

EXECUTIVE SUMMARY

1. INTRODUCTION

- Solid waste management has become a major environmental issue in India. The increase in population and urbanization are largely responsible for the increase in solid waste. Municipal Solid Waste (MSW) includes mostly residential waste, commercial waste, and market waste, slaughter house waste, street sweeping etc. It consists of biodegradable waste, recyclable waste, inert waste, combustible and non-combustible waste etc.
- As per information received from State Pollution Control Boards/ Pollution Control Committees, (in between the year 2009- 2012), 1, 27,486 TPD municipal solid waste is generated in the country during 2011-12. Out of which, 89,334 TPD (70%) of MSW is collected and 15,881 TPD (12.45%) is processed or treated, which are not only impossible to reclaim because of haphazard manner of dumping, but also have serious environmental implications in terms of ground water pollution and Global Warming.

Project Highlights:

Project Details	Proposed Municipal Solid Waste Management at Bundi
Site	Khasra No.- 649/49 Village- Astoli, Tehsil & District- Bundi (Raj)
Plant Capacity	110 TPD
Land Area Required	4.0 hectare
Water Requirement	50 KLD
Water Source	City Jal Board and Bore well
Electrical Power Demand	140 kW
Electrical Power Source	State Electricity Board
DG Set	One DG Set of 62.5 kVA/ 50kW
Fuels	HSD for DG set
Employment Opportunity	34
Capital Investment (INR)	1032.68 lakhs
Additional Environmental Mitigation Cost (INR)	123.92 lacks

2. PROJECT DETAILS

Need For the Project

At present the MSW disposal is carried out in an unscientific manner by open disposal of mixed waste. The Government of Rajasthan thus proposes to strengthen the MSWM system covering collection, segregation, recycling, transportation processing and disposal in ULBs so as to comply with the service level benchmarks of the GoI and also to meet its goal of maintaining growth rates without jeopardizing the environment and its natural resources. The setting up of proposed project at Bundi, which is one of the ULBs, is aimed at fulfilling the above objectives. The ZEPL has proposed composting & RDF production with sanitary landfill.

Location of the project

The proposed project is situated at Khasra No. - 649/49, Village- Astoli, Tehsil & District- Bundi (Raj). The project site area is 4.0 hectare, which lies about 7.0 km West of Bundi city.

Connectivity

The proposed site has well developed transport infrastructure, which has all basic amenities that are feasible for industrial projects viability.

Table 4.1 Basic Amenities

S No	Nearest	Name	Distance & Direction (From plot Boundary)
1.	Railway Station	Bundi Railway Station	~ 8.5 km in ESE
2.	Airport	Kota Airport	~ 40 km in SE
3.	Highway	NH 12	~4.0 km in NNE
4.	Highway	SH - 29	~ 3.0 km in SSE
5.	Highway	SH - 39	~ 6.5 km in NNW

Manpower Requirement

The O&M manpower has been estimated for different sections of the processing plant is 34.

Power Requirement: total power requirement for process will be about 110 kW. A DG sets 62.5 kVA (with fuel consumption of 16.2 litre/ hour at 100% load) is proposed for emergency power backup.

3. PROPOSED SOLID WASTE MANAGEMENT FACILITIES

- A proper and **scientific integrated waste management system** would upgrade significantly the living status of the people residing there and also ensure eradication of some of the major health related problems when combined with 100% compliance to clean sewerage facilities and pure drinking water supply in all the Wards.
- **A two bin system** shall be introduced for waste collection at all levels and sources of generation. The 2-bin system would essentially comprise of (i) principally wet or moist waste comprising of kitchen waste, food waste etc. which are bio-degradable and (ii) principally waste papers, plastics, sanitary napkins, rags, cardboards, etc. many of which are recyclable.
- **Primary waste** would be collected from all households, slum areas and market palace & community centre within each ward of the ULB.
- **Secondary collection** includes picking up waste from community bins, waste storage depots or transfer stations and transporting it to waste processing sites or disposal wastes.
- For **Construction and Demolition (C&D)** waste in Bundi, dedicated metal bins of 3.5 cum capacity with proper markings on them shall be placed at specific locations in each ward of the municipality.
- It is estimated that about 11% of the total waste generation would be **rejects or wastes** in the real term, which if no other use could be found out need to be land filled in a proper manner. The secured waste landfill area shall be designed for an initial period of 30 years based on land area availability.

- **Energy** can be recovered from the organic fraction of waste (biodegradable as well as non- biodegradable) deploying both Bio-chemical and Thermo-chemical conversion processes. Bio- chemical process is based on enzymatic decomposition of organic matter by microbial action to produce methane gas or alcohol.
- **Refuse derived fuels** prepared from MSW can be sold in the market (cement plants installed close to such projects are consistent buyers for such fuel) or directly used in boilers for steam generation.
- The guidelines shall be taken care while **handling, treating and disposing** the waste so as to prevent contamination of ground water, surface water and ambient air quality. The quality requirements of the RDF and compost are maintained as per the Solid Waste Management Rules, 2016 & acceptance of the market (FCO specification).
- A ramp with suitable gradient will be provided along the length of the composting pits, which will be used as an **unloading** platform for incoming vehicles loaded with garbage. Compactors/trucks (as applicable) will enter through this ramp only and unload the garbage inside the pits. The height of ramp will be decided as per economic design.
- As per the concept of **drying**, pits (of RCC) will be constructed for retention of 25 days material. Waste will be unloaded inside this pit. Proper aeration will be provided by tumbling the waste after 3 to 4 days to maintain aerobic conditions.
- MSW will be fed in the centre of this **ballistic separator** through a hopper/chute and will be screened in two stages. The oversize material from 100 mm size screen will be taken to a shredder where it will be converted into fluff of 50-80 mm size and to storage thereafter. Material of size between 60 to 100 mm will be directly taken into RDF storage.
- The **undersize material** coming out from 10 mm screen will be fed to 4 mm trammel screen. Once this equipment screens material, it gradually feeds the same to the consecutive equipment at a controlled rate.
- **Leachate** contains a host of chemicals that may be toxic to both humans and environment. Also, the high Bio-chemical Oxygen Demand (BOD) of leachate makes its treatment inevitable. Based upon characteristics of the leachate collected, the treatment units will be provided.
- There will be a dedicated engineered **sanitary landfill** site which will handle the rejects from the MSW processing facility. Deposition of inert in conical heaps over the landfill site and spreading these heaps using a tracked bull dozer is a low cost and easy option.

4. SITE SELECTION AND SOCIAL ASPECTS

Land Ownership:

Land is located at Khasra No 649/49 Village- Astoli, Tehsil & District- Bundi (Raj). The proposed land an area of 4.0 hectare for Solid waste management is a govt. land of Nagar Parisad, Bundi which has been granted to Zonta Environment Pvt. Ltd on lease for 30 years vide Certificate no IN-RJ10120600694319P dated 23.05.2017.

Topography

The topography of the study area (10 km radius) is almost flat. In 10 km buffer area there is Reserve Forest at 0.3 km distance in North direction, Ramgarh Vishdhari Sanctuary at about 4.5 km in NE direction, mangali River at about 8.0 km in South direction, Phul Sagar at 4.5 km in NE direction and Jait Sagar Lake at 7.5 in ENE direction.

Soil Classification

Major soil types found in Bundi district were Deep brown loamy (23.57%), Deep brown clayey (15-25%), Medium brown loamy (15.11%), Red gravelly loam hilly soil (16.01%), Deep black clayey (8.61%) and Shallow yellowish brown gravelly loam (14.24%), Out of the above six varieties of soils, four types viz. Deep brown loamy, Deep brown clayey, Medium brown loamy and Deep black clayey are the most suitable for rice cultivation in the area. (KVK, Bundi).

Climate Data from Secondary Sources

The district has a dry climate except in the monsoon seasons. The winter season runs from mid of November to March and summer season runs from March to mid of June. The period from mid of June to September is the monsoon season followed by the months October to mid of November constitutes the post monsoon or the retreating monsoon. The average rainfall in the district is 824.31 mm. January is the coldest month with the average daily maximum temperature of 24.0 C and the average daily minimum temperature of 10.0 C.

Social Infrastructure Available

Social infrastructure like hospitals, educational facilities, temple, community centre, roads, telecommunication and others similar are available within 10 km radius.

5. ENVIRONMENTAL PROTECTION MEASURES

Air Pollution Control Measures

- Maintaining and/or re-establishment of a grass cover on area where there is no on-going activity
- Frequent watering of unsealed roads and stockpile area- cover material
- Blacktop of the roads as and when they are settled and ready for the same
- Repair, relaying of blacktop roads from the landfill area to the main road
- Using dust control sprays during loading and unloading of wastes

Water Pollution Control Measures

Construction Phase: During the construction phase, a septic tank shall be provided to treat the domestic wastewater generated due to labour settlements. Temporary facility would have impermeable flooring and proper leachate collection arrangement.

Operation Phase: During initial composting i.e. for about 3 days, leachate will be released. This leachate shall be utilized to maintain required moisture level in composting pits. However the excess leachate discharged shall be collected and treated before draining.

SOLID WASTE DISPOSAL MANAGEMENT PLAN

The processing and disposal plant has been designed on latest technology involving accelerated and complete composting using thermophilic enzymes. Density separation along with above technology enables effective and efficient segregation of compost, RDF combustibles, recyclables and inert comprising of construction and demolition waste. The construction and demolition waste so separated is further planned to be converted into construction material thereby moving towards zero disposal in the landfill.

NOISE CONTROL MEASURES

- Maintaining the site machinery in good operating condition
- Regular maintenance of systems and installation of noise control equipment wherever required
- Development of green belt all around the site
- Periodical monitoring of noise levels

GREEN BELT DEVELOPMENT

A green belt is provided to mitigate various emissions. Green belts are wide strip of trees and shrubs planted in rows to reduce air velocity there by facilitating settling of the particles on the leaf surfaces and allowing absorption of the pollutant gases.

HEALTH AND SAFETY MANAGEMENT:

The health and safety of all those who work at the Plant shall be ensured.

All necessary tools and equipment, including personal protective equipment, shall be properly maintained. Defective tools and equipment shall be repaired or replaced immediately.

6. REHABILITATION AND RESETTLEMENT (R&R) PLAN

Proposed land is located at Khasra no- 649/49 Village- Astoli, Tehsil & District- Bundi (Raj). The proposed land an area of 4.0 hectare for Solid waste management is a govt. land of Nagar Parisad, Bundi which has been granted to Zonta Environment Pvt. Ltd on lease for 30 years vide Certificate no IN-RJ10120600694319P dated 23.05.2017.

Rehabilitation and Resettlement plan is not applicable in this particular project.

7. PROJECT SCHEDULE & COST ESTIMATES

The whole project is estimated to be completed in about 12 months following approval of DPR and 6 months from obtaining environmental clearance whichever is later. It is envisaged that the proposed facility would be operational from September 2018.

Project Cost

The estimated project cost is Rs 1032.68 lakhs. The capital investment of Land & site development, Civil works, Plant & Machinery and Particulars of interface equipment.

EMP budget: EMP budget will be about 82.61 lakhs.

Budget for Labour welfare: Budget for labour welfare will be 75.04 lacks.

Budget for CSR activities: for CSR activities capital cost will be 12.00 lacks.

CHAPTER 1 – INTRODUCTION

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As per information received from State Pollution Control Boards/ Pollution Control Committees, (in between the year 2009- 2012), 1, 27,486 TPD municipal solid waste is generated in the country during 2011-12. Out of which, 89,334 TPD (70%) of MSW is collected and 15,881 TPD (12.45%) is processed or treated, which are not only impossible to reclaim because of haphazard manner of dumping, but also have serious environmental implications in terms of ground water pollution and Global Warming.

The Ministry of Environment & Forest & Climate Change (MoEF & CC), Government of India had formulated MSW rule 2000 and updated in 2016 as SWM Rules 2016. These rules are formulated for collection, storage, transportation, sorting and segregation, processing and disposal of municipal solid wastes as per the rules.

- Reduces waste sent to the landfill, which may have negative impacts on groundwater and air quality;
- Reduce emissions from energy consumption, as waste when recycled requires less energy than making goods from virgin materials thereby reducing the energy demand and pressure on non renewable sources; contributes to climate change by reducing methane emissions from landfills.
- Waste prevention and recycling (including composting) divert organic wastes from landfills, reducing the methane released when these materials decompose.
- Reduction in quantum of waste by diverting it to recycling and other processing unit reduces the landfill costs;
- An effective waste management implies the concept of 3R (Reduce, Reuse and Recycle) waste matter leading to introduction of more and more of waste matter into the value chain leading to economic benefits;
- Waste management being a labour intensive activity, it helps in employment generation.
- The Implementation of Municipal solid Waste (MSW) Management is an important component of the Government of India's (GoI) "Swachh Bharat Mission" (SBM) - component IV.

1.1 IDENTIFICATION OF THE PROJECT

M/s Zonta Environment Pvt. Ltd (ZEPL) participated in the competitive bidding process carried out by Rajasthan Government and succeeded in winning the bid for Bundi. The concession period for this project is for a term of 30 years including construction and implementation of the project. The ZEPL has proposed composting & RDF production with sanitary landfill at Khasra no- 649/49 Village- Astoli, Tehsil & District- Bundi (Raj). Total capacity of unit will be 110 TPD.

1.2 PROJECT OBJECTIVES

The current Solid Waste Management (SWM) system is being carried out in most of the ULBs including Bundi is collection waste from door to door, market and community bins, transportation and disposal at the dump yard. No processing or treatment is undertaken. This has led to environmental degradation, air pollution, surface and ground water contamination and poses grave health hazards.

The objective of the project is to implement solid waste management practices into action in the identified ULBs and offer to the citizens of the state a clean, healthy and safe environment. The SWM system would be in line with Integrated Municipal Solid Waste Management (ISWM) practices and adhering to the local regulations and professional best practices.

CHAPTER 2- PROJECT DETAILS

2.1 NEED FOR THE PROJECT

At present the MSW disposal is carried out in an unscientific manner by open disposal of mixed waste. The Government of Rajasthan thus proposes to strengthen the MSWM system covering collection, segregation, recycling, transportation processing and disposal in ULBs so as to comply with the service level benchmarks of the GoI and also to meet its goal of maintaining growth rates without jeopardizing the environment and its natural resources. The setting up of proposed project at Bundi, which is one of the ULBs, is aimed at fulfilling the above objectives. The ZEPL has proposed composting & RDF production with sanitary landfill.

2.2 PROJECT DESCRIPTION

Bundi Municipal Council awarded the project to M/s Zonta Environment Pvt Ltd., to implement the processing facility & sanitary landfill. Zonta Environment Pvt Ltd., shall Implement Compost + RDF plant and Sanitary Landfill for 30 years.

Location of the project

The proposed project is situated at Khasra no- 649/49 Village-Astoli, Tehsil & District- Bundi (Raj). The project site area is 4.0 hectare, which lies about 7.0 km in West from Bundi City. District- Bundi is surrounded by Kota in East and South, Bhilwara in East, Tonk in North. The topography of the land area is almost flat. The mRL of the site varies between 96 - 100 m. The proposed site falls in Geological Survey of India of Toposheet No. 45 O/7, 45 O/10 and 45 O/11.

Geographical Location

Table 2.1: Geographical co-ordinates of proposed site

Pillar	Latitude	longitude
A	25° 25'49.72"N	75°34'05.95"E
B	25° 25'49.72"N	75°34'11.14"E
C	25° 25'58.63"N	75°34'11.14"E
D	25° 25'58.63"N	75°34'05.95"E

The location map is provided as below clearly showing the project site and its study area is shown in Figure 2.1.

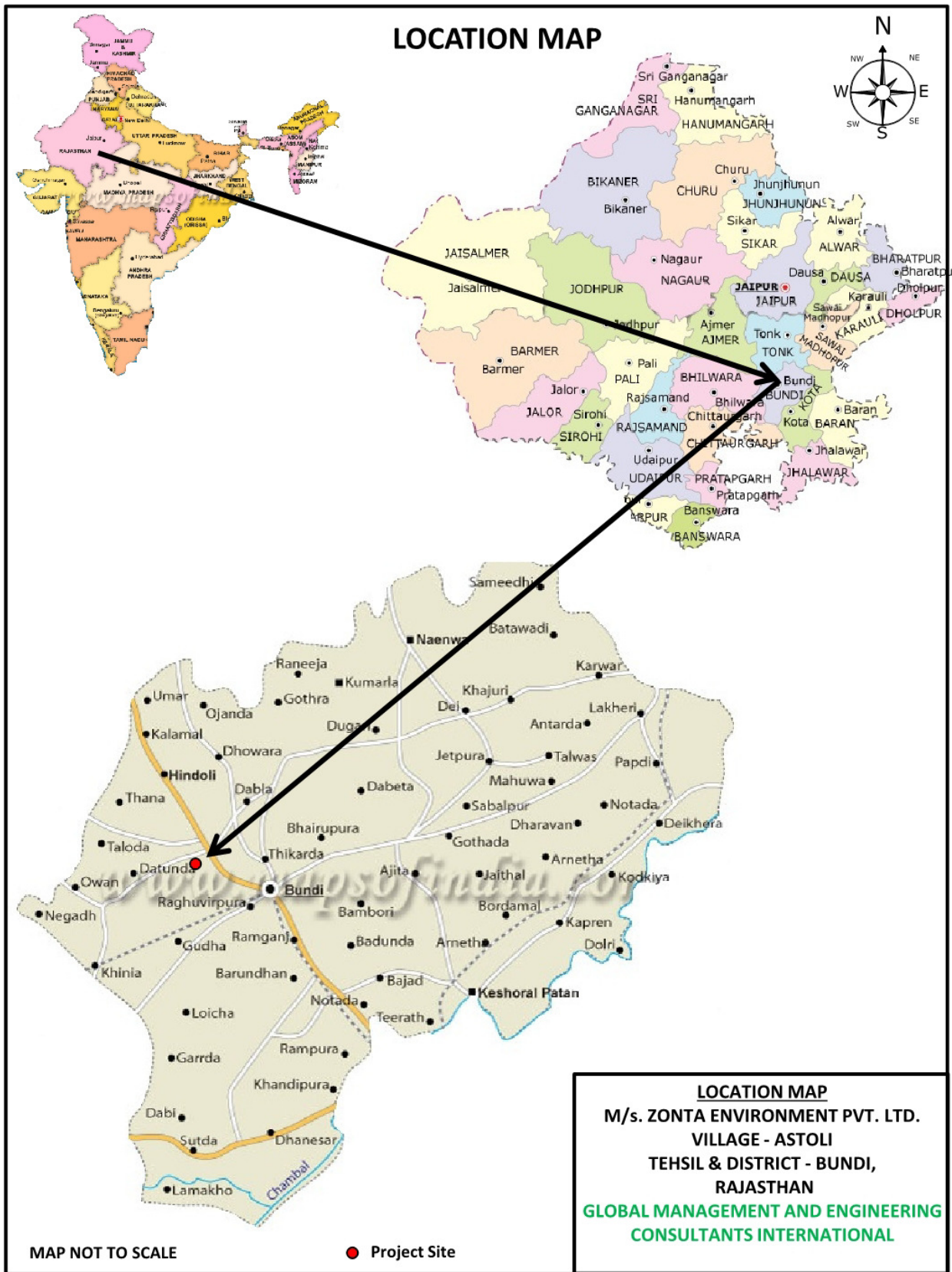


Figure: 2.1 Location map

Connectivity

The proposed site has well developed transport infrastructure, which has all basic amenities that are feasible for industrial projects viability.

Table 4.1 Basic Amenities

S No	Nearest	Name	Distance & Direction (From plot Boundary)
1.	Railway Station	Bundi Railway Station	~ 8.5 km in ESE
2.	Airport	Kota Airport	~ 40 km in SE
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Current waste management Scenario

The existing total waste generated from Bundi town is about 42 Tons including drain silt and C&D waste. For design purpose per capita waste generation for 2015 (base year) is considered as 350 grams. Thus, the total waste of the base year used for designing purpose of Bundi 42 tons per day respectively.

There is also no efficient disposal of household solid wastes. There is lack of segregation of solid wastes. There is also no proper disposal from the slaughter house and waste is collected and disposed off in the solid waste. Storage of solid waste is unorganized.

Primary Collection & Secondary Collection:

Waste is being collected from intermediate storage points such as open dumps and transported to disposal. The bins are in abandoned / burnt / broken condition. Due to lack of proper collection system and civic sense, most of the households throw waste on to the streets, open drains and open spaces within localities creating unhygienic conditions. Lack of door-to-door collection is also one of the main reasons for this situation. Most of the open drains in the towns are choked due to indiscriminate solid waste disposal. Most of the places where community bins should be placed on those places currently there are no community bins available due to lack of physical infrastructure which not only leads to open dumping but also leads to spreading of wastes in the surrounding areas, which further demands time for collection.

Transportation and Disposal

The waste is collected from Secondary Storage locations and is transported to the Disposal site without treatment. Landfill site has been constructed at Mathani village site but it is not used by the BMC. The waste is not covered properly during transportation of waste. The waste is dumped on open ground.

2.3 WATER REQUIREMENT

The whole process doesn't require any additional water for processing and producing compost & RDF. The total water requirement for drinking and sanitation shall be met with ground water or portable water by tanker supplies. The daily water requirement on this account is approximately 50 KLD.

2.4 POWER REQUIREMENT: Total power requirement for process will be about 140 kW. A DG sets 62.5 kVA (with fuel consumption of 16.2 litre/ hour at 100% load) is proposed for emergency power backup.

2.5 MANPOWER REQUIREMENT

For Operation & Maintenance for the processing & sanitary landfill the estimated manpower is 34.

CHAPTER 3- PROPOSED SOLID WASTE MANAGEMENT FACILITIES

3.1 TECHNICAL PROFILE

The Municipal Area of Bundi Town has been divided into 40 wards .The high density areas are in the old city and developments have largely been concentrated along the major corridors. Residential developments are focused on the South side.

3.1.1 Integrated Waste Management

A proper and scientific integrated waste management system would upgrade significantly the living status of the people residing there and also ensure eradication of some of the major health related problems when combined with 100% compliance to clean sewerage facilities and pure drinking water supply in all the Wards.

3.1.2 Proposed Scheme for Solid Waste Management at Bundi City

The essential steps of an efficient solid waste management system are balanced on scientific and timely collection both at primary and secondary levels, of waste generated from each household across all sections of people including the slum areas in each Ward of the municipality, regular street and drain sweepings, ensuring maximum segregation at origin followed up by secondary segregation at waste processing facility and secured land filling of inert and non recyclable waste fraction. Other important aspect of a sustainable waste processing facility is installing proper monitoring mechanism from the angle of environmental aspects, economic returns and community acceptance.

3.2 WASTE COLLECTION

A two bin system shall be introduced for waste collection at all levels and sources of generation. The 2-bin system would essentially comprise of (i) principally wet or moist waste comprising of kitchen waste, food waste etc. which are bio-degradable and (ii) principally waste papers, plastics, sanitary napkins, rags, cardboards, etc. many of which are recyclable. The street sweepings and drain cleaning material and sludge would not be disposed along with the household municipal waste collected. The silt collected from the drains would be disposed of in low lying lands. The street litter collected which would be mixed in nature shall be brought to the processing facility for waste processing and segregation.


3.2.1 Primary Waste Collection

Primary waste would be collected from all households and slum areas within each ward of the ULB. For one first time Municipal Authorities in Bundi has to provide two (2) separate bins of color 'Blue' and 'Green' to each household. The Blue color bin would be meant for collection of all recyclable or non-biodegradable items which are basically dry in nature.

The Green color bin would be meant for collection of various wastes as identified above which are wet in nature. The bin sizes can be of 20 litres each. Two tippers with dedicated dry and wet waste containers (capacity -1.8 cum) of green and blue colour would visit the major lanes and by-lanes every day morning at pre-determined time for waste collection. For areas where tipper cannot enter due to narrow lane access, the tri-cycle with separate dry and wet waste containers would enter for waste collection at a pre-determined time. Balance population would be covered by Tippers for primary collection.

Waste collectors shall be provided with Auto Tipper to inaccessible areas and waste shall be deposited by the households in the separate container. The Auto Tipper shall cover about 1400-1500 HH per day and once filled up to its full capacity, shall be transported to a nearby, closed bin location and garbage will be emptied manually in to these bins.

Table - Requirements of Waste segregation Bins

Waste Segregation Initiatives	Quantity	Model
Green colour dust bins for Door-to-Door collection of Biodegradable waste (10 lit. capacity) for households	26,135	
Blue colour dust bins for Door-to-Door collection of Non-bio degradable waste (10 lit. capacity) for households	26,135	
Total	52270	

3.2.2 Secondary Collection

There are open dumps for secondary waste storage in Bundi town. In the proposed system, storage of waste in open dumps has been totally eliminated and it is proposed that MSW at secondary collection locations will be stored in closed containers. The existing infrastructure for secondary collection of waste will be upgraded to comply with MSW Rules 2000 and additional secondary collection locations will be developed to ensure that no primary collection staffs has to travel more than 250m for dumping of waste. There are three types of waste streams from the primary collection of waste – bio-degradable, recyclables and non biodegradable. It is proposed to provide secondary collection facility for biodegradable and non-biodegradable waste. The recyclables will be sold directly in the market by waste collectors. MSW at every secondary collection point shall be stored in two separate covered containers – green for bio-degradable and blue for non-biodegradable. The sweeper shall not travel more than 250m to dispose-off primary collection waste. Therefore distance between two secondary waste collection locations shall not be more than 500m. The bin design and strength shall be able to facilitate its hydraulic lifting by transportation vehicles. The secondary waste collectors shall be well equipped to avoid direct contact with waste.

Secondary collection includes picking up waste from community bins, waste storage depots or transfer stations and transporting it to waste processing sites or disposal wastes. The primary and

secondary collection system is essential to avoid containers' overflow and waste littering on streets. Separate 3.5 cum bins for dry and wet waste types shall be provided at a centralized location(s) in each Ward.

The waste collected in designated dry and wet bins located in the market area and market or shopping Centres or Office/Institutions and served by the waste collection team within respective domain areas would be separately brought to the centralized processing facility by refuse compactors. The refuse compactor truck would stand near the bins and lift up same for waste feeding into the compactors and transportation to the centralized processing facility. This would also minimize manual handling of the waste to the extent possible.

3.2.3 Construction and Demolition Waste

For Construction and Demolition (C&D) waste in Bundi, dedicated metal bins of 3.5 cum capacity with proper markings on them shall be placed at specific locations in each ward of the municipality. The C&D waste shall be lifted by hook loaders or refuse compactors onto the trucks/dumpers and brought to a separate segregation facility to be identified by the ULB. In this facility after recovery of valuables and re- useable, the construction wastes shall be utilized for designated low lying land filling and other construction back filling purpose.

3.2.4 E-Waste

Various electronic wastes belonging to these two categories generated within the Bundi ULB shall be stored separately at the generation place. Such waste can be arranged to be collected from the sources by the Municipality as a part of special waste stream or through dedicated e-recycling agencies. For such collection dedicated bins of adequate capacity may be kept at each ward of the ULB.

3.5 WASTE TREATMENT AND DISPOSAL

- (1) Process Scheme
- (2) Aerobic Composting
- (3) Refused Derived Fuel
- (4) Sanitary Landfill
- (5) Leachate Treatment Plant

3.5.1 PROCESS SCHEME

Based upon the experiences and prevailing market for both compost and RDF, the concept of the processing plant is based on treatment of waste with thermophilic enzymes for maximum drying. Due to biological digestion of organic matter compost will be formed. Compost, RDF and recyclables are separated in various steps of manual Orting and mechanical separation. The process reject/inert will be regularly removed and transported to the adjacent landfill site.

In the proposed RDF cum compost processing facility, MSW will be composted for period of about 25-30 days. Bio inoculums will be sprayed over the MSW which will help in achieving moisture content of about 20% in period of about 8-10 days and also suppressing the odor. The dried MSW will be processed in various sections of processing facility where fractions of RDF

(combustibles), Recyclables (metal, rubber, cans etc.), Compost and Inert will be separated. MSW processing unit would have following steps:

A. Unloading

A ramp with suitable gradient will be provided along the length of the composting pits, which will be used as an unloading platform for incoming vehicles loaded with garbage. Compactors/trucks (as applicable) will enter through this ramp only and unload the garbage inside the pits. The height of ramp will be decided as per economic design.

B. Drying

As per the concept of drying, pits (of RCC) will be constructed for retention of 25 days material. Waste will be unloaded inside this pit. Proper aeration will be provided by tumbling the waste after 3 to 4 days to maintain aerobic conditions.

Owing to the criticality of leachate management, the whole composting section (pits) will be at ground level only, where the drains can easily be cleaned at regular intervals to avoid choking and putrefaction.

Sufficient quantity of decomposing microbial cultures (inoculums & sanitizer) will be inoculated at this point with sprayer to reduce odor and enhance digestion. Bio-inoculum will be sprayed over the MSW in order to reduce moisture level in MSW. The process will be bacteria induced, leading to temperature rise (550°C to 600°C). This kind of exothermic phase ensures oozing out of intercellular (imbibed moisture) thereby drying of waste. This system is much better than surface drying through hot air; it also works out cost effective. Drastic moisture (up to 20%) reduction leading to free flow ability of waste and loosening of material for easy shredding is expected. The proposed bio drying process is called Bio Thermal Stabilization Method (BTSM) is based on the principles of raw material constituents of waste. The constituents are to be seen from bio chemical composition such as content of cellulose, hemi cellulose, lignin, protein, lipids, waxes etc. When such waste is subjected to bacterial feeding enzymatic reaction, it will induce Mesophilic (200°C to 450°C) temperature range followed by thermophilic (550°C to 650°C) temperature range. Mesophilic microbes break down simple sugars and thermophilic microbes break down break down proteins and some complex carbohydrates. The process starts within 36 to 48 hours of inoculation and continues till oxygen is available in the biomass. The total time required to achieve 20% moisture level is about 8-10 days. The composting pits will be turned every third or fourth day for increasing the rate of reaction with thermophilic enzymes leading to faster drying. Moisture will also be supplemented at required levels after leachate treatment. The composting heap will be stabilized in about 25 days, when it is shifted to the screening section.

On 26th day, the completely digested waste will then be conveyed to a manual sorting belt through grab cranes. For the ease of handling this waste to further process line, grab cranes will be provided along the length of this section.

C. Segregation

A long manual sorting will be provided to remove inert, very heavy or large sized material and cutting of packed garbage bags in order to promote proper digestion of waste by

enzymes. The manually segregated waste after magnetic separation will then be passed through a ballistic separator with twin screens of mesh size approx. to 100 mm & 10 mm which will separate the mass into fuel fluff and compostable material.

MSW will be fed in the centre of this ballistic separator through a hopper/chute and will be screened in two stages. There will be four outputs from this equipment.

The oversize material from 100 mm size screen will be taken to a shredder where it will be converted into fluff of 50-80 mm size and to storage thereafter. Material of size between 60 to 100 mm will be directly taken into RDF storage.

D. Refining

The undersize material coming out from 10 mm screen will be fed to 4 mm trammel screen. Once this equipment screens material, it gradually feeds the same to the consecutive equipment at a controlled rate. The screened material is sent to the Destoner/vibratory screen which removes heavy impurities such as glass, metals, sand, silica etc. from the organic manure. The magnetic separator in the production line will take care of all kinds of ferrous impurities in the compost. The screened and refined Compost is stored in curing section for about 10-15 days for further stabilization and moisture control. Cured material is then packed in the mechanized packing section to do the bagging, weightment and stitching of various sizes of bags and finally stacked in the finished product store by using a belt conveyor. A permanent truss-shed will be provided over processing area, composting area and unloading area with suitable height (as required for mounting grab cranes).

3.5.2 MECHANICAL AEROBIC COMPOSTING

Aerobic composting is the process of degradation of biodegradable waste matter into simple organic compound by certain micro-organisms in the presence of air. The main requirements are adequate supplies of air and moisture. Compared to anaerobic process, aerobic conversion process is preferable as it is fast, exothermic and free from odour. Aerobic process also helps to eliminate pathogenic organisms, weed seeds, larva etc. as a result of high temperature developed during the process. Main factors affecting the composting through aerobic process are Moisture Content (50% to 60% optimum), Temperature (50- to 60 degree C (5 to 7 days for pathogens to get killed), C/N Ratio (Between 20 – 40), If C/N Ratio is less – straw, saw dust, paper to be added as carbon Source, If C/N Ratio is more – sewage sludge, slaughter waste to be added as nitrogen source At the end of composting C/N Ratio=20. Adequate oxygen provide throughout the mass-normally ensured by turning every 5-7 days.

The waste being generated and received at the processing site is composted aerobically. This composting process makes the waste inert. The aerobic composting process involves placing the waste into windrows. Windrows are long heaps of waste formed in a trapezoidal shape of base 4-5 m and height of 2.0 to 2.5 m. The dimensions would vary depending on the volume of waste to be handled per day. The windrows are placed on a specially constructed concrete platform. The windrows are turned every 6-7 days over a period of 4 weeks. The turning of the waste is done using frontend loaders. After this the material will be stored under shelter for a period of 1 week. In this process the material gets stabilized. Addition of microbial cultures like cow dung slurry or

special cultures can speed up the degradation and with adequate turning the stabilization process can be completed in 30 days. This reject material can be sent for landfill.

The compost processing involves segregation of rejects from the stabilized wastes by sieving. The stabilized materials are sieved using rotary sieves. The material movement for sieving can be manual or mechanised based on the capacity of the plant. Three-stage sieving mechanism of 80 mm, 34mm, 16 mm and 4 mm sieve shall be utilized. The materials not passing 40 mm and above are sent to landfill as reject. The material passing 40 mm but retained on 16 mm can be sold as pit filling material. The materials passing through 16 mm but retained on 4mm is the grade II 48 compost and the material passing 4 mm is sold as Grade I compost. Organic manure could be enriched for improving its material value by organic additives like neem cake, rock phosphate, decomposed poultry litter and micronutrients.

3.5.3 REFUSED DERIVED FUEL

The process of conversion of garbage into fuel pellets involves primarily drying, separation of combustibles from garbage, size reduction and pelletisation after mixing with binder and/or additives as required. The MSW collected to be dried if the moisture content is more than 35- 40%, until 10-12% moisture content is desirable to be maintained in the garbage for densifying into fuel pellets. By open sun drying and also fed into a rotary drying system i.e. Hot Air Generation burning oversize garbage or other fuel to further bring down the moisture After drying the garbage is passed through a screening equipment to separate sand/grit (below 8mm), heavier combustibles and ferrous materials. The dried and screened garbage is then passed through an Air-Classifer (Density Separator) in which the light combustibles and dense fractions (e.g. stones, glass etc.) are separated over an air barrier. At the same time, the garbage is passed over a magnetic separation unit to remove magnetic materials. The light combustibles are ground to 10/15mm particle size. The binder and/or additives are mixed with ground garbage in mixer/ conditioner before pelletising. The pellets coming out of pelletiser are cooled and stored in the pellet storage yard for dispatch. The pellets so produced can be used in industrial boilers and thermal power plants as fuel.

3.5.4 SANITARY LANDFILL

Landfill Site & Design

Land filling shall be restricted to non-biodegradable, inert waste and other waste that are not suitable either for recycling or for biological processing. Land filling shall also be carried out for residues of waste processing facilities as well as pre-processing rejects from waste processing facilities. Land filling of mixed waste shall be avoided unless the same is found unsuitable for waste processing. Under unavoidable circumstances or till installation of alternate facilities, land filling shall be done following proper norms.

Landfill sites and design shall meet specifications as given in MSW (Management & Handling) Rules 2016:-

The Existing landfill site is about 7.0 Kms from Bundi City in West direction. The land proposed for solid waste management is about 4.0 Ha in Astoli village at following coordinates:

Table 2.1: coordinates for land fill site

Pillar	Latitude	longitude
A	25° 25'49.72"N	75°34'05.95"E
B	25° 25'49.72"N	75°34'11.14"E
C	25° 25'58.63"N	75°34'11.14"E
D	25° 25'58.63"N	75°34'05.95"E

Figure 3.1: Sanitary Landfill site

Assessment of Landfill Volume and Life

The processing and disposal plant has been designed on latest technology involving accelerated and complete composting using thermophilic enzymes. Density separation along with above technology enables effective and efficient segregation of compost, RDF combustibles, recyclables and inert comprising of construction and demolition waste. The construction and demolition waste so separated is further planned to be converted into construction material thereby moving towards zero disposal in the landfill.

However to take care of any exigencies , a landfill for about 5% of total waste is planned for first 2 years of operation and will further be augmented on need based as it is expected that there will be no disposal for landfill.

The solid rejects (about 5% of the total waste) from the processing would consist of stone, sand, earth, ceramic etc. That will be segregated and managed appropriately. The inert produced shall be disposed in an Engineered landfill.

Volume and Area Required for Landfill with designed processing capacity

Landfill Site Closure Plan

Final Cover Systems

The closure standards for MSWLFs require owner/operators to install a final cover system to minimize infiltration of liquids and soil erosion. The permeability of the final cover must be less than the underlying liner system, but no greater than 1.0×10^{-7} cm/sec. The reason for this requirement is to prevent the "bathtub effect" where liquids infiltrate through the overlying cover system but are contained by a more permeable underlying liner system. This causes the landfill to fill up with water (like a bathtub), increasing the hydraulic head on the liner system that can lead to the contaminated liquid (leachate) escaping and contaminating groundwater supplies.

The final cover system must consist of an infiltration layer of at least 18 inches of earthen material covered by an erosion layer of at least 6 inches of earthen material that is capable of sustaining native plant growth. An alternative cover design may be used as long as it provides equivalent protection against infiltration and erosion. Such alternative designs must be approved by the director of an approved/authorized state program.

3.5.5 LEACHATE TREATMENT PLANT

Leachate is the water-based complex liquid, comprising of innumerable organic and inorganic compounds, which percolates through garbage heaps and accumulates at the bottom. The water from interstitial moisture of the decomposing waste and also due to precipitation subsequently moves through the waste deposit collecting the leached chemicals thereby

forming leachate. Leachate contains a host of chemicals that may be toxic to both humans and environment. Also, the high Bio-chemical Oxygen Demand (BOD) of leachate makes its treatment inevitable.

Leachate management follows the hierarchical procedure comprising of

- Leachate Avoidance: by keeping the compost as dry as possible.
- Leachate Minimization: by re-circulating the leachate onto the composting heap.
- Leachate Collection & Treatment: by incorporating proper drainage system to collect the leachate from the bottom and efficiently treating to comply with the standards before disposing the treated liquid waste into streams.

A. Drainage System:

The leachate drainage system is responsible for the collection and transport of the leachate collected inside the liner. Leachate collection systems are installed above the liner and usually consist of a piping system sloped to drain to a central collection point where a pump is located. The pipes and conduits must be capable of bearing the load they are subjected to, since they are placed beneath the composting heap.

B. Leachate treatment Plant

Based upon the analyzed characteristics of the leachate collected, the treatment units are provided.

Treatment Process

- Influent Leachate Storage Tank: For collecting and storing the leachate generated. Helps in flow equalization and allows controlled flow of leachate per treatment cycle.
- Mesh Screens: Removes unwanted solid particles that may cause clogging of the drainage system and also leads to wear & tear of further treatment units.
- Oil & Grease Trap: Efficient removal of oil & grease produced from decomposing organic matter.
- Moving Bed Bio-film Reactor: The inoculums are added after studying the characteristic of leachate to be treated. The bacteria/activated sludge grow on the internal surface of the carriers. The bacteria break down the organic matter from the waste water. The aeration system keeps the carriers with activated sludge in motion. Only the extra amount of bacteria growth, the excess sludge will come separate from the carriers and will flow with the treated water towards the final separator. Blowers: aids biological growth and facilitate waste reduction.
- Secondary Clarifier: Here, the supernatant treated water is collected and stored in the sump tank, while the settled sludge received in the hopper attached at the bottom of the clarifier is to the sludge drying beds.
- Sump Tank: temporarily stores the water and provides further aeration via blower.
- Carbon filter and Sand Filter: Provides proper filtration from any unwanted particles.
- Sludge Disposal: Sludge containing the carriers is dried at the sludge drying beds and used as manure for gardening.
- The treated water is re-circulated by spraying onto the composting heap in order to

maintain its moisture content. Thus, the treatment plant becomes a Zero Discharge Unit.

C. Design of Leachate Collection System

Leachate Collection system

The primary function of leachate collection system is to collect and to convey the leachate out of the landfill unit and to control the depth of the leachate above the liner. As per USEPA Manual the leachate collection system should be designed to maintain a leachate depth or less above the liner. The design leachate head is very important as flow of leachate through imperfections in the liner system increases with an increase in leachate head above the liner. Maintaining a low leachate level above the liner helps to improve the performance of the composite liner system. The main components of leachate collection system are leachate collection tank, feeder mains and header main.

Leachate Collection Network

Leachate Collection Network comprising header pipe and feeder pipe/ laterals has been proposed. The feeder pipes shall be of 200 mm diameter at a spacing of 10 m centre to centre at a slope of 2 per cent and connected to header pipe. Similarly the header pipe shall be 270 mm diameter at a slope of 2 per cent connected to leachate collection tank.

Leachate Collection Sump

The purpose of leachate collection tank is to collect the leachate from header pipe and active landfill area. The leachate collection tank would be supported by the pump to lift the collected leachate.

Feeder and Header Pipe Material

A leachate collection system is a network consisting, 200 mm diameter feeder pipe at lateral spacing of 10m connected to 270 mm diameter header pipe. The pipes shall be HDPE perforated pipes with sufficient strength and should be safe from particulate and biological clogging and deflections.

The generated leachate shall be transported to Leachate Treatment Plant (LTP) and treated to as per prescribed norms prior to its final disposal.

3.6 MATERIAL BALANCE

Table 2.4: Material Balance

Detail	%	MT
Total	100	110
Losses(Decomposition/Moisture)	30	33
Total Compost for Packing	9	9.9
Total RDF for storage	50	55
Total Inert	11	12.1

3.7 COMPARISON OF WASTE MANAGEMENT SYSTEM IN EXISTING AND PROPOSED SCENARIO

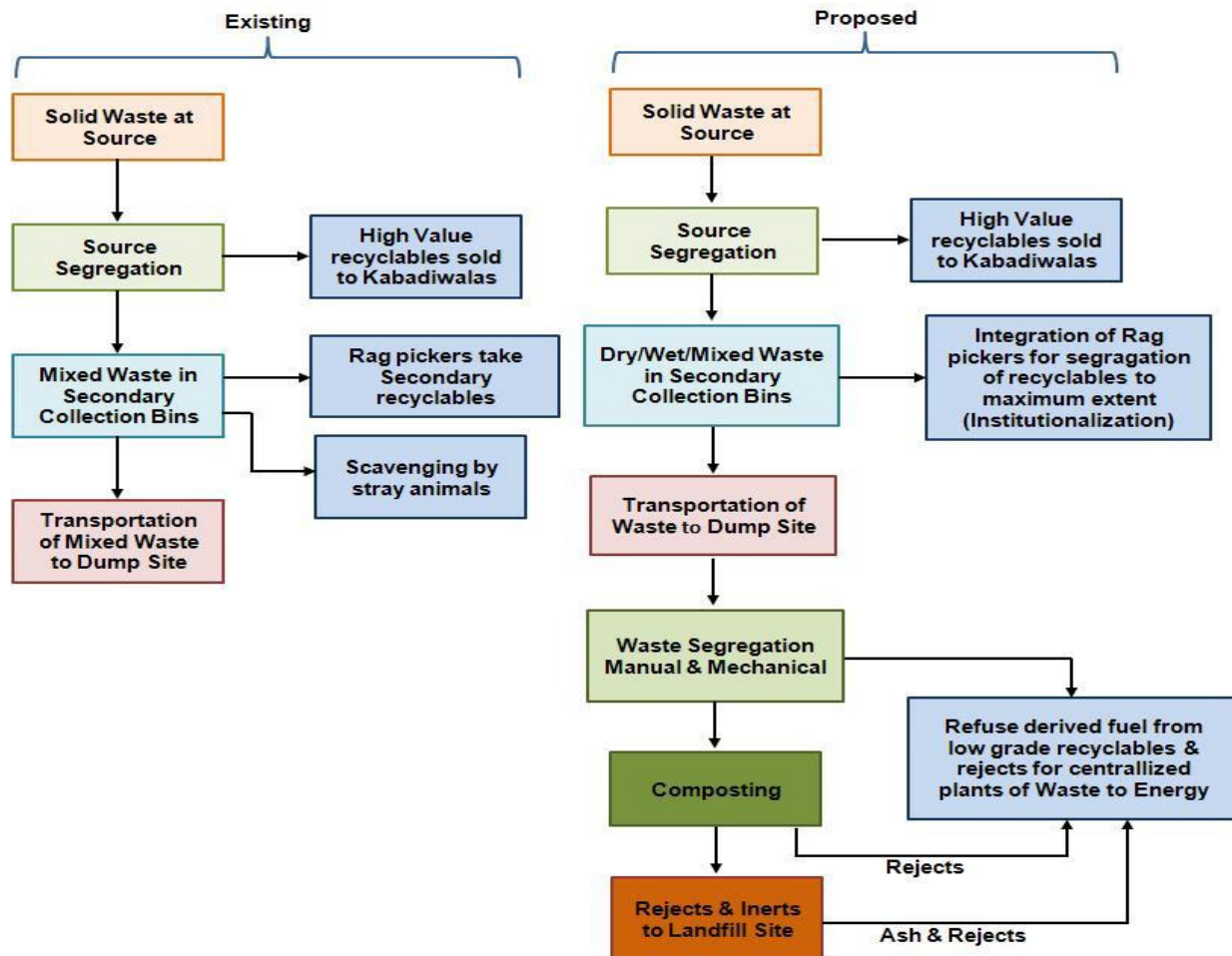


Fig 3-5: A Comparison of Waste Management System in Existing and Proposed Scenario

The physical infrastructure components in the primary and secondary collection and transportation services include the procurement of the following tools/equipments/vehicles:

- Tricycles
- Household Bins
- Community Bins
- tippers

Garbage compactors for transportation of MSW from various wards With the increase in population the waste generation would also increase which would in turn require larger number infrastructure components for collection and transport of the waste.

S No	Type of Vehicle	No of Vehicle
1	Tractor	2
2	JCB	2
3	Auto Tipper	2
4	Dustbin for Tricycle	680
5	Sewage suction truck	1
6	Dumper Placer	1

Source: Municipal Council, Bundi

CHAPTER 4 - SITE ANALYSIS

4.1 LAND FORM, LAND USE AND LAND OWNERSHIP

Land Form:

The proposed project is new project at already converted land for municipal solid waste dumping site of Nagar Parisad Bundi. The land an area of 4.0 hectare has allotted to the Zonta Environment Pvt. Ltd by Nagar Parisad Bundi.

Land Use: The detailed Land area break up is shown in Table 4.1

Table 4.1 Land Area Breakup

S. No.	Particulars	Area (sq m)
1.	Plant/ Build up area	4893.42
2.	Roads/ Corridors	3355.02
3.	Green belt/ Plantation	4105.39
4.	Compost Facility area	1050.0
5.	Sanitary Landfill area	26196.17
6.	Leachate treatment plant area	400.0
	TOTAL	40000.0

Land Ownership:

Land is located at Khasra No 649/49 Village- Astoli, Tehsil & District- Bundi (Raj)

The proposed land an area of 4.0 hectare for municipal Solid waste management is a govt. land of Nagar Parisad Bundi, which has been granted to M/s Zonta Environment Pvt. Ltd on lease vide letter no. IN-RJ10120600694319P dated 23.05.2017.

4.3 TOPOGRAPHY

The topography of the study area (10 km radius) is almost flat. In 10 km buffer area a Protected Forest at 0.3 km distance in North direction, Ramgarh Vishdhari Wildlife Sanctuary at 4.5 km in NE direction, Jait Sagar Lake at 7.5 km in ENE direction, Phul sagar at 4.5 km in NE direction and Mangali Nadi at 8.0 km in South direction.

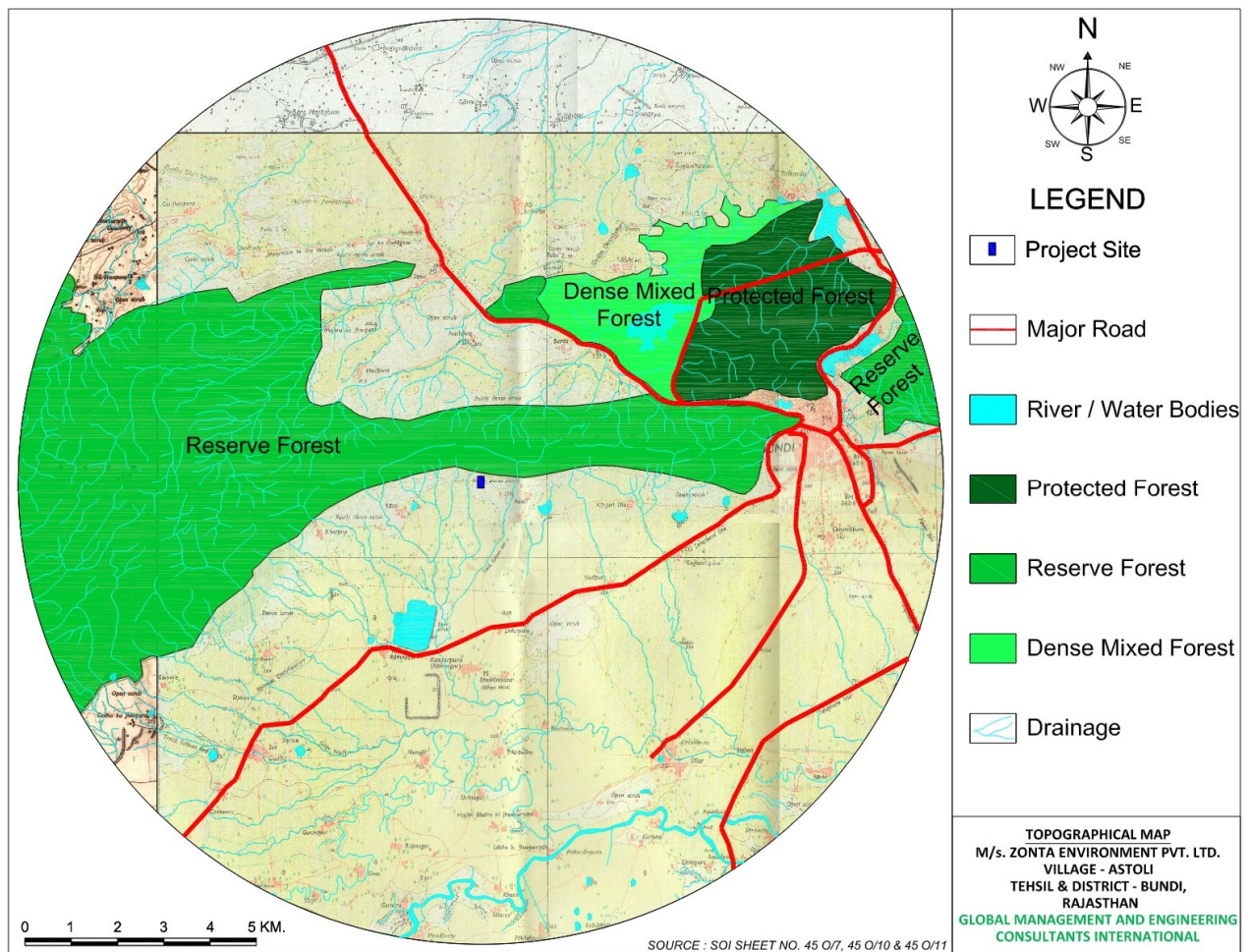


Figure 4.2 Topographical Map (10 Km area)

4.4 SOIL CLASSIFICATION

The soils of Rajasthan vary from desert sand to heavy clay with all intermediate stages like sandy loam, loam and clay loam. The last two textural groups are more prevalent on the eastern, northeastern and southeastern part of the Aravallies which run almost in the middle of the State from southeast to northeast. The latter groups of soils have more potential from the point of agricultural development in the State. These soils are widely termed as alluvial soils which are a general term to indicate the nontaxonomic group of soils that have parent material of alluvial origin, The soils developed from the alluvium as classified under variety of world soil groups. In our country many of the alluvial soils have not yet been studied from the soil genesis point of view as a measure to classify the soils under taxonomic groups. Alluvial soil groups of our country are ill defined and the classification of these soils need more study.

4.5 CLIMATE DATA FROM SECONDARY SOURCES

The climate of the District is semi-arid and very hot in summer and extremely cold in winter. The monsoon season is of very short duration. The cold season starts by the middle of November and continues up to the beginning of March. The summer season follows thereafter and extends up to the end of the June. The south-west monsoon continues from July to mid-September. The period

from mid-September to mid-November forms the post monsoon season. The rainfall during the south-west monsoons constitutes about 80 % of the annual rainfall. About 772 mm is the annual average rainfall. Temperature is varies from 10.0 ° C to 45.0° C Relative humidity is 16 – 80 %.

4.6 SOCIAL INFRASTRUCTURE AVAILABLE

Social infrastructure like hospitals, educational facilities, temple, community centre, roads, telecommunication and others similar are available within 10 km radius.

CHAPTER 5 ENVIRONMENTAL MITIGATION MEASURES

Proposed construction and operation of the project comprising various activities may have some impacts on one or more environmental components. Probable impacts during various phases of the project lifecycle on the environmental and socioeconomic components are evaluated.

In consideration to the prevailing site features and the proposed Integrated Municipal Solid Waste Management Facilities, outlined in earlier Chapters, it is necessary to ensure that the proposed plant and facilities would be adequately designed with necessary environment protection measures. This Chapter accordingly outlines the environment protection measures for the proposed Integrated Municipal Solid Waste management at Bundi site comprising of Compost Plant and Sanitary Landfill. During project implementation period special emphasis would be made on measures to minimize leachate or effluent generation and dust control at source. The sources and types of pollution with broad level mitigation measures have been outlined in the following sections.

5.1 AIR POLLUTION CONTROL MEASURES

Comparing the baseline air quality along with predicted increase in SPM, the increase would be still within the stipulated ambient air quality levels for the residential areas. However, following mitigation measures are proposed to reduce the dust levels in the ambient air environment:

- Maintaining and/or re-establishment of a grass cover on area where there is no on-going activity
- Frequent watering of unsealed roads and stockpile area- cover material
- Blacktop of the roads as and when they are settled and ready for the same
- Repair, relaying of blacktop roads from the landfill area to the main road
- Using dust control sprays during loading and unloading of wastes
- Ceasing dust generating activities during high wind times
- Minimizing working distances for internal transport of wastes
- Periodical monitoring of ambient air quality for all relevant parameters as indicated in the monitoring plan
- Odor control by rapid stabilization and disposal of wastes at the earliest along with daily cover placement

The above mentioned measures will help in minimizing the fugitive emissions and dust.

5.2 WATER POLLUTION CONTROL MEASURES

Construction Phase: During the construction phase, a septic tank shall be provided to treat the domestic wastewater generated due to labor settlements. Temporary facility would have impermeable flooring and proper leachate collection arrangement.

Operation Phase: During initial composting i.e. for about 3 days, leachate will be released. This leachate shall be utilized to maintain required moisture level in composting pits. However the excess leachate discharged shall be collected and treated before draining.

The small quantities of leachate generated will be collected in the sump and treated in leachate Treatment Plant which will comprise of a settling tank, aeration system and treatment with suitable chemicals. This treated leachate will be used for gardening.

Excessive leachate generation in monsoon season will be combated by covering the sub-cells of the facility during rain with HDPE sheets and ensure that no water comes in contact with the waste.

5.3 SOLID WASTE DISPOSAL MANAGEMENT PLAN

The processing and disposal plant has been designed on latest technology involving accelerated and complete composting using thermophilic enzymes. Density separation along with above technology enables effective and efficient segregation of compost, RDF combustibles, recyclables and inert comprising of construction and demolition waste. The construction and demolition waste so separated is further planned to be converted into construction material thereby moving towards zero disposal in the landfill.

However to take care of any exigencies, a landfill for about 5% of total waste is planned for first 2 years of operation and will further be augmented on need based as it is expected that there will be no disposal for landfill.

The solid rejects (about 5% of the total waste) from the processing would consist of stone, sand, earth, ceramic etc. that will be segregated and managed appropriately. The inert produced shall be disposed in an Engineered sanitary landfill.

The proposed facility will have seven days storage for RDF fluff. To mitigate potential fire problems, adequate measures such as water hydrants with adequate pressure or dry powder type will be provided.

5.4 NOISE CONTROL MEASURES

The sources of noise generation in the facility will be from the generators, heavy earth machinery and plant machinery in addition to the vehicular movement. While all noise levels are well within the acceptable limits the following strategies would be adopted to further minimize the noise levels:

- Maintaining the site machinery in good operating condition
- Regular maintenance of systems and installation of noise control equipment wherever required
- Development of green belt all around the site
- Periodical monitoring of noise levels

5.5 ECOLOGY OF THE AREA

Site clearing or operational activities would not impact the ecology of the area adversely, since there are no known rare, endangered or ecologically significant animal and plant species in the area. In 10 km buffer area there is Protected Forest at 3.5 km distance in East direction and two reserve forests are at 6.0 km and 6.5 km in North direction.

5.6 GREEN BELT DEVELOPMENT

A green belt is provided to mitigate various emissions. Green belts are wide strip of trees and shrubs planted in rows to reduce air velocity there by facilitating settling of the particles on the leaf surfaces and allowing absorption of the pollutant gases. It also serves to cool the

atmosphere by transpiration from the leaf surface and also provide habitat for birds, reptiles and insects. The advantages of a green belt are given below:

- Greenbelts are important habitats for birds and animals, which add to the aesthetic value of the environment. Generally, birds prefer to make their habitat, nest, on trees. Further trees provide shade and hiding places to wild life.
- It helps to restore the ecological balance.
- It helps in prevention of soil erosion.
- It helps to improve the aesthetics in the area.
- It also diminishes noise pollution by absorbing high degree of noise due to their Spongy foliar crown

A. Selection criteria of Plant species for Green belt development

The selection of plant species for the development depends on various factors such as climate, elevation and soil. The list of plant species that can be suitably planted and having significant importance are provided below. The plants should exhibit the following desirable characteristic in order to be selected for plantation. The species should be fast growing and providing optimum penetrability. The species should be wind-firm and deep-rooted.

The species should form a dense canopy. As far as possible, the species should be indigenous and locally available Species tolerance to air pollutants.

- The species should be permeable to help create air turbulence and mixing within the belt.
- There should be no large gaps for the air to spill through.
- Trees with high foliage density, leaves with larger leaf area and hairy on both the surfaces.
- Ability to withstand conditions like inundation and drought.
- Soil improving plants (Nitrogen fixing, rapidly decomposable leaf litter).
- Attractive appearance with good flowering and fruit bearing.
- Bird and insect attracting tree species.
- Sustainable green cover with minimal maintenance

B. Suggested Trees For Peripheral Green Belt Development

Following species can be used in a greenbelt to serve as noise breakers:

S No	Common Name	Scientific Name	Family
1	Safed siris	Albizia procera	Fabaceae
	Babool	Acacia nilotica	Fabaceae
	Neem	Azadirachta indica	Meliaceae
	Shesham	Dalbergia sissoo	Fabaceae
	Gulmohar	Delonix regia	Caesalpiniaceae
	Bargad	Ficus benghalensis	Moraceae
	Pipal	Ficus religiosa	Moraceae
	Jamun	Syzygium cumini	Myrtaceae
	Ashok	Polyalthia longifolia	Annonaceae

5.7 HEATH AND SAFETY MANAGEMENT

The health and safety of all those who work at the Plant shall be ensured by:

- Assessing the risk of all work activities, recording the significant findings and developing method statements are as appropriate.
- Providing and maintaining safe plant and systems of work, together with appropriate personal protective equipment
- Minimizing risks associated with hazardous substances including waste to be processed, materials used and the by-products of waste treatment processes
- Minimizing risks associated with other occupational health risks including noise, vibration and manual handling
- Maintaining the Plant in safe condition including as regards workplace transport and fire risks
- Providing appropriate information, instruction, training and supervision to those working at the Plant or visiting the Plant, including information and training with regard to the emergency procedures
- Implementing effective systems for active and reactive monitoring of compliance, including by inspections, audits and incident/ near miss investigation
- All personnel attending site, shall be equipped with Long Sleeves work clothes, Safety Helmet, Safety Boots, Hi-Vis vest or jacket and Safety Glasses which shall be worn at all times whilst working in the construction area.

Equipment safety rules

All necessary tools and equipment, including personal protective equipment, shall be properly maintained. Defective tools and equipment shall be repaired or replaced immediately.

- All equipment shall be used only by employees who have been properly trained and are
- otherwise competent to use the tools and equipment safely
- Only authorized personnel shall operate heavy-duty equipment/ equipment/ machinery in the Plant. Equipment can only be started when the following two conditions are fulfilled:
 - Comply with the applicable Permit-To-Work System
 - Local check has been carried out to confirm that the equipment is in working condition and that no one is near the equipment. For equipment with local on/ off switch, it should always be started locally. Unauthorized possession of equipment switching keys by any person is prohibited. No bypassing is allowed unless approval given by the authorized person.
- Hazards caused by moving or rotating parts of machines are covered with providing an electrical/ pneumatic lockout procedure.
- The allowable safety load limit of a machine, a working tool, or piece of equipment may not be exceeded. Tools, equipment, and machinery shall not be altered in any manner that would reduce their original safety limit. Any and all changes to machines, equipment and/or materials must be approved by an official inspection unit.

CHAPTER 6- REHABILITATION AND RESETTLEMENT (R&R) PLAN

The proposed project is new project at already converted land for municipal solid waste dumping site of Nagar Parisad Bundi. The proposed land an area of 4.0 hectare for municipal Solid waste management is a govt. land of Nagar Parisad Bundi which has been granted to M/ s Zonta Environment Pvt. Ltd on lease vide letter no. IN-RJ10120600694319P dated 23.05.2017.

Land is located Khasra No. 649/49 Village- Astoli, Tehsil & District- Bundi (Raj).

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CHAPTER 7- PROJECT SCHEDULE & COST ESTIMATES

7.1 Project Implementation Schedule

The whole project is estimated to be completed in about 9 months following approval of DPR and 6 months from obtaining environmental clearance whichever is later. It is envisaged that the proposed facility would be operational from June 2018.

7.2 Project Cost

The estimated project cost is Rs 1032.69 lakhs and EMP cost is about Rs 82.61 Lakhs. The capital investment of Land & site development, Civil works, Plant & Machinery and Particulars of interface equipment.

Budget for CSR Activities

Cost of CSR for Entire Project Period		
S. No.	Parameter	Revised Amount in Rs.
1	Health Campaign for Local Habitation	750,000.00
2	Awareness Campaign	300,000.00
3	Social Event Sponsorship (festival and others)	150,000.00
Total		Rs. 1,200,000.00

Budget for Labour

Cost of Labour Welfare for Entire Project Period		
S. No.	Parameter	Revised Amount in Rs.
1	Medical Health Check-up	306,000.00
2	Health Care Facility	3,570,000.00
3	Mediclaime Insurance /Compensation for injuries	1,200,000.00
4	Facility for drinking, bathing and washing facilities	1,020,000.00
5	Education and Training	408,000.00
6	Leave and travel maternity benefits	500,000.00
7	Food and Beverages	500,000.00
Total		7,504,000.00