHEDULE

20.1 INTRODUCTION

The proposed Hindustan Lalpeth Expansion OC mine is expansion of existing Hindustan Lalpeth OC mine in eastern dip side and hence many infrastructural facilities of existing mine would be gainfully utilized in this mine. The existing Hindustan Lalpeth OC mine will continue to produce upto 2014-15 and thereafter production from proposed Hindustan Lalpeth Expansion OC mine will start from 2015-16. Thus about two years are available before start of production from proposed Hindustan Lalpeth Expansion OC mine and this time period can be utilized for preparation and approval of Project Report, for cost plus agreement with the customer and for transfer of forest land from Mining right to All right.

20.2 PROJECT SCHEDULE

The major project implementation activities and their schedule of completion for the proposed Hindustan Lalpeth Expansion OC mine are detailed below :

Sl. No.	Activities	Completion Schedule
1.	Preparation of PR, First Stage Approval, Cost Plus Agreement with customer and Final Approval of PR	Upto 31st March, 2015
2.	**Post Sanction Activities Before Start of Production:**	
2a)	Transfer of 36.98 ha forest land from Mining Right to All Right.	01.04.2013 to 31.03.2015
2b)	Preparation of budgetary estimates for construction / modification of various infrastructural facilities like Workshop, Buildings etc.	
2c)	Detailed surveying of the area to locate various infrastructural facilities.	01.04.2013 to 31.03.2015
2d)	Soil investigation for construction work.	
3	**Development Activities After Start of Production:**	

3a)	Procurement and Commissioning of HEMM	1st -4th year
3b)	Procurement, Erection and Commissioning of Electrical and Power Supply equipment	1st - 4th year
3c)	Procurement and Commissioning of Pumps, Pipes etc.	1st – 5th year
3d)	Selection, recruitment and training of manpower for the project as per manpower budget	1st year
3e)	Completing construction of all infrastructural facilities like Workshop, Office, Garage, Stores etc.	1st - 2nd year
3f)	Construction of Service and Residential buildings	1st - 2nd year
3g)	Construction of Road, Water Supply & Sewerage	1st - 2nd year
3h)	Construction of new Haul Road in southern side	1st – 4th year
3i)	Diversion of Coal Transportation roads	1st - 2nd year
3j)	Diversion of H.T. and L.T. Overhead Lines	1st - 2nd year
3k)	Shifting and Rehabilitation of Encroachment in WCL and forest land	1st – 2nd year

Project Construction Group : To ensure timely completion of the project, it would be necessary to have a project construction team for Hindustan Lalpeth Expansion Opencast Project right from the date of sanction of the project. This would ensure proper co-ordination amongst the various agencies essential in the project construction period. After the completion of the project, some of the personnel could be retained at the project itself and some may be shifted to other projects as the need arises.

20.3 PERT CHART OF MAJOR ACTIVITIES

PERT chart of Major activities are enclosed in Volume-III of this report.

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CHAPTER - XXI

FINANCIAL EVALUATION (DEPARTMENTAL OPTION)

21.1 CAPITAL INVESTMENT

21.1.1 EXISTING CAPITAL AND ADDITIONAL CAPITAL WITH PHASING

In this chapter financial evaluation of Departmental option has been detailed. The financial evaluations of Partial Hiring and Total Hiring options have been detailed in Chapter – XXII and XXIII respectively.

The total additional capital required for the project in departmental option works out to **Rs. 233.9163 crores** in addition to the written down value of **Rs. 17.5956 crores** of existing capital as on 1.4.2015 of Hindustan Lalpeth OC mine. The phasing of capital has been given in Appendix- A. The capital expenditure is summarized below:

Sl. No.	Particulars	CAPITAL (Rs. in Lakhs)		
		WDV of Existing Capital as on 1.4.2015	Additional Capital	Total Capital (WDV + Additional)
A.1	Land	0.00	1328.61	1328.61
A.2.1	Service Buildings	83.98	1449.72	1533.70
A.2.2	Residential Buildings	119.48	782.84	902.32
A.3	Plant & Machinery	1282.45	16251.11	17533.56
A.4	Furniture & Fittings	0.87	5.00	5.87
A.5	Railway Siding	0.00	0.00	0.00
A.6	Vehicles	5.09	103.15	108.24
A.7	Prospecting & Boring	0.00	0.00	0.00
A.8	Mine Development			
A.8.1	Capital Outlay in Mines	0.00	2827.33	2827.33
A.8.2	Roads & Culverts	251.32	94.74	346.06
A.8.3	Water Supply & Sewerage	5.40	392.86	398.26
A.8.4	PR & GR Preparation Cost	0.00	136.27	136.27
A.8.4A	EMP	10.97	0.00	10.97
A.8.5	Scientific Research	0.00	20.00	20.00
A.9	Revenue Expnd. Capitalised	0.00	0.00	0.00
	Total	**1759.56**	**23391.63**	**25151.19**

21.1.2 BASIS OF PRICE OF P&M, CIVIL WORKS & HIRING RATE

P & M

The price of P&M has been considered based on price list supplied by CMPDI (HQ) as on June, 2012 and it has been escalated upto March, 2013.

CIVIL WORKS

The price of civil works has been taken based on civil index 442 (Maharashtra) as on 1st half of year 2013.

21.1.3 FOREIGN CAPITAL

No foreign capital is involved in this PR.

21.1.4 CAPITAL UPTO TARGET YEAR:

It is envisaged in this report to achieve target production in 5th year. The entire additional capital of **Rs. 233.9163 crores** has been proposed in this PR upto 5th year and thus the additional capital upto target year is same as the total initial additional capital i.e., **Rs. 233.9163 crores**.

The specific investment for the project is Rs. 2515.12/t for total capital including WDV of existing capital and it works out to Rs. 2339.16/t for additional capital excluding WDV of existing capital. The specific investment for the P&M including WDV of existing P&M items is Rs. 1753.36/t.

21.2 OPENING OF REVENUE ACCOUNT

The proposed mine is an expansion of existing Hindustan Lalpeth OC mine which is already in revenue. Hence, the mine will be in revenue account from **1st year** of mine life.

21.3 REPLACEMENT CAPITAL

Yearwise replacement capital is indicated in cash flow statement. (App.-D1)

21.4 SOURCES OF FINANCE: INTERNAL RESOURCES OR LOAN

The source of finance will be through internal resources.

21.5 COMPLETION COST

The completion cost for the project works out to **Rs. 340.7386 crores**.

21.6 METHOD OF ESTIMATION OF CAPITAL COST

A) LAND & REHABILITATION

No acquisition of additional land is involved in the proposed Hindustan Lalpeth Expansion OC mine. Only diversion of **36.98 ha** forest land from Mining Right to All Right is required for the extension of quarry in dip side as well as for safety zone. 100% **NPV** @ **Rs. 6.26 lakh/ha** (as communicated by mine/Area) has been considered in this report for payment to forest department for acquiring All Right of forest land. In addition to this, cost of compensatory afforestation has been taken as **Rs. 2.53 lakh / ha for afforestation of 2 x 36.98ha** land as communicated by the mine/Area management.

About 300 houses exist in the dip side of existing Hindustan Lalpeth OC mine as Encroachment on WCL land and Forest land. This land will be required for the proposed Expansion mine partially for excavation and partially for 100m safety zone. As communicated by mine/Area management, capital provision of **Rs. 9.00 crores** @ **Rs. 3.00 lakh/family** for shifting and rehabilitation of the above 300 families has been made in this report.

B) CIVIL CONSTRUCTION (ALONG WITH COST INDEX)

The additional capital provision for civil construction has been estimated as **Rs. 27.2016 crores** (Rs. 14.4972 crores for service buildings, Rs. 7.8284 crores for residential buildings, Rs. 0.9474 crores for roads and culverts

excluding haul roads and Rs. 3.9286 crores for water supply and sewerage) in addition to the WDV of existing civil items of Rs. 4.6018 crores. The details of capital cost for civil construction have been given in Appendix-

A.2. The civil cost index for the first half of the year 2013 works out to 442 (Maharashtra).

C) P&M

The additional capital provision for P&M has been estimated as **Rs. 162.5111 crores** in addition to the WDV of existing capital items of **Rs. 12.8245 crores**. The detailed capital cost for P&M has been given in Appendix- A.3.

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 manshift is given in appendix-B.1. The estimated salaries & wages cost has been worked out as **Rs 580.98/t** at 100% level of production.

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 **Rs 877.03/t** at 100% level of production.

C) POWER COST

Estimated energy consumption is given in the relevant chapter for power supply. The average power cost per tonne of coal production works out to **Rs 140.14/t** 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 debit, insurance & taxes for vehicles and other repairs and a further

provision has been made for deterioration of coal stock. The miscellaneous expenditure cost works out to **Rs 76.51/t** at 100% level of operation.

E) ADMINISTRATIVE CHARGES:

A provision has been made in total revenue cost estimate for administrative charges based on the actual administrative cost of WCL for 2012-13 which is **Rs. 135.21** per tonne of coal production as communicated by WCL. Total

administrative cost has been calculated at 100% level and treated as fixed cost. As such for all other estimated level of operation the absolute administrative cost has been taken as it worked out for 100% level of operation.

G) MINE CLOSURE COST :

As per recent guidelines of MOC, **Rs. 6.00 lakhs/ha** of the entire project area has been provided in the PR for Mine Closure which works out to **Rs. 57.35/t.**

H) EXPENDITURE ON CORPORATE SOCIAL RESPONSIBILITY :

Rs. 5.00/t has been considered as the expenditure on Corporate Social Responsibility in this PR.

H) INTEREST ON WORKING CAPITAL

Interest on working capital has been calculated on the basis of 4 months operating expenditure. Interest on working capital works out to **Rs. 90.78/t**. Rate of interest is taken as 14.50%.

I) DEPRECIATION

Straight line method of depreciation has been provided to arrive at depreciation cost per tonne of coal production. The depreciation cost works out to **Rs. 286.64/t.**

J) INTEREST ON LOAN CAPITAL

Interest @ 11.5% on loan capital has been computed based on given debt equity mix. Interest on loan capital works out to **Rs 70.00/t**.

K) ENVIRONMENT RELATED COST

Rs. 6.00/t of coal has been provided to absorb environmental related cost in the project.

L) COST OF PRODUCTION FOR DIFFERENT LEVEL OF PRODUCTION

The cost of production at 100% and 85% production capacity works out to Rs. **2325.64/t** and **Rs. 2639.08/t** respectively.

The different components of cost of production at 100% and 85% production capacity (based on 0% discount) are tabulated below :

Sl. No.	Particulars	Fixed Cost (Rs./t)	Variable Cost (Rs./t)	Total Cost (Rs./t) at Capacity	
				100%	85%
1	Salaries & Wages	580.98	0.00	580.98	683.51
2	Stores	460.48	416.55	877.03	958.30
3	Power	63.74	76.40	140.14	151.39
4	Env. Pollution Control	6.00	0.00	6.00	7.06
5	Misc. Expenses incl. W.D.	50.29	26.22	76.51	85.38
6	Mine Closure	57.35	0.00	57.35	67.47
7	Corporate Social Responsibility	0.00	5.00	5.00	5.00
8	Administrative Charges	135.21	0.00	135.21	159.07
9	Depreciation	286.64	0.00	286.64	337.22
10	Interest on Working Capital @ 14.5%	65.45	25.33	90.78	102.33
11	Interest on Loan Capital @ 11.5%	70.00	0.00	70.00	82.35
	Total Cost of production	**1776.14**	**549.50**	**2325.64**	**2639.08**

21.8 GRADE OF COAL & WEIGHTED AVERAGE SELLING PRICE

The year-wise GCV of despatchable coal has been calculated which ranges from 4105 to 4527 kCal/kg (Weighted Average GCV – 4328 kCal/kg) without any contamination at roof and floor. The year-wise selling price of coal based on year-wise GCV has been considered to work out the economics. The economics of the proposed expansion mine have been worked out separately

for year-wise selling price of coal (based on year-wise GCV) for Power, Fertilizer and Defence Sector as well as for year-wise selling price of coal (based on year-wise GCV) for other than Power, Fertilizer and Defence Sector. The weighted average selling price of the coal works out to **Rs. 898.43/t for Power, Fertilizer and Defence Sector and Rs. 1200.09/t for Other than Power, Fertilizer and Defence Sector.**

21.9 PROFITABILITY [PROFIT(+)/LOSS(-)] AT 100% AND 85% LEVEL OF PRODUCTION.

For Power, Fertilizer and Defence Sector - The loss with weighted average sale value of coal (Rs. 898.43/t) for Power, Fertilizer and Defence Sectors works out to Rs. **(-) 1427.21/t** and Rs. **(-) 1740.65/t** at 100% and 85% of total production capacity respectively.

For Other than Power, Fertilizer and Defence Sector - The loss with weighted average sale value of coal (Rs. 1200.09/t) for Other than Power, Fertilizer and Defence Sector works out to **Rs. (-) 1125.55/t** and Rs. **(-) 1438.99/t** at 100% and 85% of total production capacity respectively.

21.10 MANPOWER & OMS

The total requirement of manpower in departmental option works out to **680** giving OMS of **5.570 t**. This includes provision for leave/sick. The manpower requirement and manpower analysis are given in Appendix-B & B.1.

21.11 EMS

The overall EMS works out to **Rs. 2630.93** based on WCL budget of 2012-13 of Hindustan Lalpeth OC mine.

21.12 FINANCIAL IRR

For Power, Fertilizer and Defence Sector - The IRR of the project works out to **– ve** for both 100% and 85% of target capacity.

For Other than Power, Fertilizer and Defence Sector - The IRR of the project works out to **– ve** for both 100% and 85% of target capacity

21.13 DETAILS OF FSA ENTERED ON COST-PLUS BASIS (OPTIONAL)

The FSA has not been finalized. It will be finalized after approval of PR from competent board with the desired customer.

21.14 DESIRED SELLING PRICE:

The desired selling price to achieve 12% IRR at 100% and 85% level works out to **Rs. 2751.93/t** and **Rs. 3140.58/t** respectively.

21.15 COMPLETION COST

Capital expenditure has been estimated / increased for forward escalation on the phasing of initial estimated capital. The escalation rate is based on W.P.I. / Civil Index of preceding 36 months. The total completion cost has been estimated as **Rs. 340.7386 crores**.

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CHAPTER - XXII

FINANCIAL EVALUATION

(PARTIAL HIRING OPTION)

22.1 INTRODUCTION

This chapter deals with Partial Hiring Option for the proposed Hindustan Lalpeth Expansion OC mine considering leasing/out sourcing of HEMM for excavation, transport, drilling, dozing, etc for part of Top OB. It is envisaged in this report that the existing departmental capacity of Hindustan Lalpeth OC mine (about 2.42 Mm3) will be maintained in the Expansion mine in Partial Hiring Option and entire coal and part of Top OB will be worked by departmental equipment. Rest Top OB and entire re-handling of backfilled OB will be removed by hiring of HEMM. Blasting and surface illumination, pumping, coal handling at CHP etc. would be done departmentally. The production target (1.00 Mty), mineable reserves, total volume of in-situ and rehandled OB, year-wise quantity and quality of coal etc. in this Option are same as in Departmental Option. However, yearly OB removal is slightly different from that in Departmental Option.

22.2 SCOPE OF WORK PROPOSED TO BE OUTSOURCED

The scope of work include excavation, transport, drilling, dozing at dumps, haul road construction for OB dump & maintenance, water spraying and land reclamation charges etc. have been considered for planning purpose only. The details of hiring rates are enclosed as annexure to this PR.

22.3 SCOPE OF WORK PROPOSED TO BE DONE DEPATMENTALLY

Extraction of coal and part of Top OB removal, CHP, Pumping, Blasting and surface illumination, Supervision etc. would be done departmentally.

22.4 ANNUAL WORK LOAD FOR EXTERNAL AGENCY

The annual workload for external agency for in-situ OB removal and rehandling of OB are tabulated below:

ANNUAL WORKLOAD FOR OUTSOURCING AGENCY

YEAR	IN-SITU OB (Mm^3)	REHANDLING OB (Mm^3) (solid)	TOTAL OB (Mm^3)
1	2.980	3.820	6.800
2	2.780	3.820	6.600
3	2.787	3.513	6.300
4	3.703	2.697	6.400
5	6.900	-	6.900
6	5.600	-	5.600
7	4.600	-	4.600
8	-	-	-
Total	**29.350**	**13.850**	**43.200**

22.5 OUTSOURCING RATES

The year-wise lead and lift, outsourcing rates and expenditure on hiring of HEMM for removal of Top OB and rehandling of backfilled OB including service tax for planning purpose are as follows:

ANNUAL EXPENDITURE ON HIRING OF HEMM FOR REHANDLING OF OB

Yr.	REHANDLING OB BY HIRING					
	Ann. Total OB (Mm3) (solid)	Cum. (Mm3)	Ann. Av. Lead (Km)	Ann. Av. Lift (m)	Hiring Rate (Rs./m3)	Annual Expdt. (Rs. In Crores)
1	3.820	3.820	2.295	30	66.44	**25.380**
2	3.820	7.640	2.296	35	66.45	**25.384**
3	3.513	11.153	2.296	35	66.45	**23.344**
4	2.697	13.850	2.341	50	66.82	**18.021**
5	-	13.850				
6	-	13.850				
7	-	13.850				
8	-	13.850				
TOTAL	**13.850**					**92.129**
Average Cost of OB Rehandling by Hiring/Out-Sourcing (Rs./m3) =						**66.52**

ANNUAL EXPENDITURE ON HIRING OF HEMM FOR IN-SITU OB REMOVAL

Year	IN-SITU OB BY HIRING					
	Annual In-situ OB (Mm3)	Cum. (Mm3)	Ann. Av. Lead (Km)	Ann. Av. Lift (m)	Hiring Rate (Rs./m3)	Annual Expdt. (Rs'000's)
1	2.980	2.980	2.279	43	71.15	**21.203**
2	2.780	5.760	2.279	43	71.15	**19.780**
3	2.787	8.547	2.297	49	71.30	**19.871**
4	3.703	12.250	2.500	69	72.98	**27.024**
5	6.900	19.150	2.743	71	75.00	**51.750**
6	5.600	24.750	3.045	103	77.51	**43.406**
7	4.600	29.350	3.337	130	79.94	**36.772**
8	-	29.350	-	-	-	**-**
TOTAL	**29.350**					**219.806**
Average Cost of Top OB Removal by Hiring/Out-Sourcing =						**74.89**

22.6 SAFETY ASPECTS FOR OUTSOURCING OF HEMM

Safety aspects for outsourcing of HEMM have been deliberated in Safety Chapter (Chapter-XV).

22.7 PROJECT ECONOMICS

22.7.1 Total Capital Investment

The total additional capital required for the project in Partial Hiring option works out to **Rs. 87.8883 crores** in addition to the written down value of **Rs. 17.5956 crores** of existing capital as on 1.4.2015 of Hindustan Lalpeth OC mine. The phasing of capital has been given in Appendix- A. The capital expenditure is summarized below:

Sl. No.	Particulars	CAPITAL (Rs. in Lakhs)		
		WDV of Existing Capital as on 1.4.2015	Additional Capital	Total Capital (WDV + Additional)
A.1	Land	0.00	1328.61	1328.61
A.2.1	Service Buildings	83.98	963.57	1047.55
A.2.2	Residential Buildings	119.48	782.84	902.32
A.3	Plant & Machinery	1282.45	3171.84	4454.29
A.4	Furniture & Fittings	0.87	5.00	5.87
A.5	Railway Siding	0.00	0.00	0.00
A.6	Vehicles	5.09	56.18	61.27
A.7	Prospecting & Boring	0.00	0.00	0.00
A.8	Mine Development			
A.8.1	Capital Outlay in Mines	0.00	1834.80	1834.80
A.8.2	Roads & Culverts	251.32	94.74	346.06
A.8.3	Water Supply & Sewerage	5.40	394.98	400.38
A.8.4	PR & GR Preparation Cost	0.00	136.27	136.27
A.8.4A	EMP	10.97	0.00	10.97
A.8.5	Scientific Research	0.00	20.00	20.00
A.9	Revenue Expnd. Capitalised	0.00	0.00	0.00
	Total	**1759.56**	**8788.83**	**10548.39**

22.7.2 Basis of Price of P&M, Civil Works & Hiring Rate

The price of P&M has been considered based on price list supplied by CMPDI (HQ) as on June, 2012 and it has been escalated upto March, 2013. The price of civil works has been taken based on civil index 442 (Maharashtra) as on 1st half of year 2013 with a base of 100 in Nagpur on 1.1.1992.

In proposed Hindustan Lalpeth Expansion OC mine, the rates for OB removal by hiring equipment has been estimated on the basis of hiring rate decided in the meeting of Functional Directors of WCL and taking into consideration the change in price of diesel and change in lead and lift. The rates of hiring of HEMM for in-situ OB removal and rehandling of OB are tabulated below :

OB	Annual Average LEAD (km)	Annual Average LIFT (m)	Hiring Rate for OB (Rs./m^3)
In-situ OB	2.279 – 3.337	43-130	71.15 – 79.94
Rehandling of OB	2.295– 2.341	30 - 50	66.44 – 66.82

22.7.3 Manpower and OMS

The total requirement of manpower in Partial Hiring option works out to **518** giving OMS of **7.313 t**. This includes provision for leave & sick. Details of manpower requirement and manpower analysis are given in Appendix -B and B.1. However, the total manpower in the existing Hindustan Lalpeth OC mine is 600 as on 16.03.2013. The proposed Hindustan Lalpeth Expansion OC mine will start from 01.04.2015 and by that time 37 manpower will retire and the available manpower would be 563. The surplus 45 manpower (563-518) over the actual requirement of 518 will be transferred to some other mines of WCL. However, the economics of this Option has been worked out for existing 563 manpower (as on 1.4.2015) absorbing the surplus 45 manpower.

22.7.4 EMS

The overall EMS works out to **Rs. 2630.93** based on WCL budget of 2012-13 of Hindustan Lalpeth OC mine.

22.7.5 Cost of Production for Different Level of Production

The cost of production works out to **Rs. 2017.51/ t** and **Rs. 2215.49/ t** at 100% and 85 % of production capacity respectively.

The different components of cost of production at 100% and 85% production capacity (based on 0% discount) are tabulated below :

Sl. No.	Particulars	Fixed Cost (Rs./t)	Variable Cost (Rs./t)	Total Cost (Rs./t) at Capacity	
				100%	85%
1	Salaries & Wages	442.54	0.00	442.54	520.64
2	Stores	198.08	241.61	439.69	474.66
3	Power	56.56	54.00	110.56	120.54
4	Env. Pollution Control	6.00	0.00	6.00	7.06
5	Misc. Expenses incl. W.D.	40.11	22.29	62.40	69.48

Sl. No.	Particulars	Fixed Cost (Rs./t)	Variable Cost (Rs./t)	Total Cost (Rs./t) at Capacity

				100%	85%
6	Mine Closure	57.35	0.00	57.35	67.47
7	Corporate Social Responsibility	0.00	5.00	5.00	5.00
8	Administrative Charges	135.21	0.00	135.21	159.05
9	Hiring Charges of Top OB	0.00	531.41	531.41	531.41
10	Depreciation	115.83	0.00	115.83	136.27
11	Interest on Working Capital @ 14.5%	45.23	41.29	86.52	94.50
12	Interest on Loan Capital @ 11.5%	25.00	0.00	25.00	29.41
	Total Cost of production	**1121.91**	**895.60**	**2017.51**	**2215.49**

22.7.6 Grade of Coal & Weighted Average Selling Price

The year-wise GCV of despatchable coal has been calculated which ranges from 4105 to 4527 kCal/kg (Weighted Average GCV – 4328 kCal/kg) without any contamination at roof and floor. The year-wise selling price of coal based on year-wise GCV has been considered to work out the economics. The economics of the proposed expansion mine have been worked out separately for year-wise selling price of coal (based on year-wise GCV) for Power, Fertilizer and Defence Sector as well as for year-wise selling price of coal (based on year-wise GCV) for other than Power, Fertilizer and Defence Sector. The weighted average selling price of the coal works out to **Rs. 898.43/t for Power, Fertilizer and Defence Sector and Rs. 1200.09/t for Other than Power, Fertilizer and Defence Sector.**

22.7.7 Profitability [Profit(+)/Loss(-)] at 100% and 85% Level of Production

For Power, Fertilizer and Defence Sector - The loss with weighted average sale value of coal (Rs. 898.43/t) for Power, Fertilizer and Defence Sectors works out to **Rs. (-) 1119.08/t** and Rs. **(-) 1317.06/t** at 100% and 85% of total production capacity respectively.

For Other than Power, Fertilizer and Defence Sector - The loss with weighted average sale value of coal (Rs. 1200.09/t) for Other than Power, Fertilizer and Defence Sector works out to **Rs. (-) 817.42/t** and **Rs. (-) 1015.40/t** at 100%

and 85% of total production capacity respectively.

22.7.8 IRR

For Power, Fertilizer and Defence Sector - The IRR of the project works out to **– ve** for both 100% and 85% of target capacity.

For Other than Power, Fertilizer and Defence Sector - The IRR of the project works out to **– ve** for both 100% and 85% of target capacity.

22.7.9 Desired Selling Price

The desired selling price to achieve 12% IRR at 100% and 85% level works out to **Rs. 2281.26/t** and **Rs. 2519.68/t** respectively.

22.7.10 Completion Cost

Capital expenditure has been estimated / increased for forward escalation on the phasing of initial estimated capital. The escalation rate is based on W.P.I. / Civil Index of preceding 36 months. The total completion cost has been estimated as **Rs. 132.8612 crores**.

22.7.11 Conclusion

In the Partial Hiring Option, the project has been planned for 1.0 Mty production. It is envisaged in this report that the existing departmental capacity of Hindustan Lalpeth OC mine (about 2.42 Mm3) will be maintained in the Expansion mine in Partial Hiring Option and entire coal and part of Top OB will be worked by departmental equipment. Rest Top OB and entire re-handling of backfilled OB will be removed by hiring of HEMM.

Total Cost of Production in Partial Hiring option works out to Rs. 2215.49/t at 85% of target capacity. The average notified Sale Price of coal is **Rs. 898.43/t** for Power Sector and **Rs. 1200.09/t** for Other than Power Sector.

The IRR is negative for both the selling prices of coal. The desired Selling Price of coal to yield 12% IRR at 85% of target capacity is **Rs. 2519.68/t.** The difference between average notified sale price of coal for Power Sector and desired selling price to yield 12% IRR at 85% of target capacity is **Rs. (-) 1621.25/t**. Similarly, the difference between average notified sale price of coal for Other than Power Sector and desired selling price of coal to yield 12% IRR at 85% of target capacity and is **Rs. (-) 1319.59/t.** This option may be considered for approval only if customer agrees to pay the price to yield 12 % IRR at 85% of target capacity for coal produced.

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CHAPTER - XXIII

FINANCIAL EVALUATION

(TOTAL HIRING OPTION)

23.1 INTRODUCTION

This chapter deals with Total Hiring Option for the proposed Hindustan Lalpeth Expansion OC mine considering leasing/out sourcing of HEMM for excavation, transport, drilling, dozing, etc for the entire Top OB, rehandling of OB and extraction of coal. Blasting and surface illumination, pumping, coal handling at CHP etc. would be done departmentally. The production target (1.00 Mty), mineable reserves, life of mine, coal quality, yearly coal extraction etc. in Total Hiring Option are same as in Departmental and Partial Hiring Option. However, yearly OB removal is slightly different in all three options.

23.2 SCOPE OF WORK PROPOSED TO BE OUTSOURCED

The scope of work include excavation, transport, drilling, dozing at face & dumps, haul road construction & maintenance, water spraying and land reclamation charges etc. and have been considered for planning purpose only. The details of hiring rates are enclosed as annexure to this PR.

23.3 SCOPE OF WORK PROPOSED TO BE DONE DEPATMENTALLY

CHP, Pumping, Blasting and surface illumination, Supervision etc. would be done departmentally.

23.4 ANNUAL WORK LOAD FOR EXTERNAL AGENCY

The annual workload for external agency for removal of Top OB, Rehandling of OB and extraction of coal are tabulated below:

ANNUAL WORKLOAD (COAL & OB) FOR OUTSOURCING AGENCY

YEAR	COAL (Mt)	IN-SITU OB (Mm^3)	REHANDLING OF OB (Mm^3) (solid)	TOTAL OB (Mm^3)
1	0.650	4..980	3.820	8.800

2	0.650	4.880	3.820	8.700
3	0.650	4.887	3.513	8.400
4	0.700	5.803	2.697	8.500
5	1.000	8.700	-	8.700
6	1.000	7.300	-	7.300
7	1.000	6.300	-	6.300
8	0.220	1.303	-	1.303
Total	**5.870**	**44.153**	**13.850**	**58.003**

23.5 OUTSOURCING RATES

The year-wise lead and lift, outsourcing rates and expenditure on hiring of HEMM for removal of Top OB, Rehandling of OB and extraction of coal including service tax for planning purpose are as follows:

ANNUAL EXPENDITURE ON HIRING OF HEMM FOR COAL EXTRACTION

YEAR	Annual Coal Productiion (Mt)	Annual Average Lead (Km)	Annual Average Lift (m)	Hiring Rate (Coal) (Rs./t)	Annual Expdt. (Rs Crores)
1	0.650	2.243	103	41.41	**2.692**
2	0.650	2.243	103	41.41	**2.692**
3	0.650	2.243	103	41.41	**2.692**
4	0.700	2.469	120	43.09	**3.016**
5	1.000	2.580	128	43.62	**4.362**
6	1.000	2.841	144	44.61	**4.461**
7	1.000	3.030	155	45.39	**4.539**
8	0.220	3.030	155	45.39	**0.999**
TOTAL	**5.870**				**25.453**
Average Cost of Coal Extraction by Hiring (Rs./t) =					**43.36**

ANNUAL EXPENDITURE ON HIRING OF HEMM FOR TOP OB REMOVAL

YEAR	Annual In-situ OB (Hiring) (Mm3)	Annual Average Lead (Km)	Annual Average Lift (m)	Hiring Rate (Rs./m3)	Annual Expdt. (Rs'crores)
1	4.980	2.279	43	71.15	**35.43**
2	4.880	2.279	43	71.15	**34.72**
3	4.887	2.291	47	71.25	**34.82**

4	5.803	2.473	67	72.76	**42.22**
5	8.700	2.720	71	78.96	**68.70**
6	7.300	3.040	102	85.79	**62.63**
7	6.300	3.333	130	88.23	**55.59**
8	1.303	3.524	145	93.95	**12.24**
TOTAL	**44.153**				**346.35**
Average Cost of Top OB Removal by Hiring (Rs./m^3) =					**78.44**

ANNUAL EXPENDITURE ON HIRING OF HEMM FOR REHANDLING OF OB

YEAR	Annual Rehandling of OB (Hiring) (Mm3) (solid)	Annual Average Lead (Km)	Annual Average Lift (m)	Hiring Rate (Rs./m3)	Annual Expdt. (Rs'crores)
1	3.820	2.295	30	66.44	**25.380**
2	3.820	2.296	35	66.45	**25.384**
3	3.513	2.296	35	66.45	**23.344**
4	2.697	2.341	50	66.82	**18.021**
5	-				
6	-				
7	-				
8	-				
TOTAL	**13.850**				**92.129**
Average Cost of OB Rehandling by Hiring/Out-Sourcing (Rs./ m^3) =					**66.52**

23.6 SAFETY ASPECTS FOR OUTSOURCING OF HEMM

Safety aspects for outsourcing of HEMM have been deliberated in Safety Chapter (Chapter-XV).

23.7 PROJECT ECONOMICS

23.7.1 Total Capital Investment

The total additional capital required for the project in Total Hiring option works out to **Rs. 64.9985 crores** in addition to the written down value of **Rs. 17.5956 crores** of existing capital as on 1.4.2015 of Hindustan Lalpeth OC mine. The phasing of capital has been given in Appendix- A. The capital expenditure is summarized below:

Sl. No.	Particulars	CAPITAL (Rs. in Lakhs)		
		WDV of Existing Capital as on 1.4.2015	Additional Capital	Total Capital (WDV + Additional)
A.1	Land	0.00	1328.61	1328.61
A.2.1	Service Buildings	83.98	226.93	310.91
A.2.2	Residential Buildings	119.48	782.84	902.32
A.3	Plant & Machinery	1282.45	2112.26	3394.71
A.4	Furniture & Fittings	0.87	5.00	5.87
A.5	Railway Siding	0.00	0.00	0.00
A.6	Vehicles	5.09	35.04	40.13
A.7	Prospecting & Boring	0.00	0.00	0.00
A.8	Mine Development			
A.8.1	Capital Outlay in Mines	0.00	1363.18	1363.18
A.8.2	Roads & Culverts	251.32	94.74	346.06
A.8.3	Water Supply & Sewerage	5.40	394.98	400.38
A.8.4	PR & GR Preparation Cost	0.00	136.27	136.27
A.8.4A	EMP	10.97	0.00	10.97
A.8.5	Scientific Research	0.00	20.00	20.00
A.9	Revenue Expnd. Capitalised	0.00	0.00	0.00
	TOTAL	**1759.56**	**6499.85**	**8259.41**

23.7.2 Basis of Price of P&M, Civil Works & Hiring Rate

The price of P&M has been considered based on price list supplied by CMPDI (HQ) as on June, 2012 and it has been escalated upto March, 2013. The price of civil works has been taken based on civil index 442 (Maharashtra) as on 1st half of year 2013 with a base of 100 in Nagpur on 1.1.1992.

In proposed Hindustan Lalpeth Expansion OC mine, the rates for coal/OB removal by hiring equipment has been estimated on the basis of hiring rate decided in the meeting of Functional Directors of WCL and taking into consideration the change in price of diesel and change in lead and lift. The rates of hiring of HEMM for coal extraction, in-situ OB removal and rehandling of OB are tabulated below :

COAL/ OB	Annual Average LEAD (km)	Annual Average LIFT (m)	Hiring Rate for coal (Rs./t) and OB (Rs./m^3)
Coal	2.243 – 3.030	103 - 155	41.41-45.39
In-situ OB	2.279 - 3.524	43 - 145	71.15-93.95
Rehandling of OB	2.295-2.341	30- 50	66.44-66.82

23.7.3 Manpower and OMS

The total requirement of manpower in Total Hiring option works out to **214** giving OMS of **17.700 t**. This includes provision for leave & sick. Details of manpower requirement and manpower analysis are given in Appendix -B and B.1.

However, the total manpower in the existing Hindustan Lalpeth OC mine is 600 as on 16.03.2013. The proposed Hindustan Lalpeth Expansion OC mine will start from 01.04.2015 and by that time 37 manpower will retire and the available manpower would be 563. The surplus 349 manpower (563-214) over the actual requirement of 214 will be transferred to some other mines of WCL. However, the economics of this option has been worked out for entire 563 manpower as on 1.4.2015 absorbing the 349 surplus manpower.

23.7.4 EMS

The overall EMS works out to **Rs. 2630.93** based on WCL budget of 2012-13 of Hindustan Lalpeth OC mine.

23.7.5 Cost of Production for Different Level of Production

The cost of production works out to **Rs. 1619.74/ t** and **Rs. 1728.13/ t** at 100% and 85 % of production capacity respectively.

The different components of cost of production at 100% and 85% production capacity (based on 0% discount) are tabulated below :

Sl. No.	Particulars	Fixed Cost (Rs./t)	Variable Cost (Rs./t)	Total Cost (Rs./t) at Capacity	
				100%	85%
1	Salaries & Wages	182.81	0.00	182.81	215.07
2	Stores	33.78	132.08	165.86	171.82
3	Power	40.61	10.43	51.04	58.21
4	Env. Pollution Control	6.00	0.00	6.00	7.06
5	Misc. Expenses incl. W.D.	25.35	21.35	46.70	51.17
6	Mine Closure	57.35	0.00	57.35	67.47
7	Corporate Social Responsibility	0.00	5.00	5.00	5.00
8	Administrative Charges	135.21	0.00	135.21	159.07
9	Hiring Charges of Top OB	0.00	790.33	790.33	790.33
10	Depreciation	91.83	0.00	91.83	108.04

11	Interest on Working Capital @ 14.5%	23.25	46.36	69.61	73.71
12	Interest on Loan Capital @ 11.5%	18.00	0.00	18.00	21.18
	Total Cost of production	**614.19**	**1005.55**	**1619.74**	**1728.13**

23.7.6 Grade of Coal & Weighted Average Selling Price

The year-wise GCV of despatchable coal has been calculated which ranges from 4105 to 4527 kCal/kg (Weighted Average GCV – 4328 kCal/kg) without any contamination at roof and floor. The year-wise selling price of coal based on year-wise GCV has been considered to work out the economics. The economics of the proposed expansion mine have been worked out separately for year-wise selling price of coal (based on year-wise GCV) for Power, Fertilizer and Defence Sector as well as for year-wise selling price of coal (based on year-wise GCV) for other than Power, Fertilizer and Defence Sector. The weighted average selling price of the coal works out to **Rs. 898.43/t for Power, Fertilizer and Defence Sector and Rs. 1200.09/t for Other than Power, Fertilizer and Defence Sector.**

23.7.7 Profitability [Profit(+)/Loss(-)] at 100% and 85% Level of Production

For Power, Fertilizer and Defence Sector - The loss with weighted average sale value of coal (Rs. 898.43/t) for Power, Fertilizer and Defence Sectors works out to **Rs. (-) 721.31/t** and **Rs. (-) 829.70/t** at 100% and 85% of total production capacity respectively.

For Other than Power, Fertilizer and Defence Sector - The loss with weighted average sale value of coal (Rs. 1200.09/t) for Other than Power, Fertilizer and Defence Sector works out to **Rs. (-) 419.65/t** and **Rs. (-) 528.04/t** at 100% and 85% of total production capacity respectively.

23.7.8 IRR

For Power, Fertilizer and Defence Sector - The IRR of the project works out to **NEGATIVE** at 100% and 85% of target capacity respectively.

For Other than Power, Fertilizer and Defence Sector - The IRR of the project works out to **NEGATIVE** at both 100% and 85% of target capacity respectively.

23.7.9 Desired Selling Price

The desired selling price to achieve 12% IRR at 100% and 85% level works out to **Rs. 1747.20/t** and **Rs. 1872.19/t** respectively.

23.7.10 Completion Cost

Capital expenditure has been estimated / increased for forward escalation on the phasing of initial estimated capital. The escalation rate is based on W.P.I. / Civil Index of preceding 36 months. The total completion cost has been estimated as **Rs. 102.3253 crores**.

23.7.11 Conclusion

In the Total Hiring Option, the project has been planned for 1.0 Mty production. It is envisaged in this report that the entire coal production and removal of Top OB and rehandling of OB will be done by hiring of HEMM.

Total Cost of Production in Total Hiring option works out to **Rs. 1728.13/t** at 85% of target capacity. The average notified Sale Price of coal is **Rs. 898.43/t** for Power Sector and **Rs. 1200.09/t** for Other than Power Sector. The IRR is negative for both the selling prices of coal. The desired Selling Price of coal to yield 12% IRR at 85% of target capacity is **Rs. 1872.19/t.** The difference between average notified sale price of coal for Power Sector and desired selling price to yield 12% IRR at 85% of target capacity is **Rs. (-) 973.76/t**. Similarly, the difference between average notified sale price of coal for Other than Power Sector and desired selling price of coal to yield 12% IRR at 85% of target capacity is **Rs. (-) 672.10/t.** This option may be considered for approval only if customer agrees to pay the price to yield 12 % IRR at 85% of target capacity for coal produced.