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Annexure-IV

**INDICATIVE FORMAT FOR  
PREPARATION OF DETAILED PROJECT REPORT (DPR)  
FOR MANAGEMENT OF MUNICIPAL SOLID WASTE**



**CENTRAL POLLUTION CONTROL BOARD**  
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**FORMAT FOR PREPARATION OF DETAILED PROJECT REPORT (DPR) FOR  
MANAGEMENT OF MUNICIPAL SOLID WASTE  
{IMPLEMENTATION OF THE MUNICIPAL SOLID WASTES (MANAGEMENT AND  
HANDLING) RULES, 2000}**

**CHAPTER - 1: INTRODUCTION**

**Objectives/ Scope of DPR:**

The preparation of DPR includes following objectives;

**CHAPTER - 2: CITY PROFILE**

- 2.1 General Profile (including city map):
- 2.2 Historical Profile:
- 2.3 Tourist, religious or any other specific Profile of the city:

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2.4 Area and Population:

Area of the city/ town (under the jurisdiction of the local body) in Sq. Km.

Details of Population

Census Year	Population				Projected population
	1981	1991	2001	2011	2021
Population					
Decadal growth					

2.5 Slum Population (no. of slum pockets and approximate population, ward-wise list of slums and the area occupied by them, population)

2.6 Main tourist spots in the city

2.7 Climate

2.8 Political Set up of the local body (no. of election wards etc.)

2.9 Administrative Set up of the local body:

Municipal Solid Waste Management Department: (health officer, assistant health officers, details of Supervisory staff etc.)

Name of the circle/ ward	No. of AHOs	No. of sanitary inspectors	No. of Supervisors	No. of Sweepers	Ward Area	Population
Total						

2.10 GENERAL INFORMATION TO BE COLLECTED AND UPDATED FROM TIME TO TIME

1. Area of the city;
2. Population of the city;
3. Decadal growth of population;
4. Number of wards, their area and population;
5. Ward-wise information in regard to:
  - Population density in different wards;
  - No. of Households, shops and Establishments
  - Vegetable/fruit/meat/fish markets
  - Number of Hotels & Restaurants
  - Number Of Hospitals and Nursing Homes
  - Number Of Industries
  - Number Of slum pockets/their population

- Road length width wise
- Percentage of area covered with under-Ground sewage system
- Percentage of area having surface Drains
- Percentage of area having no drainage Facility
- Number of slaughter houses
- Total number of public toilets and Toilet seats.
- Number Of public urinals
- Number Of Nuisance spots

**CHAPTER - 3: PRESENT PRACTICES OF SOLID WASTE MANAGEMENT IN THE CITY**

- 3.1 Waste generation rate: (MSW generated in MT per day)
- 3.2 Break-up of waste generation (domestic, markets, industrial etc.)
- 3.3 Storage of Domestic Waste at Source: (existing system of storage and segregation of waste at source at the household level)
- 3.4 Storage of market and trade waste at source: (existing system of storage and segregation of waste in the vegetable, fruit, meat or fish market)
- 3.5 Storage at slums
- 3.6 Segregation of Recyclable wastes
- 3.7 Primary Collection of Domestic, Trade and Institutional Wastes: (existing system of door-to-door collection, adequacy of community bin facilities etc.)
- 3.8 Hospital and Nursing Home Waste: (no. of hospitals and nursing homes, estimated bio-medical wastes generation, existing processing and disposal system)
- 3.9 Hotels and Restaurants waste (nos. of hotels and system of primary collection)
- 3.10 Construction Waste (system of storage and its primary collection)
- 3.11 Street Sweeping: (Work norms and frequency of street sweeping, circle/ward wise road length)

Frequency of street cleaning	Wards covered or % of street covered
Daily	
Alternate day	
Once a week	
Occasionally	

- 3.12 Tools Used: (availability of traditional/ containerized handcarts, long handled brooms etc.)
- 3.13 Waste Storage Depots: (circle/ ward wise nos. of waste storage depots, mode of transmission of waste upto depots, condition of depots, nos. of litter bins provided etc.)
- 3.14 Material Recovery Facilities (MRFs): (circle/ ward wise nos. of MRFs, mode of transmission of waste upto MRF, nos. of MRFs provided, employee, facility, etc.)
- 3.15 Transportation of Waste: (frequency of transportation, mode of loading- manual/ mechanized loader, vehicles- tractor, trucks, autos etc.)

Name of the Circle/ Ward	Frequency of lifting#	Types of vehicle\$	No. of vehicles		
			Total	Functional	Out of order

# Daily, Alternate day. Once in week, Occasionally etc.  
 \$ Tractors, Tipper trucks, Loader cum excavator, Mini loaders etc.

- 3.16 Waste Processing and Disposal Facilities: (Details of waste processing and disposal facility like- year of commissioning, designed life, design capacity (Mt/ Day), operation capacity (MT/ Day), Scientifically operated or haphazard dumping in low lying areas, daily soil coverage provided or not, availability of weigh bridge facility, buffer zone, road facilities, status of authorization from SPCB etc.)

3.17 **Financial Aspects**

Years	Actual Receipt including Grant	Actual Expenditure	Expenditure incurred on management	
			MSW department	Expenditure on salary
				Expenditure on infrastructure
2001-02				
2002-03				
2003-04				

**3.17 GENERAL INFORMATION OF MSW TO BE COLLECTED AND UPDATED FROM TIME TO TIME**

**Waste generation**

- 1. Average quantity of waste produced each day.
- 2. Seasonal variations in daily waste generation.
- 3. Total quantity of waste produced annually during last 3 years
- 4. Breakup of the quantity of wastes generated
  - i Household, shops and establishment waste;
  - ii Vegetable and food market waste;
  - iii Meat, fish and slaughter house waste;
  - iv Construction & demolition waste;
  - v Horticultural waste
  - vi Hospital waste
  - vii Industrial waste

- 5 Average number of carcass removed each day

**Staff Position**

- 6 Number of sanitation workers deployed in the city for the collection of waste
- 7 Number of sanitation workers deployed for the transportation of waste
- 8 Ward wise allocation of sanitation workers
- 9 Sweeper population ratio in each ward
- 10 Sweeper road length ratio in each ward
- 11 Sweeper supervisor ratio in each ward

**Waste storage depots**

- 12 Number of sites designated/notified for temporary of waste (Dust bins)
- 13 Type and size of Dustbin provided in each ward.
- 14 Ward-wise Quantum of waste generated each day.

**Material Recovery Facility:**

- 15 Nos. of facility exist/ converted/proposed
- 16 Infrastructure facilities
- 17 Mode of operation
- 18 Quantity recovered- disposal

**Transportation**

- 19 Number Of vehicles available with the local body for the transportation of waste, their types, size and age.
- 20 Number of trips made by each vehicle in one shift.
- 21 Number of vehicles used in:

First shift  
Second shift &

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Third shift

- 22 Qty. of waste transported in each shift.
- 23 Total qty. of waste transported each day.
- 24 Percentage of waste transported each day.

**Waste processing and disposal**

- 25 Number of waste processing and disposal sites in the city.
- 26 Their distances from the Centre of the city.
- 27 The area of these sites
- 28 The qty. of waste treated/disposed of at each site
- 29 The expected life of each land filled site

**Financial aspects**

- 30 Operating cost
  - a. Cost of collection per ton/day
  - b. Cost of transportation per ton/day
  - c. Cost of disposal per ton/day

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## **CHAPTER-4: PROPOSED ACTION PLAN FOR MSW MANAGEMENT (In accordance with the Solid Wastes Management Rules, 2016):**

### **4.1 Storage of Waste at Source:**

*No waste should be thrown on the streets, footpaths, open spaces, drains or water bodies, nallas, etc.*

*Waste should be stored at source of waste generation in two bins/ bags, one for food waste/ bio-degradable waste and another for recyclable waste such as papers, plastic, metal, glass, rags etc.*

*Waste such as used batteries, containers for chemicals plastics pesticides, discarded medicines and other toxic or hazardous household waste, if and when produced, should be kept separately from the above two streams of waste.*

The following indicative measures may be taken by the local body to meet the above;

- All the household may be directed that they shall (a) keep the food waste/ bio-degradable as and when generated, in any type of domestic waste container, preferably with a cover, and (b) keep dry/ recyclable wastes preferably in bags or sacks.
- A metal or plastic container of 15 litre capacity for a family of 5 members would ordinarily be adequate to store the waste produced in 24 hours having a spare capacity of 100% to meet unforeseen delay in clearance or unforeseen extra loads.
- In slum pockets where it may be difficult to do house-to-house collection, community bins of 80 to 100 litres capacity @ 1 community bin per 20-30 dwelling units may be placed at suitable locations to facilitate the storage of waste generated by them.
- Shops/ offices/ institutions/ workshops/ hotels/ restaurants/ meat shops/ fish shops etc. should be directed to store their waste on-site in sturdy containers of about 100 litres capacity.
- In case of large hotels/ restaurants/ commercial complexes, residential societies, vegetable markets etc., they should be directed to provide large size containers 3.0 cmt to 7.0 cmt, which should match with the transportation system of the city.

### **4.2 Segregation of Recyclable/ non-biodegradable Waste:**

*The local body may draw up a program of conducting awareness campaign in various wards of the city utilizing the ward committees, local NGOs and resident welfare association. Simple literature may be developed for bringing in the awareness, which may be publicized through media using cable net*

*work, and group meetings in different areas through NGOs. The sanitation supervisors may also create awareness during their field visits.*

*As soon as the awareness campaign picks up, the local body may direct households, shops and establishments not to mix recyclable waste with domestic food/bio-degradable waste and instead store recyclable/non-bio degradable wastes in a separate bin or bag at the source of waste generation.*

- The local body may mobilize NGOs or Co-operatives to take up the work of organizing street rag-pickers and convert them to door step "waste collectors" by motivating them to stop picking up soiled and contaminated solid waste from streets, bins or disposal site and instead improve their lot by collecting recyclable clean material from the doorstep at regular intervals of time.
- The upgraded rag pickers on becoming doorstep waste-collectors may be given an identity card by NGOs organizing them so that they may have acceptability in society. The local body may notify such an arrangement made by the NGOs and advise the people to cooperate.

#### **4.3 Primary collection of waste**

*The local body shall arrange for the primary collection of putrescible organic/food/bio-degradable waste from the doorstep on a daily basis. This service should be regular and reliable. Recyclable material can be collected at longer regular intervals as may be convenient to the waste producer and the waste collector, as this waste does not normally decay and need not be collected daily. Domestic hazardous waste is produced occasionally and so such waste need not be collected from the doorstep. People could be advised or directed to put such waste in special bins kept in the city for disposal of such wastes.*

**The following arrangements may be made by the local body:**

- Garbage is to be containerized at the point of generation to reduce collection time and health hazard. The system of house-to-house collection is to be extended to all the households of all wards, slums, markets, establishments etc. either through containerized wheelbarrow (handcarts) or containerized pedal tricycles with bells or whistles or through community collection (central bin).
- Devising collection of waste from slums and squatter areas or locality including hotels, restaurants, office complexes and commercial areas.
- Modus Operandi: Each sweeper may be given a handcart or pedal tricycle having detachable containers (preferably six) of 25-30 litres capacity each and provided with a bell or whistle. Each sweeper should be given a fixed area or beat for sweeping plus a fixed number of stretches/ houses from which to collect the domestic waste. The local body may, based on local conditions, fix the work norms as they deem appropriate.

- However, it is suggested that in a congested or thickly populated areas, 350 running meters of road length and the adjoining houses may be given to each sweeper, whereas in medium density areas 500 to 600 running meter of the road length with adjoining houses may be allotted to a sweeper depending upon the density of population in the given area and local conditions. In low density areas even 750 running meter of road length can be given. Normal 150 to 250 houses coupled with the above roads length may be taken as a yard stick for allotment of work to an individual sweeper.
- Motorized vehicles having unconventional horns may be deployed in highly congested areas where containers cannot be placed for the doorstep collection of waste.
- The local body should collect waste from slums either from house-to-house collection or through central bins (of about 100 litres capacity) or through community bins (3.0 to 4.5 cum capacity) provided @ 1 bin per 20-30 households. Residents should bring their biodegradable wastes from their houses to bins.
- Societies, complexes, market associations, hotels etc. could be advised or directed to deliver their biodegradable wastes into central bins or community bins to facilitate its easy collection by municipal staff.

**4.3 Sweeping of Streets and Public Spaces:**

*Daily sweeping of public streets is almost becomes essential where there is habitation close by. Isolated pockets or roads with little or no habitation around are to be cleaned periodically. A schedule of streets cleaning should be prepared, assigning clearly demarcated area to each sweeper and street sweepings should be deposited in the storage containers.*

The following measures may be taken to ensure regular sweeping of streets and public places:

- Each sweeper engaged in street sweeping should be given individual containerized handcarts having 4 to 6 containers or a tricycle having 6 to 8 containers of 25 to 30 litres capacity. These containers should be detachable to facilitate the direct transfer of street sweepings and household wastes from the container into the communal waste storage bins.
- Each sweeper engaged in street sweeping should be given a metal tray, a metal plate, a long handled brooms and protective gears, etc.
- Measures should be taken to prevent burning of the leaves and other waste by sweepers on the roadside and direct sweepers to take all waste to the communal waste storage bins.

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➤ By adopting the norms of road length for the purpose of entrusting work to the sanitation workers, the requirement of sweepers and their tools may be worked out as under;

Types of roads	High density roads	Medium density roads	Low density roads	Total
Length of roads				
No. of sweepers required @ 1 sweeper per 350Mt. in dense area, 500 Mt. in medium density areas and 750 Mt. in low density areas, coupled with 150 to 250 houses.				
No. of metal trays, metal plates, long handed brooms, pairs of protective gears etc.	No. of sweepers worked out above			

**Estimated need of the containerized handcarts and pedal tricycles for primary collection system:**

S.No.	Name of Item	Nos.
<b>a)</b>	<b>Design parameters</b>	
	Base year 2004	
	Design Period 10 years	
	Population of city/ town (2001 Census)	
	Projected population 2004 (by Geometric Increase Method)	
	Projected population 2014 (by Geometric Increase Method)	
	Population considered for design (Arithmetic average of projected population for years 2004 and 2014)	<b>P</b>
	Total Waste generated (Mt/ day) = Design population x waste generated, kg/capita/day	<b>W</b>
	Volume of waste (V) (Cum/ day) = Total waste generated (Mt/day) / density (Mt/ Cum) {density of MSW may be taken as 0.425 Mt/Cum}	<b>V</b>
<b>b)</b>	<b>Calculation for 30 litres capacity containers</b> (Sweepers are expected to make at least two trips to the temporary waste storage depots and therefore, will use the same containers at least two times a day)	
	Nos. of Containers = $\{[V \text{ Cmt} \times 1000 \text{ litre/Cmt}] / 30 \text{ litre}\} / 2$ trips a day	<b>A</b>
<b>c)</b>	<b>Calculation for six containerized handcarts and tricycles</b> (Assuming X% of waste collection will be through handcarts and Y% of waste collection will be through tricycles only. It is suggested that handcarts may be used by female sanitary workers and tricycles may be used by male sanitary workers.)	
	No. of six containerized handcarts = $(A/6) \times X\% = \text{Say, B}$	<b>B</b>
	No. of six containerized tricycles = $(A/6) \times Y\% = \text{Say, C}$	<b>C</b>
<b>d)</b>	<b>Nos. of central bins (100 litres capacity)/ community bins</b>	<b>D</b>

S.No.	Name of Item	Nos.
	required in slum areas/ markets etc. = Say, D	
e)	<b>Add Standby containers, handcarts, tricycles, bins @ 10%</b>	

**4.5 Provision of Litterbins:**

*To enable citizens to dispose of their waste-in-hand, litterbins should be provided at all railway stations, bus stations, in all market places, places where people gather or wait in squares and on important roads at a reasonable distance ranging from 25 to 250 metres.*

Ordinarily providing about 11 litter bins per square Km area of city/ town, depending on local condition may fulfill the requirements.

**4.5 Temporary Waste Storage Depots for onward transportation of Waste**

*Solid waste collected from the doorstep or from the central bins (kept in slums, markets etc.) by the primary collection system has to be unloaded and stored at a convenient place for their onward transportation in a cost-effective manner. Temporary waste storage depots/MRFs are required to be created at suitable locations in lieu of open waste storage sites.*

- The following systems could be considered for set up by the local body:
- Provide large metallic containers (3.0, 4.5, 6.0, 7.0 cum capacity) with lid at a distance not exceeding 250 m from the place of work of the sweepers and to cover all the wards. The distance between two consecutive storage bins should therefore, not exceed 500m. The distance between the communal storage bins can be determined on the basis of load of garbage/ refuse that is likely to be received at the containers from the area concerned.

Ordinarily 4 to 5 communal storage bins (3.0 to 7.0 cum capacity) are required per square Km area. It has also to be ensured that at least twice the storage capacity of the total wastes generated per day, should be created for the storage of wastes in the city/ town. This will ensure that no waste will spill outside the bin and will give sufficient time to the local body to remove the waste by organizing a periodic cycle of transportation of waste. This number could also cover ward-wise bins for storage of domestic recyclable and hazardous wastes.

- The bins should be placed on cement concrete or asphalt flooring having a gradual slope towards the road to keep the site clean. The flooring should be flush with the border of the road to maintain hygienic conditions and facilitate the transfer of waste from the containerized handcarts/ tricycles into the container. A catch pit may be provided close by if storm water drain exists in the city/ town.
- In highly congested areas an option of using small vehicles (like auto bins) for direct collection of waste instead of placing containers on the roads could be

considered. Such vehicles can be parked at suitable locations in the congested areas where sweepers can bring the waste easily.

#### 4.7 Transportation of Waste

**The system of transportation should appropriately match with the system adopted for the storage of waste at the communal bins/ containers, i.e., at the temporary waste storage depots. Manual loading should be discouraged and phased out expeditiously and replaced by direct lifting of containers through hydraulic system or non-hydraulic devices or direct loading of waste into transport vehicles.**

The following measures may be taken by the local body to achieve effective transportation of wastes:

- The transportation of waste from the temporary waste storage depots/ sites may be planned in accordance with the frequency of containers becoming full. The locations where the containers are placed may be grouped into following categories as under;
  - (a) Containers which are required to be cleared more than once a day.
  - (b) Containers which are required to be cleared daily.
  - (c) Containers which are required to be cleared on alternate days.
  - (d) Containers which take longer time to fill and need clearance twice a week.
- Depending on the containers to be cleared each day, the route for lifting the containers may be worked out avoiding zigzag movement of the vehicles to the extent possible.
- All the vehicles may be utilized at least in two shifts to lift containers, to ensure full utilization of the fleet of vehicles and to reduce the requirement of new vehicles.
- Transportation of waste during night may be done in areas where there is serious traffic congestion during the day and it hampers MSW management operations. Work at night will increase the productivity and reduce the cost of the service.
- The containers lifting tractors and devices such as dumper placers/ skip lifters may be utilized for transportation of 3.0 to 7.0 cum containers to the wastes processing and disposal sites.
- The local body may enter into a rate contract for maintenance of vehicles and equipment and ensure that they are kept in a good working condition.

#### **Estimated need of the vehicles and temporary waste storage containers:**

S. No.	Name of Equipments/ tools	Nos	Rate per unit	Total Cost
a)	Dumper placer containers ( 4 to 5 nos. per Sq. Km)			
	3.0 cum containers			
	4.5 cum containers			

	6.0 cum containers			
	7.0 cum containers			
	Total			
	No. of containers available with the local body			
	No. of containers required to be purchased			
<b>b)</b>	<b>Container lifting devices/ vehicles</b>			
	No. of 3.0 cum containers to be lifted each day			
	No. of 4.5 cum containers to be lifted each day			
	No. of 6.0 cum containers to be lifted each day			
	No of 7 cum containers to be lifted each day			
	No. of containers that can be lifted by one tractor/dumper placers in two shifts	8 to 10		
	No. of containers lifting tractors required			
	No. standby tractors required			
	Total nos. of containers lifting tractors			
	No. of dumper placers required to lift 6 -7 cum containers			
	Standby dumper placers required			
	Total dumper placers required			
	No. of tractors available with the local body			
	Therefore, new tractors to be procured			
	Existing tractors to be mounted with container lifting devices			
	No. of dumper placers available with the local body			
	No. of dumper placers to be procured by the local body			

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c)	<b>Small vehicles (like auto bins) required for direct collection</b>			
	No. of vehicles required for direct collection of waste from highly congested areas and narrow lanes			
	No. of standby vehicle			
	Total			
d)	<b>Hotel/ market waste collection vehicles</b>			
	No. of vehicles required for collection of hotel/ market waste			
	No. of standby vehicle			
	Total			
e)	<b>Construction waste collection vehicles and skips</b>			
	No. of skip containers required			
	No. of skip lifters required			

#### 4.8 Waste Processing (Composting) and Disposal

**All organic/ biodegradable wastes collected from households, shops, markets, hotels and other establishments should preferably be biologically processed; and**

**Only rejects, drain silts & domestic hazardous waste should be carefully landfilled. Bio-Medical Waste should be disposed of as per the Bio-Medical Wastes (Management and Handling) Rules, 1998**

*Available technologies:* The waste processing can be achieved either through biological route or the thermal route. In the biological route mainly two processes, aerobic stabilization (composting) and anaerobic process (biomethanation) are used.

Aerobic stabilization of organic fraction of waste yields a final product which can be used as organic manure and is called compost. In the anaerobic process, also referred as biomethanation, the organic matter after segregation and size reduction is mixed with water and allowed to degrade under controlled anaerobic conditions. The generated biogas has a fuel value, which is used as a source of energy and the digested residue as compost. The biofuel (ethanol) also can be processed from biodegradable fraction for locomotive use.

In the thermal route, two processes are commonly adopted. In the first process, commonly referred to as 'Incineration' the waste is burnt in an excess amount of oxygen and the related heat is utilized to generate electricity. The second process in the thermal route involves combustion of the material in the absence of air or in an oxygen deficient atmosphere. This is commonly referred to as 'pyrolysis', which results in the generation of three different products namely, gas, liquid and char each of which has certain calorific value.

To facilitate the thermal processing of waste, the combustible portion of MSW is separated in yet another process to obtain Refuse Derived Fuel (RDF) which is then subjected to incineration or pyrolysis process.

Further, it is to mention that out of the various processing technologies, the technologies which are being used/ considered for use in Indian conditions are: (i) Composting, (ii) Anaerobic digestion to recover biogas and electricity, (iii) Refuse Derived Fuel and (iv) Pyrolysis.

**The following measures may be taken by the local body for setting up of waste processing plant and for development of landfill site:**

The waste processing should be addressed by the local bodies in compliance with Schedule II and IV of the Municipal Solid Wastes (Management and Handling) Rules, 2000. Similarly, the waste disposal by landfilling should meet the criteria as laid under Schedule II, III and IV of the Municipal Solid Wastes (Management and Handling) Rules, 2000.

Presently in most of cities/ towns, the waste is collected without any source segregation. SWM Rules 2016 has given one year for implementation of segregation. The experience all over the world indicates that it will need a decade before effective source segregation is achieved. It is, therefore, desirable that all the MSW produced be first biologically processed and the non-biodegradable removed for disposal in a landfill along with drain silt and such other inorganic material.

Therefore, till such time the people develop a habit of segregation and effective source segregation can be achieved, local body should set up and operate and maintain waste processing plant(s) of adequate design capacity to process all the waste of generated per day from the municipality, other than debris, biomedical waste, etc.

Based on some compost plants set by private entrepreneurs in the country, it has been estimated that a compost plant processing 100 MT of wastes per day would cost around Rs.1.50 Crores (excluding land cost). For preliminary cost estimation for setting up of a compost plant of adequate design capacity local body may use this estimates.

Similarly, preliminary estimated cost for development/ setting up of engineered landfill site could be carried out at Rs.700/- to Rs.800/- per square metre of landfill surface area to be developed (excluding land cost). A land area of about 100-150 acres may be considered as ideal for setting up of compost plant and for development of sanitary landfill site having life span of about 20 years.

However, it is required to get the waste quantification, characterization, detailed engineering site investigation, design, drawing, specification and cost estimate done for setting up of a common compost plant of adequate capacity for processing of MSW and development/ setting up of engineered landfill site from an expert consultants. It is suggested that a separate 'Detailed Project

report' (DPR) for setting up of a compost plant/ waste processing facility and for development of sanitary landfill site may got prepared.

It may be necessary that the local body may invite competitive bids from private sector to set up waste processing plant on BOO basis as well as to run the plant that may alternately be set up by the local body, on O & M basis. In case of BOO the entire investment will have to be done by the private sector whereas, land will be made available by the local body to the private sector for a minimum 20 years on a nominal lease rent, preferably of Re.1 per Sq. metre per year and delivery of garbage at the plant site without levy of any charges. The local body may negotiate with the private sector regarding the payment of royalty by the private sector for the valuables (like compost, energy etc.) produced or payment of tipping fees by the local body to the private company as may transpire from the bids received. Whereas, in O & M contract the investments will be made by the local body to set up plant particularly compost plant and operation and maintenance will have to be done by the private sector on its own and in return they will get the compost produced to be marketed by them at their own cost. Here, the local body will not pay any charges for O & M but, will supply agreed quantities of garbage on day to day basis at its own cost at the plant site.

**4.8 Intra-city Activity:**

The local body should set up a 'Surveillance Squad' for efficient management of intra city activities and attainment of emergency matter/ public calls related to MSW management on urgent basis.

**Local body may procure requisite nos. of sets of Walky& Talky/mobile phones, web camera for management levels officials to be associated with the MSW activities and for implementation of the proposed project; and**

Control rooms may be set up to register complaints received from the public and settle such complaints expeditiously on 'no-delay' basis..

**CHAPTER - 5: REQUIREMENT OF FUNDS FOR SETTING UP OF FACILITIES FOR MSW MANAGEMENT (Indicative equipments/ tools)**

S. No.	Equipments/ tools	Quantity required	Qty. existing	Qty. Shortfall	Cost per unit	Total estimated cost
<b>Compliance with Schedule II of the MSW Rules to cover:</b>						
1	<b>Mass Awareness</b> (through booklets, print and electronics media, workshops, seminar etc.)					
<b>Primary Collection System</b>						
2	Containers (30 litres capacity)					
3	Containerized handcarts					
4	Containerized pedal tricycles					
5	Central bins (100 litres capacity)					
6	Community bins (3.0 to 4.5 Cum) for slums					
	<b>Street Sweeping</b>					

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S. No.	Equipments/ tools	Quantity required	Qty. existing	Qty. Shortfall	Cost per unit	Total estimated cost
7	Mechanical Sweeper					
8	Seamless handcarts for drain desilting					
9	Sweeping tools (Metal tray and metal plate, Long handled brooms, shovels and protective gears)					
	<b>Litter bins</b>					
10	Litter bins (approx. 11 bins per Sq. Km.)					
	<b>Temporary Waste Storage Depots</b>					
11	Small vehicles for congested places/ important places					
12	Dumper placer containers 7 cmt.					
13	Dumper placer containers 6 cmt.					
14	Dumper placer containers 4.5 cmt.					
15	Dumper placer containers 3 cmt.					
16	Skip containers					
17	Auto bins					
	<b>Transportation/ Vehicles</b>					
18	Dumper placer vehicles					
19	Tractors to be fitted with containers lifting device					
20	Trolleys					
21	Wheel dozer					
22	JCB					
23	Trucks with JCB					
24	Bob Cat					
25	Cattle catcher					
	<b>Compliance with Schedule II and IV of the MSW Rules relating to Waste Processing:</b>					
26	Setting up of Waste Processing Plant (For compost plant estimated cost at Rs.1.5 crores per 100 MT of waste, excluding land cost)					
	<b>Compliance with Schedule II, III and IV of the MSW Rules relating to Waste Disposal by landfilling:</b>					
27	Development of landfill sites (estimated cost at Rs.700-Rs.800/- per Sq. Mt of landfill area to be developed, excluding land cost)					
	<b>Intra-city activities</b>					
28	Surveillance Squad (Walky- Talky)					

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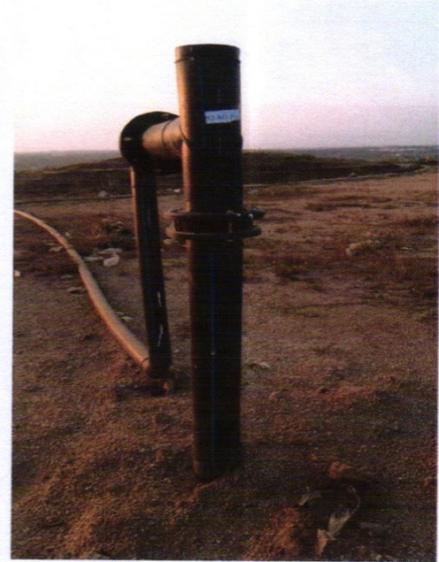
### Estimation of requirement of Sanitation workers, drivers etc. (indication)

Designation of Post	Sanitation Workers	Drivers
Street sweepers for street sweeping and primary collection of waste from households, shops and establishments		
Sanitation workers/drivers on tractors and dumper placers in 2 shifts @ 1 person per vehicle		
Sanitation workers/drivers on small vehicles @ 1 labour and 1 drivers per vehicle		
Sanitation workers/drivers on skips @ 1 per vehicle on vehicles for construction waste		
Sanitation workers/drivers on hospital vans @ 1 per van		
Sanitation workers/drivers on hotel waste collection vans @ 2/1 per van		
Sanitation workers/drivers on garden waste van, @ 2/1 per vehicle		
Sanitation workers/drivers on bull dozer		
Labour at land fill site		
<b>Sub-Total</b>		
Weekly off relievers @ 17% for round the year service		
<b>Total</b>		

#### REFERENCES:

1. Solid Wastes Management Rules, 2016
2. Manual on Municipal Solid Waste Management, 2000 (Central Public Health and Environmental Engineering Organization, Ministry of Urban Development, Government of India).
3. Municipal Solid Wastes Processing Technologies: Reference Manual for Local Bodies, 2002 (Central Pollution Control Board)
4. Guidelines for Selection of Site for Landfilling, 2003 (Central Pollution Control Board)

Management of Gas generated inside the capped dump



Gas collection network

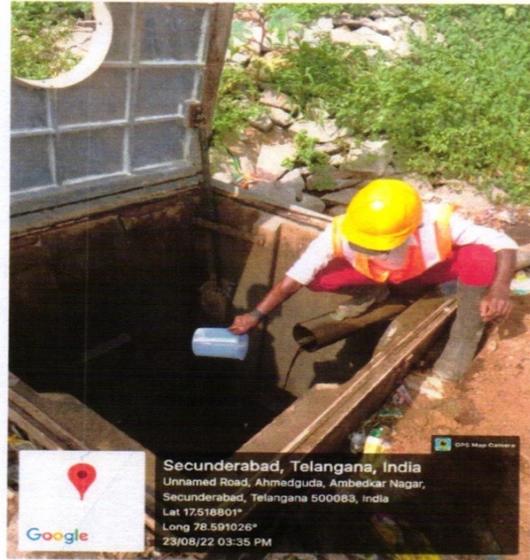


CBG plant



Flaring of excess landfill gas

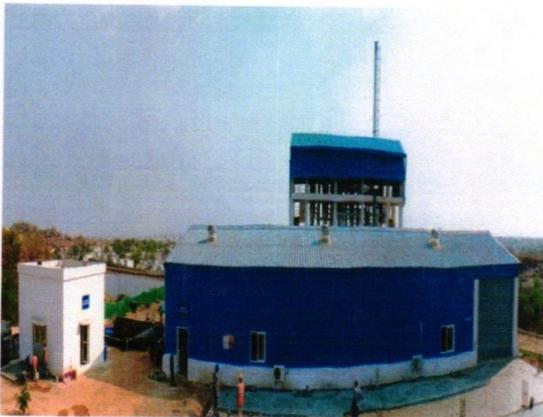
**Leachate Management from legacy dump**



Lateral pipes/ shafts, leachate collection sumps



Pretreatment of leachate



RO Stage Treatment



MEE-ATFD Treatment

## Characterization of Leachate and its Effects on Ground Water Quality Around Jawaharnagar Municipal Open Dumpsite, Rangareddy, Telangana

B. SOUJANYA KAMBLE

Department Of Environmental Science, University College Of Sciences,  
Osmania University, Hyderabad - 500007, India.

<http://dx.doi.org/10.12944/CWE.11.1.15>

(Received: March 02, 2016; Accepted: March 25, 2016)

### ABSTRACT

In the present work, characterization of leachate from an open dumpsite, Jawaharnagar, Rangareddy district, Telangana and its effects on surrounding ground water was investigated. A total of one leachate sample and twelve ground water samples were collected during pre-monsoon and post-monsoon seasons (2015) for monitoring purpose. All the samples were analyzed for physico-chemical parameters (pH, TDS, TH, CH, Cl,  $\text{SO}_4^{2-}$ ,  $\text{NO}_3^-$  and F) as per standard procedures (APHA). Results indicate that, only pH and sulphates were found to be within the permissible limits in ground water recommended by WHO:2006. Total dissolved solids, Chlorides and Nitrate levels were found to be alarming in both pre and post monsoon. Water quality index (WQI) study also showed that most of the water samples fall in "Poor" and "Unsuitable" category. It is evident that the leachate from the municipal dumpsite is polluting the ground water at greater extent making them unsuitable for drinking purpose. Therefore, immediate measures should be taken to control the leachate contamination in the ground water.

**Key words:** Jawaharnagar Dumpsite, Water Quality Index (WQI), Physico-chemical parameters, WHO (2006).

### INTRODUCTION

Management of solid waste and related environmental impacts presents a challenge to both developing and developed countries. Rapid industrialization, growing population and changing lifestyle are the root causes for increasing rate of solid waste generation. The quantum of municipal solid waste generated in India is about 0.15 million tons per day. This is approximately 50 million tons annually. Out of the total municipal waste collected, on an average 94% is dumped on land and 5% is composted. However, the average rate of MSW generation in India (0.35 to 0.60 kg/ person/day)

is very low as compared to developed countries<sup>1</sup>. The most widely used method for disposal of municipal solid waste is land filling. Landfills or open dumps are tremendously used for disposal of solid waste because they have capacity to accumulate large amounts of wastes offering very low cost as compared to incineration. For a long time, land filling was the most common waste management option for Municipal Solid Wastes (MSW). Not only is it a waste of resources but landfills as such constitute a health hazard and an environmental burden<sup>2</sup>. Unconditional dumping of municipal solid wastes results in generation of toxic leachate, which percolates through the soil and finally reaches the water table

monsoon and 19-1580mg/l during post-monsoon. Most of the water samples exceeded the WHO (2006) limits. Alarming, highest value was observed in GW8 (1580mg/l) collected in poultry farm present within the study area during post-monsoon which is a point source of pollution. About 50-80% of nitrogen is excreted<sup>18</sup> by the livestock which can be easily leached to the ground water table posing threat to the groundwater resources. In general, other major sources for nitrate in ground-water

include domestic sewage, runoff from agricultural fields, and leachate from landfill sites. Higher concentration of  $\text{NO}_3^-$  in water causes a disease called "Methaemoglobinaemia" also known as "Blue-baby Syndrome". This disease particularly affects infants that are up to 6 months old<sup>19</sup>. Fluoride values of waters ranged from 1.2-1.7mg/l during pre-monsoon and 1.1-1.9mg/l during post-monsoon season. Most of the samples are slightly higher than the permissible (WHO:2006).

**Table 3: Computed Average WQI Values Of Pre-Monsoon Ground Waters Around Jawaharnagar Dumpsite**

Parameter	WHO: 2006 (Sn)	Weight (Wi)	Relative Weight (Wn)	Observed Value	Standard Value (Sn)	Unit Weight (Wn)	Quality Rating (qn)	Wn*qn
pH	7-8.5	4	0.125	7.3	8.5	0.125	20	2.5
TDS	500	5	0.156	765	500	0.156	153	23.8
TH	200	3	0.093	405	200	0.093	203	18.8
CH	100	2	0.062	161	100	0.062	161	9.9
Cl <sup>-</sup>	250	4	0.125	345	250	0.125	138	17.2
SO <sub>4</sub> <sup>2-</sup>	250	4	0.125	152	250	0.125	61	7.6
NO <sub>3</sub> <sup>-</sup>	50	5	0.156	95	50	0.156	190	29.6
F <sup>-</sup>	1	1	0.156	1.2	1	0.156	120	18.7
Total		32	0.998					
							$\Sigma Wn=0.998$	$\Sigma Wn^*$ qn = 136.5

All parameters are in mg/L, except for pH & TDS.

**Table 4. Computed Average WQI Values of Post-Monsoon Ground Waters Around Jawaharnagar Dumpsite**

Parameter	WHO: 2006 (Sn)	Weight (Wi)	Relative Weight (Wn)	Observed Value	Standard Value (Sn)	Unit Weight (Wn)	Quality Rating (qn)	Wn*qn
pH	7-8.5	4	0.125	7.3	8.5	0.125	20	2.5
TDS	500	5	0.156	748	500	0.156	150	23.4
TH	200	3	0.093	348	200	0.093	174	16.1
CH	100	2	0.062	233	100	0.062	233	14.4
Cl <sup>-</sup>	250	4	0.125	361	250	0.125	144	18
SO <sub>4</sub> <sup>2-</sup>	250	4	0.125	95	250	0.125	38	4.75
NO <sub>3</sub> <sup>-</sup>	50	5	0.156	218	50	0.156	436	68
F <sup>-</sup>	1	1	0.156	1.1	1	0.156	110	17.1
Total		32	0.998					
							$\Sigma Wn=0.998$	$\Sigma Wn^*$ qn = 164.4

Annexure H

RA bills certified by the Independent Engineer with respect to Waste Shifting & Capping works

Bill No	Date of submission of invoice	Date of Certification	Component	Page No's
RA Bill 1 to 3	27.02.2012	19.05.2012	<input checked="" type="checkbox"/> Dump shifting	2 to 6
RA Bill 11	08.06.2012	28.06.2012	<input checked="" type="checkbox"/> Dump shifting	7 to 9
RA Bill 15	18.08.2012	15.11.2012	<input checked="" type="checkbox"/> Dump shifting	10 to 12
RA Bill 22	22.05.2014	10.07.2014	<input checked="" type="checkbox"/> Waste shifting & spreading <input checked="" type="checkbox"/> Profiling <input checked="" type="checkbox"/> Soil cover	13 to 14
RA Bill 37	02.06.2014	07.05.2016	<input checked="" type="checkbox"/> Waste shifting & spreading <input checked="" type="checkbox"/> Profiling	15 to 20

P. PRASADA RAO  
Head – ESD Division

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**EPTRI**  
ENVIRONMENT  
PROTECTION  
TRAINING & RESEARCH  
INSTITUTE

To  
The Additional Commissioner (H&S)  
Greater Hyderabad Municipal Corporation  
Hyderabad

Lr.No. EPTRI/78/GHMC/T&D

Dated 19-05-2012

Sub: EPTRI - Processing of RA Bills of the processing facilities established by the  
Concessionaire at Jawaharnagar site – Reg.

- Ref:
1. RA Bill-1- Submitted vide letter no.HiMSW/11-12/275 dated 27.02.2012
  2. RA Bill 2: Submitted vide letter no. HiMSW/11-12/277 dated 27.02.2012
  3. RA Bill 3: Submitted vide letter no. HiMSW/11-12/278 dated 27.02.2012
  4. RA Bill 4: Submitted vide letter no. HiMSW/11-12/279 dated 27.02.2012
  5. RA Bill 5: Submitted vide letter no. HiMSW/11-12/280 dated 27.02.2012
  6. RA Bill 6: Submitted vide letter no. HiMSW/11-12/281 dated 27.02.2012
  7. RA Bill 7: Submitted vide letter no. HiMSW/11-12/282 dated 27.02.2012
  8. RA Bill 8: Submitted vide letter no. HiMSW/11-12/283 dated 27.02.2012
  9. Lr.No.1458/AC (H&S)/SWM/GHMC/2010-11 dated 11.05.2012 enclosing the DPR signed by Concessionaire and the Additional Commissioner (H&S), GHMC

...

The Concessionaire submitted eight RA bills vide reference 1<sup>st</sup> to 8<sup>th</sup> cited. RA bill No. 8 could not be processed due to lack of detailed information and the same is awaited from the Concessionaire. The remaining bills from 1 to 7 have been processed in accordance with the DPR and clause - d of article 5 of C.A.

As per clause - d of article 5 of C.A, GHMC would be responsible for providing equivalent grants contributing to 50% (35% of JnNURM + 15% of GoAP) of the eligible project cost. The eligible project cost as per DPR is Rs. 50,000 lakh (page 117 of DPR). The total project cost as per DPR is Rs. 72,720 lakh (table 7.4 of page 117 of DPR).

As per clause – d of article 5 of C.A, the grants shall be disbursed to the Concessionaire on a pro-rata basis in relation to the total cost incurred by the Concessionaire till such time for development of project facilities and shall be duly certified by the I.E.

Contd...2

R.A. bills from 1 to 7 have been processed with reference to the detailed measurements taken by the technical team of I.E at the site and the amount has been processed on a pro-rata basis. Pro-rata means - R.A. bill amount ÷ total project cost as per DPR x GHMC share (Rs. 250 crore). The amounts certified by the I.E for R.A. bills 1 to 7 are as under:

(in Rs.)

R.A. Bill No.	Amount claimed by Concessionaire	Amount certified by I.E.
1	7,04,52,354	2,35,48,724
2	2,34,63,259	78,42,602
3	10,52,54,420	3,10,92,261
4	7,55,31,925	2,17,33,840
5	34,60,78,683	6,61,06,988
6	15,20,56,375	2,83,34,544
7	1,82,32,206	50,29,307
Total	79,10,69,222	18,36,88,266

The amount claimed by the Concessionaire is inclusive of seigniorage charges, VAT, overheads, contractors' profit, survey and geo-investigation, design and detailed engineering. In all the R.A. bills, I.E. has deducted the amounts pertaining to seigniorage charges, VAT, ineligible overheads and contractors' profit. The amount considered is the amount calculated by the I.E based on the BOQ or Concessionaire's claim whichever is lower. The amount pertaining to survey and geo-investigation, design and detailed engineering has not been considered in all the bills, as the Concessionaire has not provided the details for the same.

After deducting the above said items, in the bill amounts claimed by the Concessionaire, the I.E. has certified the amount of Rs.18,36,88,266/- for payment to the Concessionaire. We RA bill 1 to 7 with detailed measurements for supporting the above said certified amount.

Yours faithfully,

HEAD - IESD

Encls : as above

✓ Copy to Project Director, HiMSW, Rajabhavan Road, Hyderabad along with the summary claim sheets pertaining to RA bills 1 to 7 for information.

**ENVIRONMENT PROTECTION TRAINING & RESEARCH INSTITUTE, HYDERABAD**  
**RA Bill No.1 towards dump shifting work done at Compostpad area & Weighbridge to Compost plant at Jawaharnagar site**

SI. No	Item	As per Concessionaire				As per I.E				Seigniorage charges (Rs)	Amount certified for payment (Rs)	Remarks
		Units LS/No.	Qty (cum)	Rate (Rs)	Amount (Rs)	Qty (cum)	Rate as per DPR (Rs)	Amount (Rs)	Amount considered (Rs)			
1	Removal of municipal solid waste including excavation, loading, unloading of garbage up to 500 - 1000 m lead but excluding compaction which shall be paid separately	cum	325415.03	216.5	70452354	420708	216.50	91083282	70452354		70452354	Excess amount is due to variation in quantities executed. All the measurements, levels connected to the claim are verified in presence of the Concessionaire's representative. Concessionaire started the work without informing to the I.E and approval of master plan for Jawaharnagar site, as such, there are no pre-levels of I.E. The quantities are assessed based on the pre-levels of the Concessionaire and post levels of the I.E, as I.E has taken the post levels. The quantities thus worked out by the I.E is more when compared to the quantity furnished by the Concessionaire. However, the quantity considered is the quantity calculated by the Concessionaire.
<b>Total Amount in Rs.</b>					<b>70452354</b>			<b>91083282</b>	<b>70452354</b>		<b>70452354</b>	

Vat @ 2.8%

Net Amount

Amount certified for payment on prorata basis (68479688/727\*250)

-1972666

68479688

23548724

The amount of Rs.2,35,48,724 may be paid to the concessionaire after deducting the applicable taxes, if any

Note: IE - Independent Engineer  
 LS - Lumpsum  
 No - Number  
 Qty - Quantity

.. Amount considered' is the amount calculated by the I.E based on BoQ's or Concessionaire's claim, whichever is lower.

*[Signature]*  
 Quantity Surveyor, I.E

*[Signature]*  
 B. Koteswara Rao  
 Site Incharge, I.E

*[Signature]*  
 Team Leader, I.E

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ENVIRONMENT PROTECTION TRAINING & RESEARCH INSTITUTE, HYDERABAD

RA Bill No.2 towards dump shifting work done at Roads around Compostpad, Admin block & Entrance to Weighbridge at Jawaharnagar site

Sl. No	Item	As per Concessionaire		As per IE			Amount certified for payment	Remarks
		Units LS/No.	Qty	Rate	Rate per DPR	Amount (Rs)		
1	Removal of municipal solid waste including excavation, loading, unloading of garbage up to 500 - 1000 m lead but excluding compaction which shall be paid seperately	cum	1,08,375	216.5	216.5	2,34,63,259	2,34,63,259	Excess amount is due to variation in quantities executed. All the measurements, levels connected to the claim are verified in presence of the Concessionaire's representative.  Concessionaire started the work without informing to the I.E. and approval of master plan for Jawaharnagar site, as such, there are no pre-levels of I.E. The quantities are assessed based on the pre-levels of the Concessionaire and post-levels of the I.E. I.E. has taken the post levels. The quantities thus worked out by the I.E. is more when compared to the quantity furnished by the Concessionaire. The quantity considered is the BOQ calculated by the Concessionaire.
<b>Total Amount in Rs.</b>						<b>2,34,63,259</b>	<b>2,34,63,259</b>	

Vat @ 2.8%  
-6,56,971  
Net Amount  
2,28,06,288  
78,42,602

Amount certified for payment on prorata basis (22806288/727\*250)

The amount of Rs.78,42,602 may be paid to the concessionaire after deducting the applicable taxes, if any

Note: IE - Independent Engineer  
LS - Lumpsum  
No - Number

\* 'Amount considered' is the amount calculated by the IE based on BoQ's or Concessionaire's claim, whichever is lower.

*[Signature]*  
Team Leader, I.E

*[Signature]*  
Site Incharge, I.E

*[Signature]*  
Quantity Surveyor, I.E

**ENVIRONMENT PROTECTION TRAINING & RESEARCH INSTITUTE, HYDERABAD**

**RA Bill No.3 towards dump shifting work done and procurement of operational vehicles for processing and disposal operations at Jawaharnagar site**

Sl. No	Item	Units LS/No.	As per Concessionaire			As per IE				Seigniorage charges (Rs)	Amount certified for payment (Rs)	Remarks
			Qty	Rate	Amount (Rs) (LS)	Qty	Rate as per DPR	Amount (Rs) (LS)	Amount considered * (Rs) (LS)			
1	Removal of municipal solid waste including excavation, loading, unloading of garbage up to 500 - 1000 m lead but excluding compaction which shall be paid separately	cum	1,09,204	216.5	2,36,42,721	98,792	216.5	2,13,75,501	2,13,75,501		2,13,75,501	Difference of amount (less) is due to variation in quantities executed. All the measurements, levels connected to the claim are verified in presence of the Concessionaire's representative
2	Purchase of operation vehicles for the compost plant and landfill (as per the attached sheet) - 18 nos	Nos	18	8,16,11,699	8,16,11,699	18	6,96,39,309	6,96,39,309	6,96,39,309		6,96,39,309	Difference of amount (less) is due to discounting the Overheads & Contractors profit. Also, Vat not admitted for want of payment vouchers
<b>Total Amount in Rs.</b>					<b>10,52,54,420</b>			<b>9,10,14,810</b>	<b>9,10,14,810</b>		<b>9,10,14,810</b>	

Vat @ 2.8% on 2,13,75,501

-5,98,514

Net Amount

9,04,16,296

Amount certified for payment on prorata basis (90416296/727\*250)

3,10,92,261

The amount of Rs.3,10,92,261 may be paid to the concessionaire after deducting the applicable taxes, if any

Note: IE - Independent Engineer

LS - Lumpsum

No - Number

Qty - Quantity

\* Amount considered is the amount calculated by the IE based on BoQ's or Concessionaire's claim, whichever is lower.

*[Signature]*

Quantity Surveyor, I.E

*[Signature]*

Site Incharge, I.E

Team Leader, I.E

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P. Prasada Rao  
Head – Environment & Sustainable  
Development Division

To

The Additional Commissioner (H&S)  
Greater Hyderabad Municipal Corporation  
4<sup>th</sup> Floor, Head Office, Tank Bund Road  
Hyderabad – 500 063.



Lr. No. EPTRI/(P&P)/78/2010/ 563

June 28, 2012

Sir,

Sub: EPTRI – Processing of RA bills of the processing facilities established by the  
Concessionaire at Jawaharnagar site – Reg.

- Ref:
- |   |                 |                                  |
|---|-----------------|----------------------------------|
| 1. RA Bill 5A Concessionaire letter no. | HiMSW/12-13/357 | dated 21.05.2012                 |
| 2. RA Bill 8                            | - do -          | HiMSW/11-12/283 dated 27.02.2012 |
| 3. RA Bill 9                            | - do -          | HiMSW/12-13/372 dated 08.06.2012 |
| 4. RA Bill 10                           | - do -          | HiMSW/12-13/373 dated 08.06.2012 |
| 5. RA Bill 11                           | - do -          | HiMSW/12-13/374 dated 08.06.2012 |
| 6. RA Bill 12                           | - do -          | HiMSW/12-13/375 dated 08.06.2012 |

The Concessionaire has submitted six RA bills vide references 1<sup>st</sup> to 6<sup>th</sup> cited and they have been processed in accordance with the DPR and clause - d of article 5 of Concession Agreement (C.A).

As per clause - d of article 5 of C.A, GHMC would be responsible for providing equivalent grants contributing to 50% (35% of JNNURM + 15% of GoAP) of the eligible project cost. The JNNURM eligible project cost as per DPR is Rs. 500,00 lakh (Table 7.5 at page 117 of DPR). The total project cost as per DPR is Rs. 727,20 lakh (Table 7.4 at page 117 of DPR).

As per clause – d of article 5 of C.A, the grants shall be disbursed to the Concessionaire on a pro-rata basis in relation to the total cost incurred by the Concessionaire till such time for development of project facilities and shall be duly certified by the I.E.

The R.A. bills at sl. no. 1 to 6 have been processed with reference to the detailed measurements taken by the technical team of I.E at the site and the amount has been processed on a pro-rata basis. Pro-rata means – R.A. bill amount ÷ total project cost as per DPR x GHMC share (Rs. 250 crore). The amounts certified by the I.E for R.A. bills at sl. no. 1 to 6 for payment on pro-rata basis are as under:

P.T.O

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(in Rs.)

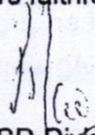
R.A. Bill No.	Amount claimed by Concessionaire	Amount certified by I.E. for payment (on pro-rata basis)
5A	6,69,79,955	2,19,69,926
8	7,25,83,221	2,42,46,839
9	6,60,53,096	1,79,48,860
10	1,12,49,729	34,82,708
11	6,67,04,499	1,88,68,102
12	1,75,06,443	54,37,482
Total	30,10,76,943	9,19,53,917

The amount claimed by the Concessionaire is inclusive of seigniorage charges, VAT, overheads, contractors' profit. In all the R.A. bills (wherever applicable), the I.E. has deducted the amounts pertaining to seigniorage charges, VAT, ineligible overheads and contractors' profit. The amount considered is the amount calculated by the I.E based on the BOQ or Concessionaire's claim, whichever is lower.

After deducting the above said items, in the bill amounts claimed by the Concessionaire, the I.E. has certified the amount of Rs. 9,19,53,917/- for payment to the Concessionaire on pro-rata basis.

Encl: as above

Yours faithfully,

  
Head - ESD Division

Copy to the Project Director, Hyderabad Integrated MSW Limited, 4<sup>th</sup> Floor, TSR Towers, 6-3-1090, Somajiguda, Raj Bhavan Road, Hyderabad - 500 082 along with the summary claim sheets pertaining to RA bills 5A, 8 to 12 for information.

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ENVIRONMENT PROTECTION TRAINING & RESEARCH INSTITUTE, HYDERABAD								
RA Bill No. 11 towards Removal of MSW, Morum filling & Rock cutting at Jawaharnagar								
Sl. No	Item	As per Concessionaire		As per IE		Seigniorage charges (Rs)	Amount certified for payment (Rs)	Remarks
		Units LS/No.	Amount (Rs)	Amount (Rs)	Amount considered * (Rs)			
1	Entrance and office area garbage removal and morum filling	One	15137549	14550891	14550891	523842	14027049	Difference of amount (less) is due to variation in quantities executed. All the measurements, levels connected to the claim are verified in presence of the Concessionaire's representative.
2	Garbage removal at landfill road	One	24111804	15847714	15847714	0	15847714	
3	Garbage removal at Power Plant road	One	1102978	1064052	1064052	0	1064052	
4	Rock cutting in Power Plant road	One	2441163	1775315	1775315	176123	1599192	
5	Service area garbage removal	One	23911005	23911005	23911005	0	23911005	
<b>Total Amount in Rs.</b>			<b>66704499</b>	<b>57148977</b>	<b>57148977</b>	<b>699965</b>	<b>56449012</b>	

Vat @ 2.8% -1580572

Net Amount 54868440

Amount certified for payment on prorata basis (54868440/727\*250) 18868102

The amount of Rs. 1,88,68,102 may be paid to the concessionaire after deducting the applicable taxes, if any

Note: IE - Independent Engineer  
No - Number

\* 'Amount considered' is the amount calculated by the I.E based on BoQ's or Concessionaire's claim, whichever is lower.

*Prasad*

Quantity Surveyor

*U.N.S*

Site Incharge

*J.R.*

Team Leader

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Lr. No. EPTRI/ESD/78/2010/1250  
November 15, 2012



**EPTRI**  
ENVIRONMENT  
PROTECTION  
TRAINING & RESEARCH  
INSTITUTE

The Additional Commissioner (H&S)  
Greater Hyderabad Municipal Corporation  
4<sup>th</sup> Floor, Head Office, Tank Bund Road  
Hyderabad - 500 063.

Sir,

**Sub: EPTRI – Processing of RA bills of the processing facilities established by the Concessionaire at Jawaharnagar and Imlibun – Reg.**

- Ref:
1. RA Bill 2 of Imlibun vide letter no. HiMSW/12-13/436 dated 17.09.2012
  2. RA Bill 16 vide letter no. HiMSW/12-13/435 dated 17.09.2012
  3. RA Bill 15 vide letter no. HiMSW/12-13/438 dated 18.08.2012 received in EPTRI on 18.09.2012

The Concessionaire has submitted three RA bills vide references 1<sup>st</sup> to 3<sup>rd</sup> cited and they have been processed in accordance with clause - d of article 5 of Concession Agreement (C.A) and DPR.

As per clause - d of article 5 of C.A, GHMC would be responsible for providing equivalent grants contributing to 50% (35% of JNNURM + 15% of GoAP) of the eligible project cost. The JNNURM eligible project cost as per DPR is Rs. 500,00 lakh (Table 7.5 at page 117 of DPR). The total project cost as per DPR is Rs. 727,20 lakh (Table 7.4 at page 117 of DPR).

As per clause – d of article 5 of C.A, the grants shall be disbursed to the Concessionaire on a pro-rata basis in relation to the total cost incurred by the Concessionaire till such time for development of project facilities and shall be duly certified by the I.E. Pro-rata means – R.A. bill amount ÷ total project cost as per DPR x GHMC share (Rs. 250 crore).

RA bill No. 2 and 16 pertains to infrastructure development: Site in-charge and the Quantity Surveyor independently assessed the work done by the Concessionaire under the supervision of Team Leader by taking the physical measurements. The unit cost for different infrastructural items is provided in their respective Bill of Quantities (BoQs). Based on the units, the bill amounts were certified after deducting the amount pertaining to VAT.

P.T.O

Page 1 of 2

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RA bill No. 15 in respect of machinery, implements etc were processed as per item 7.6 of the DPR. Volume of waste shifted was calculated using the pre and post levels. The unit cost (cum) for this item is given in the DPR. It is further requested that GHMC shall also verify the claims received and more the eligible payments after thorough scrutiny.

The amounts certified by the I.E for R.A. bills vide references 1 to 3 for payment on pro-rata basis are as under:

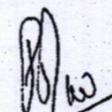
(in Rs.)

R.A. Bill No.	Amount claimed by Concessionaire	Amount certified by I.E. for payment (on pro-rata basis)
15 of Jawaharnagar	2,66,30,579	89,35,768
16 of Jawaharnagar	2,07,07,652	50,15,240
2 of Imlibun	1,14,30,956	32,64,166
Total	5,87,69,187	1,72,15,174

Finally, I.E. has certified an amount of Rs. 1,72,15,174/- for payment to the Concessionaire as against the claim amount of Rs. 5,87,69,187/-.

Encl: as above

Yours faithfully,

  
Director General 15/11/12

✓ Copy to the Project Director, Hyderabad Integrated MSW Limited, 4<sup>th</sup> Floor, TSR Towers, 6-3-1090, Somājiguda, Raj Bhavan Road, Hyderabad - 500 082 along with the summary claim sheets pertaining to RA bill 14 of Jawaharnagar and RA bill 1 of Imlibun for information.

**ENVIRONMENT PROTECTION TRAINING & RESEARCH INSTITUTE, HYDERABAD**  
**RA Bill No.15 towards Dump Shifting and Operation Vehicles in Jawaharnagar site**

Sl. No	Item	As per Concessionaire		As per IE		Seigniorage charges (Rs)	Amount certified for payment (Rs)	Remarks
		Units LS/No.	Amount (Rs)	Amount (Rs)	Amount considered* (Rs)			
1	Dump Shifting	LS	23048801	23048801	23048801	-	23048801	
2	Operation Vehicles	LS	3581778	3581778	3581778	-	3581778	
<b>Total Amount in Rs.</b>				<b>26630579</b>	<b>26630579</b>		<b>26630579</b>	

Vat @ 2.8% on SI.No 1

-645366

Net Amount

25985213

Amount certified for payment on prorata basis (25985213/727\*250)

8935768

The amount of Rs.89,35,768 may be paid to the concessionaire after deducting the applicable taxes, if any

Note: IE - Independent Engineer  
 LS - Lumpsum  
 No - Number

\* 'Amount considered' is the amount calculated by the IE based on BoQ's or Concessionaire's claim, whichever is lower.

*[Signature]*

Quantity Surveyor, I.E

*R. Kotamra Rao*

Site Incharge, I.E

*[Signature]*  
 Team Leader, I.E

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**ASHWINI KUMAR PARIDA, IAS**  
Director General &  
Special Chief Secretary to Government

Lr. No. EPTRI/ESD/78/CG/2014/330  
July 10, 2014

The Additional Commissioner (H&S)  
Greater Hyderabad Municipal Corporation  
4<sup>th</sup> Floor, Head Office, Tank Bund Road  
Hyderabad - 500 063.

**EPTRI**  
ENVIRONMENT  
PROTECTION  
TRAINING & RESEARCH  
INSTITUTE

Sir,

**Sub: Processing of Expenditure Statements pertaining to processing facilities at Jawaharnagar - Reg.**

- Ref
1. Expenditure Statement No. 22 of processing and disposal facility at Jawaharnagar submitted vide letter no. HiMSW/13-14/748, Dated: 22.05.2014
  2. Expenditure Statement No. 29 of processing and disposal facility at Jawaharnagar submitted vide letter no. HiMSW/13-14/618, Dated 26.08.2013
  3. Expenditure Statement No. 35 of processing and disposal facility at Jawaharnagar submitted vide letter no. HiMSW/13-14/704, Dated 20.02.2014
  4. Expenditure Statement No. 36 of processing and disposal facility at Jawaharnagar submitted vide letter no. HiMSW/14-15/741, Dated 02.05.2014

The Concessionaire has submitted four Expenditure Statements vide references 1<sup>st</sup> to 4<sup>th</sup> cited and they have been processed in accordance with clause - d of article 5 of Concession Agreement (C.A) and DPR.

As per clause - d of article 5 of C.A, GHMC would be responsible for providing equivalent grants contributing to 50% (35% of JNNURM + 15% of GoAP) of the eligible project cost. The JNNURM eligible project cost as per DPR is Rs. 500,00 lakh (Table 7.5 at page 117 of DPR). The total project cost as per DPR is Rs. 727,20 lakh (Table 7.4 at page 117 of DPR).

As per clause - d of article 5 of C.A, the grants shall be disbursed to the Concessionaire on a pro-rata basis in relation to the total cost incurred by the Concessionaire till such time for development of project facilities and shall be duly certified by the I.E. Pro-rata means - R.A. bill amount + total project cost as per DPR x GHMC share (Rs. 250 crore). Expenditure Statement Nos. 22, 29, 35 and 36 in respect P&D facilities at Jawaharnagar. The amount considered is the amount calculated by the I.E based on the invoices and the bank statement provided by the Concessionaire in arriving the total value of the bills or Concessionaire's claim whichever is lower.

P.T.O

Page 1 of 2

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ENVIRONMENT PROTECTION TRAINING & RESEARCH INSTITUTE, HYDERABAD  
 Expenditure statement No.22 towards Jawahar nagar Dump Capping work

Sl. No	Description of Item	Units	Qty	As per Concessionaire		As Per I.E.		Amount certified for payment	Remarks
				Amount	In INR	Amount	In INR		
1	Waste Shifting and Spreading	LS	1.0	2,96,81,606.59	In INR	2,96,81,606.59	In INR	-	Difference of amount (less) is due to variation in quantities executed. All the measurements, levels connected to the claim are verified in presence of the Concessionaire's
2	Waste Prolifing	LS	1.0	9,02,622.52	In INR	9,02,622.52	In INR	-	
3	Soil Cover	LS	1.0	17,97,945.24	In INR	11,98,629.61	In INR	58,404.99	
Total Amount in INR :				3,23,82,174		3,17,82,858.71		58,404.99	3,17,24,454
Amount certified for payment on pro rata basis						3,08,36,169 / 727*250 :		3,08,36,169	
						Net Amount in INR :		3,08,36,169	
						Vat @ 2.80% :		8,88,285	
								1,06,03,910	

The amount of Rs. 1,06,03,910

Note: IE - Independent Engineer  
 LS - Lumpsum  
 No. Number

\*\* Amount considered is the amount calculated by the IE based on Bc's or Concessionaire's claim, whichever is lower.

*[Signature]*  
 Quantity Surveyor (I.E)

*[Signature]*  
 Site-In-charge (I.E)

*[Signature]*  
 Site-In-charge (I.E)

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S. D. Mukherjee, IFS (Retd.)  
Advisor & Head ESD- Division.



To,  
The Additional Commissioner (H&S)  
Greater Hyderabad Municipal Corporation  
4<sup>th</sup> Floor, Head Office, Tank Bund Road  
Hyderabad - 500 063.

Lr. No. EPTRI/ESD/78/CG/2016/ 127 / Dt: 07/05/2016.

Sir,

Sub: Processing of Expenditure Statement Bills pertaining to processing facilities at Jawaharnagar- Reg.

- Ref
1. Expenditure Statement No. 37 of processing and disposal facility at Jawaharnagar submitted vide letter no. HiMSW/14-15/753, Dated 02.06.2014.
  2. Expenditure Statement No. 22 of processing and disposal facility at Jawaharnagar submitted vide letter no. HiMSW/13-14/748, Dated 22.05.2014.

\*\*\*\*\*

M/s HiMSW, has submitted Expenditure Statement No. 37 towards grant vide ref 1<sup>st</sup> cited. The bill is for payment of grant amount.

SL. NO:	Description of Item.	Units	Qty	Rate	Amount
1	Waste shifting and spreading	Cum	1,16,493.47	216.50	2,52,20,825.98
2	Waste profiling	Sqm	13,987.20	34.00	4,75,564.80
	<b>Total=</b>				<b>2,56,96,400.78</b>

In this regard it is to state that vide ref 2<sup>nd</sup> cited. Part grant amount on Pro-rata basis payment was recommend for Rs. 85, 89,031.00

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Annexure – F ( BOQ for Items – Dump Waste Reclamation at Jawaharnagar)						
1. Waste shifting & Spreading						
DPR SL.NO: 1	Item	Units	QTY	RATE	AMOUNT	Remarks
As Per DPR	Waste shifting & Spreading	Cum	8,65,134.60	216.50	18,73,01,640.90	
Expenditure Statement no:22	Concessionaire's,, Vide letter No:HiMSW/13-14/748 Dt:22.05.2014	Cum	1,37,097.49	216.50	2,96,81,606.58	
	I.E Certified Amount on Date: 07-10-2014.	Cum	1,37,097.49	216.50	2,96,81,606.58	
	Balance Amount to be paid to Concessionaire				15,76,20,034.31	Balance Part Amount Due for Next Bill
	I.E Certified Grant amount on Pro-rata basis on Date: 07-10-2014.				1,02,06,879.84	Pro-rata basis= (2,96,81,606.58/727)*250 = 1,02,06,879.84
						18,73,01,640.90 - 2,96,81,606.58 = 15,76,20,034.3
Expenditure Statement no:37	Concessionaire's Vide letter No:HiMSW/14-15/753 Dt: 02-06-2014	Cum	1,16,493.47	216.50	2,52,20,835.98	
As per CPHEEO Manuel, Landfills, Chapter 17.6.2 Waste Volume Landfill Capacity. Accurate prediction of settlement is difficult because time related settlement data are not readily rarely available. Initial settlement values of between 12% and 17% have been reported for household waste sites in the UK with long term (30 Years) values of approximately 20%.						Total dump Capping QTY = 1, 16, 493.47 Settlement (17%) QTY= - 19,803.81 Net QTY = 96,689.66 Cum
	I.E Certified Amount on Date: May, 2015.	Cum	96,689.66	216.50	2,09,33,311.39	

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	I.E Certified Grant Amount on Pro-rata basis						I.E Certified amount = 2,09,33,311.39 Vat 2.8% = - 5,86,132.71 Net amount = 2,03,47,179 Pro-rata basis = (2,03,47,179/727.2) * 250 = <b>69,95,042</b>
						<b>69,95,042</b>	
							Balance Part Amount Due for Next Bill 15,76,20,034.31 - 2,09,33,311.39 = 13,66,86,722.92
						13,66,86,722.92	

2. Waste profiling Work						
DPR SL.NO:	Item	Units	QTY	RATE	AMOUNT	Remarks
2						
As Per DPR	Waste profiling Work	Sqm	6,63,414.40	34.00	2,25,56,089.60	
Expenditure Statement no:22	Concessionaire's, Vide letter No:HiMSW/13-14/748 Dt:22.05.2014	Sqm	26,547.72	34.00	9,02,622.48	
	I.E Certified Amount on Date: 07-10-2014.	Sqm	26,547.72	34.00	9,02,622.48	
	Balance Amount to be paid to Concessionaire				2,16,53,467.12	Balance Part Amount Due for Next Bill
	I.E Certified Grant amount on Pro-rata basis on Date:07-10-2014.				3,10,392.87	Pro-rata basis = (9,02,622.48 / 727) * 250 = 3,10,393.87
			Balance Part Amount Due for Next Bill		2,16,53,467.12	
Expenditure Statement no:37	Concessionaire's, Vide letter No:HiMSW/14-15/753 Dt: 02-06-2014	Sqm	13,987.20	34.00	4,75,564.80	
	I.E Certified Amount	Sqm	11,167.20	34.00	3,79,684.80	

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	I.E Certified Grant Amount on Pro-rata basis				1,26,875	I.E Certified amount = 3,79,684.80 Vat 2.8%= - 10,631.17 Net amount = 3,69,054. Pro-rata basis= (3,69,054/727.2) * 250 = 1,26,875
					2,12,73,782.32	Balance Part Amount Due for Next Bill 2,16,53,467.12 - 3,79,684.80 = 2,12,73,782.32

**3. Soil Cover**

DPR SL.NO:	Item	Units	QTY	RATE	AMOUNT	Remarks
3						
As Per DPR	Soil Cover	Cum	72,975.10	451.50	3,29,48,251.65	
Expenditure Statement no:22	Concessionaire's, Vide letter No:HiMSW/13-14/748 Dt:22.05.2014	Cum	3,982.16	451.50	17,97,945.24	
	I.E Certified Amount on Date: 07-10-2014.	Cum	2,654.77	34.00	11,98,628.55	
					11,40,225.00	Deduction of Seignior age Charges Amount= 11,98,628.55 - 58,404.99 = 11,40,225.
	Balance Amount to be paid to Concessionaire				3,17,49,622.99	Balance Part Amount Due for Next Bill
	I.E Certified Grant amount on Pro-rata basis on Date: 07-10-2014.				3,92,099.38	Pro-rata basis= (11,40,225 /727)*250 = 3,92,099.38
			Balance Part Amount Due for Next Bill		3,17,49,622.99	
Expenditure Statement no:37					Nil	

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Now Expenditure Statement No. 37 for Jawaharnagar the following grant amount is recommended for payment.

Abstract Statement:

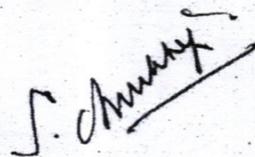
	Items	I.E Certified Amount	Deduct 2.8% Vat	Net Amount Rs.	I.E, to be Release Amount (on pro-rata basis)
1	Waste shifting and spreading	2,09,33,311.39	5,86,132.71	2,03,47,179	69,95,042
2	Waste profiling	3,79,684.80	10,631.17	3,69,054	1,26,875
	Total =	2,13,12,996.19	5,96,763.88	2,07,16,233	71,21,917

The amount considered is the amount calculated by the I.E based on the BOQ in which the approved rates of the DPR are adopted in arriving the total value of the bills or Concessionaire's claim whichever is lower.

In the bill amounts claimed by the Concessionaire, the I.E. has certified the amount of **Rs. 71, 21,917/-** on pro-rata basis for payment to the Concessionaire.

Encl: as above

Yours faithfully



HEAD - ESD



Copy to the Project Head, Hyderabad Integrated MSW Limited (HiMSW), Survey No:173, Jawaharnagar Dump Site, CRPF Road, Near Army Dental College, Shamirpet Mandal, Hyderabad - 500087. Along with the summary claim sheets pertaining to Expenditure Statement bill no: 37 of processing facilities at Jawaharnagar Site.

ENVIRONMENT PROTECTION TRAINING & RESEARCH INSTITUTE, HYDERABAD  
Expenditure statement No.37 towards Jawahar nagar Dump Capping work

Sl. No	Description of item	As per Concessionaire				As per I.E				Remarks	
		Qty	Amount Incurred (Rs)	Grant Claimed Amount (Rs)	Qty	Amount considered	Seignior age charges	Amount certified for payment	Vat 2.8%		Eligible Grant Amount
1	Waste Shifting and Spreading	1.0	2,52,20,836.3	2,52,20,836.26	1.00	2,09,33,311.39	-	2,09,33,311	(5,86,133)	69,95,042	Difference of amount (less) is due to variation in quantities executed. All the measurements, levels connected to the claim are verified in presence of the Concessionaire's
2	Waste Profiling	1.0	4,75,564.8	4,75,564.80	1.00	3,79,684.80	-	3,79,685	(10,631)	1,26,875	
	<b>Total Amount in INR :</b>		<b>2,56,96,401</b>	<b>2,56,96,401</b>		<b>2,13,12,996.19</b>	<b>-</b>	<b>2,13,12,996</b>		<b>71,21,917</b>	

Nte Amount in INR      71,21,917

Note: IE - Independent Engineer  
LS - Lumpsum  
No - Number

\* Amount considered is the amount calculated by the I.E based on BoQ's or Concessionaire's claim, whichever is lower.

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*B. Koteshwara*  
Team Leader.

Item No. 01

Court No. 1

**BEFORE THE NATIONAL GREEN TRIBUNAL  
PRINCIPAL BENCH, NEW DELHI**

Review Application No. 02/2021  
(with I.A. No. 31/2021 & I.A. No. 32/2021)

IN  
Original Application No. 606/2018

**Compliance of Municipal Solid Waste Management Rules, 2016  
(State of Telangana)**

The Greater Hyderabad Municipal  
Corporation, Hyderabad & the State of Telangana: Review Applicants

Date of hearing: 18.02.2021

**CORAM: HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON  
HON'BLE MR. JUSTICE SHEO KUMAR SINGH, JUDICIAL MEMBER  
HON'BLE DR. NAGIN NANDA, EXPERT MEMBER**

**IN CHAMBER BY CIRCULATION****ORDER**

1. This review application has been filed by The Greater Hyderabad Municipal Corporation and State of Telangana for review of order dated 14.02.2020. The said order was passed in the presence of the Chief Secretary, Telangana accompanied by other senior officers and Chairman and Member Secretary of CPCB.
2. The grievance in the review application is primarily against the direction not to cap the legacy waste and instead to undertake biomining for compliance of Solid Waste Management Rules, 2016. According to the review applicants, capping work of Jawahar Nagar dump site had commenced prior to 2016 Rules when technology options of biomining were not in contemplation. Accordingly, at the said site in terms of Integrated Solid Waste Management Project a detailed DPR with Rs. 500

crores as project cost was submitted to the Government of India and after approval and sanction of 50% funds under the JNNURM, global tenders were called and contract was given to M/s. Ramky Enviro Engineers Ltd. (M/s. REEL) which included reclamation of dump sites of Jawaharnagar, Fathullaguda, Gandhamguda and Shamshiguda. Work commenced and part of the land has already been reclaimed. **Scientific capping design was prepared by the international consultants and approved on 22.03.2018.**

3. The issue has been duly considered in the order of this Tribunal dated 14.02.2020 as follows:

*"32. We first consider the stand of the State for capping of the old dump site at Jawahar Nagar in Hyderabad. The stand is not legally and environmentally tenable. Capping will result in leachate remaining untreated affecting the ground water and gases in the dump site will remain unflared having potential for air pollution and hazardous for environment. Moreover, huge area of land which is scarce and valuable will be wasted. The cost involved will be far less than the value of the land and need for protection of environment. It is also wrong to say that bio-mining or bio-remediation can be only of small size dump sites and not big dump sites. The size of the dump site is said to be 339 acres and the garbage is said to be 1.2 crore tonnes. We considered this aspect in the order dated 17.07.2019 in O.A. No. 519/2019. Therein three dump sites of Delhi, including Ghazipur with 1.4 crore tonne of garbage were involved. This Tribunal rejected the plea of the Corporation that bioremediation of bio-mining were not possible and only option was capping. It was observed:*

*"8. In O.A. No. 386/2019, the grievance raised was that unscientific capping process of the Bhalswa legacy waste dumpsites was against the SWM Rules and not conducive to the environment. This Tribunal, vide order dated 04.04.2019, sought opinion from a Committee comprising CPCB and Dr. G.K. Pandey, former Expert Member of this Tribunal, who is known to have expertise in the subject. Report dated 31.05.2019 has been submitted by the said Committee after visit to the Bhalswa site, visit to Bawana Waste Processing Plant and meeting with the North Delhi MC officers. Presentation was made before the said Committee by concerned officers of the North MCD as well as experts hired by the said*

Corporation. Some of the observations of the said Committee are as follows:

“3.5 The Cost indicated in the DPR for bioremediation is Rs.1178 Crores. However, as per CPCB Guidelines for Disposal of Legacy Waste, the cost of bioremediation and bio-mining of dumpsite is in the range of Rs.400- 700/Cum which works out in the range of Rs.440 - 560 Crore. The actual cost shall be further reduced, if cost of land recovered by means of bio-mining/bioremediation is factored in. Hence the cost indicated by NDMC seems to be very much on the higher side.

Similarly, the other issues raised by NDMC need detailed assessment.

3.6 As per CPCB Guidelines, **capping of dumpsites is not advisable as it would lead to generation of more leachates and methane/landfill gas generation which would further contaminate the already heavily contaminated Groundwater** (Ground/surface water reports at Annexure VIII to X). Further as per CPCB Guidelines, gas extraction is very difficult and inefficient when attempts are made to insert suction pipes into dumped waste instead of before dumping begins. Poor success at Gorai capping led to the forced refund by Mumbai city of Rs.15 crore advance carbon credits. Taking into consideration the present height (65 m) of the landfill, extraction of leachate & gas will be even more difficult.

3.7 In addition, in the present tender documents, there is no provision for onsite treatment of leachates and utilization of gas generated as also decontamination of ground water/bioremediation have not been envisaged in spite of the fact that ground and surface water are heavily polluted as reflected by analysis of ground water and surface water reports given in the DPR. The details of analysis reports are given below:

(a) Table-I (Annexure-VIII) pertains to ground water sampling report of hand pumps which has indicated that average levels of BOD (2.4 mg/1), COD (28.0 mg/1), TDS (2783 mg/1) are more than the prescribed acceptable limit of zero for BOD, zero for COD and 500 mg/1 for TDS. Besides, the average high level of Residual Free Chlorine of 208.7 mg/1 (limit 0.2mg/1), Chlorides 769.7 mg/1 (limit 250 mg/1), Sulphate 228.2 mg/1 (limit 200mg/1), Alkalinity 508.7

mg/1 (limit 200 mg/1), Lead 0.2 mg/1 (limit 0.01 mg/1) and Nickel 0.1 mg/1 (limit 0.02mg/1) indicates that drinking water from the hand pumps has been significantly polluted and is not drinkable.

- (b) Table-2 (Annexure-IX) reflects ground water analysis report pertaining to 18 boreholes. The average levels of BOD (93.11 mg/1), COD (783.72 mg/1) and TDS (6841.83 mg/1) were found more as against the acceptable limit of zero for BOD, zero for COD and 500 mg/1 for TDS indicating that ground water has been significantly contaminated due to percolation of leachates from the landfill.
- (c) Table-3 (Annexure-X) pertains to analysis of surface water taken from Bhalsawa drain and Bhalsawa lake. The analysis report indicates that the average levels of BOD (68.40 mg/1), COD (547.51 mg/1) and TDS (4465.23 mg/1) were found higher as against the permissible limit for drinking water for BOD (0), COD (0) and TDS (500 mg/1) respectively indicating that surface water is significantly polluted due to discharge of untreated leachates. Besides, the average levels of residual free chlorine (179.60 mg/1, limit 0.2 mg/1), Iron (0.53 mg/1, limit 0.3), Chlorides (13119.04 mg/1, limit 250), Calcium (188.99 mg/1, limit 75), Alkalinity (1285.96 mg/1, limit 200), phenolic compound (0.07 mg/1, limit 0.001), Lead (0.15 mg/1, limit 0.01), Mercury (3.75 mg/1, limit 0.001) and Nickel (0.15 mg/1, limit 0.02) were found high indicating that surface water is very polluted and Bhalswa lake is not meeting the criteria for drinking water as toxic elements like phenolic compounds including heavy metals are present in the lake water. It is quite possible that the animals (buffalos, cows etc.) may be drinking lake water and as such the possibility of toxic chemicals and heavy metals entering the food chain cannot be over ruled. Therefore, lake water should not be used for drinking purposes by the human beings and the animals.
- (d) Table-4(Annexure-XI) leachate emanating from the BLF indicates that BOD (500 mg/1), COD (2279 mg/1) & TDS (19000 mg/1) levels are higher in comparison to leachate standards of BOD (30 mg/1), COD (250 mg/1) & TDS (2100 mg/1) as prescribed in SWM Rules,2016.

3.8 There are various technologies available for treatment of MSW such as composting, bio-methanation, incineration coupled with power generation, gasification, pyrolysis, plasma arc gasification, molten salt oxidation (non-flame thermal process for destroying organic materials) etc.

**4.0 Recommendations**

- i. NDMC should do a detailed assessment of the alternative technological options including Bio-mining / Bio-remediation for Bhalswa dumpsite.
  - ii. Niti Aayog has constituted a Committee to identify the technologies in Solid Waste Management for Cleaning up of Delhi (Annexure XII). NDMC may consider the outcome of this committee's report in assessing options for Remediation of Bhalswa dumpsite.
  - iii. In case, capping of Bhalswa Dumpsite (which is not advisable as per CPCB Guidelines as mentioned at point 3.6 above) is proposed as the only option due to time and space constraints as also technoeconomic reasons, the DPR should be revisited especially to look into the following conditions:
    - (a) Bio-mining should be undertaken to the maximum extent possible without having significant adverse environmental impacts on the adjoining population.
    - (b) Bio-remediation/decontamination of surface, ground water and soil should also be undertaken in the affected areas.
    - (c) No dumping of MSW/Garbage (about 2000 tons/day) shall be done at Bhalswa dumpsite and alternate arrangements for disposal of this waste to be made by NDMC on priority in accordance with S WM Rules, 2016."
9. We may note that as per information furnished during the hearing, the extent of legacy waste and the land covered by the three dump sites are as follow:
- i. East Delhi Ghazipur dumpsite- 1.4 crore metric tonne approx. on 70 acres of land
  - ii. North Delhi Bhalswa dumpsite - 80 lakh metric tonne approx. on 36 acres of land
  - iii. South Delhi Okhla dumpsite - 55-60 lakh metric tonne approx. on 46 acres of land
10. Information made available from Indore Municipal Corporation is as follows:

"For screening purposes, trommels of 30 MT per hour capacities, are available in the market on rental basis. Necessary vehicles and equipments (like excavators, back-hoe loaders, dumpers, vibratory screens for dust removals and bundling machines for Refused Derived Fuel) are required for bio-mining and bio-remediation purposes. Normally, 20 trommels along with necessary machines and tools can process 5000 MT of legacy waste on daily basis in two shifts operation. Recently, Indore has successfully completed bio-mining/bio-remediation of 15 lakh MT legacy waste in 1 year. Rent for trommels paid by Indore to various machine manufacturers were in tune of Rs. 7.25 Lakh per trommel per month and bio-mining/bio-remediation process was followed as mentioned in the latest guidelines issued by the CPCB. Normally, the per metric ton cost of bio-remediation process of legacy waste will range between Rs. 300- 450 depending upon area to area.

In legacy waste sites where local bodies have space constraints can initially start the bio-mining/ bio-remediation options through mobile trommels.

Similarly, Ahmedabad Municipal Corporation has started the bio-mining/bio-remediation at Pirana dumping site and they are paying Rs. 6.40 Lakh per trommel per month.

The trommel machines are very simple in fabrication and can be fabricated as per the design mentioned in CPCB guidelines by local fabricators.

Instead of having multiple machines, it is advisable to have a single trommel of 16-20 MM bore size screen and reject conveyer should have blower. This will reduce the cost due to multiple trommeling. Also, to utilise the Refused Derived Fuel ('RDF') recovered from this process should be made free from dust. Thereafter RDF can be bundled and sent to waste-to-energy plant and cement industries for further utilisation.

The recovered soil from the bio-mining/bio-remediation process can be used in filling the dead mines so as afforestation in the area can take place. Secondly, it can be used by National Highway Authorities/ State Road construction agencies and local bodies in sub-base filling.

Local bodies can install number of trommels at bio-remediation site based on availability of land

and with time they can increase the number so as to complete the process as soon as possible.

Once the bio-mining and bio-remediation process starts, dumping of fresh garbage should be stopped at the legacy waste dumpsites, local bodies may identify a separate piece of land to process the fresh garbage through various processes mentioned in Municipal Solid Waste Management Rules, 2016 and guidelines issued by the CPCB.”

11. *In-Charge, Member Secretary, CPCB has similar view. Chief Secretary, Delhi suggests that a functional model may be preferred to any other option which has not been experienced on the ground.*
12. *We find merit in the model followed by Indore Municipal Corporation, the views of Member Secretary, CPCB and the Chief Secretary, Delhi. **This opinion is also in consonance with the SWM Rules as well as the CPCB Guideline on Legacy Waste<sup>1</sup> and recent orders of this Tribunal. A conjoint reading of Rule 15 (zj), Rule 15(zk) and Clause J of Schedule I of the SWM Rules leaves room for capping of old dump sites, only in cases where there is “absolute absence of potential of bio-mining and bio-remediation” and not in cases of present nature where bio-mining and bio-remediation is possible. In cases of present nature, both ex-situ and in-situ bio-mining options can be exercised according to Indore Municipal Corporation, which is not only environmentally safe but cost effective. Though plea for capping legacy waste dumpsites is being raised frequently as a convenient mode, there may be hardly any situation when bio-remediation is not possible. The option of capping of legacy wastes, which has huge environmental and health consequences, in practical terms is no option at all, except for inert waste, which again is to be disposed in a scientific secured landfill. According to Indore Municipal Corporation, bio-mining as a treatment option is environmentally safe and does not require recurrent costs on account of leachate treatment in Effluent Treatment Plant (ETP). Furthermore, only peripheral leachate can be taken to the ETP and leachate percolating underneath the dumpsite contaminates ground water and water in subterranean space. Bio-mining as a treatment option in comparison to engineering capping of legacy wastes, is not only environmentally safe and holistic but also meets the yardstick of fiscal prudence and propriety.”***

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<sup>1</sup> Guidelines for Disposal of Legacy Waste (Old Municipal Solid Waste), Central Pollution Control Board, February 2019

33. **Applying the above principle to the present case, we reject the plea of the State and direct that instead of capping of the dump site, it is imperative to do bio-mining and bioremediation in the interest of environment and to save valuable scarce public resource in the form of land. The land can be used for setting up integrated waste processing facilities and developing green belt or bio-diversity park. If the State/Corporation does not have funds, the State may consider monetizing a part of the land to raise revenue for the purpose, after following due process of law. In any case, capping cannot be permitted.**

34. **We find that steps taken for legacy waste remediation are not adequate. The work has not even commenced at 138 out of 140 sites which is a matter of serious concern. The timeline needs to be consistent with the statutory rules as well as the orders of this Tribunal. The timeline 2025 proposed by the State of Telangana needs to be preponed accordingly.**

35. **There remains gap of 4506 TPD for Telangana in terms of current generation and treatment of solid waste which is endangering environment, adversely affecting public health and posing serious threat to life. No firm commitment to remedy the gap consistent with the statutory Rules specially the timelines has been put forth, as expected in terms of directions of the Hon'ble Supreme Court and this Tribunal. Thus, suitable remedial measures need to be adopted in the matter."**

4. As mentioned in the order sought to be reviewed, the proceedings were transferred to this Tribunal by the Hon'ble Supreme Court vide order dated 02.09.2014 in Writ Petition No. 888/1996, *Almitra H. Patel v. Union of India & Ors.*, The said order also refers to earlier judgments in (2000) 2 SCC 679 and (2004) 13 SCC 538 containing observation that absence of waste disposal is resulting in slum creation and that the States, PCBs and local bodies have ignored the issue. The Rules are not being complied with inspite of mandate of law to secure clean environment as observed in *Municipal Council, Ratlam vs. Vardhichand*<sup>2</sup> and *B.L. Wadhera v. Union of India and Ors.*<sup>3</sup>.

<sup>2</sup> (1980) 4 SCC 162

<sup>3</sup> (1996) 2 SCC 594

5. The Tribunal, vide order dated 22.12.2016<sup>4</sup>, directed all the States/UTs to follow SWM Rules, 2016 in terms of the timelines laid down therein. In this background, **the scope of proceedings before the Tribunal post 22.12.2016 is limited to execution. The Tribunal could not go behind the said order.** The Tribunal passed earlier orders dated 20.08.2018, 16.01.2019 which attained finality. It is thereafter, in the presence of Chief Secretary, Telangana, order dated 14.02.2020 was passed on due consideration. **Thus, the plea that the State of Telangana had taken irreversible steps prior to the order is not factually correct.**

6. We have noted that the applicant filed Civil Appeal No(s). \_\_\_\_\_ of 2020 (Diary No(s). 11490/2020) wherein following order was passed:

*“Mr. V. Giri, learned senior counsel appearing for the appellants submits that **there are certain issues which have not been considered by the National Green Tribunal (NGT).***

*Learned senior counsel seeks and is granted permission to withdraw this appeal **with liberty to approach the NGT by filing an application for review of the Order dated 14.2.2020 passed by the NGT in Original Application No. 606 of 2018.***

***Liberty is given to the Appellants to approach this Court in case of dismissal of the review by challenging the order dated 14.02.2020 as well.***

*The appeal is, accordingly, dismissed as withdrawn with the aforesaid liberty.”*

7. From the above, it is seen that the issue raised has been duly considered earlier and the review application merely seeks re-hearing. The averments in the review application that the action of capping had been undertaken **much after coming into force of the 2016 Rules** are not factually correct. As per the application, the design was prepared in March, 2018 much after the orders of this Tribunal requiring following

<sup>4</sup> O.A. No. 199/2014 (2016) SCC Online NGT 2981

2016 Rules. Thus, the applicant acted in violation of law and to the detriment of the environment inspite of rules and binding orders to the contrary. As already mentioned, the design prepared and further steps taken result in irreversible damage to the environment by way of continuing generation of leachate, adversely affecting the groundwater.

8. Accordingly, even on reconsideration of the matter, in view of earlier binding orders of this Tribunal on the subject, the statutory mandate and the need for environmental protection, there is no merit in the review application. As already noted, it is not shown to be factually correct that when capping was done, it was legally permissible. The Tribunal has considered the issue earlier and rejected the very same contention not only of the applicants but also of several States/local bodies including Delhi Municipal Corporations, who find it convenient to avoid the mandate of law and to resort to capping, illegally and to the prejudice of the environment.

Accordingly, the review application is dismissed.

In view of main order, IA Nos. 31/2021 and 32/2021 also stand disposed of.

Adarsh Kumar Goel, CP

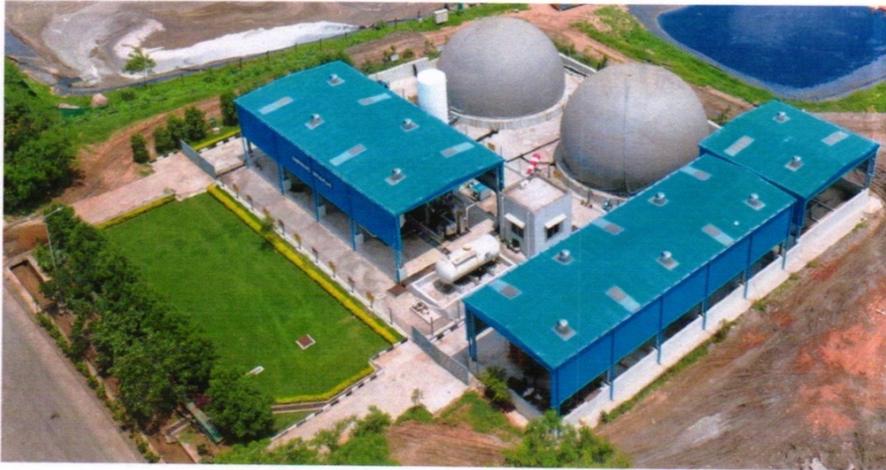
S.K. Singh, JM

Dr. Nagin Nanda, EM

February 18, 2021  
Review Application No. 02/2021  
IN Original Application No. 606/2018  
(I.A. No. 31/2021 & I.A. No. 32/2021)  
DV

**Annexure – Measure taken to Control Odor**

**i. From Legacy capped Dump:**

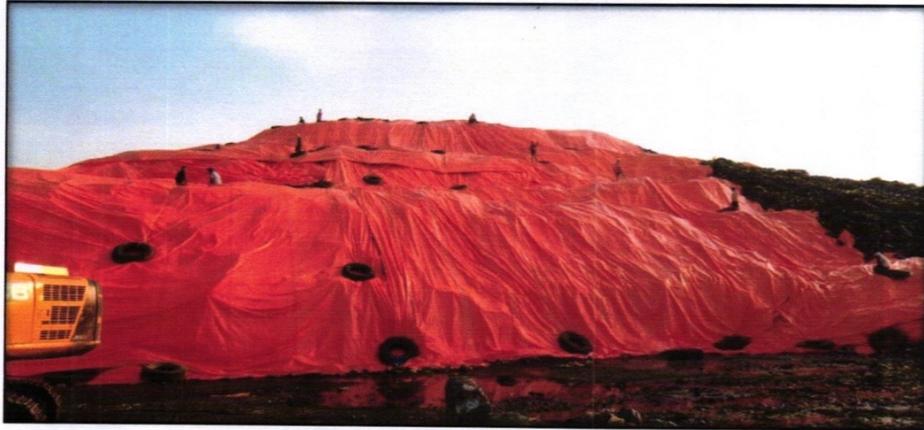


Processing of landfill gas from legacy dump at CBG plant



Flaring of excess landfill gas from capped dump

**ii. From daily Operational Areas:**



Temporary cover of MSW using tarpaulin sheets



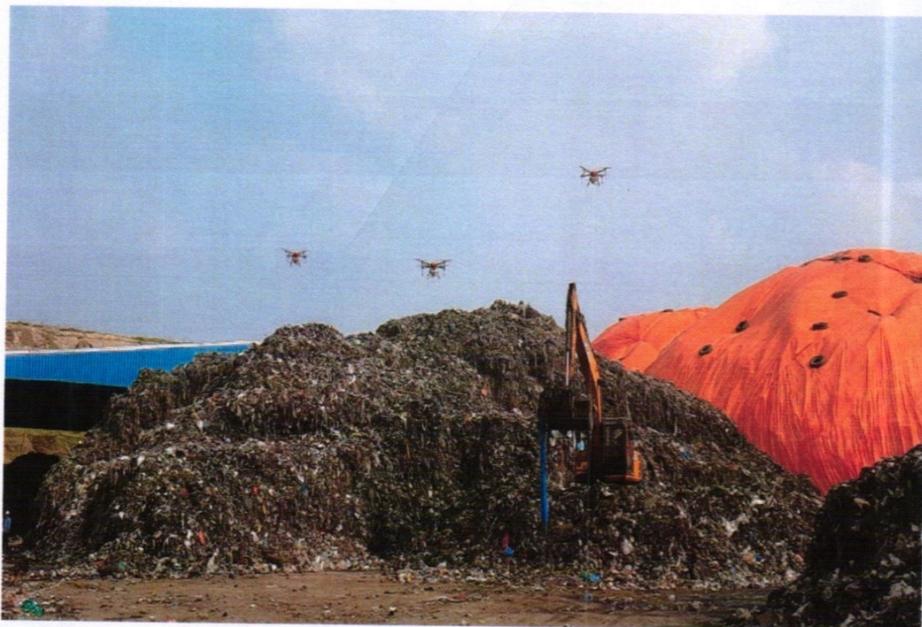
Temporary tarpaulin covering of scientific landfill



Soil cover on the Scientific Landfill after its saturation



Closed PEB shed for composting



Spraying through Drones on the tipping floor, RDF storage and operational areas of landfill



Spraying of bio-enzyme through Truck mounted fog cannon



Fixed Misting system is erected around the entire periphery and inside working areas such as pre-sorting area, tipping floor, composting shed and monsoon shed



GI sheets are placed around the periphery of working areas to prevent suspended particles from dispersing into atmosphere.



Spraying of odour masking chemicals such as citronella oil is carried out in case of severe odour complaint from surrounding habitations

BEFORE THE HON'BLE  
NATIONAL GREEN  
TRIBUNAL  
SOUTHERN ZONE,  
CHENNAI

In the matter of O.A no: 199 of  
2021

Between :

Sri. Shankar Narayanan Bala  
Krishnan and Others

....Applicants

AND

State of Telangana and Others

....Respondent ....

**Report filed by Respondent 6**

M/s. D. Sreenivasan, Counsel  
for Respondent no.6