

PUBLIC HEARING DOCUMENT

FOR

NARAINKURI UNDERGROUND PROJECT  
(0.54 MTY)

KUNUSTORIA AREA

EASTERN COALFIELDS LTD.

# PUBLIC HEARING DOCUMENT

## PH-1.0 Summarized Data

1. Area of the Project : 7.93 Sq. km.
2. Seam considered : R-VIIT/T2, R-VI & splits & Lo
3. Reserves considered :
  - Net reserves : 112.88 MTes
  - Extractable reserve : 32.52 MTes
4. Weighted Av. Grade of coal : 'C' LF
5. Gassiness of the seam : Degree-II
6. Target capacity : 0.54 MTY
7. Estimated year of achieving target output : 6<sup>th</sup> Year
8. Life of the Project : More than 25 Years
9. Total capital investment
  - Capital (Rs. Crores) : 149.06
  - Specific Investment ( Rs. / te) : 2760.40
10. Investment on P & M:
  - Total ( Rs Crs) : 104.36
  - Specific investment ( Rs./te) : 1932.59
11. Main P & M
  - Face Machinery : LCCM, Coal Hauler, Roof Bolter, SDL, UDM, Pony belt conveyor, Auxiliary fans, Pumps, Haulage etc.
  - Gate & Trunk Transport : Belt conveyor/Haulage
  - Material Transport : Endless Haulages
  - Vertical Transport : Electric Winders (500 KW for coal & 175 KW for man & material).
12. Phasing of Total capital:

Year	1 <sup>st</sup> yr	2 <sup>nd</sup> yr	3 <sup>rd</sup> yr	4 <sup>th</sup> yr	5 <sup>th</sup> yr	6 <sup>th</sup> yr	Beyond 6 <sup>th</sup> yr
Capital (Rs. Crs.)	3.20	11.17	54.12	46.35	9.13	2.50	22.59

13. Phasing of production:

Year	4 <sup>th</sup> Year	5 <sup>th</sup> Year	6 <sup>th</sup> Year	7 <sup>th</sup> Year onwards
Production (MTes)	0.03	0.315	0.54	0.54

14. Manpower Requirement:
  - Underground : 763
  - Surface : 219

15.	O.M.S.(Tonne)		
	• Overall OMS	:	2.10
	• U/G.OMS	:	2.71
16.	E.M.S.(Rs.)	:	901.86
17.	Estimated cost of production (Rs./te):		
	• At 100% of target output	:	1142.92
	• At 85% of target output	:	1311.80
18.	Average selling price (Rs./te)	:	1633.83
19.	Profit (in Rs./te):		
	• At 100% of target output	:	490.91
	• At 85% of target output	:	322.03
20.	Break Even Point:		
	• BEP (in %)	:	66.10
	• BEP (in MTe)	:	0.357
21.	I.R.R (%)		
	• At 100% of target output	:	20.67
	• At 85% of target output	:	13.14

### PH-1.1 Introduction

Eastern Coalfields Limited (ECL), a subsidiary of Coal India Limited is a prime producer of superior quality non-coking coal in the country. It operates coal mines in the states of West Bengal and Jharkhand. It is producing coal from different coal seams of Raniganj and Barakar measures in the districts of Burdwan, Birbhum, Bankura, Purulia, Pakur, Godda, Deoghar, Dumka and Dhanbad. Mining operation is spread over four coalfields i.e Raniganj, Mugma-Salanpur, Saharjuri and Rajmahal. ECL has produced 24.06 Mt. of coal during 2007-08. Contribution from underground was 8.32 MT.

This EIA/EMP report has been prepared with a view to obtaining Environmental clearance for the proposed Narainkuri Underground Project (0.54 MTY) of M/S Eastern Coalfields Ltd. as per provisions of EIA Notification, September, 2006 from Ministry of Environment & Forests, Govt. of India.

### PH-1.2 Salient Features of the Project

#### Project Area

The total area of the Narainkuri Block is 950 Ha. However an area of 793 Ha forming part of the block has been considered for the proposed project. The balance area of 157 Ha has not been considered due to the presence of Bengal Paper Mill (presently closed) and its infrastructure. The main surface features are:

- i) Villages/settlements viz. Egara, Nutan Egara, Upper Narainkuri, Nicha Narainkuri, Girijapara, Sahibganj, Ballavpur, Leper Asylum, Belunia having a combined total population of 19711.
- ii) The Bengal Paper Mill (which is closed at present).

- iii) Railway line connecting Eastern Railway Main line to Mejia T.P.S.
- iv) Road to Bakura and various District Board/ village/colliery roads.
- v) Small abandoned quarries, old abandoned waterlogged pits of Mahabir, Bolompur and Nupur collieries and old abandoned waterlogged incline of Porarband colliery.
- vi) Paddy fields and water tanks/ponds.
- vii) High Tension Power Transmission line.

### Project at a Glance

The proposed Narainkuri Underground Project is a new underground mine slated to produce 0.54 MTY (1800 TPD) of coal with a project area of 793.0 Ha. The proposal is to exploit virgin R-VI, R-VIB & R-VIB1, R-VIIT and Lo(Local) coal seams in Narainkuri Block having net coal reserves of 112.88 Million Tonnes out of which 32.52 Million Tonnes are extractable.

Targeted output of 0.54 MTY will be achieved by the 6<sup>th</sup> Year and the total life of the project is more than 25 years. Out of the total project area of 793 Ha, 378 ha falls in the leasehold of erstwhile Mahabir Colliery. Lease for the remaining 415 Ha land has to be obtained. The project does not involve any resettlement of population as it is an underground project to be depillared with sand stowing and no surface subsidence is envisaged. *10.4 Ha of vacant land will be required for sinking shafts , building the colliery infrastructure and service buildings along with approach road. This land will be purchased from the land-owners at prevailing rates and due compensation shall be admissible as per the R&R Policy, 2008 of Coal India Ltd. Action for acquisition of land shall be initiated after the Project Report is sanctioned.*

As the surface is heavily built up and the upper seams have been worked in the past, which is now waterlogged, extraction of seam by mechanized Bord & Pillar mining using Low Cost Continuous Miner (LCCM) for development of bottom lift and LHD/SDL for development of top lift and for depillaring for both top and bottom lifts, has been envisaged. Depillaring by stoking in single lift or double lifts (without leaving any coal parting between them, depending upon the seam thickness) with stowing has been proposed.

The following new mine entries have been proposed-

Sl. No.	Shafts	Fitting	Purpose
1	Shaft 'A' depth - 235 m Dia. -7.0 m	Electric Winder, 500KW	Coal Winding, Intake airway
2	Shaft 'B' depth - 235 m Dia. - 7.0 m	Electric winder, 175KW.	Man & Material Winding, Return airway

## Safety

Safety precautions have been considered while planning of the project. However, constant vigil by the project management are required for protection of the project from surface and underground inundation, fire hazards including spontaneous heating and explosion hazards, hazards from air pollution, mine dust etc. Permission regarding method of work would be obtained from DGMS before commencement of work by the project management.

This aspect becomes all the more important as the upper seams have been worked in the past by different collieries through a number of pits and quarries details of many of which are not available and likely to be waterlogged.

### PH-1.3 Description of the Environment

#### Micrometeorology

As a part of micrometeorological study, micrometeorology and microclimatic parameters were recorded by installing a meteorological station in Core Zone. Data for wind velocity, wind direction, ambient temperature, relative humidity, cloud cover and rainfall data were recorded at hourly intervals along with atmospheric pressure for 24 hours for the study period (15<sup>th</sup> October, 2006 to 14<sup>th</sup> January, 2007) ie for Post Monsoon period.

The micrometeorological data thus collected was processed and analyzed as per standard procedures. Meteorological data collected during the study reveal the following status:

**Flow Vector:** Predominant winds are from 315 / 360 degrees (Northwest / North directions).

**Wind Velocity:** Wind velocity readings are ranging from < 0.28 to 1.74 m/s.

**Temperature:** Temperature values are ranging from 283 to 305.5 K.

**Relative Humidity:** The average relative humidity is found to be 69.1%.

**Cloud Cover:** Mostly clear sky is predominant during the study period.

**Atmospheric Pressure:** The atmospheric pressure values are ranging from 758.5 mm of Hg to 756.2 mm of Hg.

**Rainfall:** There were two rainy days during the study period. The recorded rainfall is 4.3 mm.

#### Ambient Air Quality

The main objective of the ambient air quality monitoring is to assess the existing levels of air pollutants as well as the regional background concentration in the project area. Air pollution forms an important and critical factor to study the environmental issues in the mining areas. The ambient air quality study was carried out during the post-monsoon period (Winter season) from Oct'06 to Jan'07. Seven stations- 2 in core zone and 5 in buffer zone along coal transport route were selected.

Project : Narainkuri UGP Season : Winter  
 Season: Post monsoon 2006 Unit :  $\mu\text{g}/\text{m}^3$

Location Category	Location Name & Code	Min.	Percentile Value		Max.	AM	GM	SD	CPCB Limits for RCF	
			95 <sup>th</sup>	98 <sup>th</sup>						
<b>SPM Concentration</b>										
Core Zone	Narainkuri (A <sub>1</sub> )	R	101	138	140	140	125.67	125.28	9.77	R-200 I-700
	Ballavpur (A <sub>2</sub> )	R	100	139	141	141	127.17	126.71	10.61	
Buffer Zone	Mejia (A <sub>3</sub> )	I	100	130	131	131	117.58	117.27	8.64	
	Raniganj (A <sub>4</sub> )	R	85	147	150	150	128.3	127.0	16.2	
	Amrasota (A <sub>5</sub> )	I	92	148	150	150	132.7	131.9	14.0	
	Kunustoria (A <sub>6</sub> )	I	100	169	170	170	145.29	143.77	20.55	
	Belbaid (A <sub>7</sub> )	I	100	169	170	170	140.0	138.6	20.5	
<b>RPM Concentration</b>										
Core Zone	Narainkuri (A <sub>1</sub> )	R	43	59	60	60	54.04	53.87	4.20	R-100 I-300
	Ballavpur (A <sub>2</sub> )	R	45	63	63	63	57.23	57.02	4.77	
Buffer Zone	Mejia (A <sub>3</sub> )	I	45	59	59	59	52.91	52.77	3.89	
	Raniganj (A <sub>4</sub> )	R	42	70	71	71	61.2	60.6	8.3	
	Amrasota (A <sub>5</sub> )	I	46	69	70	70	63.7	63.4	5.9	
	Kunustoria (A <sub>6</sub> )	I	47	79	80	80	68.29	65.57	9.73	
	Belbaid (A <sub>7</sub> )	I	46	75	75	75	62.9	62.3	9.0	
<b>SO<sub>2</sub> Concentration</b>										
Core Zone	Narainkuri (A <sub>1</sub> )	R	<10	13	13	13	11.50	11.47	0.86	R-80 I-120
	Ballavpur (A <sub>2</sub> )	R	<10	13	13	13	11.59	11.57	0.73	
Buffer Zone	Mejia (A <sub>3</sub> )	I	<10	13	13	13	11.36	11.33	0.95	
	Raniganj (A <sub>4</sub> )	R	12	16	18	18	14.4	14.3	1.40	
	Amrasota (A <sub>5</sub> )	I	10	13	13	13	12.1	12.0	0.9	
	Kunustoria (A <sub>6</sub> )	I	10	13	13	13	12.25	12.22	0.85	
	Belbaid (A <sub>7</sub> )	I	10	15	15	15	13.1	13.0	1.3	
<b>NO<sub>x</sub> Concentration</b>										
Core Zone	Narainkuri (A <sub>1</sub> )	R	<10	15	16	16	13.64	13.56	1.47	R-80 I-120
	Ballavpur (A <sub>2</sub> )	R	<10	17	18	18	14.18	14.06	1.84	
Buffer Zone	Mejia (A <sub>3</sub> )	I	<10	15	15	15	13.36	13.32	1.14	
	Raniganj (A <sub>4</sub> )	R	14	22	22	22	18.5	18.4	2.2	
	Amrasota (A <sub>5</sub> )	I	10	20	20	20	16.5	16.3	2.7	
	Kunustoria (A <sub>6</sub> )	I	10	20	20	20	16.21	15.97	2.69	
	Belbaid (A <sub>7</sub> )	I	10	19	20	20	16.0	15.8	2.4	

I – Industrial Category  
 R – Residential Category

### Ambient Noise Level Observations

Sl. No.	Location Category	Location Name & Code	L <sub>eq</sub> Noise Level, dB(A)			
			Day Time	Night Time	CPCB LIMITS	
					Day time	Night time
1.	Core zone	Narainkuri (N <sub>1</sub> )	47.2	37.3	75	70
2.		Ballavpur (N <sub>2</sub> )	47.4	37.6		
3.	Buffer Zone	Mejia (N <sub>3</sub> )	47.5	38.3	55	45
4.		Raniganj (N <sub>4</sub> )	58.5	47.6		
5.		Amrasota (N <sub>5</sub> )	47.2	38.2		
6.		Kunustoria (N <sub>6</sub> )	48.4	39.2		
7		Belbaid (N <sub>7</sub> )	58.5	47.8		

### Water Sampling

Three samples of ground water from tube well and two surface water samples from Damodar River and Nunia Nallah were collected on 20<sup>th</sup> October'2006. These were monitored for all the parameters as per MoEF guidelines / Indian Standard. The ground water/drinking water samples were compared with IS: 10500 standard and surface water samples were compared with IS: 2296-1982 for Inland Surface water (Class C). All the samples were found to conform to the above standards.

### Hydro-Geological features

#### Drainage

The Narainkuri UGP block area is drained by a few ephemeral streams including Nunia Khal/Jore (Nala) flowing from north-west to south-east. The Nunia jore and other south-easterly flowing nalas join easterly flowing Damodar river towards south, the main drainage of the area. However, the Damodar River is flowing very near to the project area.

#### Water Level Trend

The ground water level data of the permanent observation wells of CGWB shows that the pre-monsoon water level vary from 0.92 m (1990, Andal) to 11.32 m (2000, Raniganj) with an average of 7.84 m ( Raniganj) and 4.30 m (Andal). Post monsoon water levels vary from 0.27 m (1995, Andal) to 6.99 m (1992, Raniganj) with an average 5.26 m (Raniganj) and 2.21 (Andal). The annual water level fluctuation varies from 0.07 (Andal) to 7.93 m (Andal).

*The pre-monsoon and post-monsoon water level trends of Raniganj and post-monsoon water level trend of Andal reveal an upward trend.* This upward trend of water level in this area mainly due to the recharge which is taking place from the mine water through mine pumping and released into dug-wells and nala through check dams. This induces recharge to the phreatic aquifer. The decline trend of water level in pre-monsoon at Andal may be attributed to over exploitation of groundwater with the increase in local population and demand.

### **Soil Quality Status**

Soil samples from agricultural land & barren land were collected by using auger from three horizons (30, 60 and 90 cm) below ground level and analysed for fertility and engineering parameters as per IS methods. The soil quality in the project area appears to be good and would support plantation.

### **Flora and Fauna Survey**

Flora and Fauna Survey was conducted by Andhra University in January, 2007 and the brief report is given below. There are no endangered or endemic species of flora and fauna in core zone. No migratory species were found in the core zone.

### **Socio-economic Survey**

The socio-economic study was conducted by M/s PDIL during 2006. With a view to survey villages of core and buffer zones, 637 and 599 sample populations have been selected respectively in the study area.

A list of the studied village of core and buffer zone is given below:

<b><u>CORE ZONE</u></b>		<b><u>BUFFER ZONE</u></b>	
1] Ballavpur Debogram	6] Sahebganj	1] Belebathan	6] Debogram
2] Egara Benathal	7] Girjapara	2] Jemari	7] Benathal
3] Natun Egra	8] Belunia	3] Shaldanga	8] Jemua
4] Nicha Nariankuri		4] Harishpur	
5] Upper Nariankuri		5] Bhadur	

The socio-economic data reveals that the socio-economic profile of the area is good.

## Land Use Pattern

The present land use of the project area of 793.0 Ha is as follows:-

<u>Particulars</u>	: <u>(in Ha.)</u>
Village	: 153.20
Agricultural land	: 476.13
Rocky area	: 31.00
Old quarries (abandoned)	: 27.11
Waste land	: 14.12
Degraded forest land*	: 8.00
Water bodies	: 73.98
Others	: 9.46
<b>Total</b>	: <b>793.0</b>

### PH-1.4 Anticipated Environmental Impacts & Mitigation Measures

The impacts (both beneficial and adverse) of mining and its allied activities of the project have been assessed and presented in respect of air, water, noise, ground vibration, socio-economic profile, flora & fauna, land resource, traffic movement and visual/aesthetic aspect .

The control measures to mitigate various environmental impacts have also been highlighted for carrying out mining operation in an environmentally compatible manner. Further, all provisions of Coal Mines Regulations and Directives shall be followed in this project.

#### Air Pollution

Narainkuri UGP being an underground mine, the major activities contributing to air pollution will be handling of coal at surface CHP , transport of coal from mine to the Belbaid Railway Siding at distance of about 15 kms and coal loading into wagons at Railway Siding. However, this can be controlled to a great extent by regular sprinkling by mobile water sprinklers. Dust enclosure at CHP, wetting of coal before transportation and transportation of coal by covered trucks will help prevent spillage, thereby, reducing the quantum of dust. ISCST3 Model of USEPA was used for impact prediction.

Station	Max <sup>m</sup> GLC Recorded ( $\mu\text{g}/\text{m}^3$ )	Maximum Incremental value estimated by ISCST3 Modeling (24 hourly concentration) ( $\mu\text{g}/\text{m}^3$ )	Resultant air quality ( $\mu\text{g}/\text{m}^3$ ) (SPM)	Limits for RCF
Narainkuri	140	4.89	144.89	200
Ballavpur	141	2.76	143.76	200
Mejia	131	9.22	140.22	700
Raniganj	150	10.66	160.66	200
Amrasota	150	16.51	166.51	700
Kunustoria	170	10.44	180.44	700
Belbaid	170	63.06	213.06	700

It is observed that the predicted Air Quality continues to satisfy the norms for Raniganj Coalfields.

### Control Measures for Air Pollution

The following measures will be taken to minimize dust during transportation of coal :

- Surfacing of all service roads/permanent roads by asphalt.
- The metalled roads shall be kept free of potholes, etc.
- Regular maintenance of trucks and payloaders to limit emission of harmful exhaust fumes.
- Water will be sprayed on coal transport road at regular intervals,. Two Nos. of mobile water sprinklers will be provided in the project.
- Provision of auto-start, time cycle controlled, fine nozzle mounted fixed sprinklers at siding and CHP.
- Physical removal of dust from the roads.
- Greenbelts around CHP, service building area besides avenue plantation along roads.
- Wetting of coal before transport.
- Transportation of coal from CHP to Railway Siding by covered trucks.

The following control measures will be adopted during coal handling:

- Suppression of coal dust during coal handling by fine nozzle mounted fixed sprinklers.
- Dust extraction system shall be provided at all dust generating points.
- Minimization of the height of coal-fall at transfer points to reduce the dust generation.
- Improved maintenance of plant and machinery.
- Proper enclosure of CHP will be provided

### **Noise Pollution**

The increase in production will lead to increased coal transport by road and thus noise levels are likely to increase along the coal transport route and at the Railway Siding. However, the same is likely to remain below the prescribed limits of CPCB.

There will be insignificant Ground vibration due to blasting in the underground as the mining will be done at deep levels.

### **Water Pollution**

#### Water Quality

The ground water chemistry indicates that the ground water in the area is potable and does not contain any toxic elements. The underground mining activity does not induce any unwanted chemical or elements into the ground water affecting the water chemistry. No serious pollutant has been observed in the nearby mine water discharge. The discharge water of nearby mine conforms to the MOEF standards.

### Sources of Water Pollution

Likely sources of water pollution from this project along with the type of pollutants are as follows:

- (i) Industrial wastewater from workshop & CHP : Suspended solids, oil & grease;
- (ii) Wastewater from mine : Suspended solids of coal, clay and oil
- (iii) Surface run-off passing through coal stockpiles : Suspended solids.
- (iv) Storm water from leasehold area and built-up area : Suspended solids.
- (v) Sanitary (domestic) wastewater : Suspended solids and BOD.

### Water Treatment Technology.

1. Mine water discharge → Settling tank → Discharge into local drainage.
2. Industrial water → Oil and Grease trap → Sedimentation tank → Local drainage.
3. Domestic waste water → soakpits

\* No DETP has been proposed as the settlements are small and scattered over the lease area.

### **Impact on Groundwater System**

With the presence of low permeable beds such as clay/shale and younger coal seams in the formation lying above the working seams the water level in the phreatic aquifer is not affected during the Bord and Pillar method (continuous miner) as well as during the extraction of total coal (de-pillaring) due to hydraulic sand stowing. As such, there is no danger of cracks and water inrush to underground workings. However, a number of old abandoned pits, quarries and ponds exists in this block which may act as source for water inrush to underground working. Damodar River and Nunia jore in the south and south western corner of the block respectively, which may be a source of water inrush from surface to this underground mine. Moreover, the previous workings (R-VIII (T+B1), R-VIII B2 and R-VIIC may create passage for water inrush. When the lower seams shall be extracted there is possibility of cracks joining upto the top seam goaf. Water inrush is expected to the lower seam through these cracks. Precautions would be taken up to prevent sudden water inrush from the above source. Adequate pumping arrangements have been proposed to handle water make of mine.

Since Narainkuri U/G project is a deeper underground mine, the impact of mining activity on unconfined/water table aquifer will be marginal. However, due to development of cracks, the water may drain into the mine causing lowering of water table at the vicinity of the mine. Drawdown thus created may be limited to lesser extent since the mine pumped out water is re-circulated into the unconfined/ phreatic aquifer by natural recharge.

Groundwater inflow (3670 m<sup>3</sup>/day) and mine influence area (592 m from the project) have been estimated and the groundwater monitoring would be undertaken as corrective measure to avoid adverse effects. The mine discharge after passing through sedimentation tank would be discharged onto land / natural drains with check dams at suitable locations so that the groundwater gets additional recharge by the return flow. The artificial recharge by water conservation structures in the outside mine influence area will check water level lowering. But within the mine influence area it may not be a viable solution because of the reason that recharged water would drain into the mine at a faster rate due to the steep hydraulic gradients resulted in the mining activity. However, artificial recharge will be taken up for improving the quality of ground water.

#### Radius of Mine Influence Area

Project	Mine depth (m)	Maximum probable drawdown (m)	Radius of influence (m) (Average K=0.16 m/day)
Narainkuri UGP	315	145	592

#### Conservation Measures

- The mine discharge would be effectively utilized to meet the mine's domestic and industrial needs
- Hydraulic sand stowing during depillaring operation increases the permeability of the formation and improves the groundwater resources in the area.
- After cessation of mining, with plenty rainfall and abundant ground water recharge, the water levels will recoup and attain normalcy. Thus, the impact of mining on groundwater system may be considered as a temporary phenomenon. The abandoned mine workings also behave as water pool and improves the resources availability in the area.
- To increase the source availability, hand pumps and piped water supply would be provided in nearby villages.
- The discharge mine water would be gainfully utilized by the local people for irrigation and domestic use. Thereby the mine water, form existing mines in the area, is a resource for local villages.

#### Future Strategy

- To assess the impact on local water levels, in time and space coordinates, a monitoring network of dug wells and piezometers in the zone of influence will be established and the water levels will be monitored quarterly.
- To create the water resources and to increase groundwater recharge in the nearby villages, under community development, hand pumps and tanks/ponds will be constructed or strengthened.
- Utilization of mine water for irrigation use will also enhance the ground water recharge potential through artificial recharge in the area.
- Increase vegetative cover by plantation in the mine area under land amelioration measures. This will contain the surface run-off and increase the ground water recharge.

- The impact on groundwater level will be minimized by artificial recharge by spreading of pumped out water, creation and filling of ponds with mine water and construction of rain water harvesting structure. Creation of awareness among workers and local peoples about rain water harvesting and artificial recharge will be given priority. This aspect is usually covered during the Environmental Week celebrated every year (5 to 12 June).
- Rain water along with surplus mine pumping water will be discharge into Nunia Jore (nala) after passing through the settling tank. Necessary earthen check dams will be made in the nala for recharging ground water aquifer. Rainwater harvesting and artificial recharge will also take place through abandoned dug-wells and final voids of old opencast mines for increasing ground water potential and check water level lowering.
- Utilization of treated mine water discharge by both industry and local people in the mine influence area.
- Monitoring of water quality of mine water discharge, local river/nala and domestic water source (dug well/tube well) will be continued under routine monitoring (February, May, August & November).
- During course of operation, area received considerable impact, suitable control and remedial measures would be adopted by the project authorities.
- Any other measures recommended by the regulatory agencies.

#### Uses of mine water

Mine discharge water will be collected in a sump pit located in the mine floor from where it will be pumped out @ 3670 m<sup>3</sup>/day and diverted to sedimentation pond(s) to arrest suspended solids. Then, clear water will be used for dust suppression on haul roads and CHP besides washing of dumpers and/or dozers in workshop. The rest of the mine water will be discharged on to agricultural land if required for irrigation or else into local nallah. The sludge collected from the pond(s) will be utilized as landfill in the de-coaled area.

	Purpose	Avg. Demand	Peak Demand
<b>A</b>	<b>Mine site</b>		
1	Hydraulic sand stowing*	2640 (one time only)	2640 (one time only)
2	Dust suppression/Fire service	24	50
3	Drinking		
4	Green Belt	150	150
5	Beneficiation	Nil	
6	CHP	22	30
<b>B</b>	<b>Township</b>		
1	Green Belt		
2	Domestic	250	300
	<b>Total</b>	<b>446</b>	<b>530</b>

## **Impact on Flora and Fauna & Conservation Measures**

The area is not rich in biological diversity. No wild life population is present in the study area except the common type of birds and domestic animals in the adjoining villages. No significant long-term residual impacts on fauna due to mining are expected.

### Conservation Measures

- Green Belt Around the Mine

There is need for creating green belt (approximately 30m wide) to provide an effective dust, noise and sight curtain in the periphery of mining area. The trees to be planted in the green belt area shall act as buffers and shock absorber against dusts, noise and stone flying. Trees in the green belt will be tall, wind firm, broad leaved and evergreen.

- Green Belt on the Sides of Other Road

On the road from the mine to CHP, 3-4 rows of evergreen and dust resistant plants will be planted. This will also be raised in triple storey fashion.

- Species for Plantation and Green Belt Development

The species selected for plantation on the internal dump and also in the other areas will be of mixed type having a combination of fast and slow growing species with an ultimate aim to have triple storey plantation i.e. a combination of species of tall, intermediate and short height. However, in any case monoculture will not be adopted, because ecologically these are more unstable communities.

## **Socio-economic Impact**

There is possibility of creation of direct employment opportunities due to the acquisition of land for mine infrastructure. Also, the setting up of a new mine will provide a good amount of indirect employment opportunities. Overall, this will have a positive impact on socio-economic profile of the area.

### Community Development

Several basic and civic amenities under community development programme have been extended to adjoining villages. An amount of Rs.1.0 per tonne of coal produced has been provided for community development in adjoining villages.

## **Impact on Land Resource and Its Management**

About 10.4 ha land will be acquired for shaft sinking, service buildings and for making the approach road to the pits. Apart from this land which will be developed, here will be no impact on the land-use pattern due to mining except certain areas coming under plantation as per EMP and habitation for the growing population.

Greenbelt around industrial sites, service building area and residential colony will be developed along with avenue plantation along roads. Plantation of trees on vacant land in project area will also be taken up.

There will be no effect on surface topography and soil since mining activity will take place at great depth and depillaring will be done in conjunction with hydraulic sand stowing.

### **PH-1.5 Safety Management & Conservation**

While planning of the mine, all possible safety parameters as per statute have been taken into consideration. These include safety from mine inundation, fires and subsidence along with other safety aspects associated with underground mining.

Constant vigil is required by the mine operators with regard to the sources of danger.

All other provisions of the statute and circulars brought out by DGMS from time to time, as and when attracted, and conditions stipulated in the permission letter issued by DGMS, would be strictly complied with during actual operation of the mine.

### **PH-1.6 Environmental Monitoring Programme**

The scope of environmental management includes plantation, surface drainage, subsidence monitoring and air, water and noise pollution checks etc. For air, water and noise pollution control measures, samples will be collected and tested for all four seasons at strategic places representing all the categories of areas as indicated by CPCB.

#### **Monitoring Schedule**

For air, water, noise and ground-water level, quarterly monitoring is proposed. Following number of stations have been fixed for monitoring of environment for the proposed project.

- i. Ambient Air:-4 Stations (1 in core zone, 2 residential along coal transportation roadway & 1 at Railway Siding)
- ii. Water:- 2 Stations (1 drinking water & 1 mine discharge)
- iii Noise:- 3 Stations (1 in core zone, 1 at a residential station & 1 at Railway Siding)
- iv. Ground water level monitoring wells (2 in core zone & 2 in buffer zone)

### Plantation Monitoring

The project authority at field level will continuously monitor the growth and survival/mortality rates of the plantations till the end of 3 years or so. Once trees attain desired growth, no further monitoring will be required.

### Health Monitoring

A regular schedule will be programmed for monitoring health of the workers and staff associated with the mining operations and other connected industrial activities for identifying occupational diseases etc. in time and initiating remedial measures. Mobile ambulance will also be used for such programmes to monitor the health of the population around the area.

### PH-1.7 Provision for Environmental Management

For environmental management, necessary capital, manpower and equipment have been provided. A total capital investment of Rs. 75.00 lakhs has been envisaged for various environmental management activities as shown in the following table.

Sl.	Item	Amount in Rs. Lakh
1	Environmental data generation and EMP preparation.	20.00
2	Settling Tank. with connecting drains	20.00
3	Dust suppression through water spraying by 2 nos. of 10 KL tanker-trailers.	18.00
4	Consent to establish.	6.00
5	Dust suppression and dust extraction in mini CHP	7.00
6	Dust suppression at Railway Siding.	3.00
7	Miscellaneous (for safety equipment)	1.00
<b>Total</b>		<b>75.00</b>

In addition to capital investment, a revenue expenditure @ Rs. 9.98 per tonne of coal produced has been suggested for carrying out environmental control measures and afforestation work during the life of the Project.

### PH-1.8 Mine Closure

Mine closure planning needs to be done before the commencement of mine operation and requires periodic reviewing and modification, if needed, during its life cycle to ensure safety and to cope up with social & environmental challenges. Various objectives of the advance mine closure planning are as follows:

- a) To allow 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 eliminate environmental damage due to mining operation and thereby encourage environmental sustainability.
- d) To minimize adverse socio-economic impacts.
- e) To protect the flora and fauna of the area.
- f) Effective re-use of the assets.

The life of the mine as per present proposal is more than 25 years for exploitation of R-VIIT, R-VI and Lo seams. After exhaustion of reserves of this seam, existing shafts will be further deepened for exploitation of lower seams; this will increase the life of the mine considerably. Separate project report will be prepared for continuing mining activities in lower seams within the same leasehold area of the mine. Mine closure planning has to be done keeping these facts in view.

It is under consideration by CIL to earmark a tentative amount of Rs.1.00 per tonne of coal produced for implementing the mine closure plan. Although no statutory guidelines exist on financial provisioning for mine closure activities as yet, financial provisions are proposed to be provided from revenue expenditure in order to undertake mine closure activities. Closure cost may be reviewed under the changing circumstances and new legislative requirements.

#### PH-1.9 Sources & Type of Data

Sl. No.	Nature of Study	Name of the Agency
1	Geological Report	CMPDI, a subsidiary of Coal India Ltd., is a premier consultancy organization engaged in mineral exploration, land resource management through remote sensing survey, coal petrography, mine planning, coal preparation & utilization, design of coal handling plants, environmental management of coal projects etc. The environmental laboratory of CMPDI is recognised by Central Pollution Control Board, Ministry of Environment & Forests, Government of India and accredited with ISO-9001 certification. It undertakes baseline environmental data generation, EIA, EMP and monitoring various factors related environment.
2	Project report	
3	Land-use study	
4	Hydro-geological Study	
5	Mineralogical analysis of dust	
6	Seasonal Ambient Air Quality Study	VRDS Consultants, Chennai
7	Ambient Noise Level Study	
8	Soil Quality study	
9	Water Quality study	
10	Socio- Economic Study	PDIL, Dhanbad . a premier design engineering and consultancy PSU organization having ISO 9001:2000 certification, committed towards technological excellence and self-reliance in the growth of the core sector.
11	Flora & Fauna study	VRDS Consultants, Chennai alongwith Dr. PS Raja Sekhar, Associate Professor, Department of Environmental Science & Dr. M Venkaiah, Associate Professor, Department of Botany, Andhra University, Visakhapatnam

