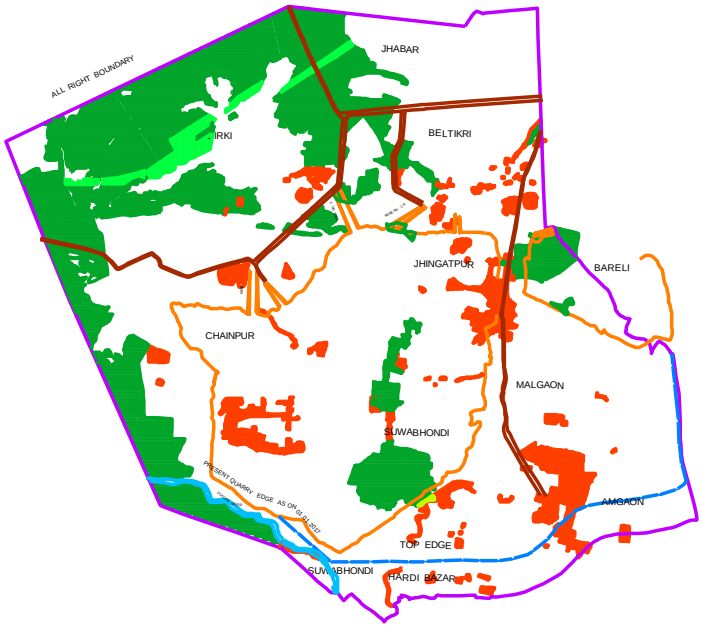
# PUBLIC HEARING DOCUMENT OF EIA/EMP FOR CAPACITY ENHANCEMENT OF EXISTING DIPKA OPENCAST PROJECT

## *(Dipka Area)*

***Village: Dipka; Tahsil: Katghora; District: Korba; State: C.G;***
***Capacity: 31.00 MTPA To 35.00 MTPA)***
***Project area: 1999.417 Ha.***

## *South Eastern Coalfields Limited*

*(A Mini Ratna Company)*




***July-2017***

***Central Mine Planning & Design Institute Limited***
***Regional Institute – V***
***SECL Complex, Post Box No. 22,***
***BILASPUR (C.G.)***

## 1.0 INTRODUCTION:

### 1.1 Purpose of the project:

The Dipka OCP is an existing mega opencast project in the thick seam zone of SECL command area. It is under the administrative control of Dipka Area. The Project Report for Dipka Expansion Opencast Project (20 to 25 MTPA) was approved by CIL Board on dated 22.12.2009. Presently, Dipka OCM is having Environment Clearance for a peak coal production of 31.0 MTPA. The mine has achieved the coal production of 31.0 MTPA in the year 2015-16.

Based on "Road Map for Enhancement Coal Production of CIL-1 BT" the target of SECL for the year 2017-18 is 165.00 Mt. Demand for power grade has increased. To meet this growing demand, Dipka OCP has been identified for enhancement of production from its present peak production of 31 MTPA to proposed normative production of 35 MTPA.

Within the same land area, the balance coal within the approved quarry boundary is 359.19 MT and balance OB within the approved quarry boundary is 430.71 Mcum as on 01.04.2016. Based on the balance coal and OB, the revised production calendar programme is calculated to produce 35.0 MTPA of coal. Accordingly, a new mining plan has been prepared to produce 35.0 MTPA and approved by SECL Board on 13/05/2016. As per the approved mining plan the balance life of the project was 11 years. Since this is a running mine the current status of reserve has been changed/reduced. The production of the 1$^{st}$ year i.e. in 2016-17 is restricted to 31.00 MT (coal) & 18.88 Mcum (OB), hence the balance reserves of the mine comes to 328.19 MT (coal) & 411.62 Mcum (OB) as on 01/04/2017. Balance life of the mine is also reduced to 10 years as on 01/04/2017.

### 1.2 Location:

Dipka OCP Expansion, a part of Dipka and Hardi Blocks, is located in the south-central part of Korba Coalfield in Korba district of Chhattisgarh. These blocks cover an area of 12.42 sq.km. and are bounded by latitudes 22$^{o}$18'59" and 22$^{o}$19'43" North and longitudes 82$^{0}$30'47" to 82$^{0}$33'34" East (ref. Plate No. I) and included in Survey of India Toposheet No. 64J/11.

### 1.3 Communication:

The blocks are well connected by rail and road. 'Gevra Road' and 'Korba Railway Stations' on Champa-Gevra Road branch line of S.E. Railway are at a distance of 19 km and 25 km respectively.

Railway siding which exists upto Gevra OCP is being extended upto Dipka. At present, Coal from Dipka OCP is being dispatched through the existing Rly Sidings at Junadih and Gevra Road. SECL headquarters, Bilaspur, is at a distance of about 90 km by road. Important Distance by Rail to Gevra Road Station -

| | | |
|---|---|---|
| From Bilaspur (Company HQ) | ... | 93 |
| KmFrom Howrah (CIL HQ) | ... | 708 Km. |

## 1.4 Scope of the study:

CMPDI had started drilling in and around Dipka in 1977-78 and first phase of drilling was completed in 1986-87. However, the detailed drilling in second phase on the dip side started in 1997 and completed in 1998. On the basis of detailed drilling, G.R. was prepared. A total 81 boreholes were drilled in the mine take area of 20.00 sq.km. Based on GR, project report and further expansion project report and scheme/mining plan has been prepared. Based on GR & approved PR/Scheme/Mining Plan, EIA/EMP has been prepared.

Baseline environmental data in respect of micro meteorological data, air, water, soil quality data, and noise level data have been generated by M/s Edward Food Research and Analysis Centre (EFRAC), Kolkata (A MoEF & CC Recognized and NABL Accredited Environment Laboratory).

Meteorological data has been collected from Indian Meteorological Department at Bilaspur and rainfall data from Katghora.

The socio economic data in respect of population statistics, economic profile, work force pattern, civic amenities, land use pattern etc. is based upon data generated by M/s VRDS Consultants, Chennai. The Flora and fauna details in core and buffer zone is based upon data generated by M/s/VRDS Consultants, Chennai.

Data incorporated from PR-25 MTPA & scheme/mining plan of Dipka opencast expansion project-35 MTPA and other data collected from Area/Mine authority, Dipka opencast project.

Ground water data has been collected from Ground Water Survey Unit of Bilaspur District for Banki Mogra village and Hardibazar village.

## 1.2 Project description:

### 1.2.1 Need for the Project:

Liberation of power sector by Govt. of India has generated wide spread interests private & public sector investments in power generation and other industrial development. As such, there is an appreciable increase in the number of upcoming new projects as well as expansion of existing projects. The demand projection of coal nationally as well as from CIL/SECL is increasing rapidly. Hence, a road map has been prepared to meet the demand. CIL has to produce nearly 1 billion ton in 2019-20 in which SECL has to share 239 MT.

Based on the "Road Map for Enhancement Coal Production of CIL" the target of SECL for the year 2017-18 is 165.00 MT. To meet this growth in production of SECL in the year 2017-18, Dipka OC has been identified for enhancement of production from 31 MTPA to proposed normative production of 35 MTPA due to unavoidable delay in opening of new projects.

### 1.2.2 Justification:

i. Sufficient strike length and additional proved reserves are also available at favourable stripping ratio on the dip side of existing Dipka OCP for planning its expansion to 35 MTPA capacity.

ii. As the project will be an expansion of the existing Dipka OCP, the basic infrastructure is already available and additional production can be planned with less gestation period.

iii. All the additional 4 MTPA production of Dipka OCP is proposed to be linked to Seepat STPS (under construction) of NTPC located at a distance of about 35 km from the project. The location of Dipka OCP is ideal for supplying coal to this STPS.

iv. Out of four seams LK (B), LK (T), UK and E&F having ranges of thickness 2.19-24.50m, 34.70-44.85m, 24.69-35.82m and 12.7-19.05m respectively, main chunk of production is from LK (T) and UK. But both the seams split into three sections. In case of LK (T), total coal thickness of all splits stoops down to as low as 27.32 m (split thickness varying as 4.0m, 9.47m and 13.85m). Similarly, for UK, total coal of all splits plummets to 25.76m (split thickness varying 4.83m, 8.38m and 12.55m).

v. Considering all the above points and geo-mining parameters of the quarry, the annual production of 35 Mte is the optimum and sustainable production from this property.

### 1.2.3 Description of Coal Seams:

Occurrence of 3 nos. of coal seams have been proved in the block. These seams in descending orders are 'E' & 'F', Upper Kusmunda and Lower Kusmunda. Lower Kusmunda Seam occurs as composite seam in the northern part of the block. However, it splits up in two sections, namely, Lower Kusmunda (Top Section) and Lower Kusmunda (Bottom Section) in southern part of the block. The average grade of the coal is 'E'

### 1.2.4 Reserve:

The mine-able reserves & volume of OBR have been given as in table-1.1. Representative bore hole log is shown in plate – IV of EIA/EMP.

**Table-1.1**

| S.N. | Seams/Partings | Unit | West Section | East Section | Total |
|---|---|---|---|---|---|
| A. | Mineable Reserves | | | | |
| | E&F Seam | Mt | 6.63 | 1.96 | 8.59 |
| | Upper Kusmunda seam | Mt | 56.21 | 41.57 | 97.78 |
| | Lower Kusmunda (Top) seam | Mt | 83.19 | 106.70 | 189.89 |
| | Lower Kusmunda (Comb/Bot) | Mt | 133.15 | 187.59 | 320.74 |

| S.N. | Seams/Partings | Unit | West Section | East Section | Total |
|---|---|---|---|---|---|
| | Total Reserves | Mt | **279.18** | **337.82** | **617.00** |
| B. | Vol. of OB/Parting | | | | |
| | Top O.B.R. | Mcum | 108.58 | 166.16 | 274.74 |
| | Parting between E&F & UK | Mcum | 21.08 | 5.64 | 26.72 |
| | In seam band of Upper Kusmunda seam | | 6.76 | 3.74 | 10.5 |
| | Parting between LK (Comb) / (Top) & U/K | | 83.32 | 122.29 | 205.61 |
| | In seam band of Lower Kusmunda(Top)seam | | 3.51 | 5.90 | 9.41 |
| | Part. bet. L/K(B/C) & L/K(T) | | 27.55 | 37.15 | 64.70 |
| | In seam band of Lower Kusmunda(Comb/Bot) | | 9.39 | 13.93 | 23.32 |
| | Total vol. of OB/Parting | Mcum | **260.19** | **354.81** | **615.00** |
| C. | Stripping Ratio | Mcum/t | 0.93 | 1.05 | 1.00 |

### 1.2.5 Geo-mining characteristics:

The total quarry has been divided into two sections i.e. western section and eastern section. Western section would be worked in advance. Geo-mining characteristics of the project is depicted in table-1.2.

**Table-1.2**

| Sl.No. | Particulars | Unit | Values |
|---|---|---|---|
| (a) | Lower Kusmunda (Comb) | m | 56.70 - 70.15 |
| (b) | Lower Kusmunda (Top) | m | 34.70 - 44.85 |
| (c) | Lower Kusmunda (Bot) | m | 2.19 – 24.50 |
| (d) | Upper Kusmunda | m | 24.69-35.82 |
| (e) | Seam E&F | m | 12.70- 19.05 |
| A. | Specific Gravity of the seams | Mcum/t | 1.58 |
| B. | Av. gradient of the quarry floor | | 1 in 9 to 1 in 17 |
| C. | Av. Quality of seam | Grade | E |
| D. | Excavation Category | Assumed | III |
| a | Parting between Lower Kusmunda (Bottom) and Lower Kusmunda (Top) | m | 3.00-35.56 |
| b | Parting between Lower Kusmunda (Top)/(Combined) & Upper Kusmunda | m | 12.17-78.63 |
| c | Parting between E&F and UK | m | 30.14-62.12 |
| d | Top O.B. | m | 8.02-85.15 |
| E. | Excavation Category | Assumed | 50% Cat III<br>50% Cat IV |
| F. | Insitu volume weight | T/cum | 2.25-2.40 |
| A. | Strike length of the quarry. | Km | 3.0 – 4.0 |
| B. | Dip rise width of the quarry | Km | 2.6 – 3.2 |
| C. | Maximum depth of the quarry | m | 250 |
| D. | Surface area of the quarry | Ha | 1002.053 |

### 1.2.6 Method of mining:

Considering the geo-mining parameters of the quarry, shovel-dumper mining system has been adopted to excavate OB, while extraction of coal will be done through Surface Miner.

Excavation and transport of OB will be done departmentally by deploying existing equipment with additional 10 cum capacity rope shovels and 100 T rear dumpers. The top size of the elect. rope shovels will have a nominated rated bucket capacity of 42 cum. Elect. rope shovels of this size will be used for excavation of waste material and will be largely restricted to the overburden above UK seam including detrital mantle, and to the parting between UK and LK seams.

Surface Miner will be deployed for extraction of coal and loading & transport operations will be done by leased equipment. Tipping trucks will be deployed for coal loading and transport. In the proposed system tipper transport is being limited to flanks, where lead will normally not be exceed 2 km on level stretch during mining operation.

The coal benches would be formed parallel to the coal seams and would be mined by inclined slicing method. The O.B. benches would be formed horizontally along particular horizons of 15 m thick and would be mined by horizontal slicing method. However, the O.B. benches immediately above the roof of the seams would be formed parallel to the coal seam roof to avoid the formation of triangular rib of O.B. which is likely to mix up with the coal after blasting. The maximum OB bench height would be maintained at 15m and coal bench height at 20-25m for Surface Miner.

The following pit design parameters have been adopted.

1. Maximum Bench Height

   O.B. - 15m

   Coal - 20-25 m (by Surface Miner)

2. Width of the permanent haul road - 40 m

3. Width of the temporary transport ramp - 20 m

4. Usual height of the spoil dump bench - 30 m

5. The width of the active dump bench - 60 m

6. Bench Slope (working)

   O.B. bench - within $70^0$

   Coal bench - Within $50^0$ -$60^0$ (Surface Miner)

   OB Dump bench - Upto $37^0$

7. Overall OB dump slope (for 250- depth) will be maintained – Within $28^0$

## 1.3 Description of the environment:

### 1.3.1 Study Area, Period, Components & Methodology:

Study area is considered area within 10 km radius from the periphery of the project as all the base line data have already been studied and assessed within this definition of ambit of the study area.

#### 1.3.1.1 Components:

As mentioned in point no. 3.1.1 of EIA/EMP.

#### 1.3.1.2 Methodology:

#### 1.3.1.3 Socio-economic study:

Referring to Census 2011 the socioeconomic study has been made.

#### 1.3.1.4 Land Use pattern:

Referring to Census data-2011, the Land Use pattern study has been considered.

### 1.3.2 Ambient Air Quality Study:

**A. Methodology:** The Ambient Air monitoring encompasses the results and statistical evaluation of the data monitored at six locations in the Dipka OC project site. The study includes baseline monitoring for ambient air for three Months from April to June 2016. The AAQM Stations were selected in such a way that One should be in Upwind, Two in Down Wind, One in Core Zone & Two in Predominant wind direction. Different parameters like SPM, PM10, PM2.5, Oxides of Sulphur, Oxides of Nitrogen, Ozone, Ammonia, CO, Lead, Nickel, Arsenic, Benzene, Benzo (a) Pyrine, Mercury, Chromium and Cadmium were monitored for representing the baseline status of ambient air quality within the study area. The following standard methods for collection, analysis & interpretation of data have been considered.

### 1.3.3 Water Quality Study:

**A. Sampling Methodology:** To assess the water quality of the project area, two locations were selected for drinking water sampling, two ponds from two villages viz. Chainpur & Vivekananda nagar village were selected for surface water sampling & Dipka O/C Mine pit Sump Water & Mine water at discharge point were collected for effluent water quality assessment throughout the period. The quality of drinking water samples were compared with respect to IS 10500:2012 specification, the surface water quality was compared with respect to IS 2296: 1982 Class C, the effluent water quality was compared with respect to GSR no 422(E) of part A (Class-A) Bacterial examination was also carried out to find out the coliform contamination in drinking water sources.

### 1.3.4 Noise Quality Study:

**A. Sampling Methodology:** To know the background ambient noise level at the project and surrounding environment, noise level were measured at all the ambient air monitoring stations. The Day time & Night time Noise Level data are given in tabular formats as well as in graphical way for easy interpretation. Day Time means 06:00 am to 10:00 pm & Night Time means 10:00 pm to 06:00 am.

**B. Noise Level Monitoring:** "Protocol for Ambient Level Noise Monitoring, CPCB July 2015" was followed to collect and analyse the Ambient Noise level surrounding the Project Site.

**Table – 1.3**

| Parameters | Standard Methods | Analytical Instruments | Make & Model |
|---|---|---|---|
| Leq | Protocol for Ambient Level Noise Monitoring, CPCB July 2015 | Noise Level Meter | HTC, 1352 |

### 1.3.5 Soil Quality Study:

**A. Methodology:** "Indian Standard Method of Test for Soils (IS: 2720)" & "Soil Chemical Analysis by M. L. Jackson" for the analysis of soil sample in the laboratory have been followed. pH of Soil is analysed by pH Meter after overnight shaking of 10% soil solution. Electrical conductivity of Soil is determined by Conductivity Meter of the same soil solution. SAR is determined by mathematical calculation after the analysis of Na, Ca, Mg, K in soil by Atomic Absorption Spectrophotometer (AAS). Water Holding Capacity is determined gravimetrically by taking a measured amount of soil sample and by using Whatman 42 filter paper. WHC is actually the amount of water which is absorbed by the measured amount of soil sample. Specific gravity is measured gravimetrically by calibrated pyknometer with respect to the density of Water. Ammoniacal Nitrogen is measured by digesting soil with freshly prepared NaOH solution and absorbed in borate buffer & indicating boric acid solution and then titrating against 0.01N sulphuric acid. Phosphorus is measured in UV Visible spectrometer at 430 nm by developing colour with molybdovenadate reagent. Potas (as $K_2O$) is calculated from the concentration of available potassium by AAS. Cation exchange capacity is calculated by measuring the sodium content of 10% of the solution by AAS by adding 25 ml of 1.0 M sodium acetate solution and by centrifuging it at 2000 rpm and after getting the sample whose EC is below 40 mS/cm. Mechanical soil analysis (Soil Texture) is determined by hydrometer by taking 10 gm of soil sample and by giving 10 ml of sodium hexametaphosphate solution to break down the soil aggrigates by taking the hydrometer readings in a room temperature in different time intervals like 40 sec and 2 hour. Organic carbon is calculated by digesting 1 gm of the soil with conc. $H_2SO_4$ and 1 N $K_2Cr_2O_7$ solution in digester and by titrating against ferrous ammonium sulphate solution with ferroin indicator.

### 1.3.6 Study of Socio -Economic Profile:

Socio-economic study including demographic, economic, workforce, civic amenities and basic & civic amenities within 10 km. radius of the project is based on 2011 census data.

**A. Methodology:**

The study of Socio-economic environment is an integral part of Environmental Impact Assessment (EIA). The study includes the Social profile, Economic, Infrastructure facilities, Occurrence of historical / Archaeological sites and presence of important features of the study area (Core zone and Buffer zone 10 Km radius from mine lease area). Census 2011 Village boundary map is used as a reference for identifying the villages. All the information is collected from the census and reported in this report.

In order to validate the census data, house hold survey of 256 households was made by floating questionnaire to the residence and local people/Village head (Mukhia/Sarpanch) of different project affected villages. House Hold data was collected in the presence of representative of South Eastern Coalfields Ltd. Sample size varies as per need, time and convenience. Occupational health status of the above for the different age group and sex was also collected.

**B. Rationale behind sampling:**

Villages were chosen as per convenience of team and response of localities. Also accessibility to the villages was considered. Project affected villages were selected for House Hold Survey to know the effect of the project on them.

**1.3.7 Land use distribution:**

Land use and land management practices have a major impact on natural resources, including water, soil, nutrients, plants and animals. Land use information can be used to develop solutions for Natural Resource Management. Pre-mining, existing mining land use pattern of core zone is given below and the land use pattern of buffer area is covered in *annexure – IV of EIA/EMP*.

**A. Core Zone Land use:**

The project has EC on 1999.293 Ha land. However, enhancement of production has been proposed within 1999.417 Ha. of land. This includes land for quarry, external dumps, infrastructure, workshop, administrative building, roads, green belt and safety zone etc. The break-up of land is given below and shown in figure - 3. 5 of EIA/EMP.

**Table-1.4**

| Stages of mining | Activity | Types of land area (in Ha.) | | | Total Area (in Ha.) |
|---|---|---|---|---|---|
| | | Forest | Tenancy /Agri. | Govt. | |
| Pre-mining | Nil | 409.149 | 1409.244 | 181.024 | 1999.417 |
| During mining | Quarry area | 52.858 | 858.314 | 90.881 | 1002.053 |
| | External OB dump | 54.718 | 125.212 | 26.07 | 206 |

| | | | | | |
|---|---|---|---|---|---|
| | **Infrastructure, Workshop, Admn. building etc.** | **279.242** | **313.518** | **41.114** | **633.874** |
| | **Roads** | **0** | **4** | **0** | **4** |
| | **Green Belt** | **0** | **23** | **0** | **23** |
| | **Safety zone** | **22.331** | **85.2** | **22.959** | **130.49** |
| | **Total land** | **409.149** | **1409.244** | **181.024** | **1999.417** |
| | **% of total land** | **20.46** | **70.48** | **9.06** | **100** |

**B. Buffer Zone Land use:**

The detailed land use map is prepared based on topo-sheets and then supplemented by information collected from Forest Department, revenue department and mouza maps of the neighbouring villages. Study area map is shown in plate-VI of EIA/EMP.

Census data of 2011 have been collected and utilised for knowing the land use pattern. Village wise land use pattern is given in *annexure –IV* of EIA/EMP.

***Table-1.5: Summary Land – use distribution***

| Zone | Forest | Non-Agr | Barren Land | Grazing Land | Trees/ Crops | Waste Land | Fallows Land | Net Area Sown |
|---|---|---|---|---|---|---|---|---|
| Buffer Zone | 23.26% | 2.78% | 2.71% | 7.10% | 0.07% | 2.10% | 2.41% | 1.86% |

### 1.3.8 Meteorological Trend:

The meteorological data with respect Temperature for 1984 to 2014 are available so far from the nearest Bilaspur Meteorological Observatory, which is situated approximately 90 km. from the project. For details refer to Annexure - IX. Brief description thereto is given as in table-3.9. The temperature varies from $5^0$C to $44.7^0$C. The average rainfall as per rain gauge station at Katghora for 1954 to 2014 is 1490.4 mm.

### 1.3.9 Micro-meteorological Study:

**A) Location & Rationale of Sampling:**

Micrometeorological and microclimatic parameters were collected and recorded by installing station at the terrace of CGM office that represents micrometeorological aspects of the study area. During April 2016 to June 2016 hourly reading of wind velocity, wind direction, temperatures, humidity, cloud cover, etc., were recorded and collected. Location is shown in plate –VIII of EIA/EMP.

**B) Methods Followed:** "EPA454/R99005, February 2000" was followed for micrometeorological data collection & result interpretation.

**Table – 1.6**

| Parameters | Standard Methods | Sensors | Make & Model |
|---|---|---|---|
| Air Temperature | EPA454/R99005 | Digital sensor | Virtual Electronics Company (Eco Serise) |
| Relative Humidity | EPA454/R99005 | Digital Sensor(Hygrometer) | |
| Wind Speed | EPA454/R99005 | 3 Cup anemometer | |
| Wind Direction | EPA454/R99005 | Hall Effect (Wind Vane) | |
| Barometric Pressure | EPA454/R99005 | Piezo Resistive | |
| Rain Fall | EPA454/R99005 | Tipping Bucket | |

**C) Weather Monitoring:** Weather monitoring would help in keeping track of different parameters like temperature, humidity, rainfall, wind direction, wind speed & barometric pressure. Real time meteorological data is used to support a number of programs including public aviation, agricultural activity, disaster management etc. In the present study, the "ambient temperature, relative humidity, wind speed, wind direction, barometric pressure, cloud cover" at the proposed project area are monitored.

### 1.3.10 Ambient air quality:

The locations for air sampling were selected on the basis of "joint site survey", "examination of topo sheet of the project area", "secondary micrometeorological data analysis", historical wind direction pattern" and "availability of resources" for ambient air quality monitoring & micrometeorological monitoring. A synopsis about the locations is as follows:

**Table – 1.7**

| Location Code | Name of Location | Latitude | Longitude | Direction & distance from Core zone | As per Wind Direction |
|---|---|---|---|---|---|
| L1 | CGM office, Dipka OC | N 22° 20'15.85" | E 82° 31'06.78" | Core Zone | Core Zone |
| L2 | Sirki Village | N 22° 21'03.77'' | E 82° 31'08.97'' | NW,0.5 Km | Crosswind Direction |
| L3 | Binjhra Village | N 22° 21'46.08'' | E 82° 33'50.64'' | NE, 1.6 Km | Crosswind Direction |
| L4 | Dadar Para Village | N 22° 21'28.43'' | E 82° 36'37.32'' | NE, 2.8 Km | Upwind Direction |
| L5 | Renki village | N 22° 18'27.33" | E 82° 30'55.15'' | W, 1.7 Km | Downwind Direction |
| L6 | Saraisingar Village | N 22° 18'59.57'' | E 82° 36'03.99'' | E, 1.1 Km | Downwind Direction |
| Weather | CGM office | N 22° 20'16.44" | E 82° 31'06.94" | Core Zone | MET Data Station |

**AAQM Monitoring Stations:** Six Ambient Air Quality Monitoring stations were selected as per the Guidelines mentioned in IS: 5182 (Part14): 2000 for Rapid

Environmental Impact Assessment in the project area. On the basis of wind rose pattern, these AAQM stations were so selected that one would be at upwind direction, two at downwind direction, two at crosswind direction & one at the core zone. All the selected stations were situated within the 1.0 to 3.0 km from periphery of the core zone.

**(i)** **CGM Office, Dipka *(L1):*** It is selected to assess the baseline environmental status at the core zone of the proposed project activity.

***(ii)*** ***Sirki Village (L2):*** It is selected to assess the base line environmental status at the crosswind direction of the proposed project activity. This station was situated at North-West & nearly 0.5 km away from the core-zone.

**(iii)** ***Binjhra village (L3):*** It is selected to assess the base line environmental status at the downwind areas of the proposed project activity. This station was situated at north-east & nearly 1.6 km away from the core-zone.

**(iv)** ***Dadar Para Village (L4):*** It is selected to assess the base line environmental status & to know the increase of the pollutant at the downwind direction of the project activity. This station was situated at north-east & nearly 2.8 km away from the core-zone.

**(v)** ***Renki village (L5):*** It is selected to assess the baseline environmental status in the upwind direction of the proposed project. This station was situated at south-west & nearly 1.7 km away from the core- zone. This will help to know the background of the pollutant at the southwest of the project.

***(vi)*** ***Saraisingar Village (L6*)** **:** It is selected to assess the base line environmental status in the crosswind areas of the proposed project. It will help to know the increase of the pollutant at the crosswind due project activities. This station was situated at south-east & nearly 1.1 km away from the core-zone.

### 1.3.11 Water quality:

#### A) Inventory of existing water pollution sources:

Sources of pollution are given as in table-11.8.

**Table-1.8**

| Sl. No. | Sources | Major Pollutants |
|---|---|---|
| 1 | Mine Water | Coal fines/ suspended solid |
| 2 | Effluents from CHP/ Workshop | Suspended solids, oil & grease & COD |
| 3 | Domestic waste water discharge | Suspended solid and organic pollutants. |

#### B) Sampling Station & their Rationale:

Drinking water was collected from two hand pumps situated at Ranki village & Dadarpara village to assess the drinking water quality of the project area. Similarly to assess the surface water quality, two ponds from Chainpur village &Vivekand village

were selected. To evaluate the pollution, the effluent water from mine pit of Dipka OC & mine water from discharge point of Dipka OC have been collected and analyzed.

Sampling stations are shown in the *Plate - IX* of EIA/EMP and their rationale are depicted in the table.

**Table-1.9**

| Location Code | Name of Location | Latitude | Longitude | Direction & distance from Core zone | Reason for selection |
|---|---|---|---|---|---|
| D/W 1,3,5 | Borewell water, Renki Village | N 22° 18'26.61'' | E 82° 30'55.42'' | 1.7 KM SW | To assess drinking water (ground water) quality at village areas. |
| D/W 2,4,6 | Borewell water, Dadarpara Village | N 22° 21'24.53'' | E 82° 36'38.43'' | 2.8 KM NE | To assess drinking water (ground water) quality at village areas. |
| S/W 1,3,5 | Pond water, Chinpur Village | N 22° 19'58.14'' | E 82° 30'29.98'' | 2.5 KM SW | To assess surface water quality |
| S/W 2,4,6 | Pond water, Vivekananda Village | N 22° 21'01.12'' | E 82° 31'41.96'' | 2.6 KM SE | To assess surface water quality |
| E/W 1,3,5 | Sumpwater, Mine pit, Dipka OC | N 22° 20'17.56'' | E 82° 30'36.54'' | Core Zone | To assess mine water quality. |
| E/W 2,4,6 | Mine water at Discharge Pt, Dipka | N 22° 20'18.67'' | E 82° 31'23.27'' | Core Zone | To assess mine water quality. |

The above locations/stations have been chosen in such a way so as to cover the Core and Buffer zone area of the mine. This will enable to obtain a comprehensive idea of water quality in and around the mining area.

### 1.3.12 Noise level:

At CGM Office Dipka, OC the average value of Leq at day time was noticed 62.5 dB (A) & at night time it was 49.0 dB (A). Similarly at all other locations viz. Renki village, Dadar Para Village, Binjhra Village, Sirki Village &Sarisingar Village the average noise level at day time was in the range of around 53.9 to 48.0 dB(A) & at night time it was 46.0 to 37.9 dB(A). It is easily concluded that all the Leq values, for all the locations, both for Day & Night time were within the CPCB prescribed Limit.

***** Remarks:** Sampling & analysis of noise level had been carried out as per standard methodology; refer "Annexure-B" for the range under the Scope of NABL & MoEF & CC.

### 1.3.13 Soil Quality:

pH value of 10% Soil solution was found in the range of 5.835.56. Electrical conductivity was found was in the range of 28.5 to 22.8 µs/cm. Water holding capacity was found in the range of 28.6 to 27.5 %. The Specific gravity of the soil was in the range of 2.27 to 2.2 gm/cc. Available Nitrogen was found in the range of 8.29 to 5.59 mg/kg.

****** Remarks:** All the soil parameters mentioned above had been sampled & tested as per standard methodology; refer "Annexure- B" for the range & specific test methods which are under the Scope of MoEF & CC.

**Analysis:** The soil quality of all the locations are supportive for vegetation.

### 1.3.14 Forest flora & fauna:

**A. Baseline status of flora:**

Flora of the project areas is classified into Terrestrial and Aquatic flora.

**B. Terrestrial Flora:** Terrestrial flora consists of the following:

**(i)** Agriculture crops cultivated (cereals, pulses and vegetables) during rainy season (Kharif) and post rainy moths of winter season (Rabi);

**(ii)** Commercial crops;

**(iii)** Natural vegetation of Forest type includes endemic species/ endangered species.

**(iv)** Plantations and Agro-forestry species.

**(v)** Grass lands.

### 1.3.15 Hydrogeology:

**Annual Groundwater Recharge*:***

In the study area, rainfall is the major recharge source to groundwater. This area experiences an average annual rainfall of about 1438 mm (Period: 1989-2015), monitored at GM Office station, Dipka OCP. The highest rainfall recorded within 24 hrs was 230mm as per PR. Part of the mine water discharged into the local drainage has been utilized by villagers for irrigational purposes and 20% of recharge to the groundwater system as a return flow.

***a. Water table fluctuation method*:** The annual ground water recharge by water level fluctuation method, as specified in GEC, 1997, for the rechargeable area (404.27 $Km^2$) was estimated as *61.60 M.Cum (32.26 M.Cum + existing draft 29.34 M.Cum)*.As the local ground water levels get affected near mine area, the recharge estimated by water level fluctuation method for future projections may

not be authentic. *Hence, in the present context, the rainfall infiltration method may be considered as more practical and reliable.*

***b. Rainfall infiltration method:*** The total area of 40,427 Ha with gently undulating terrain was considered for the recharge estimation. In the total area, about 28,980 Ha falls under sedimentary and remaining area of 11,447 Ha belongs to hard rock terrain.

As reported in GEC Report 1997, for sandstone a rainfall infiltration factor of 12% and 8% for hard rock (gneiss and schist) were considered for the study area. Accordingly, the gross recharge in the study area was estimated, by rainfall infiltration method, as ***63.18 M. Cum (Sedimentary: 50.01 + Hard rock: 13.17).*** After considering, 15% of gross recharge as natural losses (i.e. 9.48 M. Cum), the net annual groundwater recharge in study area was assessed as ***53.70 M. Cum.***

## 1.4 Anticipated Environmental Impact & Mitigation Measures:

### 1.4.1 Socio economic Impact:

**Table-1.10**

| **1.00** | **Impact on Socio-economic** |
|---|---|
| 1.01 | Population Growth & In-migration |
| 1.02 | Human Settlement & Resettlement / Rehabilitation |
| 1.03 | Transport & Communication |
| 1.04 | Income & Employment |
| 1.05 | Civic Amenities& Community Development |
| 1.06 | Educational facilities & Literacy Drive |
| 1.07 | Economic growth |
| 1.08 | Growth of Financial Revenues- State & Central |
| 1.09 | Social status growth |

The above impacts are discussed below.

**Table-1.11**

| **Sl. No.** | **Impact on** | **Impact** |
|---|---|---|
| 1 | Population Growth & In-migration | Population growth in the project area as well as in the buffer zone is already accelerated owing to immigration of people from outside resulting in increased job and income opportunities. |
| 2 | Human Settlement & Resettlement/ Rehabilitation | The incoming population to the project is already moved in search of jobs; and thereby, a problem of new human settlement come into existence, and additional worker colonies start growing in. In view of that the existing civic amenities such as water supply, power supply etc. is in improvement with the ongoing of the project.<br>Rehabilitation of 1690 families is involved in the project in. As on 31/03/2017, 421 families have been rehabilitated in 05 R & R sites and 1130 families have taken cash compensation in lieu of house plot. Balance 139 families would be |

| Sl. No. | Impact on | Impact |
|---|---|---|
| | | rehabilitated in due course. The total no. of land oustees are 1445 and entitled no. of employment is 1645 out of which job already given to 1482 nos. and 36 nos. have opted cash compensation in lieu of employment. Balance 127 nos. of employment would be given as per the R & R norms of State Government. |
| 3 | Transport & Communication | Due to increase industrial activities and population growth in the area, the existing transport and communication system have already improved with a view to catering to increased traffic volume and frequency. |
| 4 | Income & Employment | Coal mining project forms the basic sector of employment. With increase in income opportunities and employment potentialities in this sector as the mining activities increase, the other economic sectors starts gaining in momentum. New avenues of employment in the sectors such as construction, trade & commerce and service is also getting on the move resulting in shooting up demand of workers and others. |
| 5. | Civic Amenities& Community Development | Due to the infrastructural facilities created and the consequent migrational happenings in the project area and nearby, socio-cultural interaction has resulted amongst population consisting of people from different areas. With added educational, medical and communication facilities developed in the areas, the standard of living has improved. With ongoing of mining activities additional facilities for local population by way of better communication, postal services, educational facilities, advanced medical services etc. are on in the area. |
| 6 | Educational facilities & Literacy Drive | A number of educational institutes are already existing in the buffer zone. This has attracted nearby villages to avail such facilities which in turn has increased literacy level in the area.<br>An action plan for achieving 100% literacy among workers in the SECL, was launched in the year 1992. Under the same scheme, workers of Dipka project will be covered to achieve 100% literacy level. |
| 7 | Economic growth | The mining activities have accelerated the economic transformation and urbanization in the region with the creation of new employment opportunities. This has boosted or will boost the economic growth of the region. |
| 8 | Growth of Financial Revenues- State & Central | State Government is benefited through financial revenues in crores of rupees by way of royalty, sales tax etc. from the direct and indirect operations in the project area. Central exchequer is also getting financial revenues by way of Income tax, Central Sales Tax etc. |
| 9 | Social status growth | There is a marked change in social status of the area with opening of the project. |

### 1.4.2 Impact on land use:

**Table - 1.12**

| Sl No. | Parameters | Impact Assessment | |
|---|---|---|---|
| | | **Within mining area** | **Outside mining area** |
| 1.00 | Topography | In the quarry area, the dump area and the mining equipment area, there will be a marked change in topography. | No appreciable damage is envisaged. |
| 2.0 | Change in Landscape and Land use pattern than pre-mining scenario such as visual impact-loss of aesthetic beauty, ugly scar on land; deforestation-loss of surface soil and vegetation cover | Total scenario of land-scape and land use pattern will undergo a stark change. | Landscape and land use pattern will change where erection and development of plants, service /allied services buildings are established. |
| 3.0 | Change in Surface Drainage | There will be a stark change in surface drainage; rather a new pattern drainage will be developed. | Surface drainage is likely to change where construction of colony, roads and drains is to be executed. |

### 1.4.3 Impact on environment:

**A. Air environment**:-

**Table - 1.13**

| Sl No. | Parameters | Impact Assessment | |
|---|---|---|---|
| 1.00 | Meteorological condition | Coal dumps are susceptible to fire, and combustion may occur therein; hence there may be a likely change in ambient temperature, wind speed and direction to somewhat extent. | |
| 2.00 | Ambient air quality | **Type** | **Impact** |
| 2.01 | | Direct | Minimal increase in dust & noxious emission to the air owing to transport vehicles, Blasting, coal & dump handling causing to slight increase in the ambient SPM and CO levels. |
| 2.02 | | Indirect | Surface coal transport & dump handling & Workshop will generate indirect impact in the long run |
| 2.03 | | Short term | Drilling and Blasting may be attributed to slight increase in the ambient SPM and CO levels |

| | | | |
|---|---|---|---|
| 2.04 | | Long term | Surface coal transport, dump handling & Workshop will produce long term impact upon the air quality |

**B. Water environment** : -

**Table - 1.14**

| Sl. No. | Parameters | Impacts Assessment |
|---|---|---|
| **1.00** | **Hydro-geological-Ground water** | |
| 1.01 | Topography & Drainage | Topography and drainage by developing micro basins |
| 1.02 | Aquifer geometry | Changes in aquifer geometry, water level in the vicinity of the mine and disturb ground water flow direction. This can also create secondary fractures and higher permeability zones within the aquifer. After the mining activity, the aquifer restores its original water level and mined out area acts as a good reservoir. The project is deeper opencast mine, the impact of mining activity on unconfined aquifer will be to a maximum of 525 m. |
| 1.03 | Water levels | . |
| **2.00** | **Water Quality- Physico-Chemical and Bacteriological ones** | |
| 2.01 | Ground Water Quality | |
| 2.02 | Surface Water Quality | |

**C. Noise environment :-**

**Table - 1.15**

| Sl. No. | Parameters | Impacts Assessment |
|---|---|---|
| 1.00 | Increase in Noise Levels at drilling and blasting | May have impact upon the workers and the nearby habitants. The impact of noise more than permissible dosage may cause Annoyance and irritation, Mental and Physical fatigue, Interference in normal activities, Health hazards resulting from impaired hearing. In extreme cases, cardio-vascular diseases etc., Task interference, Interference with communication i.e., masking. |
| 2.00 | Increase in Noise Levels at Operation of HEMMs like shovel, dumper, dozer, excavator etc. | Do |
| 3.00 | Increase in Noise Levels at Operation of equipment in CHP, workshop etc | Do |
| 4.00 | Increase in Noise Levels due to transport system | Do |

**D. Soil Environment:**

**Table - 1.16**

| Sl. No. | Parameters | Impact Assessment |
|---|---|---|
| 1.00 | pH | Existing pH of the soil level 6.39 to 5.56is alkaline indicative and the mining activities are mainly opencast, therefore, the likely effect on surface soil quality will be to a few extent. |
| 2.00 | Electrical conductivity(EC) | Existing EC being 110.2 to 22.8 µs/cm is not going to an appreciable change as the mining activities are mainly opencast, therefore, the likely effect on surface soil quality will be to some extent. It will hardly attain harmful germination condition level of EC in this project. |
| 3.00 | N, K & P | The mining activities are mainly opencast, therefore, dump leachate may have likely some extent of effect on surface soil quality. |
| 4.00 | Soil characteristics, erosion aspects and engineering parameters such as Textural class, Bulk density, Liquid limit, Field capacity, Wilting coefficient and Water storage capacity | The mining activities are mainly opencast, therefore, the likely effect on surface soil quality will be to a few extent. |

**E. Solid Waste:**

**Table - 1.17**

| Sl No. | Pollution source | Impact Assessment |
|---|---|---|
| 1.00 | External dumps. | Maximum height of the OB dump would be 90 m above the general topography as per specified ToR. This will cause obstruction to the surface drainage pattern.<br>Source of air & water pollution due to wind & water erosion until vegetative cover has not been grown up on the dump surface. |
| 2.00 | Internal dumps | Same as above |
| 3.00 | Top soil dumps | Same as above |

**F. Health Environment:**

**Table - 1.18**

| Sl No. | Health affecting factors | Impact assessment |
|---|---|---|
| 1.00 | Air pollution borne | Slight expected increase of SPM/RPM can cause minor problems like bronchitis, bissynosis, throat infections, lung infections, etc. among workers within |

| Sl No. | Health affecting factors | Impact assessment |
|---|---|---|
| | | mines premises, but, the increase is expected to be nominal being it an opencast project. |
| 2.00 | Water pollution borne | Water quality affected by mining activities and if not treated will give rise to gastro-intestinal disorders among people if they take in polluted water. |
| 3.00 | Noise pollution borne | Workers working near higher level noise emitting mining equipment are likely to get affected with annoyance and irritation, mental and physical fatigue, interference in normal activities, health hazards resulting from impaired hearing, in extreme cases, cardio-vascular diseases etc., task interference, interference with communication i.e. masking, Hypertension and higher blood cholesterol. |

**G. Flora & Fauna:-**

**Table - 1.19**

| Sl. No. | Parameters | Impact Assessment |
|---|---|---|
| **1.00** | **Negative** | |
| 1.01 | Vegetation Cover | During survey it is observed that, areas which are important or sensitive for ecological reasons – wetlands, coastal zone, biospheres, mountains are not present within the 10 km buffer zone of the project. Also, areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration are not present within the study area.<br>Except the area used for quarry excavation, erection & development of plants, service & allied structures, colony, roads, drains, culverts, etc., no other area is going to affected directly or indirectly by mining activities.<br>Hence, impact on flora and fauna out of core zone will not be of stark appreciable level. |
| 1.02 | Forests degradation | (i) Mining activities will be carried in 1999.417 Ha of land out of which 409.149Ha is forest land i.e. 20.46 % of total land of project is going to be affected.<br>(ii) The impact on the terrestrial ecosystem due to operation of the proposed mining would mainly occur from deposition of air pollutants. By OB & coal transportation air pollution may affect photosynthesis and transpiration in plants by plugging their leaves pores. Dust in atmosphere, contributed by mining and associated activities, when deposited on leaves of the plants in the surrounding areas may thus retard their growth. |

| Sl. No. | Parameters | Impact Assessment |
|---|---|---|
| | | (iii) There will be loss of vegetation by excavation and dumping thereby affecting the species for which such vegetation was the host.<br>(iv) Although, $SO_2$ causes Necrosis disease in plants, the effects of air emissions on nearby vegetation and crop lands are not likely to be injurious and noticeable as the pollutants concentrations are expected to be well below the prescribed standards. |
| 1.03 | Ecological change | (i) As the fauna is closely related to and dependent on the flora, there will be movement of species away from mine core zone with the loss of vegetation and influence of noise, vibrations and lights, etc.<br>(ii) Since, this is an expansion project without increasing its existing land area, the fauna of buffer zone will not be so disturbed due to enhancement of proposed mining activities.<br>(iii) Pollution of surrounding water bodies and the Lilagar Nadi flowing adjacent to the core zone, may affect the aquatic bodies to some extent due to leaching from overburden dumps and pollutants from other activities. |
| 1.04 | Hydro-geological aspects | Owing to opencast project, water level and draw down are likely to be affected to a nominal value; ground water and surface water on which the flora and fauna of the area directly or indirectly depend upon are not going to be affected to an appreciable and discernible level. |
| **2.00** | **Positive** | |
| 2.01 | Plantation work and forest & wild life conservation | (i) Plantation work & conservation in reclaimed areas will develop habitat for flora & fauna<br>(ii) Conservation of forest & wild life in a scientific way by project authorities will take care of flora & fauna to revive in the area. |

## H. Impact on Meteorology:

Meteorological data with respect to temperature for 1984 to 2014have been collected from nearest IMD station at Bilaspur. The annual month-wise average rainfall for 1954 to 2014 have been collected from rain gauge station at Katghora. Average rainfall is 1516 mm. Maximum rainfall is received during monsoon months of June to September. During summer season, the temperature rises to a maximum of more than 44.7$^{o}$C with daily maximum and minimum temperatures averaging about 39$^{o}$C and 23$^{o}$C respectively. In winter, daily maximum and minimum temperatures averaging at about 27$^{o}$C and 5$^{0}$C respectively.

Looking into general trend of rainfall, differences are within normal cyclic pattern and cannot be attributed to mining activity in the area. There is slight temperature variation in its annual cycle. The variation is normal and cannot be attributed to mining operations.

**I. Impact on Hazards:**

**Ground Vibration:**

Ground vibrations produced from blasting operations are another cause of environmental concern. Apart from the effective utilization of explosive energy in fragmenting and displacing rock mass, a lot of energy is wasted in the form of detrimental side effects like ground vibrations, air blast, fly rocks, etc. which create problems to miners as well as nearby inhabitants in many ways.

### 1.4.4 Environmental Control Measures:

**A. Control measures for air pollution:**

Following activities for air pollution control measures are being performed within the mining area and at coal handling plants and railway siding site in Dipka Expansion Project, Dipka Area:

1. Fixed sprinklers has been installed on approximately 5.5 Km of coal transport road and is working satisfactory.
2. 5 no. 70KL water tanker and 04 no. 28 KL water tanker has been deployed on haul road, coal transport road and in CHP for suppression of dust emission.
3. Every year extensive plantation is being done both on plain and dump area by Chhattisgarh Van Vikas Nigam (a state government organization) and till date about 1705100 nos. of plant planted on approx 531.84 Ha area. Till 2016-17 total approx expenditure incurred is 8.54 Crore.
4. 13 no. rain guns have been provided in Coal transportation road to curb the dust emission in CHP area.
5. Concreting of coal transport road from BSES chowk to Shramik chowk to Dipka police station chowk and also concreting of road from Shramik chowk to Gandhinagar is being done to avoid fugitive dust emission.
6. Inpit belt conveyor system has been commissioned with mist spray systems and is working satisfactorily.
7. Mist spray and conventional system of spray has been installed in the feeder breaker of CHP.
8. Mobile Water sprinkling on coal stock is practiced diligently.
9. Wetting of coal before handling in CHP during handling in CHP and finally in loading operations.
10. CAAQMS has been installed/commissioned on 18/01/2014 and is working satisfactorily.

**B. Water Conservation:**

The waste water recycling after due treatment for the purpose mentioned above will enable conservation of water. Storage of conserved water in mine pits will be given due emphasis to provide water round the year and quality of water will be maintained before and after storage.

**C. Control measures for Noise:**

The present noise levels are below the prescribed limits. If the impulsive noise levels increase due to mining operation, sufficient measures will be adopted to maintain the noise level within permissible limits at working zone. The following measures are being adopted and will be continued:

1. Every year extensive plantation is being done both on plain and dump area by Chhattisgarh Van Vikas Nigam (a state government organization) and till date about 1705100 nos. of plant planted on approx 531.84 Ha area. Till 2016-17 total approx expenditure incurred is 8.54 Crore.
2. High capacity machines to be deployed in mine. This will ensure reduced number of vehicular trips, thereby reducing noise levels.
3. Reduced quantity of blasting will result in lower noise levels.
4. Lined chutes in Silo to reduce noise.
5. Surface miner deployed to eliminate coal crushing will reduce noise.
6. Provision of ear muffs/ear plugs to workers subjected to noise level above recommended limits.
7. Regular monitoring of noise level of project area.
8. Routine maintenance schedules for HEMM and other machineries to eliminate noise as far as possible.

**D. Green Belt Development:**

In the directions where natural forest does not exist, green belt of adequate width on acquired land are being developed around the periphery of mining area. The trees planted in the green belt area shall act as buffers and shock absorber against dusts, noise and stone flying. The trees in the green belt will be tall, wind firm, broad leaved and evergreen.

### 1.4.5 Mine closure planning:

Although, the mining activities may last a few decades, but they are liable to leave a long lasting impacts on the landscape, ecology and on local inhabitants.
The objective of mine closure plan is aimed at restoration / reclamation of disturbed area, which should be acceptable to local community as well as regulatory authority.

Mine closure is not something that happens at the end of a mine's life, rather mine closure is an ongoing series of activities starting from the planning stage of a mine and ending with a suitably restored site that can be returned to the community. The mine closure is planned in two phases.

**a)** The first phase/progressive site specific closure plan includes the various activities to be implemented over the life of the mine. The progressive mine closure plan of the project has been approved along with its mining plan. Mine closure cost calculations has been shown in table – 4.16a of Chapter – IV of EIA/EMP. The closure plan approved its required fund under different heads as shown in table 4.16b of Chapter – IV of EIA/EMP.

**b)** This plan mentioned and incorporated changes depending upon the actual site condition during implementation, legal & societal requirements in future, availability of additional coal reserves, etc. As such a detailed final closure plan will be prepared five years before the actual/scheduled closure time of the mine. This plan will be the culmination of the activities given under progressive plan.

### 1.4.6 Air Quality Impact Prediction (AQIP)*

***(a)*** Model named FDM, USEPA has been used to find out the incremental values of $PM_{10}$ on the baseline air monitoring stations in Table – 11.20 as receptors due to proposed coal production of 35.00 MTY of Dipka OC Expansion Project (existing capacity of 31.00 MTY). Refer AQIP Output in pages AQM-1 to 22 in SECTION – C of EIA/EMP.

**(b) Maximum incremental GLC values of pollutants based on prediction exercise.**

**Table – 1.20**

| S. No. | Receptor Locations code | Receptor Locations name | Baseline PM10 values (in µg/m3)- Mean value | Incremental Pollution load due to 4 MTY additional production by Dipka OC from 31 MTY to 35 MTY | | Net pollution load of PM10 (in µg/m3) | |
|---|---|---|---|---|---|---|---|
| | | | | Without control | With Control | Without control | With Control |
| 1. | L1 | CGM office, Dipka OC | 179 | 38.03 | 26.16 | 217.03 | 205.16 |
| 2. | L2 | Sirki Village | 86 | 5.77 | 3.13 | 91.77 | 89.13 |
| 3. | L3 | Binjhra Village | 80 | 0.11 | 0.07 | 80.11 | 80.07 |
| 4. | L4 | Dadar Para Village | 82 | 0.02 | 0.00 | 82.02 | 82.00 |
| 5. | L5 | Renki village | 86 | 18.89 | 10.6 | 104.89 | 96.60 |
| 6. | L6 | Saraisingar Village | 78 | 0.00 | 0.00 | 78.00 | 78.00 |

Refer AQIM output for the project in Plates – XVI (B) and XVI (D) of EIA/EMP for study area zone.

## 1.5 Analysis of Alternatives:

### A. Selection of Technology alternatives:

Method of work to be adopted for any seam depends on many aspects such as depth of occurrence, thickness and gradient of the seam, parting between the seams, structure, gassiness of the seam, geological disturbances etc. In addition the presence of village, built up area and other surface features play an important role in deciding the method of work.

**Underground Mining:**

Keeping in view the disposition of coal seams in the area, cover over the seams and occurrence of thick of seams it does not suit underground mining.

**Opencast Mining:**

The above factors have contributed towards selection of mining methods as opencast mining for the seams E&F, Upper Kusmunda, Lower Kusmunda (Top Split, Lower Kusmunda (Bottom Split) in the identified area of the project.

Keeping in view techno-economic viability and environmental consequences of each system the disposition of coal seam in the area does not suit underground mining techno-economically. Considering cover over the seam and occurrence of thick of seams, opencast mining has been proposed.

## 1.6 Environmental Monitoring Program:

**Monitoring Schedule:**

A monitoring schedule for Air, Water, and Noise levels is already in operation as per Standards of MOEF vide GSR 742 (E) dated 25.9.2000 & G.S.R-826 (E), dated 16/11/2009.

**Ambient Air:** Parameters monitored are SPM, $PM_{10}$, $PM_{2.5}$, $SO_2$, and NOx at the frequency mentioned in GSR 742 (E) dated 25.9.2000 & G.S.R-826 (E), dated 16/11/2009. Monitoring of heavy metal contents such as lead, chromium, arsenic, nickel etc. in ambient air quality is being done half yearly.

**Water:** For effluent & surface water the parameters monitored are pH, Chemical Oxygen Demand, Total Suspended Solid, Oil & Grease at every fortnight and all parameters once in a year.

For drinking water, monitoring is being done as per IS.10500 once in a month.

For Surface Water, Monitoring will be done on monthly basis as per IS: 2296: Part C

**Noise:** Noise is being monitored during day & night at every fortnight.

Monitoring data thus generated are being submitted to SPCB by end of the following month.

## 1.7 Additional Studies:

### 1.7.1 Public consultation:

To ascertain the concern of local affected persons and others who have a plausible stake in environmental impacts due to expansion of the project / activity from 31.00 to 35.00 MTPA, public consultation will be conducted and proceedings will be included in final EIA/EMP and submitted to MoEF & CC for seeking EC. The last public consultation was conducted on 05/09/2008 at project site during environmental clearance process for 25 MTPA.

## 1.8 Project Benefits:

### 1.8.1 Secondary Employment opportunities:

The mine is located in a highly industrialized area of Korba district. A no. of mines like Gevra OC, Kusmunda OC and several underground mines of SECL and their colonies are situated in the study area. This has led to creation of social infrastructures like schools, hospitals, roads etc., which have helped in the economic development of the region. The expansion of mine will further help in development of region through CSR activities and creation of direct and indirect employment.

With the expansion of the project, there will be further improvement of the socio-economic status of the adjoining areas and will help to meet the energy demand of the nation. Project will lead to development of ancillary industries and an overall economic growth of nearby towns to supplement the population of the area.

The project is likely to give a boost to the economy of the area and providing primary and secondary employment to local people. There will be improvement in infrastructure facilities like drinking water, medical, educational, schools etc. There will be overall gain with respect to improvement in social and economic aspect. This will lead to the overall development of the society.

There will be spontaneous economic stimulus in the area with the expansion of opencast mine. Traders and private enterprises will grow in the area with this economic growth. Besides, the State exchequer will derive financial revenues through levy of royalty, sales tax etc. and Central Government will also be benefited by way of Central Sales Tax, Income Tax, Cess‘s etc.

## 1.9 Environmental Cost Benefit Analysis:

MOEF while issuing TOR has not specifically indicated for carrying out ‘ Cost Benefit analysis‘, hence the same has not been carried out.

## 1.10 Environmental Management Plan:

### 1.10.1 Socio Economic Measures:

#### A. Rehabilitation & Resettlement plan:

There are 12 nos. of villages including Dipka itself, involved in the project comprising a total land area of 1999.417 Ha. It involves rehabilitation of 1690 families. As on 31/03/2017, 421 families have been rehabilitated in 05 R & R sites and 1130 families have taken cash compensation in lieu of house plot. Balance 139 families would be rehabilitated in due course. The total no. of land oustees are 1445 and entitled no. of employment is 1645 out of which job already given to 1482 nos. and 36 nos. have opted cash compensation in lieu of employment. Balance 127 nos. of employment would be given as per the R & R norms of State Government outlined in table 4.11 below. Project Affected Persons (PAF's) of 10 villages i.e. Chainpur, Beltikri, Jhingatpur, Jhabar, Sirki, Renki, Suvabhondi, Ratiza&Malgaon are under resettlement at present. Out of remaining two villages, Hardi Bazar village has been acquired but not under possession yet and for Amgaon village, it is being carried out by Gevra OC Project, adjacent to Dipka OC Project.

### 1.10.2 Land Restoration:

Land reclamation of mined out areas is the prime need. It not only involves backfilling of overburden into the excavated voids but also includes operations required to bring the land to some productive use, i.e. agricultural, forestry or recreational purposes. Dump reclamation is continuous process and a major activity of progressive as well as final mine closure plan. (Ref: final stage reclamation plan in plate – XII of EIA/EMP). Reclamation involves the following processes which include systematic handling, removal, storage, preservation and re-distribution of top soil after completion of technical reclamation. Finally biological reclamation with proper plantation technique is carried out.

### 1.10.3 Monitoring of Land Restoration / Reclamation:

Land is the most natural resource which embodies soil, water, flora, fauna and total ecosystem. All human activities are based on the land which is the most scarce natural resource in our country. Mining is a site specific industry and it could not be shifted anywhere else from the location where mineral occurs. It is a fact that surface mining activities do affect the land environment due ground breaking. Therefore, there is an urgent need to reclaim and restore the mined out land for its productive use for sustainable development of the area. This will not only mitigate environment degradation, but would also help in creating a more congenial environment for land acquisition by mining companies in future.

Keeping above in view, CIL issued a work order vide letter no. CIL/WBP/Env/2009/2428 dated 29/12/2009 to CMPDI for monitoring land reclamation. Status of all the opencast coal mines having 5 Mcum / annum (coal + OB) based on remote sensing satellite data, regularly on annual basis for sustainable development of mining. Another work order vide letter no. CIL/WBP/Env./2011 dated 23/08/2011 was issued by CIL for monitoring of less than 5 M Cum / (Coal + OB) annum (Coal + OB) capacity projects from the year 2011 at interval of 3 years. Further

a revised work order was issued vide letter no. CIL/WBP/Env./2011/4706 dated 12/10/2012 from CIL for 2012 – 13 to 2016 – 17.

**Objective:** Objective of the land restoration/reclamation monitoring is to assess the area under back filling, plantation, social forestry, active mining area, water bodies, distribution of waste land, agricultural land and forest in the leasehold area of the project. This will help in assessing the progressive status of mined land reclamation and to take up remedial measures, if any, required for environment protection.

### 1.10.4 Flora and Fauna Conservation Plan:

Mining activities will be carried in 1999.417 Ha of land out of which 409.149 Ha is forest land i.e.20.46 % of total land of project is going to be affected. The impact on the terrestrial ecosystem due to operation of the proposed mining would mainly occur from deposition of air pollutants. By OB & coal transportation air pollution may affect photosynthesis and transpiration in plants by plugging their leaves pores. Dust in atmosphere, contributed by mining and associated activities, when deposited on leaves of the plants in the surrounding areas may thus retard their growth. There will be loss of vegetation by excavation and dumping thereby affecting the species for which such vegetation was the host.
As the fauna is closely related to and dependent on the flora, there will be movement of species away from mine core zone with the loss of vegetation and influence of noise, vibrations and lights, etc.

Since, this is an expansion project without increasing its existing land area, the fauna of buffer zone will not be so disturbed due to enhancement of proposed mining activities.

Pollution of surrounding water bodies and the Lilagar Nadi flowing adjacent to the core zone, may affect the aquatic bodies to some extent due to leaching from overburden dumps and pollutants from other activities.

Owing to opencast project, water level and draw down are likely to be affected to a nominal value; ground water and surface water on which the flora and fauna of the area directly or indirectly depend upon are not going to be affected to an appreciable and discernible level.

However, Plantation work & conservation in reclaimed areas will develop habitat for flora & fauna. Conservation of forest & wild life in a scientific way by project authorities will take care of flora & fauna to revive in the area.

Details of flora & fauna present in study area has been shown in Chapter – III of EIA/EMP, which are all important from conservation point of view. SECL will take the following measures for their protection.

### 1.10.5 Protection measures:

With the help of the local people and employees watch will be kept on hunting of these animals. Forest and police department will be informed if such incident happens to take action against the offenders. If necessary help of Forest deptt. will be taken to shift any such stranded animal to a safer place.

Care will be taken to stop undue biotic pressure (both man and its animal) in core and buffer zone. SECL, under the condition stipulated in forest land clearance, provides funds to Forest department for fencing the forest falling out of core zone. The fencing will further strengthen our attempt towards conservation efforts. In addition, while under taking bio-reclamation of over burden dumps care will be taken to plant fruit trees.

### 1.10.6 Strengthening of water bodies:

Through Community development work in villages existing in the area existing water sources particularly the village tanks will be improved to provide drinking water to the local community so that biotic pressure on water resources used by fauna is gradually reduced. Snakes being a water loving animal will be greatly benefited by this program.

### 1.10.7 Afforestation:

Keeping the geo-climatic conditions of the area in mind the following tree species will be planted in the core zone (Over burden dumps, backfilled areas and vacant land) of the project:

i. Mahwa (Madhucalatifolia) – For Deer etc. and a shady tree.
ii. Jamun (Syzigiumcuminii) – Monkey, deer etc. and a shady tree.
iii. Aonla (Emblicaofficinalis) – For the people of the area. A shady tree.
iv. Aam (Mangiferaindica) – Monkey etc. and a shady tree.
v. Tendu (Dyospyrosmelanoxylon) – Different animals and the local people.
vi. Sehtoot (Morus Alba) – Different animals and the local people.
vii. Guava (Psidiumguajava) – Different animals and the local people.
viii. Bad (Ficusbenghalensis) - Deer and other animals. A shady tree.
ix. Peepal (Ficusreligioso) – Deer and other animals. A shady tree.
x. Imli (Tamarindusindica) – Many animals, the people and & shady tree.
xi. Kusum (Schleicheraoleosa) – Shady tree.
xii. Lasoda (Cordiadichotoma) – Fruits for different animals.
xiii. Kachnar (Bauhinia varigata) – Shady & ornamental tree. Also for herbivores.
xiv. Arjun (Terminaliaarjuna) – Monkey etc. and a shady tree.

Planting of such fruit and fruit bearing trees will improve the habitat of these animals, and will attract birds, insects etc. also. Planting of trees like Ficus will provide gainful arboreal habitat to Snakes.

### 1.10.8 Control of forest fire, fire in coal seam and coal stock.

Fire can destroy the entire habitats (micro and macro) and its life supporting potential in a forest area. Fire does not spare fauna also. SECL will implement the existing DGMS stipulated fire protection norms on coal seams and coal stock. This will ensure that a congenial atmosphere is created and fire does not affect the fauna and flora as well.

SECL will also encourage its employees and villagers to report forest fires (if any) to Forest/Police department. SECL will also extend its firefighting capabilities whenever needed to forest department for fighting forest fires.

### 1.10.9 Funds for Conservation efforts:

In the EMP funds have been committed under capital & revenue heads for afforestation, reclamation and other miscellaneous expenditure. These funds will be utilized for conservation efforts. However any additional requirement for conservation plan will be met from the normal revenue expenditure of the opencast project.

## 1.11 Disclosure of Consultants Engaged:

Central Mine Planning & Design Institute Limited. Briefly, it is generally called as CMPDI. It is an ISO 9001 Company. It is QCI/NABET Accredited Environmental Consultancy organization [vide Minutes of Accreditation Committee Meeting No. 76 for Re-Accreditation held on Jan. 13, 2016.

Its registered corporate office is situated at Gondwana Place, Kanke Road, Ranchi-834 008, a capital city of Jharkhand state. It operates through seven strategically located Regional Institutes over six states territories of India. These Regional Institutes are engaged in exploration , planning & design works of other subsidiary companies of CIL, namely , ECL, BCCL, CCL,MCL, NCL, WCL,SECL and NECL.

The company was formerly known as Coal Mines Authority Limited. And, the Central Mine Planning & Design Institute Limited (herein after called as CMPDI) is a planning & design division of Coal India Limited (hereinafter called as CIL) as per Memorandum of Association of the company. The CIL is a holding company since November 01, 1975, and the CMPDIL is one of its subsidiaries since then. It is under Ministry of Coal, Government of India.

The environmental laboratory of CMPDI is recognized by NABL and accredited with ISO-9001 & OHASAS 18001 certification. It undertakes baseline environmental data generation, EIA, EMP and monitoring various factors related environment. It has obtained NABL Accreditation {Certificate No.-T-2968} valid from 24.05.16 to 23.05.18 for the lab located at CMPDI, RI-V, Bilaspur.

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