

1.0 Introduction

M/s Bhatia Energy & Minerals Pvt. Ltd is a well established name in coal handling, Transportation, and Solar Power. Now, they have formed a new company as Bhatia Energy & Minerals Pvt. Ltd. is Promoting Rajan Coal Washery project with a capacity of 0.96 MTPA at Karsiya (Robertson Railway station) of Raigarh district, Chhattisgarh state.

In order to assess to potential environmental impacts likely to arise due to proposed coal washery at Karsiya (Robertson Railway station) of Raigarh district, Chhattisgarh state. M/s Bhatia Energy & Minerals Pvt. Ltd has retained Anacon Laboratories Pvt. Ltd., Nagpur, to undertake Environmental Impact Assessment studies. The report envisages the assessment of the impact of various environmental components and its mitigation measures in order to minimize the adverse impacts.

1.1 Description of the Project

The salient features of the proposed Coal Washery are as under:-

Location	Village : Chote-Dhoumarpali Tahsil : Kharsia District : Raigarh , Chhattisgarh
Total Proposed Area	8.1 ha
Greenbelt Area	2.67 Ha (33 % of the total area)
Size of the Project (Annual throughput)	0.96 Million TPA Coal Washery (160 TPH)
No. of operating days in a year	330 days
No. of operating hours in a day	18 Hours
Plant utilization	100%
Source of Raw Coal:	From Mines of Raigarh area (Chhal Mine/ Baroud Mine SECL)
Transportation of Raw Coal	Rail/ Road
Source of water:	Bore well/ Mand River (E,2.3 Km)
Cost of the Project	Rs. 31 Crores
Budgetary Provision for EMP	Rs. 18 Lacks

Vicinity map and study area map of the 10 km radius around the project site is presented in **Figure 1** and **Figure 2**.

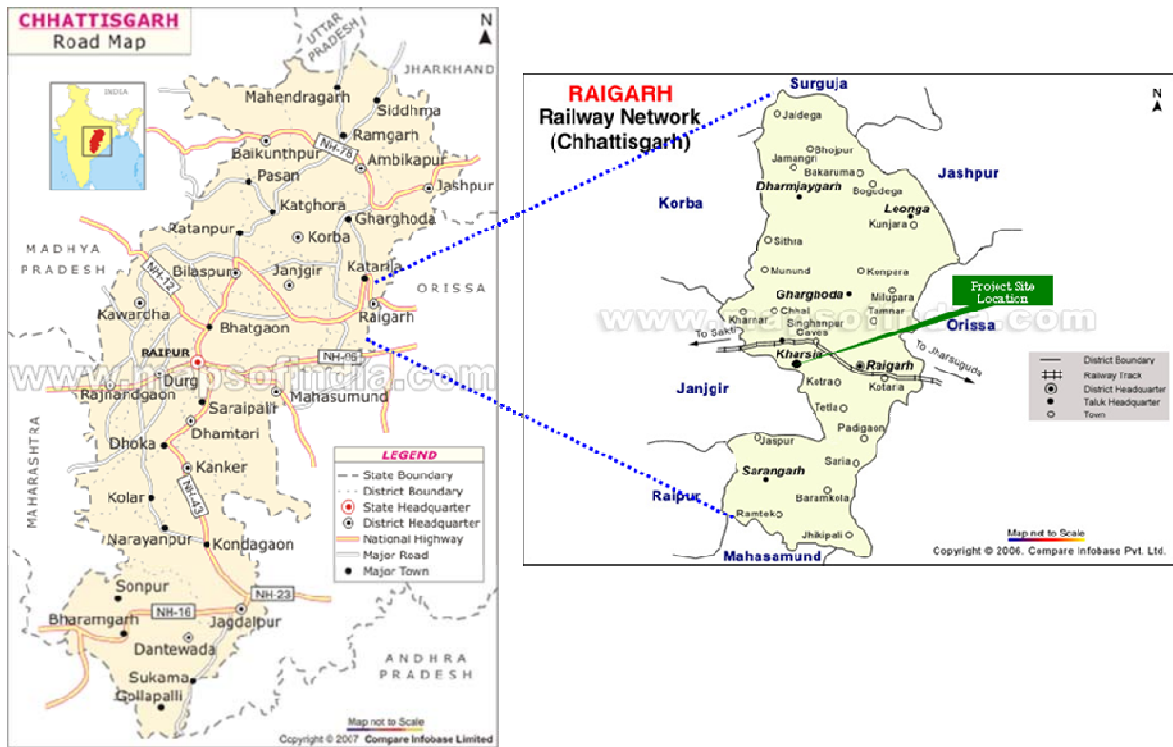


Figure 1
Vicinity Map

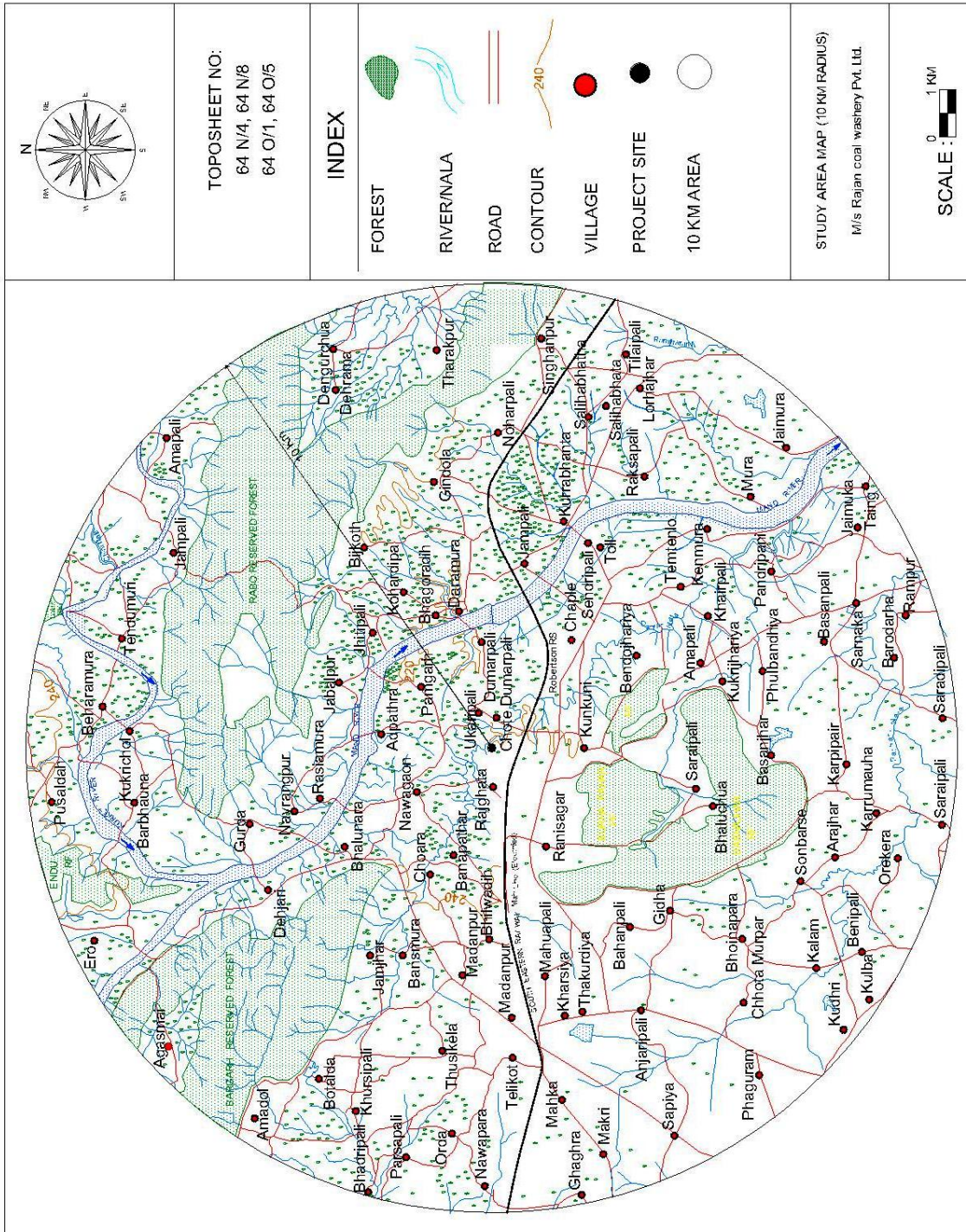


Figure 2
10 km Radius Map around the Project Site

1.2 Basic Requirement for Proposed Project

Details are presented below:

Sr. No.	Features	
1	Capacity	0.96 MTPA
2	Type of Process	Wet Washery
3	Land for washery	20 Acres (8.1 Ha)
4	Atmospheric Pollution Control System	Water Sprinklers, Bag filters etc.
5	Source of Raw Coal	From Mines of Raigarh area (Chhal Mine/Baroud Mine SECL)

1.3 Technology & Process Description

- The proposed washery shall incorporate the latest designs and the latest equipments and shall be a heavy media cyclone based coal processing unit.
- ROM shall be delivered to the truck dump station via tippers and the capacity of the truck dump hopper shall be 25tons. The truck dump shall be an elevated bunker with access for trucks to unload the ROM into the hopper.
- ROM shall be carried to the crushing and screening tower using a 1200mm belt conveyor BC1.
- The ROM will be discharged over a single deck scalping screen having a heavy duty rod deck for screening the (-) 50mm coal. The undersize from the screen will report to the belt conveyor BC2 which carries coal to its storage stockpile. The oversize from the screen will be discharged to a double roll crusher with toothed rolls where the 50mm-250mm coal will be crushed to a consistent (-)50mm size. The crusher product will also report to the same conveyor BC2 for stockpiling.
- A concrete stacking tube is proposed for stocking the raw crushed coal. The stacking tube shall have a capacity to store 12000MT of coal. There shall be 2 reclaim hoppers with vibrating feeders at their discharge which will feed the plant feed conveyor BC3 with coal. The capacity of the vibrating feeders can be changed by a simple mechanism. The uses of dozers are proposed to push the raw crushed coal into the reclaim hopper.
- The coal being carried on BC3 shall be discharged on a raw coal sizing & desliming screen where (-) 10/13mm coal will be removed on the first section of the screen and this coal having a relatively lower ash will report to the Fines carrying conveyor FC1.
- The Oversize will proceed to the second section of the screen where coal will be subjected to jets of water by which the slime on the coal body is washed off. The effluent from the desliming screen will be taken to the effluent treatment plant.

- The coal slurry consisting of coal water & magnetite is pumped using a special heavy media pump to the heavy media cyclone.
- The heavy media Bath is the main coal washing device in the coal preparation plant. The deep flow bath already carries media (Water and Magnetite powder) and the deslimed coal is received by the bath. In the bath the lighter (clean) is separated through the overflow and the heavier (rejects) is gathered and conveyed through the reject outlet of the bath to the reject screen. Thus the clean and reject is separated.
- Both the cleans and the rejects report to a Draining and rinsing screen with specially designed underpans to collect the drain water and the rinse water.
- In the first section of the screen (drain section) the water and magnetite slurry is drained partially. This drained water flows back to the heavy media sump. In the second section of the screen (rinse section) water jets are used to wash the coal of magnetite sticking to it body. The rinse water being of a lower specific gravity than the slurry in the sump has to be subjected to a wet drum magnetic separator where magnetite from the rinse water is concentrated and sent back to the heavy media sump for recirculation. The effluents from the magnetic separator reports to the effluent treatment plant.
- The reject coal from the reject D&R screen is discharged over the reject coal belt BC5 for suitable stockpiling. The clean coal is discharged over the clean coal conveyor BC4 where the clean coal is blended with the raw bypass coal in the ratio to give final ash content as required by the end user. The product on BC4 is carried to a clean coal loadout bin which has Clamshell gate at the discharge for loading coal onto trucks.
- The effluent treatment plant consists of one Hi-rate thickener and its associated flocculent dosing system, underflow sludge carrying pump and a multiroll belt press.
- The effluent from the plant which reports to the hi-rate thickener is collected in the thickener tank. This tank is dosed with suitable amounts of flocculent which aids settlement of suspended solids and helps to give a clearer overflow.
- The settled solids are collected at the bottom cone of the thickener tank by rotating rake arms the height of which can be adjusted if the amount of solids in the effluents increases.
- The solids which are collected in the bottom of the thickener is pumped using a special centrifugal pump to the multiroll belt press for reclamation of water. The dried cakes are blended with the rejects.
- The overflow of the thickener which is clear water is pumped back to the preparation plant for recirculation.

The proposed plant is a zero effluent plant and the process selected ensures minimum generation of dust.

2.0 Description of the Environment

The baseline environmental quality data for various components of environment, viz. Air, Noise, Water, Land and Socio-economic were generated during January 2011 to March 2011 in the study area covering 10 km around the proposed coal washery site. Other environmental data on flora and fauna, land-use pattern, forest etc were also generated through field surveys and also collected from different State Govt. Departments.

2.1 Air Environment

Ambient air quality was monitored at 10 locations. Results indicate that concentrations of SPM, RPM, SO₂, NO_x and CO are well within the prescribed standards.

SPM – 102 to 160 µg/m³.

PM₁₀ - 31 to 51 µg/m³.

PM_{2.5}- 19 to 31 µg/m³.

SO₂ - 7.0 to 28.0 µg/m³

NO_x - 10 to 37 µg/m³.

CO - 146 to 425 µg/m³.

O₃ - 9 to 29 µg/m³.

An automatic weather monitoring station was installed at the project site to record micro-meteorological data. Pre-dominant wind directions were observed in the winter season NE-28.6%, NW-15.7%, SE-14.9% and 21.4% of Calm.

2.2 Noise Environment

The noise levels in the study area are within the prescribed standards. Noise levels ranges from 46.0 dB (A) to 50.0 dB (A) during day time and 41.2 dB (A) to 44.5 dB (A) in the night time.

2.3 Water Environment

It has been observed that all the physico-chemical parameters and heavy metals of water samples from surface and ground water are below the stipulated drinking water standards. The pH, TDS, and Hardness of the surface water were found in range of 8.08-8.3, 106.9-136.3 mg/land 46.82-61.81 mg/lit respectively, whereas the ground water showed pH 6.78-8.50, TDS 111.5-792 mg/lit.

2.4 Land Environment

The break-up of the existing land use for the project is given below:

Breakup of Land Use

Sr. No.	Description	Area (Ha)
1	Land for Washery	2.00
2	Land for Reject Disposal Area	1.05
3	Land For Greenbelt Development	2.67
4	Land for Coal Storage Yard and Truck Tripling System Yards	1.10
5	Land for Raw Water Reservoir	0.40
6	Land for Fabrication/Construction Yard, etc.	0.50
7	Others	0.38
Total		8.10

Note: Additional area for Railway siding is 12.14 ha.

Source: Detailed Project Report

2.5 Soil

The soil quality assessment was carried out at eight locations. The bulk density of the soil in the study area ranges between 1.128 to 1.552 g/cm³, which indicate favourable physical condition for plant growth. The porosity and water holding capacity of the soils are in the range of 0.36% to 0.5% and 28.89 % 62.35% respectively. Variation in the pH of the soil in the study area were observed and it is found to be neutral (6.5 to 7.74), thus conducive for growth of plant. Organic matter and nitrogen are found in the range of 0.7599-3.9568 % and 62.899-109.09 kg/ha. This shows that soil is moderately good in organic and deficit in nitrogen contents.

3.0 Anticipated Environmental Impact & Mitigation Measures

The construction and operation of the proposed Coal washery comprises various activities each of which may have an impact on some or other environmental parameters. Various impacts during the construction and operation phase on the environment parameters have been studied to estimate the impact on the environment.

3.1 Construction Phase

- Clearing of shrubs at some locations is required during construction phase. This will slightly change the present land use pattern.
- The development of green belt in and around the project site is expected to mitigate the impact due to ground cover clearing during construction phase will have positive impact on the topography

Impact on Landuse

The total project area is of 8.1 hectare. It is proposed to develop adequate greenbelt to cover 2.67 ha of the plant area. Clearing of shrubs at some locations is required during construction phase. The plantation will be in about 33% of the total project area, which will not only improve aesthetic aspects but will also compensate the vegetation loss, which may take place during the construction period.

- After completion of the construction phase, the surplus earth shall be utilized to fill up the low lying areas.
- The top soil from the excavated areas shall be preserved in separate stacks for re-use during the plantation;
- Green belt development and related activities shall be taken up so that plantation will grow to adequate height by the time of commissioning of the plant
- The dust generated will be fugitive in nature, which can be controlled by sprinkling of water. Sprinkling of water shall be done at frequent intervals by using truck-mounted sprinklers, along the roads and work zone areas to reduce the fugitive dust;
- Construction equipment shall be maintained and serviced regularly such that the gaseous emissions from these equipment are maintained within the design specifications
- The waste generated from the sanitary units of workers camps will be treated in packaged STP and treated wastewater will be used for plantation, hence, no impact on water bodies
- Plantation will be done under green belt development plan to compensate the vegetation loss during construction. Greenbelt development will be as per CPCB guidelines.
- The contractor shall be advised to provide fire wood/kerosene/LPG to the workers to prevent damage to trees
- Local people will be offered employment during construction.

3.2 Operation Phase

Impact on Land Environment

- The development of green belt in and around the project site is expected to mitigate the impact due to ground cover clearing for proposed project.
- Adequate rainwater harvesting measures will be implemented to capture and utilize the storm water inside plant premises.

Impact on Air Environment

The impacts on air quality from coal washery depend on various factors involved in transportation of coal from mines, coal handling equipments and processing of the coal in washery. The severity of impacts on air environment from coal washery projects are governed by terrain conditions around the project site and the prevailing micro-meteorological conditions in the project region. Coal washery projects are associated with several onsite facilities such as, viz. raw coal handling system (unloading), washed coal handling system (loading) and reject handling system, are the major sources of air pollution.

Fugitive Emissions

The impact on air quality from coal washery depends on coal washery technology, its operation & maintenance as well as transportation of coal. The fugitive emissions of coal dust would be due to coal handling activities at storage yard, wind erosion, coal breakers, sieves spillages from conveyor system, loading operation etc. The fugitive emissions (mainly coal dust) would generally be less in quantity and it would be released relatively closer to ground level which would cause impacts in the immediate vicinity to very limited distances (about 1-2 km). The scenario for transportation of the raw and beneficiated coal is as follows.

Total quantity of raw coal	: 2909 Tons/day
Total Quantity of beneficiated coal (finished product)	: 1939 Tons/day
Middling Quantity	: 727 Tons /day
Final Rejects	: 242 Tons/day

Proposed Traffic

The additional traffic due to coal washery will be 116 trucks per day.

Results and Discussions for Traffic Impact

The general observation reveals that the maximum concentration occurs at 20-m from the edge of the road, and the incremental concentration is about 1.3 $\mu\text{g}/\text{m}^3$ for NO_x which are well within the permissible limit.

Storm water from Plant drains during Monsoon

Storm water recharge pits will be provided in the plant. These pits retain the storm water during monsoon season. In addition, these ponds also serve as buffer storage for any spillages, overflows and washings from different sections of the plant. This volume will be adequate for the proposed facilities which will be connected through additional plant drains. The run-off collected in these ponds will be recycled to the extent possible. Discharge, if any during monsoon period will be after complying with the permissible standard.

Mitigation/Management Measures

- The wastewater will be treated and reused for greenbelt development;
- The plant shall be operated on the zero discharge concept and no wastewater will be discharged out side the plant

3.3 Impact of Solid Wastes

Middling and final reject (stone etc.) will be the main solid waste generated from coal washery. Final Reject will be utilized for road formation and leveling of low lying areas.

3.4 Impact on Noise levels

The main noise generating sources will be crusher and DG set. The noise levels at the source for these units will be in the range of 75 dB (A).

- It shall be ensured that low noise equipments are procured wherever feasible and strict adherence to O & M schedules.
- Acoustic laggings and silencers shall be provided in equipment wherever necessary.
- Noise attenuation measures shall be taken up by strengthening existing green belt.
- Ear plugs shall be provided to all workers working close to noise generating units
- The operator's cabins (control rooms) are properly (acoustically) insulated with special doors and observation windows.
- The operators working in the high-noise areas will be strictly instructed to use ear-muffs/ear-plugs.

3.5 Impact on Soil

Impact on Ecology

The impact on terrestrial ecology may be felt due to emission of gaseous pollutants like

SO₂ SPM and NO_x. These pollutants at a very low dose act as fertilizer for the vegetation. However at higher doses, they can be injurious to both vegetation as well as animals.

3.6 Prediction of Impacts on Socio-Economics

The requirement of skilled/unskilled manpower will be met from nearby villages during construction phase in addition to some regular employment during operation. The project will also help in generation of significant indirect employment. This will be a positive socio-economic development for the region. There will be a general upliftment of standard of living in the region. Infrastructure like roads will be developed by the proponent.

Impact on Socio-Economics

Impacts on Employment Generation

The requirement of skilled / unskilled persons will be met from nearby villages during construction phase in addition to some regular employment during the operational phase. The project will help in generation of significant indirect employment. This will have positive socio-economic development in the region. There will be in general upliftment of standard of living of the people in the region.

Indirect Impacts

Impacts on Public Health and Safety

The discharge of waste materials (stack emission, wastewater and solid wastes), from process operations can have potential impact on public safety and health. The impact due to the emission from the proposed coal washery will be insignificant as the mitigation measures delineated in EMP are strictly followed. The public health and safety is dependent on the effective implementation of control measures suggested for pollution control.

Management of Public Interests

Based on the analysis of the socio-economic profile of the study area along with the prediction and evaluation of likely impacts arising out of the proposed activity, it has been possible to prepare a feasible environmental management plan. It is felt that this would help in minimizing the adverse impacts on the socio-economic environment to a considerable extent, while at the same time addressing to large extent the aspirations of the community. For the recruitment of semi-skilled and un-skilled workers particularly during construction, preference shall be given to the local people.

Rajan Coal Washery is equally conscious for socio-economic development and are committed to raise quality of life and social well being of communities where it operates. Its CSR initiatives have been prioritized on local needs, which focus on Health, Education, Sustainable

Livelihood, Social Mobilization, Infrastructure Development, Water Harvesting, Agriculture, and Environment Conservation.

Environmental Monitoring Programme

- The environmental monitoring is important to assess performance of pollution control equipment installed at the project site. The sampling and analysis of environmental attributes including monitoring locations will be as per the guidelines of the Central Pollution Control Board/State Pollution Control Board
- Environmental monitoring will be conducted on regular basis by Rajan Coal Washery to assess the pollution level in and around the project area
- Adequate budgetary provision shall be made towards implementation of Environmental Management Plan

4.0 Additional Studies

Disaster Management Plan has been prepared to manage any disastrous event, if any, from the plant operation. Environmental and safety legislations will be kept in view while implementing the project.

Occupational Health and Safety

Effective implementation of measures suggested for pollution control will ensure safety and health of the workers.

5.0 Project Benefits

The proposed coal washery will result in improvement of infrastructure as well as upliftment of social structure in the area. The people residing in the nearby areas will be benefited directly and indirectly. It is anticipated that the proposed coal washery will provide benefits to the locals in two phases i.e. during construction phase as well as during operational stage of the plant.

5.1 Construction Phase

The major benefit due to the proposed project will be in the area of generating temporary employment.

5.2 Operational Phase

Rajan Coal Washery will employ local people to the extent possible for avoiding creation of additional infrastructure. Rajan Coal Washery will develop medical facilities for

catering to the needs of the project personnel. These facilities will also be extended to the local community in due course.

Rajan Coal Washery will initiate action for social upliftment in the area like female education and vocational training. Financial support will be extended to strengthen educational and infrastructure in the region.

The manpower requirements for the operational phase of the coal washery will be about 65 people. In addition, there will be an indirect employment for skilled/ semi skilled people during project life.

All attempts will be made to employ suitable locally available skilled personnel from the study area. In case of non-availability of skilled persons, people will be taken from outside the study area.

There will also be small increase in the vehicular traffic due to Coal transport. This increase in traffic will not have any consequence to warrant special mention. One should expect that the increased passenger load in the sector would prompt the state government to start new and frequent public transport services to this area, bringing upliftment to the whole locality.

Other Benefits

Rajan Coal Washery is equally conscious for socio-economic development and are committed to raise the quality of life and social well being of communities where it operates. Its CSR initiatives have been prioritized on local needs, which focus on Health, Education, Sustainable Livelihood, Social Mobilization, Infrastructure Development, Water Harvesting, Agriculture and Environment Conservation.

6.0 Environmental Management Plan

M/s Rajan Coal Washery will follow guidelines specified by CPCB under the Corporate Responsibility for Environmental Protection (CREP) for coal washery. The following environmental management plan has been suggested during construction and operational phases:

Construction Phase

The following control measures are recommended to mitigate the probable adverse impacts:

- Site for construction workers camp shall be clearly demarcated to prevent occupational hazards. Ensure provision for necessary basic needs and

infrastructure facilities such as water supply, sanitary facilities, temporary housing, domestic fuel etc.

- At the site of construction, where petroleum powered equipment is used and temporary storage of petroleum products (highly inflammable) is done, may cause fire hazard. Necessary care shall be taken as per the safety norms.
- Diesel operated construction machinery; vehicles etc. at project site shall be properly maintained to minimize exhaust emissions as well as noise.
- Though the effect of noise on the nearby inhabitants due to construction activity will be negligible, noise prone activities shall be restricted to the day time.
- Tree plantation shall be undertaken at the time of development of the project site, so that they grow to considerable height by the time of commissioning of the proposed project.
- As soon as construction is over, surplus of excavated soil shall be utilized to fill up low lying areas, rubbish needs to be cleared and all surfaces be reinstated.
- Falling of matured trees shall be avoided.

Operational Phase

During the normal operation phase of the proposed coal washery, pollution impacts were predicted and found to be marginal on air, land and socio-economic components and insignificant on noise and water.

Air Environment

- Rajan Coal Washery will be adopting a wet process of coal beneficiation. No air emissions are generated from this process.
- An independent water spraying system shall be established for coal handling and crushing facilities. Water spraying system involves surface water tanks, network of spray water pipeline and headers. Adequate moisture will be maintained in coal handling area to ensure that dust is not getting air borne.
- Bag filters will be installed at junction points.
- The coal received at washery from mines will have sufficient surface moisture.
- Vehicle movement in the coal washery area, shall be regulated effectively to avoid traffic congestion and workers shall be protected from dust
- Emissions from the heavy duty vehicle operating in coal washery shall conform the standard under Motor Vehicles Rules 1989.

Noise Environment

- Manufacturers and suppliers of machine/equipment like compressors, turbines, and generators will be selected to ensure that these machine /equipment meet the desired noise/vibration standards by providing noise absorbing material for enclosures or using appropriate design/technology for fabricating/assembling machines.
- The operator's cabins (control rooms) shall be properly (acoustically) insulated with special doors and observation windows.
- The operators working in the high-noise areas like compressor houses, blowers, generators, feed pumps, steam generation plant, turbo-generator area shall be provided with ear-muffs/ear-plugs.
- Acoustic laggings and silencers shall be provided in equipment wherever necessary.
- The compressed air station shall be provided with suction side silencers. Ventilation fans shall generally be installed in enclosed premises.
- Supply ducts and grills on the ventilation and air conditioning system shall be suitably sized for minimum noise level.
- The silencers and mufflers of the individual machines shall be regularly checked.

Water Environment

- The efficiency of settling tank of wastewater treatment shall be 99%.
- Rajan Coal Washery will adopt rainwater harvesting scheme to recharge ground water
- Treated wastewater shall be sprayed at all coal transfer points
- The zero effluent discharge system shall be implemented judiciously

Coal Yard Drainage

During monsoon season, the problem of coal yard drainage becomes critical due to coal particles and dust in the yard. To take care of this problem, the entire coal storage yard would be provided with separate drains, which will lead to a separate sump of adequate capacity.

Wastewater Management for Zero Discharge Effluent

Zero discharge facilities will be adopted in the proposed coal washery project by recycling the wastewater for dust suppression /plantation; hence disposal of treated wastewater will be zero.

Land Environment

- The roads within the plant premises shall be concreted/asphalted.
- Quantification of the reject waste will be done regularly which will help proper management in respect of storage before it is sold to the authorized venders.
- Coal dust nuisance to the neighboring agriculture fields and residential areas will be prevented with suitable measures/ by strengthening the existing greenbelt.

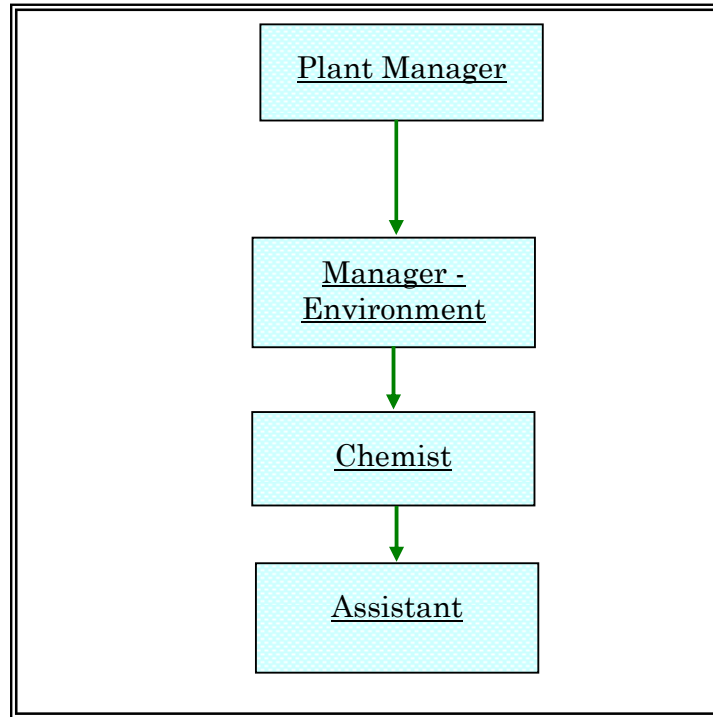
Socio-economic Environment

Following measures are suggested for minimizing the adverse impacts on socio-economic environment.

- Heads of the local pollution control authorities/Administration shall be taken into the confidence to minimize friction between management and local people.
- Communication with the local community would be done on regular basis by the project authorities to provide an opportunity for discussion.
- Project authorities will organize regular environmental awareness programs.
- Social welfare activities to be undertaken by the project authorities, in collaboration with local administration.
- Project authority will provide free medical facilities to near by villagers.
- Locally available workforce shall be given preference in the employment.
- To minimize the strain on infrastructure, existing facilities shall be augmented.

Institutional Arrangements for Environment Protection & Conservation

Environmental management cell will be established at the project site, which will be supervised and controlled by an independent plant Manager supported by a team of technically qualified personnel apart from other operating staff. Organization structure is presented below. It will be the responsibility of this department to supervise the monitoring of environmental attributes viz. ambient air quality, water and effluent quality, noise level either departmentally or by appointing external agencies wherever necessary. In case the monitored results of environmental pollution are found to exceed the allowable limits, the environmental Management cell will suggest remedial measures and get them implemented.



Budgetary Provision for Environmental Measures

An adequate budgetary provision of Rs. 18 lacks during construction and Rs. 13 lacks during operation has been made for implementation of Environmental Management Plan.

Corporate Social Responsibility

Being a corporate citizen the company has the responsibility of contributing to the welfare of the society in which it operates. The company will organise various awareness programmes for its employee and the general public of the area where it operates to ensure a better, sustainable way of life for the weaker sections of society.

Budgetary Provision for CSR Activity

Particular	Capital Cost (in Lacks)
Education	0.5
Health Care	2.0
Community Development	2.5
Total	5.0