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**EXECUTIVE SUMMARY  
OF  
ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PLAN  
FOR  
TALABIRA OPENCAST PROJECT (TALABIRA-II & III)  
NORMATIVE CAPACITY 20.0 MTY  
PEAK CAPACITY 23.0 MTY**

## **1.0 PURPOSE OF THE REPORT**

Talabira II & III geological blocks of Rampur tract are situated in south-eastern part of Ib Valley Coalfield, Talabira opencast project consists of Talabira-II & Talabira-III blocks.

These above blocks have been jointly allocated to Mahanadi Coalfields Limited (MCL), Hindalco Industries Limited (HIL) and Neyveli Lignite Corporation (NLC). In the joint venture company MCL would have equity holding of 70% whereas 30% equity shall be equally held by M/s.NLC & M/s.HIL @15% each.

The above project would meet the coal demands of the envisaged power plants of M/s.NLC and M/s.HIL and also meet the short fall in coal availability of MCL.

Prefeasibility report and Form-I were submitted to MoEF and Terms of Reference has been obtained from MoEF vide letter No.J/11015/215/2007-IA.II(M) dated 23<sup>rd</sup> May 2007.

Three variants have been considered for mining and its related activities. They are :

- (i) Departmental variant
- (ii) Coal outsourcing variant
- (iii) Coal & OB outsourcing variant

### **Departmental Variant**

All activities are proposed to be carried out departmentally.

### **Coal Outsourcing Variant**

- (i) OBR is proposed to be carried out departmental
- (ii) About 70 to 75% extraction of coal to be carried out outsourcing by adopting blast free mining technology.
- (iii) Where blast free mining technology will not be suitable, extraction of coal will be conventional shovel dumper system.

### **Coal & OB Outsourcing Variant**

- (i) Both OBR & coal extraction are proposed to be outsourced.
- (ii) Where blast free mining technology will not be suitable, extraction of coal will be conventional (shovel dumper system) and entire operation will be outsourced.

## 2.0 LOCATION, COMMUNICATION, PHYSIOGRAPHY, DRAINAGE & CLIMATE

### LOCATION

The proposed project is located in the south eastern part of Ib Valley coalfield in Jharsuguda District, Orissa. It spreads over both Sambalpur & Jharsuguda Districts.

It lies between latitude 21° 44' 37" to 21° 47' 29" (N) and longitude 83° 56' 45" to 83° 59' 00" (E). It is covered under Survey of India Toposheet No.64 0/13, 64 0/14.

### COMMUNICATION

The block is well connected with district head quarters (Jharsuguda & Sambalpur) by State Highway No.10. Jharsuguda is the nearest town at a distance about 18 km. Lapanga is the nearest railway station of East Cost Railway at a distance about 14 km.

### PHYSIOGRAPHY & DRAINAGE

The block consists predominantly a high & highly undulating terrain. The eastern part of the block is occupied by a continuous and prominent boulder ridge with steep scrap face. The surface elevation varies from 192 to 286 m.

The general slope is towards Ib river in west and Hirakud reservoir in south. Main drainage of area is controlled by Ib river, which flows from north to south and drains to Hirakud reservoir. Bheden river flows towards eastern side of the block and is main tributary.

### CLIMATE (Data from IMD station, Jharsuguda)

Item	Parameters	Particulars
Rainfall	Range	: 1086.4 to 2382.20 as recorded over a period of 15 years.
	Annual average	: 1514.5 mm. More than 85% of the rain occurs during the monsoon season, i.e. June to September.
Temperature range (mean)	Minimum	: 8.6°C (Winter season) (Dec., 2005)
	Maximum	: 47°C (Pre-monsoon cyclone season) (May 2005).
Mean relative humidity (average)	Minimum	: 15% (in April)
	Maximum	: 90% (in July)
Mean wind speed(in Kmph)	Max at 8:30 hr	: 7.0
	Min at 8:30 hr	: 1.5
	Max at 17:30 hr	: 8.3
	Min at 17:30 hr	: 1.1
Wind direction	---	: Monsoon : From south-west and south
	---	: Post-monsoon : From north-east and north
	---	: Pre-monsoon cyclone season : From south and south-west
	---	: Winter : From north and north-east

### 3.0 MARKETING AND JUSTIFICATION

Availability of coal from Ib Valley coalfield has been assessed as 45.66 Mt in 2011-12 against estimated demand of 51.28 Mt in 2011-12. There is a shortage in availability of coal to a tune of 5.62 Mt in 2011-12.

The proposed project is a joint venture project of MCL, NLC and HIL established based on the Public-Private Partnership (PPP) instituted by Govt. of India.

The production share of MCL may be linked to fulfill the demand of proposed Thermal Power Plants or to other consumers to meet short fall in coal availability.

### 4.0 PROJECT PROFILE

#### (a) Mine Boundary

North	:	Ib river and Brajrajnagar R/S.
East	:	Hirma Village, Bheden river.
South	:	Back water of Hirakud reservoir
West	:	Back water of Hirakud reservoir

#### (b) Embankment against water bodies

It has been proposed to construct an embankment with a height of 3 m above HFL against Bheden and Ib river and back water of Hirakud reservoir where the existing surface level falls below HFL.

#### (c) Distance from water bodies from mine periphery

Bheden river	=	Adj. of the mine
Ib river	=	Adj. of the mine

#### (d) Description of core zone

The core zone of the proposed project (20.0 Mty) consist of excavation zone, safety zone, infrastructure area road diversion, etc. covers partly / fully from seven villages, namely Malda, Patrapalli, Talabira, Rampur, Khinda, Khaita and Dumurmunda villages. About 2046 families involving 10230 persons will be affected due to this project.

#### (e) Description of buffer zone

Buffer zone has three revenue forests namely Rampur, Malda and Khaita. The highest and lowest altitude varies from 192 to 286 m. The population of buffer zone including core zone is about 1,33,802. There are no places of religious, historical and archeological importance, sanctuaries national parks expect some village temples.

#### (f) Geology

- The block comprising an area of 11.76 sq.km including 9.945 sq.km of coal bearing area.
- Total 151 boreholes have been drilled involving 16,638 meter of drilling.
- Borehole density is 12.84 per sq.km.

- The dip varies from 5° to 19°.
- Two coal seams namely lb seam and Rampur seam will be worked.

(g) **Coal reserve, OB and Grade of Coal**

- Net geological reserves are 589.21 million tones, out of which 553.98 is the mineable reserves.
- Total overburden is 603.77 M.cum and average stripping ratio is 1.09.
- The grade of coal is mostly F & G.

(h) **Main consumer**

Proposed Thermal Power Plants of M/s.NLC, M/s.HIL and basket linkages.

(i) **Mining Parameters**

(a) **Present Status**

- The proposed project is a joint venture company which has been registered vide corporate Identify No.101000R2008 G 01010171/2008-09.
- TOR has been issued vide letter No.J/11015/215/2007/IA.II (M) dtd.23/05/07.

(b) **Proposed Mining Technology**

Major coal horizons of lb and Rampur occur in this block. Considering the large area, high coal reserve and to minimize transport lead it is proposed to work the entire mine in three quarries. Deployment of dragline is not suggested due to the relatively thin parting, steeper gradient and irregular workability of lb top and Rampur bottom seams.

**Coal wining, OB removal and Transportation**

Out of the three proposed variants for coal wining and OB removal, coal wining will be outsourced by using blast free mining technology. Considering geo-mining condition shovel & dumper system has been adopted for OB removal. Where blast free mining technology will not be suitable due to adverse geological condition, shovel-dumper system will be adopted.

**Targeted output & life of mine**

Annual production capacity (normative) is 20.0 Mty and peak is 23.0Mty. The life of mine is 34 years including 2 years of construction period.

**Land requirement**

Forest	=	729.15 ha
Non-forest	=	1196.85 ha
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Total	=	1926.00 ha

**Manpower**

Total manpower requirement for the Departmental variant has been 1812 and that for the Contractual variant has been placed at 427.

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## Hydrogeology

- The aquifers have been identified and classified namely, shallow and deep aquifers. Ground water occurs under both unconfined and confined conditions.
- In the northern part of the block, presence of the unconfined and confined aquifers are distinguished whereas in the southern part only one aquifer is demarcated.
- The disposition of confined aquifer is further classified as lower land upper aquifers.
- The general depth to water level ranges from 0.1 to 10m and 2 to 12 m in the post-monsoon and pre-monsoon period respectively.
- The water level fluctuation ranges from 2 to 12 m in the area.
- The average hydraulic conductivity of unconfined aquifer is 0.44 m/day and average specific capacity varies from 0.06 m<sup>2</sup>/hr to 3.03 m<sup>2</sup>/hr.
- The piezometric head varies from free flowing conditions to 0.58 m below ground level (bgl) in the Malda region.
- The average transmissibility and storage co-efficient in this area are 24.924 m<sup>2</sup>/day and  $20.37 \times 10^{-4}$  respectively.
- The static head in the Khinda region ranges from 1.48 to 11.425 m below ground level (bgl).
- The average transmissibility ranges from 4.6 to 8.082 m<sup>2</sup>/day and the storativity ranges from 6.281 to  $3.367 \times 10^{-4}$ .
- The high flood level (192 m above MSL) of Hirakud reservoir is about 3 km away (near Babu Khinda village).

## Pumping and drainage

Considering meteorological data, make up water, sufficient number of pumps of different LPS and head have been provided.

## Power Supply

The project will receive power at 33 kV from 2 x 20 MVA, 132/33 kV sub-station. The sub-station will be constructed near northern boundary of Talabira project. The sub-station will receive power by loop in loop out arrangement from Budhipatar sub-station of GRIDCO.

## Coal Handling and Dispatch Arrangement

- (i) Initial coal dispatch will be through feeder breaker circuits and truck loading system.
- (ii) Finally, coal will be moved through belt conveyor system to coal storage bunkers and dispatching through SILO in tandem with MGR system.

## Workshop & Store

Two tier system of maintenance is envisaged for plant and machinery. i.e. one at unit level and at central workshop level.

## Civil construction

1266 houses have been proposed to be constructed for the project. Provision for service buildings, stores, workshop complex, sub-station, community hall,

statutory buildings and magazine house has been made. Colony roads, approach road, haul roads, road over embankment, etc has been provided.

#### **Water demand and supply arrangement**

Potable	=	1.05 MLD
Industrial	=	<u>3.41 MLD</u>
		4.46 MLD

Permanent water supply arrangement for this project is proposed to be made from Bheden river, Ib river and Hirakud reservoir.

#### **Places of religious & archaeological importance**

There are no places of religious, historical and archaeological importance in the core & buffer zone except some village temples.

### **4.0 RESETTLEMENT & REHABILITATION**

Seven villages namely Malda, Patrapali, Talabira, Rampur, Khinda, Khaita & Dumurmunda will be affected fully / partly.

About 2046 families involving about 10230 persons will be affected due to this project. However, exact no. of PAFs and PAPs will be identified only after due enumeration by project authority. The affected families will be resettled & rehabilitated as per the latest R&R Policy of Govt. of Orissa along with other displaced families.

### **5.0 ANTICIPATED IMPACTS AND MITIGATION MEASURES**

#### **IMPACT ON AIR QUALITY**

Ambient air quality will be influenced more or less due to presence of RPM, SPM, SO<sub>2</sub> & NO<sub>x</sub> which are generated due to various activities related to project.

#### **CONTROL MEASURES**

Appropriate control measures will be adopted to maintain the quality. The following measures have been suggested :

- All drills will be equipped with dust extractors.
- Proper maintenance & handling of drilling units.
- Haul roads will be sprayed regularly with water.
- Service roads will be black topped.
- Provision of greenbelts around the quarry, infrastructure area, service building area.
- Provision of covers on conveyor belts, unloading/ transfer points.
- Provision of adequate fire fighting system at coal stockyard.
- No overloading of vehicles as spillage generates the dust.

#### **IMPACT ON HYDROLOGY & HYDRO-GEOLOGY**

- Mining activities will have impact on hydrology & hydro-geology.
- Disruption of natural drainage.

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- Siltation and choking of water courses.
  - Deterioration of water quality & pollution of water bodies.
  - Due to excavation, declining of ground water in the immediate vicinity of the decoaled area.

### **CONTROL MEASURES**

- The backfilling of the decoaled area will reduce the mine seepage resulting to restore ground water in the immediate vicinity of excavation zone.
- Sufficient safeguards during the planning stage to make the project eco-friendly from water pollution control point of view.
- Recycling of wastewater at some sources after appropriate treatment to achieve "zero discharge" to the extent possible.
- Conforming to the limits of the Environment (Protection) Amendment Rules, 2000 ("Schedule-VI", General Standards for discharge of environmental pollutants, Part-A : Effluents) for the quality of the treated effluents.

The mitigatory measures have been suggested for this project :

- Provision of sewage treatment plant for domestic effluent and reuse of treated water for watering of plants.
- Oil & grease traps and settling chambers / tanks for industrial effluents from workshop and vehicle depots and reuse of treated water.
- Mine discharge water treatment plant and reuse of treated water.
- Provision of garland drain and sedimentation pond/settling tank around mine boundary.
- Storm water drainage arrangement.
- Regular monitoring of water and effluent qualities to get feedback for corrective measures for conforming to the limits of the prescribed standards.

### **IMPACT ON NOISE QUALITY**

Abnormal noise will have auditory effect noise produced from this project will not have auditory, non-auditory effects.

### **CONTROL MEASURES**

- Proper designing of plant & machinery by providing in-built mechanisms like silencers, mufflers and enclosures for noise generating parts and shock absorbing pads at the foundation of vibrating equipment.
- Routine maintenance of equipment.
- Enclosures for crusher house, etc.
- Rational deployment of noise generating plant and machinery.
- Greenbelts around the quarry, infrastructure sites, service building area and township besides avenue plantation on both sides of the roads to maintain noise level at night time within the limit for the inhabited localities situated at a very close proximity.
- Locating township away from noise center.

- HEMMs with sound proof cabins.
- Chute linings in CHP.
- Provision of isolation for vibrating equipment (both fixed and mobile) foundation.
- Personal protective devices to all the persons working in high noise areas.

### **IMPACT ON BLASTING**

Safe blasting measures have been suggested so that there will be no effects on life, property.

### **CONTROL MEASURES**

- All provisions of Coal Mines Regulations will be followed.
- Before blasting is done, warning sound is given so that people can move to safe places.
- Use of SMS explosive will be better for safe measures.

### **IMPACT ON LAND RESOURCE**

The impact of opencast coal mine on land is the change in land use pattern. The changes are due to quarrying, and construction of infrastructure. The alteration in land use pattern due to infrastructure is not to be considered as true degradation as these facilities can be utilized for some other purposes after the mining operation is over. The change in land use pattern due to activity of quarrying may be considered as true change in land use pattern. Hence, land rehabilitation scheme is planned for reclaiming the backfilled area.

### **CONTROL MEASURES**

- Solid waste generated due to coal extraction will be backfilled. Internal dump should be biological and technical reclaimed.
- During the process, the geometrical shape of the dumps is altered to make it amenable to effective biological reclamation and also to provide safety and stability.
- Suitable drainage arrangement for smooth disposal of storm water.
- Appropriate garland drain is to be provided to collect run-off.
- Topsoil shall be progressively and concurrently utilized during physical/ technical reclamation of backfilled area, thus obviating the necessity of storage of topsoil separately.
- Arboriculture is to be carried out in the vacant areas.
- Proper afforestation / plantation is to be carried out for greenbelt development.

Statements showing the pre-mining & post-mining land uses of the project are given in Table-1 & 2 as under:

<b>Table 1 : Pre-mining land use</b>				
S.N.	Item/Purpose	Land Requirement (in ha)		
		Forest	Non-forest (Govt. & tenancy)	Total
1	Quarry excavation	726.15	246.37	972.52
2	Blasting danger zone	193.64*	244.32	244.32
3	Ext. OB dump	--	156.50	156.50
4	Infrastructure	2.80	123.34	126.14
5	Rationalization of project boundary	--	16.02	16.02
6	Diversion of the road	--	4.00	4.00
7	Embankment against Bheden river & western side of the quarry	0.20	37.30	37.50
<b>Mine lease area (1 to 7)</b>		<b>729.15</b>	<b>1196.85</b>	<b>1557.00</b>
8	Residential colony	--	40.00	40.00
9	Resettlement site	--	329.00	329.00
<b>Total Land Requirement (1 to 9)</b>		<b>729.15</b>	<b>1565.85</b>	<b>1926.00</b>

<b>Table 2 : Post-mining land use</b>							
Sl. No.	Category	Land use (in ha)					
		Plantation	Water body	Dip side slope & haul road	Undisturbed	Built-up area	Total
1	Quarry excavation	730.34	77.12	165.06	--	--	972.52
2	Blasting danger zone	48.86	--	--	195.46	--	244.32
3	Ext. OB dump	156.50	--	--	--	--	156.50
4	Infrastructure	27.46	--	--	--	98.68	126.14
5	Rationalization of project boundary	16.02	--	--	--	--	16.02
6	Diversion of road	0.80	--	--	3.20	--	4.00
7	Embankment against Bheden river & western side of the quarry	7.66	--	--	--	29.84	37.50
8	Residential colony	8.00	--	--	--	32.00	40.00
9	Resettlement site	65.80	--	--	--	263.20	329.00
<b>Total</b>		<b>1061.44</b>	<b>77.12</b>	<b>165.06</b>	<b>198.66</b>	<b>423.72</b>	<b>1926.00</b>

### IMPACT ON SOCIO-ECONOMIC

About 2046 number of families will be affected from 7 villages namely, Malda, Patrapalli, Talabira, Rampur, Khinda, Khaita, and Dumurmunda will be affected due to mining and its related activities.

### CONTROL MEASURES

All project affected families along with other displaced families such as major married sons, unmarried daughters of 30 years of age, divorcee/deserted women/widows, physically handicapped and/or mentally retarded persons irrespective of age & sex, unmarried brothers/sisters whose parents are not alive, homestead less families (unobjectionable encroachers) and landless families (unobjectionable encroachers) will be resettled and rehabilitated socially, culturally and economically.

All civil amenities will be provided at rehabilitation site like school, dispensary, roads, community center, worship area, shopping center, etc.

Latest Orissa Govt. Norms / CIL Norms are to be considered while rehabilitating the project affected persons.

### **IMPACT ON BIO-DIVERSITY**

#### **a) IMPACT ON FLORA**

- Forest land in the core zone, and particularly in the excavation area, will be diverted for mining. The forest land for diversion is 729.15 ha. The forest land for permissive possession is 6.94 ha.
- The combined impact of operating coal mines and proposed coal projects may influence the forest land in the buffer zone.
- Due to biotic interference and forest fire, even the reserve forests in the area are not found to harbor many species of floral population.
- Both core and buffer zones are found to be free from ecologically sensitive and biologically rich areas/habitats, such as national parks, sanctuaries, biosphere reserves and areas rich in genetic resources.
- There are no rare, threatened and endangered plant species in the buffer zone.
- The vegetation in the area is mostly tropical dry deciduous type. The principal species found in the area is *Shorea robusta* (Sal), followed by *Buchanania lanzan* (chara) and *Madhuca Indica* (Mahul).

#### **b) IMPACT ON FAUNA**

- The population of fauna, especially mammals, is found to be low. So there will be no adverse impact on the fauna existing in the project impact area as they will migrate to the nearby forests.
- The area is not the migratory route for any wild animal.
- There are no rare, threatened and endangered faunal species in the buffer zone.
- The wild animals seen in the area are *Canis latrans* (Jackal/Bilua), *Herpestis edwardsi* (Mongoose), *Funambulus pennant* (Palm striped squirrel), etc.

### **CONTROL MEASURES**

- (i) Due to biological reclamation and greenbelt development for this project and other projects in the area, habitats will be created for fauna.
- (ii) As ultimate voids of the quarry will be developed as water reservoir and the area is having a number of large ponds, the ground and avi-fauna will get water for drinking.
- (iii) As technically reclaimed areas will be revegetated with endemic species, the avi-fauna and ground fauna will get food and shelters.
- (iv) Compensatory afforestation will be taken for the degraded forest.

## IMPACT ON TRAFFIC MOVEMENT

A series of conveyors, over ground bunker, Silos with pre-weigh hoppers etc. have been envisaged to dispatch the total coal. The evacuation of coal will be done by SILOs through the Railway loop. Therefore, effect of traffic movement within the mining lease area will be negligible on residential area.

## CONTROL MEASURES

- Plantation on both sides of the roads on the surface and around Silo systems.
- Proper maintenance of road to remove ruts and pot holes.
- Proper illumination of roads including haul road.

## 6.0 ENVIRONMENTAL MONITORING ORGANISATION

For effective implementation of various environmental control measures and subsequently monitoring the same, permanent environmental management organisations are essential at corporate, area and project levels. The various environmental attributes like air quality, water quality, effluent quality, noise level, etc. will be monitored as per the following schedules:

<i>For air quality</i>	Two days in a month at each station (once in a fortnight).
<i>For water and effluent quality</i>	Once in a month for each station (for drinking water quality), once in a fortnight (for 4 parameters) and once in a year (23 parameters) (for effluent quality)
<i>For ground water level monitoring</i>	4 times in a year (i.e., April/May, August, November & January)
<i>For noise level</i>	Once in a day-time and once in a night-time in fortnight from each station.

## 7.0 RISK ASSESSMENT & MANAGEMENT

A comprehensive blue print for risk assessment and management has been drawn up incorporating the following:

- Identification and assessment of risks.
- Recommendation of measures to prevent damage to life and property against such risks.
- Handling of disasters as per Mines Rescue Rules.

## 8.0 PROJECT BENEFIT

Talabira OC Project (Talabira II & III) (20.0 Mty) will enhance the socio-economic activities in the adjoining areas. This will result in following benefits :

- Improvement in Physical Infrastructure
- Improvement in Social Infrastructure
- Increase in Employment Potential
- Contribution to the Exchequer
- Prevention of Illegal Mining
- Post-mining Enhancement of Green Cover

## 9.0 PROGRESSIVE MINE CLOSURE PLAN

A "Progressive Mine Closure Plan" is being prepared taking into consideration the following:

- Mine description
- Management of mined out land
- Management of hydrology and hydrogeology
- Management of air quality
- Management of wastes
- Management of topsoil
- Management / decommissioning of infrastructure
- Management / disposal of mining machinery
- Safety & security
- Disaster management and risk assessment
- Care and maintenance during temporary discontinuance
- Redeployment of workforce.
- Management of community facilities.
- Cost of mine closure, etc.

The expenditure of mine closure will be met from a "**Corpus Fund**" which will be generated by keeping the provision @Re.1.0 per tonne of coal produced and will be reflected in the cost of production.

## 10.0 COST ESTIMATE

The initial capital outlay for departmental variant is Rs.1780.14 crores and for coal and OB outsourcing variant is Rs.447.72 crore.