

EXECUTIVE SUMMARY

1.0 INTRODUCTION:

1.1 Purpose : M/s. Jayaswals Industries NECO Ltd. (JNIL) has been allotted sub block IV/4 of Gare Block in Mand Raigarh Coalfield, Dist. Raigarh Chhattisgarh for mining of coal for captive consumption in their Integrated Steel Plant at Raipur. In order to meet the demand of the coal in quantity and quality Integrated Steel Plant of JNIL at Raipur, it is proposed to increase the production of coal from Gare Palma-IV/4 Coal Block. The project was earlier known as Usha Opencast /Underground Coal Mining Project, which is located at Village Bajikhola and Kondakel, Bankheda, Dongarmauha and Baijor with lease area of 884.886 Ha. Mandatory clearances have been obtained for production of 0.48 MTPA coal by combination of opencast (0.20 MTPA) and underground (0.28 MTPA) mining activities. The mine is now operating @ 0.48 MTPA. This coal mine is a captive source of coal in Integrated Steel Plant of JNIL, Siltara industrial area Raipur C.G. To cater the qualitative requirement of Sponge Iron Plant (20-25% ash) it is necessary to enhance the production as well as wash the coal to get required quality and quantity of raw feed. Thus, it is proposed to increase in the capacity of Gare Palma IV/4 coal mine and wash the coal at the proposed coal washery located in Gare Palma IV/8 coal block also allocated to JNIL.

The Environmental Impact Assessment/Environment Management Plan (EIA/EMP) report is prepared for obtaining Environmental Clearance (EC) from the Ministry of Environment and Forests (MoEF), Government of India, New Delhi for the expansion of existing coal mine project @ from 0.48 MTPA to 1.0 MTPA. Thus, the purpose of the report is to provide a complete information base of the study area in a document which is drafted in a standard format of EIA / EMP as required by the MoEF, Govt, of India. The objective of this investigation is to know the status of present environment in core zone (mining lease) as well as buffer zones of 10 km radius around the core zone and anticipate impact of the proposed expansion in capacity. The mining of coal will be carried out by combination of opencast (Rated capacity 0.4 MTPA) and underground (Rated

capacity 0.6 MTPA) method. The coal extraction with the proposed expansion (1 MTPA) will be commenced after getting Environmental Clearance from MoEF & all statutory clearances, and Consent from the Chhattisgarh Environmental Conservation Board (CECB).

1.2 Location : Gare IV/4 is the eastern most sub-block in Gare area located in the southeastern part of the Mand-Raigarh coalfield. It is located about 27 km east of the Tehsil town of Gharghora and 55 km northeast of the district headquarter, Raigarh. Gare IV/4 sub-block is bounded by -

| | |
|-----------|---|
| Latitude | 22 ⁰ 7' 40" and 22 ⁰ 10' 20" N |
| Longitude | 83 ⁰ 31' 16" and 83 ⁰ 33' 43" E |

The proposed mining block is a part of Mand Raigarh Coalfields. The area is located in Survey of India Toposheet No. 64 N/8 & 64 N/12 on 1 :50000 scale. The block is spread in the villages Bajikhola and Konkela, Bankheta, Daungamauha and Baljor Tahsil Tamnar, District Raigarh, Chhattisgarh with lease area of 884.846 Ha.

1.3 Source of data & scope :

The object of preparing an environment management plan is to first assess the likely environmental impacts (Environment Impact Assessment, EIA) and then to ameliorate these impacts (Environment Management Plan, EMP). Baseline environmental data in respect of micro-meteorological data, air, water, soil quality data, noise level data have been generated by Srushti Sewa,

1.4 Project Description :

The proposed expansion project is mechanised coal mine with rated capacity @ 1 MTPA. No change is proposed in lease area for enhanced production. The underground mine is being developed by Board & Pillar method deploying Load Haul Dumpers. Open cast mining is being done by complete mechanised system of shovel-dumper. No change in mining system is envisaged.

The expansion will be achieved through, the following criteria ;

- Capacity enhancement without change in the lease area.
- Combination of opencast and underground mining

- Enhancement in the capacity/number of the machinery used in mining.
- Enhancement in production by deploying more manpower.
- During the expansion it is proposed to shift two villages Bankheda Banjikhoh.
- Extractable reserves increase from 14.316 MT to 15.396 MT thus the conservation of the coal will be achieved.
- The extracted 1.0 MTPA Coal is proposed to be sent to coal washery (at Gare Palma IV/8 lease of JNIL) for reduction of ash content.
- Concurrent backfilling of overburden material will be carried out and backfilled area will be biologically reclaimed.
- The extracted coal shall be transported through road up to Gare IV/8 coal block having integrated coal washery.

SALIENT FEATURES OF THE MINING PROJECT

| Sr. no. | Particulars | Data | |
|---------|--|--|-----------------|
| 1. | Mining Lease Area | 884.846 ha | |
| 2. | Coal Seams to be mined | Seam II, III & IV Estimated Geological reserves in seam-II has been worked out to be 27.9124 hence, the extraction will be concentrated in seam-II at present | |
| 3. | Quality of Coal Seams | D/F | |
| 4. | Gradient of Coal Seams | 3° to 4° | |
| 5. | Excavation Area | North Quarry-61.46 ha South Quarry-52.11 ha | |
| 6. | Quarry Depth | Minimum 6 m | Maximum 40 m |
| 7. | Mineable Reserves | 5.6 mt by O/C 9.796 mt by U/G Total 15.396 | |
| 8. | Average Stripping Ratio for OC | 6.4 Cum/Tonne | |
| 9. | Annual Mine Capacity | 1.0 MTPA | |
| 10. | Mine Life (Inclusive of Construction Period) | 20 Years | |
| 11. | Land in Mining Lease Area | 884.846 ha | |

| Sr. no. | Particulars | Data |
|---------|-----------------|---|
| 12. | Forest Land | 419.887 ha* 183 ha of forestland was surrendered as it was found to be non-mineralized |
| 13. | Non-Forest Land | 464.963 ha* |

Source : Mine Plan

1.5 Method of Mining

Coal is presently being mined both by open cast as well as underground methods. Mine entry for open cast mine is situated towards south-east near incrop of seam-II while entry for under ground mine for the same seam is from north by a pair of inclines. Keeping in view of geological parameters, seam thickness & partings, the underground mine is developed by Board & Pillar method deploying Load Haul Dumpers. Open cast mining is done by complete mechanised system of shovel-dumper. No change in mining system is envisaged. The extractable reserves from underground mining are 9.796 Million Tonnes. The production build up of 0.6 Million tones per annum from underground mine will take three years from now and the life of the mine will thus be 20 years.

1.6 Mining Machinery :

As per requirement of O.B. removal and availability of machine sizes, it is proposed to remove overburden by 4.2 cum hydraulic face shovel and extract coal by 2.5 cum front-end-loader. Both coal and overburden will be transported by 35 T dumpers. Both overburden and coal will be drilled by 160 mm and 100 mm rotary drills and SMS slurry explosive will be used for blasting. Supporting equipments like dozers, water sprinklers etc have been provided in adequate numbers.

1.7 Land requirement:

The mine lease extends over an area of 884.84 ha. No additional land is required for the proposed expansion in production. The surface of Gare IV/4 consists of Forest Land, Tenancy Land and non-government forest land. Underground mining will be undertaken below forest land which will not be disturbed as mining

will be carried out in such a manner that there is no subsidence at the surface. For this scientific studies (three dimensional numerical modeling) have already been done by Banaras Hindu University.

The Opencast mining will be carried out only in the tenancy land and non forest government land. The tenancy land consists of paddy fields. All infrastructure facilities such as Workshop, Coal Handling Plant, Roads & Offices will be created in tenancy land.

1.6 Water Requirement :

The total water requirement for the will be approximately 260 m³/day The drinking water will be supplied by tube well (10 m³/day) and the balance (250 m³/day) will be met from the mine discharge.

1.7 Manpower

The total manpower required for Gare IV/4 for achieving 1 MTPA coal production capacity will be around 850. This includes the manpower which will be outsourced for various activities.

2.0 DESCRIPTION OF THE ENVIRONMENT

2.1 Study Area, Period, Components & Methodology

The total project area of the proposed Gare IV/4 Coal Project (884.84 Ha) is considered as Core Zone while the 10 Km surrounding area of core zone is considered as Buffer Zone. Baseline environmental data was collected for all the components of environment like meteorology, air, water, noise, soil, geology, hydrogeology, flora-fauna, demographic and socio-economics, industries, places of archeological and historical importance etc. Standard guidelines prescribed by Ministry of Environment & Forests and Central Pollution Control Board. This report incorporates the baseline data generated through primary surveys for three months during October 2010 to January 2011 representing winter season. All the base line data have already been studied and assessed within this definition of ambit of the study area. The description and the analysis of the baseline environmental data is described in details in draft EIA/EMP (**Chapter 3**).

2.2.1 Air Environment: Different air pollutants, namely PM₁₀, PM_{2.5}, SO₂, NO_x, Pb and CO have been identified as related to the project activities for representing baseline status of ambient air quality within the study area.

Ambient air quality data in & around Gare IV/4 project area shows maximum concentration. of PM₁₀, PM_{2.5}, SO₂ & NO_x in winter as 44.7, 13.1, 6.7 & 8.5 µg/m³ respectively which is within the permissible limits.

Hourly micro-meteorological parameters, viz. wind speed, wind direction, temperature, rainfall, barometric pressure, relative humidity and solar radiation have also been measured.

2.2.2 Water Environment: Information on water resources in the study area has been collected. Surface and subsurface samples have been collected at different locations for physico-chemical analysis.. The analytical result shows that the physical and chemical parameters are within prescribed limits of GSR : 422(E) and IS:10500 except for coliforms organisms which may be due to human/animal

waste. Provision of settling tanks to arrest suspended solids from mine water, workshop water, surface run off have been made.

2.2.3 Noise Environment: Noise survey has been carried out in the study area. Noise levels were measured at several locations in human settlements around proposed mining area during the day and night time. The maximum noise level data recorded at Gare IV/4 mine site was 56.5 dB(A) which is within the prescribed limit value of 75 dB(A).

2.2.4 Land Environment: Soil samples have been collected randomly from the study area to represent different categories of soil. Physico-chemical properties of the soil have been determined. It has been observed that the texture of soil is mostly sandy clay and sandy silt in the study area. It has been observed that the pH of the soil ranged from 6.17 to 6.97 showing that the soils range from acidic to neutral.

Information on land use pattern in the study area has also been collected from district census handbook and also from IRS - 1C satellite data.

2.2.5 Topography: Gare IV/4 block exhibits a gently undulating topography with minor undulations. The elevation of the area north of the hilly terrain varies between 268m and 330 m whereas the hill rises upto 432m above mean sea level (MSL).

2.2.6 Drainage: The core zone can be divided into the hilly terrain covered by Forest in the north-central and eastern part and relatively plain country north and south of it. The area is traversed by the southeast-northeast trending Dumer nala in the north and Bendra nala in the south. The drainage of the buffer zone is controlled by Pajhar Nala and Kelo River on the west of the block which are the tributaries of River Mand.

2.2.7 Hydrogeological Regime: The water level in core zone during pre-monsoon is 6.30 m to 14.10 m below ground level (bgl), average being 9.00 m bgl, while during post monsoon it is 1.31 to 9.80 m bgl, average being 4.00 m bgl. In buffer zone the depth to water level in pre-monsoon varies between 5.15 to 12.10 m

bgl, average being 9.00 m bgl while during post monsoon it is 0.80 to 8.00 m bgl average being 4.00 m bgl.

2.2.8 Biological Environment: Data have been collected from various Government Departments. The parameters of prime importance to both biotic and abiotic factors have been selected to estimate the structural and functional changes in the eco-system. Detailed survey has been initiated for preparing total listing of the flora and fauna in core and buffer zone. It is low density forests. No large trees are available and the whole tract consist of poles originating as coppice due to heavy human interference and grazing. Mahua trees are spread on range areas as well as near villages and they are the only grown up mature trees of Sal, Bija, etc. are scanty. Herbs layer in the forests are mainly of those species which are tolerant to grazing and sampling. This block is characterized mainly by shrubs and bushes. At places mixed forest of shrubs and trees are also present. List of flora available in the IV/4 forest are is given below. Wildlife within the block is meager. However, rabbits, wolves are occasionally seen within the block.

Wildlife sanctuary, National Park and Biosphere Reserve : There are no Wildlife sanctuary, National Park or a Biosphere reserve within 15 km radius the mine.

2.2.9 Socio-economic Environment: Secondary data have been collected from census data -2001. The parameters selected under socio-economic component were, demography structure of the study area, provision of basic amenities, welfare facilities, health status and quality of life. Relevant information collected from selected villages has been critically analysed. The 70 inhabited villages have a population of 49314 comprising of 24855 males and 24459 females. The population is distributed among 11141 households in the study area. **The scheduled caste** population of the study area on percentage basis is 9.48% the total population and **scheduled tribe** population 51.55%. The overall literacy in the 70 villages of the study area was **61.83%**. Reasonably good levels of infrastructure facilities are available in the study area, which consists of education, health care, communications, transportation, etc.

2.2.10 Rehabilitation & Resettlement : Mining is site specific activity and opencast coal mining needs shifting of every surface features of two villages. In case of proposed expansion opencast mining envisages rehabilitation of Bankheta and Banjikhoh villages for resettlement hence detailed household survey has been carried out from village these villages.

2.2.11 Industries : Gare Coal Block measuring about 100 Sq km in Mand-Raigarh coalfield is a non CIL block. It is divided into four sectors i.e. Gare sector I, II, III & IV. The sector IV is further sub-divided into eight sub sectors i.e. IV/1 to IV/8 where mining activities have been started by M/s Jindal Steel & Power Ltd, Monnet Ispat, Sharda Ispat and JNIL. The other sectors I and II is virgin.

3.0 ANTICIPATED ENVIRONMENTAL IMPACT

3.1 Socio Economic Impact : The project will have on the whole a positive impact on socio-economic profile of the area due to increase in employment opportunities, trade and business, community development, improved communication link etc. There will be creation of direct and indirect new employment opportunities in the long term as the life of the mine is 20 yrs. The land requirement from the villages is as under;

| Sr. No. | Village Name | Type of Land | Requirement of the land (Area in Ha) |
|---------|--------------|--------------|--------------------------------------|
| 1 | Banjikhhol | Private Land | 54.651 |
| 2 | Konkel | Private Land | 104.754 |
| 3 | Baljor | Private Land | 15.205 |
| | Total | | 174.610 |

The approximate no. of affected land oustees involved in the project is 109, which includes 75 land oustees from village Baljor, 27 from village Banjikhhol and 07 from village Kondkel. During the expansion it is proposed to shift two villages Bankheda Banjikhhol. Besides providing financial compensation it is proposed to employ on member of each project affected family as per his/her eligibility. The detailed Rehabilitation Plan is given in enclosed **Annexure**.

3.2 Impact on land use : The mining operations will change the topography and the landscape of coal bearing area and its immediate vicinity in the core zone only. The core area consists of 464.959 ha revenue/Government land and about 236.553 ha of forest land of various categories. The land to be broken for the opencast mining operations is estimated to be 113. 57 Ha (which includes North Quarry-61.46 ha & South Quarry-52.11 ha). Opencast mining will be carried out up to 40 m depth only. Underground mining is proposed below the forest cover hence the forest cover and its topography on the surface is unlikely to be disturbed due to proposed mining. The OCP mine area will in general becomes elevated flat ground due to backfilling of OB in decoaled area. The proposed

opencast mining including creation of temporary OB dump which will change the original topography of the ML area for a very short period..

The land will be utilized for different purposes to carry out the operations as stated in **Table-2**

TABLE-2

PROPOSED LAND USE

| Sr. No. | Purpose | Mine-1 | Mine-2 | Total |
|---------|--|----------------|----------------|----------------|
| 1 | Area for incline/open cast | 55.979 | 138.88 | 194.859 |
| 2 | Storage for top soil | 5.49 | 6.12 | 11.61 |
| 3 | Overburden/Dumps | 27.04 | 37.524 | 64.564 |
| 4 | Mineral storage (Coal stack & bunker) | 0.036 | 1.5 | 1.536 |
| 5 | Infrastructure (workshop, administrative buildings, incline, etc.) | 13.612 | 11.543 | 25.155 |
| 6 | Roads | 2.6 | 1.414 | 4.014 |
| 7 | Rail | 0 | 0 | 0 |
| 8 | Green belt | 5 | 2 | 7 |
| 9 | Township | 0 | 0 | 0 |
| 10 | Settling pond | 1 | 0.5 | 1.5 |
| | Sub Total | 110.757 | 199.481 | 310.238 |
| 11 | Others (Undisturbed) | - | - | 574.608 |
| | Total | 110.757 | 199.481 | 884.846 |

Mine- 1 Indicates the opencast Patch "A", Patch "C", Under ground & its infrastructure.

Mine- 2 Indicates the opencast Patch "B", Proposed Under ground & its infrastructure.

Impact on Drainage : The block has a few seasonal nallahs draining the storm water. The nature of topography is elevated towards northern and southern portion of ML area, which leads to flow of the western drainage from the ML area towards Dumar Nala & Bendra Nala. During the course of mining, few seasonal drainage from the lease are envisaged to be disturbed while Kelo River will remain undisturbed as no mining proposed in the vicinity of Kelo River. The seasonal drainage are proposed to be chhanalize through the undisturbed area in a phased manner to maintain the natural drainage system. The run-off channels are proposed to be created ahead of the overburden dump. The drains will be made along the contour lines to prevent entry of rainwater in the active mine area.

Impact on Soil: The environmental impact of the mining activities on

topsoil depends on the nature of activities; extent of area covered and associated aspects of environmental concern. Impact on soil will be localized i.e. around the mine site. Likelihood of any adverse impact from soil erosion and disturbance in quality is remote. However, the impacts that will occur are reversible as the impacts will be felt in the initial stages of mine operation i.e. till the vegetative cover is re-developed.

3.3 IMPACT ON ENVIRONMENT

Air environment: The ambient air quality monitoring results show that in the villages around the proposed ML area, PM concentrations are within the prescribed limits (CPCB standards) during the study period. However, at present the only source of pollution is the domestic activities. Once the mine is operated to the expanded capacity, it is anticipated that marginal increase will occur in the PM level of the core and the buffer zones. Dust suppression measures are, therefore, of utmost importance. Vehicular movements within the mine site will add marginally to contribute NO_x and CO concentration. Monitored values of SO₂, NO₂ and CO in the ambient air are reported to be very low in the study area. The mine will ensure regular maintenance and engine tuning of vehicles used within the mine area so that the emission levels remain within the stipulated norms. As adequate dust suppression measures will be provided, the dust particles and PM will not be transported to villages in the impact area in the downwind. PM levels will be higher within the active operational areas (mine area) due to blasting, transportation and crushing, however, in the buffer zone it is not likely to be affected with dust problems, if proper dust suppression and mitigation measures are taken.

Impact on Traffic Load : Currently 1600 TPD coal is being produced and dispatched after the proposed expansion this will be increased to 3333 TPD. The current transport is carried out by 30t dumpers to Raipur. Now it is proposed to dispatch the washed coal to the Siltara Steel Plant, Raipur and hence it is proposed to send the coal at Gare IV/8 Coal washery of the JNIL. After expansion the transport of the coal from mine-washery – Raipur will be carried

out by 30 t dumpers only. The number of the vehicles transporting coal will increase from current 53-55 vehicles / day to 110-115 vehicles /day. The existing road network is adequate to handle the increased traffic load.

Water environment : Untreated mine water , Workshop & Domestic effluent water could cause pollution to surface & ground water courses with excess of Suspended solids , Oil & Grease , COD and BOD, Dissolved solids , Sulphates , Chlorides , Bacterial contamination leading to serious problems to aquatic life & human health hazard. Diversion of surface water courses and lowering of ground water table are the likely impacts on surface & ground water courses leading to water scarcity in the area.

Impact Due to Solid Waste Handling: The solid waste generated will be non-hazardous in nature. Top Soil and overburden will be generated from the proposed mining project which will be stacked separately at the designated areas within ML area.

- **Overburden :** During mining operations, for entire life of quarry of 20 years, around 35.14 million m³ of overburden (waste rock) is likely to be generated. 0.67 Mcum will be dumped externally inside the block. This external OB dump will be re handled and will be used for internal dumping purpose. To arrest rain wash-off from the dumps retaining wall would be erected around the periphery of the dumps. The top of the dump will be terraced. The slope of the dump will be stabilized by seeding with grass. The waste i.e. 35.14 MCM OB will be dumped internally i.e. back dumping and the area will be rehabilitated through plantation of local species in consultation with local forest officials.
- **Top Soil:** The total topsoil generated during the development of mine will be stacked separately in a soil stack pile in between the pit and the surface dump. It will be used for growing plants along the fringes of the site roads and reclamation of external dump and backfilled area. It is envisaged to scrap out about 0.5 m thick layer of topsoil separately before excavating the 1st OB bench and stacks it in low height (< 6 m) stack near the OB dumps. It will be used for laying over dumps and backfills before afforestation. The probable

cause of pollution may be due to soil erosion and wash off from the waste dumps in monsoon season. Garland drains will be constructed around the dumps to prevent the wash off during rainy season. The proposed greenbelt plantation on dumps will prevent soil erosion.

Hydrogeological aspect : As mentioned earlier, because of the low permeability of aquifers, the impact of mining on local water regime will be marginal and the radius of influence will be limited to a small distance. So also, due to stratification, the individual permeable beds develop individual drawdown cones and the impact is usually limited to few hundred meters.

Impact on Flora and Fauna : The core and buffer zones include the village settlements with their cultivated fields, forest areas. The forest clearance for the land required for underground mining operations has already been obtained from State Forest Department for Diversion of 419.887 Ha. forest land has been granted by MoEF, 09.06.2009. There will not be any disturbance to the forest land as underground mining will be carried out below the forest. Thus, the forest biodiversity of the core zone forest remains unchanged. The opencast mining operations will be carried out on the waste land and agriculture land. The flora and fauna of the area which is likely to be disturbed is typical of rural area. There are only few local species of trees, shrubs and grasses which will be cleared for the mining operations. This loss will be compensated by greenbelt development in the mining lease area where mining is not proposed. Plantation activity is also proposed under Corporate Social Responsibility (CSR). The topsoil of the area likely to be broken during opencast mining operations will be used for the plantation activity.

Impact on Sensitive Locations: There are no locations of sensitive nature and monuments notified by archaeological department in and around the mine lease area. Thus, there will not be any impact on the tourist/religious or historical important places due to mining project.

ENVIRONMENTAL MANAGEMENT PLAN

4.1 Air Pollution Management : Mitigative measures suggested for air pollution controls are based on the baseline ambient air quality of the area.

➤ ***Measures to Prevent Generation and Dispersal of Dust*** : Dust particles, which are normally generated during mining operations, become air borne, thus leading to increase in particulate matter level in the ambient air. In the proposed mining activity adequate control measures will be adopted during both, mining operations as well as transportation of coal within the ML area. The control measures to be adopted are:

- Dust generation will be reduced by using sharp teeth of shovels;
- Wet drilling will be carried out to contain the dust;
- Water sprinkling will be done on haul roads within the ML area;
- Water sprinkler will be provided in the crusher to avoid dust generation during material unloading into crusher;
- Controlled blasting techniques will be adopted;
- Charge per hole and charge per round will be optimized;
- Plantation to be carried in and around the mine will also help in combating air pollution;
- Afforestation of completely mined out area is planned with minimum gap between excavation and afforestation to fix the dust and prevent it from getting airborne;
- Water sprinkling will be carried out at suitable points in the crushing systems;
- Wherever applicable enclosures with ventilation system will be provided with local exhaust ventilation system at crushing plant;
- Regular maintenance of vehicles and machinery will be carried out in order to control emissions;
- Cabins for shovel and dumpers and dust masks to workmen will be provided;
- A good house keeping and proper maintenance will be practiced which will help in controlling pollution.

- **Occupational Health & Safety Measures to Control Dust Inhalation** : All the above precautions will be adopted to minimize dust generation at site and to be dispersed in the outside environment. However, for the safety of workers at site, engaged at the strategic locations/dust generation points like drills, loading & unloading points, crushing *etc.*, dust masks will be provided. Dust masks will prevent inhalation of PM thereby reducing the risk of lung diseases and other respiratory disorders. Regular health monitoring of workers and nearby villagers in the impacted area (1-km from the core zone) shall be carried out by JNIL and also regular occupational health assessment of employees shall be carried out as per Government regulations.

4.2 Water Pollution Control Measures

The total water requirement is estimated to be 260 m³/per day including requirement for potable industrial purpose. Water pumped during mining shall be stored in settling pond for treatment for reuse in dust suppression, plantation.

Mine Pit Water : The pit water may contain suspended solids. The treatment scheme thus needs to focus on the removal of suspended solids from the water. Pit water is treated to meet the prescribed standards before being discharged into water bodies. At the Gare IV/4 mine the mine pit water is collected in sedimentation sump and flocculation agents are added to coagulate the suspended solids. Settling tank is provided for the treated water before its reuse in mining operation/discharge. The pit water is maintained neutral and therefore necessary arrangement is provided to monitor the pH of the to collect the mine discharged water for settling the suspended solids.

Workshop/Domestic Effluents: Effluents generated by servicing of the vehicles mainly contain pollutants such as suspended solids (SS), oil & grease, An effective Effluent Treatment Plant for workshop effluent treatment is proposed. The oil and grease collected from this ETP will be supplied to authorized recyclers. Conventional soak pits through properly deigned septic tanks for treatment of domestic effluents.

Groundwater: There will be no major problem due to the mining activities on ground water. On the contrary the opencast mine shall act a natural rain-water harvesting structure & ground recharging system as the water will be collected in the mine sump during rainy season & shall be stored for a longer period charging the ground water table.

4.3 Noise Control Measures

- Systematic blasting with proper spacing, burden and stemming will be maintained;
- Minimum quantity of detonating fuse will be consumed by using non-electrical initiation system;
- The prime movers/diesel engines will be properly maintained;
- The operator's chamber will be safe guarded with proper enclosures to reduce exposure to the noise levels;
- A buffer barrier of tree belt will be provided in phased manner around the periphery of the mine to attenuate noise;
- Trees will be planted on both sides of haul roads.
- Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators of HEMM and persons working near HEMM;
- Reducing the exposure time of workers to the higher noise levels.

4.4 Measures to Control Ground Vibration

- Blasting will be performed strictly as per the guidelines specified under blasting technology;
- Overcharging will be avoided;
- The charge per delay will be minimized and preferably more number of delays will be used per blasts;
- Blasting operations will be carried out only during day time as per mine safety guidelines;
- A safe distance of about 500 m will be maintained from blasting

- During blasting, other activities in the immediate vicinity will be temporarily stopped; and
- Drilling parameters like overburden, depth, diameter and spacing will be properly designed to give proper blast.

4.5 Land Reclamation

Land degradation is one of the major adverse impacts of opencast mining in the form of excavated voids and also in the form of waste dumps. The opencast mine is planned upto maximum 40 m depth with overall stripping ratio of 6.37 cum/t. External OB dump of 0.67 million cubic metre will be created. This external dump will be re-handled and backfilled in the subsequent years. There will be no external OB dump during the operation of the mine. The OB removed during initial years will be placed externally with the total height of 20 m in two benches of 10 m each. The concurrent back filling for opencast mine will start from 2nd year itself. Back filling will continue in quarry till end of mine-life. The face slopes of the dump will be maintained at the natural angle of repose of the material and at overall slope angle of 28°. To arrest rain wash-off from the dumps, retaining wall would be erected around the periphery of the dumps, wherever required.

The back-filled quarry area shall be stabilized progressively by planting local tree-species so as to regenerate the flora & fauna in the area. Major part of the quarry will be backfilled with overburden. The backfilling will be carried out in a phased manner. Once the backfilling has reached a certain predetermined reduced level, the plots will be levelled, graded and cleared of large stone pieces lying on the surface.

Green Belt Development : Green belt around mine , Sides of haul Roads & all other roads , around infrastructures , colony are already in existence & will be augmented further..

4.6 Socio-Economic Development : Based on the requirement of the people in the area, the development activities needs to be taken up. The basic requirement of

the community needs to be strengthened by extending health care, educational facilities developed in the township to the community, providing drinking water to the villages affected, building/strengthening of existing roads in the area etc.; JNIL will initiate the above amenities either by providing or by improving the facilities in the area, which will help in uplifting the living standards of local communities.

4.7 Rehabilitation Action Plan : Annexure attached with the summary provides detailed RAP for the project affected persons. Although the project affected families & persons will be benefited with the facilities provided at the new locality but their original cultural heritage may not be restored back. There are many educational, medical facilities and other civic amenities in the area have been developed for the benefits of the project employees as well as for the people residing around the project considered to be permanent & positive impacts.

4.8 Final decommissioning or rehabilitation of completed project : 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. If not properly managed, effects can be detrimental for general welfare of most of the stake holders. Thus, any mining venture must have adequate closure plan, aimed at rehabilitation of disturbed area, which should be acceptable to local community as well as regulatory authority.

5.0 ENVIRONMENTAL MONITORING PROGRAM

The implementation and monitoring of pollution control measures and for overall environmental management, environmental cell at the area and Corporate level will take all necessary care. It will look after the following aspects of environmental management.

- Generation of environmental data bank.
- Evolving micro environmental management plan for the project in collaboration with other agencies and consultants.

- Monitoring project implementation along with environmental control measures.
- Co-ordinate with other project activities to ensure timely implementation of the project.
- Co-ordination with Ministry of Environment & Forest, Central/State Pollution
- Control Board for prevention and control of water and air pollution.

6.0 PROJECT BENEFITS

- The proposed expansion envisages relocation of the two villages. A good number of people will be employed in the expansion project as the manpower is likely to be increased particularly in semiskilled and unskilled category.
- A good number of people will be able to generate employment in the secondary and tertiary sector.
- JNIL is also committed to spend a sizeable amount every year to bring up social development under Corporate Social Responsibility.
- The total manpower required for Gare Sector IV/4 for 4 MTPA coal production along with its corresponding assessed at 850. It is proposed to employ the local population wherever possible in the proposed project activities.

Measures to Communicate Risks for Prevention and Control : Measures will be taken to communicate risks before starting of mining to general people. This will be done through proper training and conducting safety talks for awareness of risks involved and correct practices communication by ways of display boards and safety meets. Procedures and work instructions will be displayed and communicated to all on regular basis.

With the proposed mitigating steps, the impacts can be minimized and the occupational health impacts are insignificant.

AN EPILOGUE

In compliance with the environmental procedure the environmental clearance application is made. Necessary scientific studies have been undertaken as per the guidelines set by the Ministry of Environment and Forests (MoEF). The suggestions/recommendations of all the experts, competent authorities, and government officials are being sought for the impacts of the proposed project. Views and guidance of the local residents, community based organizations, social organizations are extremely important in order to devise a full proof Environment Management Plan for the proposed mining project and also mitigate the damages caused due to the project. Allocation of necessary funds, manpower and machinery will be made to for the protection and conservation of all the components of environment. It is ensured that all mandatory clearances will be sought from respective competent authorities before operating the proposed expansion of Gare IV/4 coal mine. We at JNIL Limited are committed to implement the suggestions for the improvement of the environment and assure that every attempt will be made for the conservation and protection of the natural resources to the maximum extent.