

# Management of Waste Generated in Guwahati City and the Incorporation of Geocells at the Landfill Site

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**Abstract :** In recent years, the management of Municipal Solid Waste (MSW) has been a serious environmental issue in all urban areas of our country. Guwahati city is no exception to it. Due to increasing population (including floating population), industrialization and urbanization, the quantity of waste generated daily is increasing alarmingly. Unhealthy waste disposal practices, improper management of waste pose a serious threat to the environment in the form of air, water and soil pollution along with global warming. In fact, improper municipal waste disposal is one of the major problems faced by almost all the cities of our country including Guwahati today. However, some solid waste can be recycled or used for the generation of power, manufacture of manures for various agricultural and pisciculture activities. Thus, the solid waste can be managed productively, causing minimum harm to the environment. In Guwahati city, the waste disposal and management is a serious cause of concern for the environmentalist and Guwahati Municipal Corporation (GMC) has offered a contract to RAMKY GROUPS for proper disposal of wastes. The GMC along with RAMKY GROUPS selected West Boragaon as the dumping site for the waste. This paper concentrates on the Waste Management system in Guwahati, the use of Geocell for the development of roads and the potential of generating power from the waste.

**Key-words:** Municipal Solid Waste, floating population, industrialization, urbanization, Geocell, landfill.

## 1. INTRODUCTION

Guwahati, the gateway of North-East India and the largest city of the entire North-East, is one of the fastest developing cities in the country. Guwahati's 'urban form' is somewhat like a starfish. With a core in the central areas, the city has tentacles extending in the form of growth corridors towards South, East and West.

The census records of 2011 calculated the population of the city to be 963429 with an approximate increase to 1.2 million in the year 2013 (including floating population). Guwahati Municipal Corporation (GMC) is the local body responsible for governing, developing and maintaining the cleanliness of the city.

The growing population in the city increases the production of solid wastes proportionally. These solid wastes are being taken to the dumping ground in the West Boragaon site and are then further treated to produce various organic manures. The people on their part lack the basic knowledge about the hazards that can be caused by the improper disposal of such wastes and hence the wastes are seen lying in and across the busy streets, in drains and other such places thereby contributing to the environmental pollution, which in turn accelerates natural resources degradation, causing climate change and impacting the quality of life of the citizens.

For the solid waste to be dumped in the West Boragaon site, the approach road to the West Boragaon landfill site should be such that it is accessible to heavy vehicles like garbage dumpers. Due to the weak soil condition underneath the approach road to the Boragaon landfill site was in a very challenging condition for the heavy vehicles like garbage dumpers to move. The garbage trucks were increasingly dumping garbage much before the demarcated area, thus triggering a total mismanagement of the landfill and creating financial losses for the project. Moreover, with the impending monsoon season and ongoing frequent showers, conditions were getting increasingly difficult and posed major challenges in maintaining the serviceability of the approach road. This challenging condition was, however, overcome by the introduction of geocells. Geocells are typical cellular confinement systems which are made with ultrasonically-welded high-density polyethylene (HDPE) or Novel Polymeric Alloy strips that are expanded on-site to form a honeycomb-like structure which may be filled with sand, soil, rock or concrete.

## 2. METHODOLOGY

- The site in Boragaon is within Brahmaputra flood plain and located at a distance of around 15 km from the Guwahati City and is 2 km from the NH-37.
- The site has an area of about 108 beegha provided on lease for 20 years (2008-2028).

The study involves the collection of information and data from Boragaon waste management office, Guwahati Municipal Corporation and the office of the RAMKY Groups. The RAMKY Groups basically focuses on the areas of Civil, Environmental and Waste Management Infrastructure with special emphasis on Public Private Partnership (PPP) projects. Based on the information and data collected from the various sources an estimate of total power generation from these waste materials is prepared. The Geocells are found to be suitable for the construction of the approach road to the Boragaon landfill site. A Geocell layer of 140 mm depth is laid and temporary anchoring at the edges was done with bamboo sticks. After that the geocells are infilled with aggregates (40mm downsize) for a depth of 140mm + another 50mm extra on top as cushioning layer and finally the infilled layer was compacted with 10 ton vibratory roller. It is also found that the introduction of the geocells for road construction purposes not only proves to be time efficient but also economical.

### 3. RESULTS AND DISCUSSION

#### Composition of garbage in GMC

The following chart represents the composition of garbage in GMC

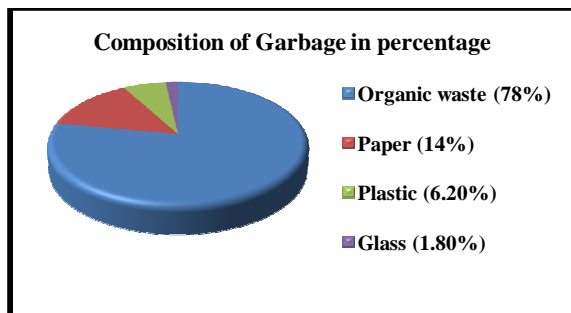


FIG.1. Representation of Composition of Garbage in GMC

(Source: City Development Plan, Guwahati adopted and recommended for approval of Ministry of Urban Development in 2006)

#### Collection and processing of wastes

The process of collection of waste materials from the city is divided into two stages:

1) **Primary Collection:** This stage consists of door-to-door collection of waste materials. This is done in collaboration with NGOs. The NGO's supply labours for this purpose. There are a total of 60 wards and 26 NGOs working for this group. These NGOs have supervisors to observe the household disposal of the waste materials. The NGO labours collect the wastes and unload the same in the bin-points (dustbin areas). Such bin-points can be seen in many places in the city like Hatigaon, Ganeshguri, Maligaon, Bhangargarh area etc.

2) **Secondary Collection:** The collection of the wastes dumped into the bin-points and transportation of the same to the site falls under this category of collection.

The wastes so collected are then dried in the sunlight and ultimately processed in the compost plant to produce organic manure.

#### Assistance by JNNURM Scheme

Jawaharlal Nehru National Urban Renewal Mission is a unique project dedicated to the re-development of Indian cities in the context of urban conglomerates. The Planning Commission has allocated a sum of Rs. 173.20 crore for the Mission Period, 2005-12 for the state of Assam. The indicative allocation for the year 2007-08 is Rs. 19.02 crore. In 2008-09, an additional amount of Rs. 100 crore for the city of Guwahati has been allocated under Urban Infrastructure and Governance (UIG) component of JNNURM. One of the approved projects for the city of Guwahati is the Solid Waste Management (SWM) which is at various stages of implementation.

Table 1. Allocation of fund by JNNURM for SWM project in Guwahati (2006-07)

Sector	Year of sanction	Approved cost (in lakhs)	Addition al Central Assistance committed (in lakhs)	Total fund released into project account (in lakhs)	Utilisation of funds out of total fund released to project (%)
SWM for Guwahati	2006-07	3516.71	3165.04	1758.00	50%

(Source: Press Information Bureau, Government of India)

#### Generation of solid waste in Guwahati

The following table gives the details of solid waste generated in Guwahati city:

Table 2. Generation of solid waste in Guwahati

Year	Actual/Projected Population (lakhs)	Estimated Generation (kg/day/person)	Estimated Generation (MT/day)
1991	6.46	0.3	193.8
2001	8.9	0.35	311.5
2010	12.5	0.6	750.0
2025	22.15	0.8	1772.0

(Source: City Development Plan, Guwahati adopted and recommended for approval of Ministry of Urban Development in 2006)

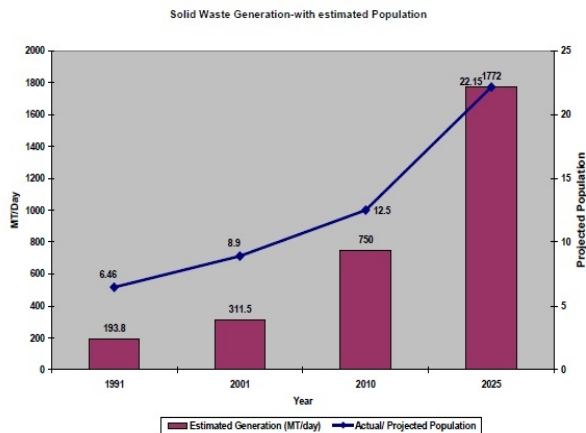


FIG.2. Generation of solid waste in Guwahati

### How it is being used

A compost plant has been installed which has the capacity to produce 50 tonnes of compost per day. The compost so produced is mostly supplied for use in the tea gardens as organic manure. A small amount of it is also supplied for other agricultural requirements. Although the compost plant has a capacity for production of 50 tonnes of compost per day, it fails to do so because of the limited amount of resources (waste materials).

### Causes of less utility

The city has a total number of about five lakh households whereas the Government has permitted the RAMKY GROUPS for collection of wastes from only one lakh households. This results in reduced amount of resources for the production of compost. At present, the total collection amounts to only 420-450 tonnes per day which is not sufficient for the production of power. A minimum amount of 600-700 tonnes of resources per day will be required for which the RAMKY GROUPS are in negotiation with the Government.

### Calculation

When the collection is from 1 lakh households, amount of resources per day = 420 to 450 tonnes (approximately) which results in about 2MW of power generation per day. Therefore,

When the collection is from 5 lakh households, amount of resources per day = 5 x (420 to 450) tonnes (approximately)

If this amount is made available, then an estimated amount of 10MW of power per day can be generated from the gas plant which is under construction. This power would be supplied to the Government for the purpose of consumption by the city.

(Source: Office of RAMKY GROUPS at the site)

### Serviceability of the approach road

The Geocells are used for the construction of the approach road to the Boragaon landfill site. In normal construction method, to stabilize the soil and to sustain heavy vehicular traffic, at least 800mm to 1m murrum infill would have been required, but by using Geocells the client managed to save precious natural resources. The installation of Geocell was completed in 3 days time whereas the total road was completed in less than 40 days. The installation of Geocell not only saves natural resources and time but also saves money.

### 4. CONCLUSIONS

- The paper finally concludes that the Government should allow for collection of wastes from more households than is presently allowed in order to ensure a clean and environment friendly Guwahati.
- Generation of 10MW of power is possible if the required amount of resources is made available through collection of wastes.
- With the cooperation of the Government, management of hazard dust can be undertaken.
- The installation of Geocell not only saves natural resources and time but also saves money.

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