

## **Executive Summary**

### **INTRODUCTION**

Raipur is the capital city of Chhattisgarh, carved out of erstwhile state of Madhya Pradesh. The city is also the head quarter of Raipur district. The city is governed by the Raipur Municipal Corporation (RMC). Raipur Municipal Corporation or Raipur Municipal Corporation (RMC) is responsible for collection, treatment and disposal of Municipal Solid Waste generated in Raipur city. At present, Raipur Municipal Corporation is not having a proper facility for disposal of the municipal solid wastes generated within the city limits. Hence they have engaged ***Raipur Waste Management Private Limited (RWMPL) – a Kivara Group Enterprise*** to develop and implement an integrated solid waste management project for collection, transportation, treatment and disposal of MSW generated from the Raipur city.

### **PROJECT LOCATION AND ACCESSIBILITY**

The proposed site for development of Municipal Solid Waste processing & disposal facility in Raipur is located near *Sakri* Village, about 20 km North-East of Raipur. The proposed site is located at the connecting road between NH-6 (Hajira Kolkata) and SH-9 (Vidhansabha Road). The Ring Road -3 connects NH-6 with SH-6. The site is bounded by Kutchana-Chinakuri Road on the south and Sakri Road on the north. The nearest railhead is at *Telibandha* located at an approximate aerial distance of 9km on south-western side of the proposed project site. On the other hand, the nearest airport to the proposed project site is *Swami Vivekananda Airport* located at an approximate distance of 9.5km on southern side of the project site.

### **THE LAND REQUIREMENT AND LAND DETAILS**

A total of 27.04 ha land is taken on a lease basis by Raipur Municipal Corporation for setting up processing and sanitary Landfill facility. The land is handed over to Raipur Municipal Corporation through district collectorate office under JUNURM Mission.

### **PROJECT ACTIVITIES**

The proposed Waste Collection and Transport Operations (WCTO) will take the waste to Municipal Solid Waste Processing Facility at Sakri. Raipur waste Management Private Limited (RWMPL) is given the responsibility of collection and transportation of waste from Raipur city. In this regard, they have started operating in Raipur city to collect waste from different corners. However, there is no scientific processing and disposal facility is present to treat and dispose the collected waste. The collected waste is presently being dumped near *Sarona*. The proposed project activities at Sakri are as follows:

#### **Materials Recovery Facility (MRF)**

The proposed Materials Recovery Facility (MRF) accepts materials, whether source separated or mixed, and separates processes and stores them for later use as raw materials for

remanufacturing and reprocessing. The main function of the MRF is to maximize the quantity of recyclables processed, while producing materials that will generate the highest possible revenues in the market.

### **Pre-Sorting Section (for Co-Processing)**

The proposed pre-sorting section will recover the Potential availability of MSW derived refuse fuel (MRF/RDF) for Processing as a fuel substitute to cement Industries. While the use of alternative fuels will help to reduce the carbon intensity of the Cement Industry, some of these MSW Sources have low carbon emissions. Only selected waste with recoverable calorific value will be made available for co-processing in to cement industries as an alternative fuel.

### **Accelerated Aerobic Composting**

Composting is controlled aerobic process carried out by successive populations of micro organisms (bacteria - fungi - actinomycetes) leading to development of mesophilic (40-45°C) and thermophilic (60-65°C) temperatures and production of carbon dioxide, minerals, organic substrate, energy and H<sub>2</sub>O. This is by far the most widely used method for processing of MSW in fruitful manner.

Mechanized windrow composting is the maximum practiced option. Rapid decomposition of organic matter is achieved within 4-6 weeks. The controlled acceleration of the process and fast sanitization of waste is achieved to kill pathogens and inactivation of weed seeds at 60 to 65°C [thermophilic phase]. During monsoon the windrows can be made under shade to minimize nutrient wash outs. The entire waste stacking has to be done on concrete paved platform.

### **Refuse Derived Technology (RDF) Technology**

Refuse Derived Fuel (RDF) is an unidentified product manufactured from the combustible fraction of waste by a sophisticated mechanical process involving the deliberate use of heat, having a granularity of at least 90% less than 10 mm and containing no more than 15% ash prior to any addition of substances to enhance fuel properties.

Based on the characteristics of throughput waste the RDF produced mass will be treated to have sufficient calorific value for marketability by enhancing with few additives like rice husk, saw dust, bagasse, etc. would be supplemented.

### **Processing of C&D Debris**

Inert like stone, brick, sand, silt, etc. obtained from the MSW received as rejects can be recycled as paver blocks and/or bricks. This will enable reduction in inert being disposed in the landfill and ultimately increases the longevity of the Sanitary Landfill.

### **Sanitary Landfilling**

The MSWM rules 2000 mandate that each municipal authority shall set up an engineered landfill for the disposal of waste. It directs as follows.

- Landfilling shall be restricted to non-biodegradable, inert wastes and other wastes which are not suitable for recycling and for biological processing.
- Landfilling shall also be carried out for residues of waste processing facilities as well as pre-processing rejects from waste processing facilities.

### **BASELINE ENVIRONMENTAL STATUS:**

The study of the baseline environmental status helps in assessing the existing environmental conditions and identifying the critical environmental attributes. Baseline environmental study comprised study of physical, biological and socio-economic environment.

### **Physical Environment:**

#### ***Climate and Meteorology:***

falls under the tropical climatic region. The climate of the area is moderate, characterized by hot summer from March to Mid June, a humid monsoon or rainy season stretching from Mid June to September, a short monsoon during October and November and the Winter between December and February.

#### ***Air Quality***

The ambient air quality representing PM<sub>10</sub>, PM<sub>2.5</sub>, Sulfur Dioxide (SO<sub>2</sub>), Nitrogen Dioxide (NO<sub>2</sub>), Ozone (O<sub>3</sub>) and Carbon Mono-oxide (CO) was monitored at eight different locations for 24 hours twice a week during April-June, 2014. All the parameters were found to be in compliance to the National Ambient Air Quality Standards (NAAQS), 2009. The average 24 hourly PM<sub>10</sub> at the monitoring locations ranged between 47-74 µg /m<sup>3</sup> (NAAQS-100 µg/m<sup>3</sup>). The average 24 hourly PM<sub>2.5</sub> concentration at the monitoring locations ranged between 16-25µg/m<sup>3</sup> (NAAQS-80 µg/m<sup>3</sup>). The average 24 hourly SO<sub>2</sub> concentration were found to be 4.8-6.7 µg/m<sup>3</sup> whereas NO<sub>x</sub> concentration ranged between 12.9-17.9 µg/m<sup>3</sup> . On the other hand the average concentration of O<sub>3</sub> ranged between 41.0-44.4 µg/m<sup>3</sup> whereas concentration of CO at all monitoring location was found to be <1.0 ppm.

#### ***Noise Quality***

Ambient noise quality monitoring was carried out at eight locations in the study area. The day time noise levels at all noise monitoring station is found within day time standards (55 decibels) for residential area excepting for one location. Similarly, excepting for one location, night time noise level are also within night time noise standard for residential area (45 decibel). The noise monitoring results revealed that the day time noise levels for all the sites varied between 51.0 dB (A) to 58.1 dB (A) during the day time and between 38.0 dB(A) to 48.8 dB(A) during the night time.

### ***Traffic and Transportation***

It has been observed that traffic volume is greater at the junction between NH-6 and Ring Road-3 compared to the junction between Bidhansabha Road and Site approach Road.

### ***Hydrogeology***

According to CGWB Report for Raipur district, the major water bearing formations are cavernous Limestone, fractured and weathered sandstones and Granite gneisses etc. The pre monsoon levels for ground water are observed to be 8-9 m bgl whereas in post monsoon season, it is 6-7m bgl in the study area.

### ***Ground Water Quality***

Groundwater samples were collected and analyzed as per IS: 10500 from Fifteen (15) locations in and around the project location. It has been observed that excepting for PH, conductivity and Total Hardness, almost all the parameters analyzed were under the acceptable and permissible limit of IS: 10500.

### ***Surface Water Quality***

Surface water samples were collected from Seven (7) locations from all the ponds and nearby dam. P<sub>H</sub> of surface water samples were in the range of 9.27-11.43 indicating alkaline nature of water. Conductivity value of the water samples were ranging between 236-923 mhos/cm. The DO content exhibited the values ranging between 5.2-6.2 mg/lit whereas the BOD value ranged between 2-7 mg/lit. COD value of all the collected surface water samples were in the range of 6.65-18.92 mg/lit. TDS value of the surface water samples varied between 140-610 mg/lit whereas TSS value of the collected surface water samples ranged between 7.6mg/lit-96 mg/lit.

### ***Natural Hazard***

The proposed project site is located in central India which comes in seismically low region. The project site is situated in the Zone II (Having low seismic intensity) of the seismic map of India (IS 1893, Part-1, 2002) and has low risk of potential damage due to earthquakes.

### ***Biological Environment***

The project site is currently a fallow land. The surrounding area is mixed-use, mainly agricultural land, settlement, village orchard, agriculture farm, and village plantation, surface water bodies like ponds and canals and waste land. There is no Protected or Reserve Forest in the study area. There is no ecological sensitive habitat like National Park, Reserve Forest, Wildlife Sanctuaries, Tiger Reserve, Biosphere Reserve, present within 10km of the proposed project site. The primary survey results shows that 64 species of trees, 19 species of shrubs, 23 species of herbs, 10 species of climbers and 11 species of grasses were recorded from the study area. There is no Schedule I species habitat in the study area, However 6 species of Schedule II animals were reported from the study area.

## **Socio-Economic Environment**

The baseline study focuses on *twelve villages* within 5 km radius around the proposed location. This comprises of *six* villages of Arang block and *six* villages of Raipur block. It was observed from the Census data (2011) that Serikhedi (5802) has the highest population among study area villages where sex ratio was observed to be 966 which is lower than the state average of Chhatisgarh (991). The major population in the study area villages is involved in agricultural. The study area mainly comprises of multi cropped land with paddy being the major agricultural produce. Apart from paddy cultivation, inhabitants of study area villages are also involved in poultry farming, fishing, and vegetable cultivation.

## **IMPACT ASSESSMENT**

The potential impacts of the project on different components of the environment was systematically identified and evaluated for significance. The principal concerns that emerged are:

### **Impact on Air Quality**

The impact on air quality is anticipated due to generation of fugitive dust from handling of construction material- transport , storage and emission from operation of heavy machineries and equipments during construction period. Fugitive emission is also anticipated during loading, unloading and transportation of solid waste during operational phase..

### **Impact on Noise Quality**

The impact on noise quality may be anticipated from operation of heavy machineries/equipments and vehicular movement during construction and operational phase of the of landfill site on access road.

### **Impact on Road and Traffic**

Impact on road and traffic is anticipated during transportation of construction material to the site during construction phase. Again during operational phase, road traffic is anticipated during operational phase for transport of MSW to the processing facilities.

### **Impact on Local Drainage**

There is natural drainage channel in and around the proposed project site. Elevating the land from the ground level during site preparation may lead to alteration of onsite micro-drainage pattern. This may lead to temporary local inundation of the surrounding area.

### **Impact on Surface and Ground Water Quality**

The sediment laden surface runoff from construction site may degrade the water quality of the receiving water body

The liner system and leachate treatment facility will be provided in the landfill system. However, the seepage and accidental release of leachate from landfill site may contaminate the receiving surface water and ground water.

### **Impact on Biological Environment**

The proposed project site has no natural vegetation or habitat of significant wildlife. Construction of MSW facility has no direct impact on flora and faunal habitat. Only few small trees and shrubs need to be cleared during site preparation; however these are common to the site. Additionally, a greenbelt will be developed around the MSW facility, which will improve the ecological habitat in and around the proposed project site.

### **Impact on Socio Economic Environment**

The adverse impact could arise from discomfort due to generation of fugitive dust, noise and odour during construction and operational activities. On the other hand positive impacts in terms of generation of employment opportunities are also anticipated from the proposed project.

### **Impact on Occupational Health and Safety**

This is anticipated from operation of construction machineries and equipments during site preparation activities, waste collection and segregation activities, waste unloading and composting and during working in sanitary landfill.

Workers involved in municipal waste disposal and handling face occupational health and safety hazards which are as diverse as the materials they are handling. The primary complaints relate to odour and upper respiratory tract irritation usually related to dust.

## **ENVIRONMENT MANAGEMENT PLAN**

The Environment Management Plan details out the mitigation measures to be implemented by both RWMPL and the Contractors during project design, construction and operation phase. The following environmental management plans have been formulated in line with the proposed project activities viz. Waste receiving at the site, processing, storage and disposal including landfill closure.

### **Air Quality Management**

#### *Construction Phase*

- Water sprinkling on main haul roads in the project area will be ensured.
- The duration of stockpiling of excavated mud will be as short as possible as most of the material will be used for backfilling for open cut trenches for road development.
- All vehicles carrying raw materials will be instructed to cover with tarpaulin/plastic sheet.

- Tree plantation around the project boundary will be initiated at the early stage.

#### *Operation Phase*

- Internal roads will be concreted to reduce dust emission.
- Speed restriction will be followed within the project area for proper dispersion of sulphur di oxide and oxide of nitrogen.
- Proper moisture, oxygen and C:N ratio will be maintained to minimize the odour and to maintain adequate temperature in compost plant.
- Gas management system in secured landfill will be provided.
- Green belt will be provided along the periphery of the plant boundary.

### **Noise Quality Management**

#### *Construction Phase*

- All vehicles entering into the project boundary will be informed to maintain speed limits, and not blow horns unless it is required.
- PPE like earmuffs, helmets covering ear would be provided to the workers.
- Temporary tin sheet of sufficient height will be erected around the noise generating activity as barrier for minimizing the noise level to surrounding areas.

#### *Operation Phase*

- Acoustic enclosures for all high noise level equipments will be ensured.
- All the design/installation precautions as specified by the manufacturers with respect to noise control will be strictly adhered to.

### **Management of Water Quality**

#### *Construction Phase*

- During site development, the run off water will be diverted to nearby greenbelt/plantation area.
- The domestic waste water generated from temporary toilets used by the work force will be diverted to septic tank followed by soak pit.

#### *Operation Phase*

- Leachate generated at various places in the plant will be collected and sprayed on windrow to maintain suitable temperature and moisture.
- Domestic wastewater will be treated in septic tank, followed by soak pit and the treated water will be used for flushing, green belt development.

### **Storm Water Management**

- Based on rainfall intensity of the proposed area, storm water drainage system will be designed. Storm water drainage system will be consisting of well designed network of open surface drains along the drains so that all the storm water is efficiently drained of without any water logging.

### **Management of Odour**

- Maintenance of proper air and moisture ratio in compost plant and windrow area will be ensured.
- Covering of landfill area under operation daily with layer of earth or clay.

### **Landfill Gas Management Plan**

Landfill gas is generated as a product of waste biodegradation. Organic waste accidentally coming into the landfill is broken down by enzymes produced by bacteria. To minimize the gas generation in the proposed project, compost plant is proposed. Therefore gas generation is anticipated to be very less.

### **Road Safety and Traffic Management Plan**

- Precautions will be taken by the contractor to avoid damage to the public access routes including highways during vehicular movement.
- Provide safe and convenient passage for vehicles, pedestrians and livestock to and from side roads and property accesses along defined project routes.
- Movement of vehicles during night time will be restricted. Speed limits will be maintained by vehicles involved in transportation of raw material and segregated waste.
- Regular supervision will be carried out control vehicular traffic movement along defined traffic routes particularly near identified sensitive receptors.
- A *Journey Management Plan* will be formulated and implemented by the proponent to control construction and operational phase traffic.

### **Occupational Health & Safety Management Plan**

- There will be routine observation of health as certain sufferings are likely to appear as result of exposure by the workers during operation of various facilities. All the employees will undergo medical examination before joining the facility. Medical checkup will be conducted on regular basis and the health conditions will be monitored.
- Provision of ear plugs, ear muffs etc and rotation of workers operating near high noise generating areas.

### **Green Belt Development Plan**

The Green Belt development helps to capture the emissions, attenuate the noise generated and improve the aesthetics. Attempts will be made to ensure that all open spaces where tree plantation is not possible, will be covered with shrubs and grasses to prevent erosion of topsoil. Indigenous plant species will be used for plantation.