

## ***VIII: ENVIRONMENTAL MANAGEMENT***

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### **8.0 INTRODUCTION**

There is no development without impact but the impacts can be minimized through impact management. An Environmental Management Action Plan is an implementation plan, which consists of mitigation, management, monitoring, and institutional measures to be taken during the implementation and operation of any project towards the mitigation of the impacts associated with the project. The impacts for the proposed Industrial Development are identified and discussed in the earlier chapters. An Environmental Management Plan (EMP) is intended to minimize these impacts. In relation to an industrial estate & baseline studies, the EMP shall cover the broad management measures for the estate as a whole. Individual Impact Analysis and Management Plan for the proposed industrial units would have to fit into this overall Environmental Management Plan. The tasks to be performed for environmental management of the estate include:

- ü Ensuring compliance with environmental norms b the individual industries of the estate
- ü Operation and maintenance of the storm water drainage system, sewerage system, CETP
- ü Compliance with water quality standards and ensuring safe disposal of effluents (check clogging, damages etc,)
- ü Maintenance of green belts
- ü Solid waste collection and disposal
- ü Hazardous waste collection and disposal
- ü Monitoring of air, water and wastes within and outside the site
- ü Monitor cleanliness within the estate
- ü Inspect from time to time performance of pre-treatment facilities in industries
- ü Inspect the safety installations of industries requiring them as per pertinent regulations

## 8.1 RESETTLEMENT & REHABILITATION (R&R) PLAN

The rehabilitation and resettlement package should be in line with Government of Chhattisgarh guidelines. As per GOI, MoEF norms, every State Government has to formulate guidelines for rehabilitation and resettlement for their developmental activities.

## 8.2 AIR ENVIRONMENT

### Sources of Air Pollution in Industrial Units

- Boilers,
- Combustion of fuel at furnace,
- Diesel generators,
- Thermic fluid heaters etc.,
- Odour from various operations
- Emissions (channelised and fugitive) from process operations and handling of chemicals etc., and
- Incinerations of wastes

Individual industries should take care of the pollution generated from their industries and use appropriate methods of control like

- Control at source for minimizing air pollution.
- Greenbelt development around the estate reduces odour and noise pollutions
- A common incinerator at places like landfill or CETP is preferred rather than having individual incinerators.

The ground level concentrations of pollutants due to the identified industrial unit emissions can be identified by the usage of database of this study. The database can also be shared with the regulatory authorities like Chhattisgarh

Environmental Conservation Board, so that the predictions made for any EIA project can be reviewed with better understanding.

Provision shall be made for sprinkling of water on loose soil to avoid dust generation. The debris and unutilized construction material and earth from the construction site shall be removed immediately to recycle within the project so that no nuisance dust is generated due to wind.

The vehicles employed by the developers shall be checked for vehicular emissions. The developers shall also impress upon the service agencies to get vehicles regularly checked for vehicular emissions. Construction Activities shall not be allowed at Night. The mitigation measures shall include regular maintenance of machinery and provision of personnel protective equipments to workers where needed.

The following mitigatory measures however can be suggested to control the ambient air quality.

Various air pollution control equipments like Bag Filter and Electrostatic Precipitators (ESP) have been installed in industries to control the air emission. These equipments will be designed with high efficiency and working satisfactorily. Efficient working of these equipments will keep the stack emissions within the prescribed limits.

- ü Proper maintenance of roads in proposed site.
- ü Water spraying on roads should be done regularly.
- ü Plugging all leakages and enclosing storage and material handling systems.
- ü Open storage piles should be enclosed by providing green belt.
- ü Proper maintenance measure, all concerned workers should be provided with safety measures etc.
- ü Adopting any other system, which can reduce the level of in-plant fugitive emissions etc.

- ü Development and maintenance of green belt to attenuate the pollutants emitted from the industrial area.
- ü Ambient air quality and stack & fugitive emissions should be monitored regularly.
- ü Subsequent operation and maintenance of pollution control system should be followed to meet the emission limits.

In-plant fugitive emissions may have occupational health impacts on workers in long run, which can be mitigated and controlled by adopting certain mitigative measures.

- ü Through appropriate design, maintenance, operation of process and pollution control equipment; It will be possible to reduce SPM emission loads.
- ü Preventive maintenance and regular checking of ESP's installed for dust collection.
- ü All the Vehicles in the proposed area will have PUC (Pollution Under Control) certificate. All the unpaved roads as well as those paved roads, which are exposed to high dust concentrations within area will be sprinkled with water from time to time.
- ü The floor of the vehicle parking area will be constructed of plain concrete or least of brick-on-edge flooring.
- ü Plantation will be done along the roadsides wherever needed, to mitigate the vehicular fugitive emissions.
- ü Regular ambient air monitoring is conducted to check the satisfactory performance of the pollution control equipments.

### 8.3 NOISE ENVIRONMENT

There will be marginal increase in noise levels during construction phase which is temporary. No construction activities are planned during night time which may contribute to the existing baseline. The following are the noise control measures proposed to be undertaken in the proposed project.

- ∅ Provision of acoustic dampeners in foundations and insulators in the interiors
- ∅ Encasement of noise generating equipment.
- ∅ A thick greenbelt will be developed to act as noise attenuator.
- ∅ In addition personnel working near high noise level generating sources will be provided with ear muffs.
- ∅ Proper and suitable acoustic barrier will also be provided around areas generating high noise.
- ∅ Effective preventive maintenance and vibration measurement of all rotating equipment will help in the noise reduction.
- ∅ Automatic door enclosures for control room and laboratory etc

### 8.4 WATER ENVIRONMENT

During construction, provision for infra-structural services including water supply, sewage, drainage facilities and electrification will be made. The construction site would be provided with suitable toilet facilities for the workers to allow proper standards of hygiene. These facilities would be connected to a septic tank and maintained to ensure minimum impact on the environment.

The total water requirement of proposed site is met from Sheonath River. The following measures are adopted for efficient water management in the proposed site including all the sections:

- ü In view of the scarcity of ground water and surface water, the wastewater after appropriate treatment and even the rainwater will be conserved and used.
- ü Rainwater harvesting will be recommended.
- ü The source of sewage water is from office toilets which are disposed off in to soak pit via septic tank. Treated Waste Water will also be used to control the fugitive emissions by water spraying.
- ü Waste water generated in site after operations in different industries will be treated properly in ETP and treated water will be used in dust suppression and greenbelt development.

To counterbalance the environmental impacts discussed in the earlier chapters, the Infrastructural measures for environmental pollution control in an industrial estate need to be taken care of. Infrastructural measures for pollution control in an industrial estate under water environment are:

- ü Collection, Treatment and Disposal of storm water
- ü Collection, Treatment and Disposal of sanitary and industrial waste water

#### **8.4.1 Collection, Treatment & Disposal of Storm Water**

Underground sewers are preferable to collect the Storm waters. Storm waters of open road drains are often misused as open sewers for the discharge of industrial and domestic wastewater and as well as dumps for disposal of solid wastes. Further more, it creates obstacle to the access of industries.

In general, the storm water run-off is often polluted through dust, garbage and unprotected solid wastes. Hence, a primary treatment in settling tanks or ponds is essential in order to minimize the pollution to a significant level before the disposal of these waters into the natural environment.

## 8.4.2 Collection, Treatment & Disposal of Sanitary and Industrial Waste Waters

The drainage pattern of the study area indicates that the natural slope is towards southwest and industrial & domestic discharges may find their way towards this end. In order to achieve a cost reduction in the collection system of these effluents, the utilization of the natural slopes plays an important role.

Keeping in view of the drainage pattern and the natural slope of the study area, the ETP for the industrial estate should be located on the southwestern side of the proposed development area. The extent of the area required for locating the treatment plant depends on:

- ü Unit Operations required for the treatment of the effluents
- ü Sizes of the Unit Operations
- ü Quantity of effluents generated
- ü Characteristics of the effluents
- ü Maintenance of Green Belt and Buffer distance around ETP area to avoid odour and emission problems.

The Characteristics and the flow of effluents play a vital role in identifying the common treatment facility. At present, the effluent treatment problem is handled by:

- Ø Individual approach
- Ø Sector-wise approach
- Ø Combined approach with or without pre-treatment

Combined Effluent Treatment Plan can be brought about efficiently by:

- Ø Zoning of Industries based on type of Pollutants
- Ø Encouraging diversified scales of industries in the same zone.

The advantages of CETP are:

- Ø Economy of scales
- Ø Full time supervision and control over treatment (Direct)
- Ø Easy Installation, Operation and Maintenance of treatment units
- Ø Hydraulic stability of treatment units
- Ø Conditioning and equalization of wastewater

#### **8.4.3 Limitations**

Development of specific category of industry in a particular zone depends on variables like:

- Ø Size of Operations
- Ø Required area
- Ø Access to infrastructure desired by the proponent.

These limitations have to be considered during Layout Planning and Zonation of the Industrial Area.

#### **8.5 MODULAR NATURE OF THE CETP**

Visualization of the CETP set up in the industrial estate has to done at layout planning stages itself. The nature of CETP should be modular wherein the up-gradation of the plant can be achieved with

- Ø Growth of the industries in the industrial estate;
- Ø Increase in the quantity of generated wastewater and
- Ø Change in the quality of the wastewater

#### **8.6 WASTE-WATER SEGREGATION**

Segregation of wastewater will be automatically done by the Zonation of the industries.

The treatment of Hazardous and the toxic effluents has to the done separately or else, they may either hamper the performance of the CETP or else they get bio-magnified in the waters.



Industries which doesn't need treatment or dilution of effluent water can be sent directly to the terminal treatment plant. In order to achieve a cost-effective and unswerving solution, a segregation plan has to be worked out based on characteristics of wastewater generated both within industrial estate and at zonal level.

The wastewaters are categorized as follows:

- Ø Biodegradable (without pre-treatment)
- Ø Biodegradable (after pre-treatment)
- Ø Non-Biodegradable
- Ø Toxic to biological systems

Collection of Non-Biodegradable wastewaters has to be done separately and should be sent to separate treatment units.

## **8.7 SOLID WASTE COLLECTION AND DISPOSAL**

Solid wastes from industrial sources, domestic sources and of Hazardous nature have to be collected, treated and disposed separately and the priority should be given to the resource recovery from the solid wastes.

- Incinerator for thermal treatment of hazardous waste, if needed, should be a common facility to optimize the cost and easier to maintenance.
- In order to lower the cost of transportation and for better safety, the disposal site of solid waste is preferred near the industrial estate with monitoring facility both from the point of view of surface run-off and ground water protection.

## 8.8 GREEN BELT DESIGN & DEVELOPMENT

Green Belt design and development has been attributed a great importance and became an essential element of planning policy for the last 30 or 40 years. The LIA - Dagori sets out the policies on the different aspects of green belt development and planning. Local authorities must take their content into account in preparing their green belt development plans. The guidance may also be material to decisions on individual planning applications and appeals.

The main objective of the green belt is to provide a barrier between the source of pollution and the surrounding areas. The green belt helps to capture the fugitive emission and to attenuate the noise generated apart from improving the aesthetics. Development of green belt and other forms of greenery shall also prevent soil erosion and washing away of topsoil besides helping in stabilizing the functional ecosystem and further to make the climate more conducive and to restore water balance.

While making choice of plant species for cultivation in green belts, weight age has to be given priority to the natural factor of bio-climate. It is also presumed that the selected plants will be grown as per normal horticultural (or forestry) practice and authorities responsible for plantation will also make sure that adequate provision for watering and protection of the saplings exists at site.

Every newly established estate should also include interior greener and a surrounding interior greenbelt. Their design and planning should be based on their function, which include:

- ü Spatio-visual separation of larger parts of the estate
- ü Roadside green separating main interior roads from the industrial buildings
- ü Provision of an interior pedestrian network

- ü Provision of (smaller) resting areas for the workforce during breaks (park benches etc,)
- ü Provision of reserve sites eventually becoming necessary at a later development stage.

Based on these functions, the interior landscaping will form an interconnected network of greenery mostly along the main interior roads.

While considering the above aspects due care must be taken in selecting the suitable plant species with following characteristics

- ü Fast growing
- ü Thick Canopy Cover
- ü Perennial and Ever Green
- ü Large Leaf Area
- ü Perfectly Indigenous
- ü Resistant to Specific Air Pollutants and should maintain ecological balance for soil and geo-hydrological conditions of the region.

## **DEFINING BOUNDARIES**

Once the general extent of a green belt has been approved it should be altered only in exceptional circumstances. If such an alteration is proposed, the alteration should satisfy the opportunities for development within the areas contained by and beyond the green belt. Similarly detailed green belt boundaries defined in adopted local plans should be altered only exceptionally. Detailed boundaries should not be altered or development allowed merely because the land has become derelict.

Where, the detailed boundaries have not yet been defined in the study area, it is necessary to establish boundaries that will endure. They should be carefully drawn so as not to include which it is unnecessary to keep permanently open. Otherwise there is a risk that encroachment on the green

belt may have to be allowed in order to accommodate future development. If boundaries are drawn excessively tightly around the built-up areas it may not be possible to maintain the degree of permanence that green belts should have. This would devalue the concept of the green belt and reduce the value of local plans in making proper provision for necessary development in the future.

When drawing green belt boundaries in development plans local planning authorities should take account of the need to promote sustainable development of channeling development towards urban areas inside the inner green belt boundary,

### **Safeguarded Land**

When local planning authorities prepare new or revised structure and local plans, any proposals affecting green belts should be related to a time-scale which is longer than that normally adopted for other aspects of the plan. They should satisfy themselves that green belt boundaries will not need to be altered at the end of the plan period. In order to ensure protection of green belts within this longer timescale, this will in some cases mean safeguarding land between the urban area and the green belt, which may be required to meet longer-term development needs.

Regional planning should provide a framework for considering this issue. In preparing and reviewing their development plans authorities should address the possible need to provide safeguarded land. They should consider the broad location of anticipated development beyond the plan period, its effects on urban areas contained by the green belt and on areas beyond it, and its implications for sustainable development. In non-metropolitan areas these questions should in the first instance be addressed in the structure plan, which should where necessary indicate a general area where local plans should identify safeguarded land.

## Land Use Objectives

When any large-scale development or redevelopment of land occurs in the green belt, it should, so far as possible contribute to the achievement of the objectives for the use of land in green belts. This approach applies to large-scale developments irrespective of whether they are appropriate development, or inappropriate development, which is justified by very special circumstances. Development plans should make clear the local planning authority's intended approach.

Planning obligations may be used to offset the loss of or impact on any amenity present on a site prior to development. In case where amenity on a site adjacent to the green belt is lost as a result of development on that site, it may be reasonable for obligations to provide for offsetting benefits on land in the green belt, as long as there is a direct relationship between the two sites.

## Visual Amenity

The visual amenities of the green belt should not be injured by proposals for development within or conspicuous from the green belt, which, although they would prejudice the purposes of including land in green belts, might be visually detrimental by reason of their siting, materials or design.

### GREEN BELT IN INDUSTRIAL AREA (GENERAL STANDARDS)

Location/ Area of Plantation	Width and Type of the Plantation
Roadside greenery plantation	15 m (grass and shrubs)
Outer Green belt	30-50m (shrubs and trees) near the plant and 25 m near the periphery
Either side of along the Highway and the railway line	500 m (shrubs and trees)
Green belt around the ETP	20 m (shrubs and trees)
Buffer zone around the places of importance	30 m (shrubs and trees)

## Green Belt – LIA Dagori

The plan for attenuation of the noise and air pollutant levels includes design for plantations around the proposed Industrial Area boundary, road-side, office buildings and stretches of open land.

The entire Large Industrial Area – Dagori is classified into four sectors.

S. No	Sector	Plots	No of Plots	Area (Acres)	Area (Ha)	Possible Area for Green Belt (20%)
1	A	01 – 12	12	448.0	181.3056	36.26112
2	B	13– 24	12	287.0	116.1489	23.22978
3	C	25 – 30	06	303.0	122.6241	24.52482
4	D	31 – 40	10	275.0	111.2925	22.2585
<b>Total including amenities &amp; excluding roads and culverts (as per site plan of CSIDC)</b>			<b>40</b>	<b>1313.00</b>	<b>531.3711</b>	<b>106.2742</b>
Allottable Area for Industrial Units				1313.0	531.3711	<b>106.2742</b>
Area Proposed for Amenities				457.30	185.0693	37.0138
Area Proposed for Roads & Culverts				196.70	79.6044	15.9209
<b>Total Area as per PPR &amp; CSIDC Records</b>				<b>1967.0</b>	<b>796.0449</b>	<b>159.209</b>

Out of the total available area (796 ha.) as per the statutory requirements 20% of the total available land i.e. 160 Ha. will be covered under green belt. Apart from that it is recommended that every industry which is going to set up in the LIA-Dagori shall develop green belt of about 20% of the total allotted land to them. Apart from the green belt plan it is also proposed to develop road-side plantation, avenue plantation and nursery shall also be developed in the proposed Large Industrial Area.

The details of the boundary plantation are as follows:

## **Primary Zone**

This zone will be nearest one to the emission sources, where the ambient pollutant concentration is higher. The trees planted here must have dense spreading canopy. The trees should be close-set with a spacing of 2-3 m between trees and width of this zone will be 10 – 15 m.

## **Secondary Zone**

Outer to the above primary zone, 10 – 15 m width wide strip of land shall be planted with trees which are moderately tolerant to the pollutants but are endowed with fast growing, dense foliage canopy.

## **Curtain Zone**

All along the boundary of the proposed Large Industrial Area Complex a 20 m width land strip has to be planted with trees which are tall in nature and evergreen in habit. This zone will act as a barrier and as far as possible check the pollutants from going to and contaminating other areas beyond the boundary premises. The spacing between the trees should be more than 1 m.

## **8.9 POST PROJECT MONITORING PROGRAMME**

### **8.9.1 Environmental Management Cell**

In order to maintain the environmental quality within the standards, regular monitoring of various environmental components is necessary. Every industry will establish a dedicated Environmental cell to monitor and analyse the various environmental components of the plant.

## 8.9.2 Environmental Monitoring

Monitoring of various environmental parameters will be carried out on a regular basis to ascertain the following:

- ü State of pollution within the plant and in its vicinity;
- ü Generate data for predictive or corrective purpose in respect of pollution;
- ü Examine the efficiency of Pollution Control Systems installed in the complex
- ü To assess and monitor environmental impacts

The following monitoring programme has been proposed to monitor various environmental components.

### A. Meteorology

An automatic weather monitoring station would be installed within the plant premises for a proper measurement and record of meteorological parameters.

### B. Ambient Air Quality Monitoring

To determine the extent to which the plant contributes to pollution in the area, a AAQ monitoring along with the stack monitoring will be carried out. It is also proposed to monitor particulate emission qualitatively as per norms. The stack monitoring data will be utilized to keep a continuous check on the performance of ESP.



### **C. Wastewater Sampling**

The wastewater samples will be collected regularly both at inlet and outlet of sewage treatment plant to assess the performance and compliance as per the norms.

### **D. Environmental Laboratory**

A full-fledged environmental laboratory shall be established in the industries with the following equipment.

1. Stack Monitoring Kit,
2. Ambient Air Quality Monitoring Equipment,
3. Dust Samplers,
4. Noise Level Meter,
5. BOD Incubator,
6. pH Meter,
7. Spectrophotometer,
8. Portable Flue Gas Analyzer
9. Continuous Weather Monitoring Station to measure, Wind Direction, Wind Speed, Humidity and Temperature.