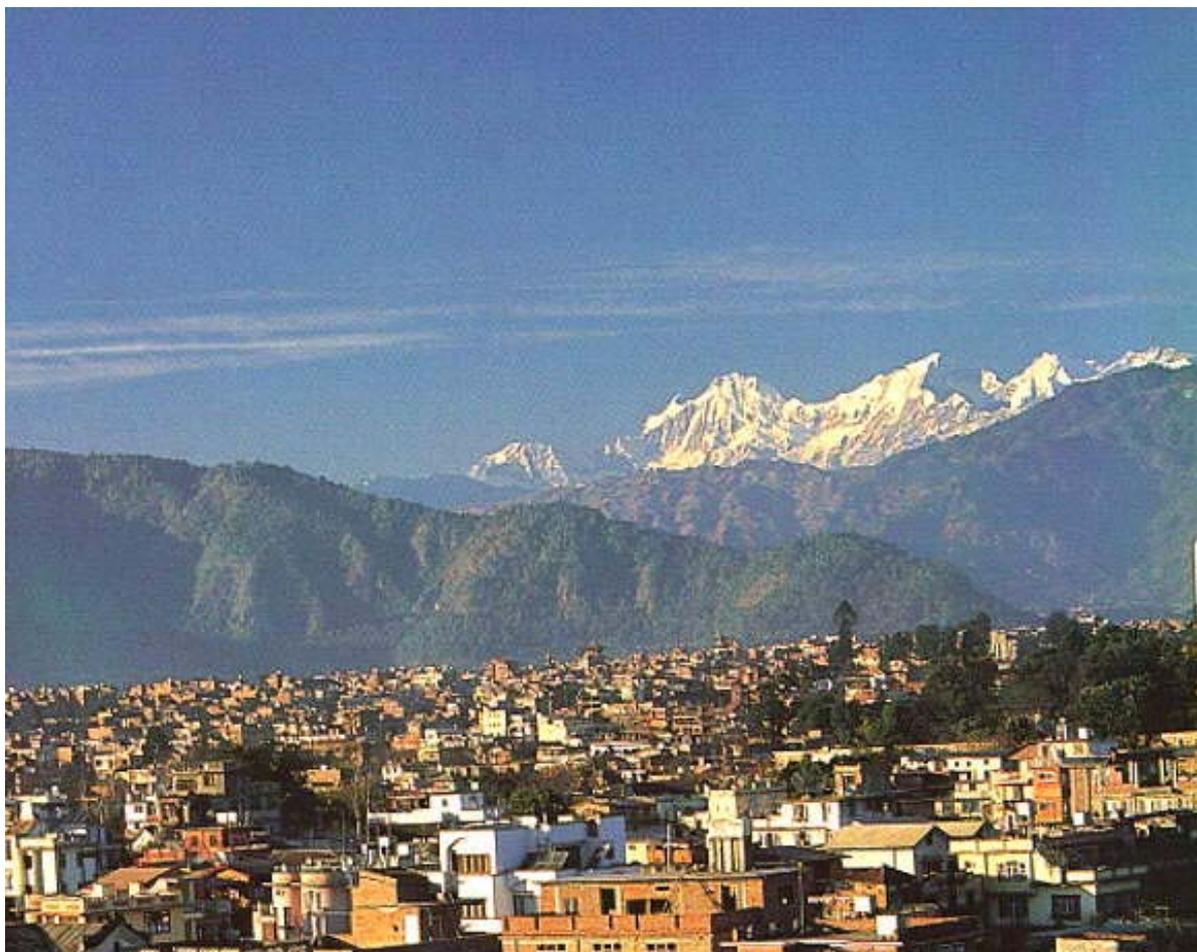


# Solid Waste Management in **Kathmandu Metropolitan City**



His Majesty's Government  
**Ministry of Local Development**  
Solid Waste Management and Resource Mobilisation Center



Clean Energy Nepal



Environment and Public Health Organisation

## Preface

**Solid Waste Management in Kathmandu Metropolitan City**<sup>1</sup> is one among a series of 58 reports, which briefly describes the current situation of solid waste management in each of the 58 municipalities in Nepal. The information presented in this report was obtained from a review of relevant literature, interviews with key municipal staff as well as other stakeholders, and a waste generation and composition survey. As the report is based on information collected over a short period, including a one-week field visit conducted in September 2003, this is not a comprehensive study, but it provides a brief overview of the solid waste management situation in the municipality.

This study was commissioned by Solid Waste Management and Resource Mobilisation Centre (SWMRMC) of the Ministry of Local Development. A team of four experts, Dr. Nawa Raj Khatiwada, Bhushan Tuladhar, Ashok Tuladhar and Dinesh Raj Manandhar, coordinated the study. The field investigations in each of the 58 municipalities were conducted by a team of environmental officers under the guidance of the coordination team.

This series of reports will be valuable for researchers as well as planners and managers of solid waste management systems. An analysis of the key findings from all the 58 municipalities is presented in a separate report published by SWMRMC.

Clean Energy Nepal (CEN) and Environment and Public Health Organization (ENPHO) wishes to thank Mr. Surya Man Shakya, General Manager of SWMRMC, for taking this bold and innovative initiative of gathering information on the solid waste management situation in all the 58 municipalities of Nepal for the first time. We also wish to thank the coordination team, as well as Mr. Murali Ranjit and Mr. Nirmal Acharya of SWMRMC, for their valuable input. Finally, we are very grateful to all the environmental officers who visited the municipalities to collect the required information and the municipal staff and the local people who have provided us with this information.

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<sup>1</sup> This report was prepared by Bhushan Tuladhar and Bhumika Vaidya based on field investigations conducted by Biju Shrestha.

## 1 Introduction

Kathmandu is the nation's capital and by far the largest city in the country in terms of population. It is also the only Metropolitan City in the country. Kathmandu is the centre for the nation's administration as well as the economy and it is rapidly growing into a cosmopolitan city. Kathmandu is also an ancient city with a rich cultural heritage. The city is located in Bagmati zone of Central Development Region. The Kathmandu Valley where Kathmandu is located also contains four other municipalities and 97 Village Development Committees. The city is spread over an area of 49.45 sq km, which is about 7.5 percent of the total area in Kathmandu Valley, and lies at an elevation of 1350 meters above sea level.

The historical core of Kathmandu is a dense settlement with narrow lanes and houses built around courtyards. Around this core area, the city has grown in a haphazard manner and urbanization is now spreading into surrounding villages and municipalities. The rapid growth is causing many environmental problems including air pollution, water pollution and improper waste management.

**Table 1: Background Information**

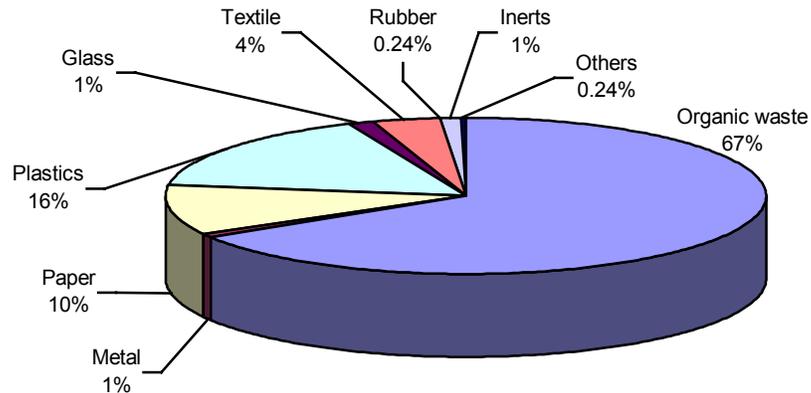
NAME	KATHMANDU METROPOLITAN CITY
District	Kathmandu
Year of Establishment	2052 B.S. (as a Metropolitan City)
No. of Wards	35
No. of Urban Wards	35
No. of Rural and semi urban Wards	NA
Total Area	49.45 sq. km (CBS data)
Built-up Area	NA
Major Rivers and Ponds	Rivers: Bagmati, Bishnumati, Dhobi Khola, Tukucha, Balkhu Ponds: Rani Pokhari, Gahana Pokhari, Nag Pokhari
Total Road length	794.13 km
Population (2001)	671,846 (CBS data)
No. of Households (2001)	152155 (CBS data)
No. Shops	13,670
No. of Restaurants, hotels and shops	NA
Annual Population Growth Rate (1991-2001)	4.8 percent
Estimated Population for 2003	737,891
Population Density	13586.37 per sq. km (CBS data)

## 2 Waste Generation and Composition

According to the field survey done in 2003, the average per capita household waste generation rate in Kathmandu was 0.39 kg/person/day. This is more than the average waste generation rate in urban areas of Nepal which is 0.25 kg/person/day. This figure is also higher than the waste generation rate calculated by Kathmandu Metropolitan City (KMC). According to studies done by KMC in 2000, the waste generation rate in Kathmandu was 0.225 kg per person per day. Considering the estimated total population of Kathmandu in 2003, which is 737,588, and the waste generation rate calculated by the field survey, the total amount of household waste generated in the municipality comes out to be 287.7 tons per day. If we assume that households contribute about 75 percent of the

total municipal waste, then the total amount of municipal waste generated in Kathmandu becomes 384 tons per day. This is probably an over estimate because of the high waste generation rate calculated during the field survey. KMC estimates that it generates about 300 tons of waste per day.

**Figure 1 Waste Composition**



The composition of waste shows that although organic waste is the largest portion of the waste stream. About two thirds of the waste is organic. This is similar to the findings of waste composition studies done earlier in Kathmandu. The percentage of plastics at 16 percent is however, higher than what was found in earlier studies. The earlier study done by KMC found the amount of plastics to be 9.2 percent.

Information on Kathmandu's waste generation and composition is based on waste collected from 100 households in ward no. 4 (Baneswor) and ward no. 1 (Naxal) that had waste from 506 people.

### **3 Waste Collection**

According to KMC, it collects approximately 250 tons of the 300 tons of waste generated in Kathmandu every day. This would result in collection efficiency of 83 percent.

The municipality has 35 tractor trailers with capacity of 1.7 m<sup>3</sup>, 26 tippers with the capacity of 4.9 m<sup>3</sup> and mini compactor with capacity of 4.5 m<sup>3</sup> for waste collection. It also has 3 types of containers, 8 containers with capacity of 4 m<sup>3</sup>, 2 containers with capacity of 4.5 m<sup>3</sup> and other 4 with capacity of 6 m<sup>3</sup> used for waste collection.

KMC has 1050 sweepers and 35 supervisors to guide them. The sweepers sweep about 280 km of the street and public space daily. The municipality and privatization are involved in cleaning services. Each of the 35 ward offices in KMC are assigned about 20 sweepers and the central office also has a team of sweepers. The city also has several private organizations and NGOs involved in waste collection.

Residents normally deposit their waste at a designated location on the roadside or directly in a waste collection vehicle or a public container. The waste at the

road side is cleaned by sweepers and loaded on to tractors or tippers and taken either to the Teku Transfer Station or directly to the landfill site. The public containers are picked up the municipality and taken to the landfill site. If the waste is collected by a small vehicle, such as rickshaw or handcart, the waste is usually transferred to a bigger vehicle before taking it to the transfer station or landfill. This transfer operation takes place at the roadside or vacant plots.

The municipality provides daily container service, daily roadside pickup service and door-to-door collection service in various locations.

## **4 Final Disposal**

Most of the collected waste is first taken to the Teku Transfer Station, which covers a 2 ha area in ward no. 12 of the municipality. At the transfer station, the waste is unloaded on to a concrete platform and then loaded on to larger haulage vehicles.

The waste from Kathmandu is currently being landfill along the Bagmati River in Balkhu. The municipality puts all the waste pits dug on the river banks and covers it up daily. The area may be used for another three to four years.

Up until the year 2000, KMC was using the Gokarna Landfill site, which was established in the year 1986 in Mulpani VDC located 5 km north-east of the city. But the landfill was closed after complaints from the local people.

Municipality is planning to construct sanitary landfill site in Okharpauwa, with support from SWMRMC. But before going to Okharpauwa, it plans to construct a landfill at Sisdoile, which is on the way to Okharpauwa and about 28 km from Teku Transfer Station.

## **5 Composting and Recycling**

KMC is actively promoting composting and recycling. The municipality has a Community Mobilization Unit (CMU) as a part of the Environment Department and one of the main functions of this unit is to promote composting and recycling.

The municipality has designed a 100 litre capacity home compost bins called "Saaga" and it is selling it, along with necessary accessories such as gardening equipment and screens, with a 30 percent subsidy at Rs. 750 per bin. So far about 500 such bins have been sold. The municipality also provides regular training and follow up services to assist people interested in composting their waste. The CMU also has regular programmes to raise awareness on composting.

The municipality also provides training on vermi composting and it is selling vermi composting kits for Rs. 500. So far about 50 of these kits have been sold.

The municipality has also assisted in establishing several community compost plants. One is being operated by Sagarmatha Environment Development Centre and Social Centre at Ratopul Ward No: 9. Its output capacity is 50-65 kg/day.

KMC has been trying to establish a central composting facility with a capacity of 300 tons per day. But so far it has not been successful in doing so because of the lack of suitable land. It invited proposals from the private sector in 1998/99 but although it selected a company and signed a memorandum of understanding

with the company, it was unable to provide 5 to 10 ha of land required by the company.

In order to promote recycling KMC has established several Community Recycling Centres. The municipality is also working with scrap dealers to increase recycling in the city. It is estimated that about 70 scrap dealers are involved in dealing with scrap materials within the municipality.

## **6 Special Waste Management**

Being a large city, Kathmandu has several hospitals and clinics that produce more than 1 ton of hazardous medical waste per day. The municipality has done some surveys on medical waste management and also done an Environmental Impact Assessment for the establishment of medical waste management system, but so far it has not been able to do so. Municipality has an incinerator for medical waste management and it has also published guidelines for effective medical waste management. However, it has not yet been able to establish a central waste management system. Both hospital waste and industrial waste are generally mixed with ordinary municipal waste. There is no special treatment done by the municipality. However, some hospitals have incinerators and manage their own waste.

The municipality buries dead animals and reuses construction and demolition waste as a cover material at the landfill site.

## **7 Community Mobilization**

KMC has a separate Community Mobilization Unit (CMU) within the Environment Department which has initiated several activities to increase public participation in waste management and promote waste minimization and recycling. Some of the activities of CMU are as follows:

- Children and Environment Programme in 35 schools where nature clubs have been formed
- Regular training on composting and recycling
- Sale of compost bins and vermi compost kits
- Demonstration of household and community composting
- Regular exhibitions on environment and waste management
- Regular clean up programmes
- Establishment of Community Recycling Centres
- Two weekly radio programmes on Metro FM
- Mobilization of youth as "city volunteers"
- Presentation of annual Kathmandu Environment Award to individuals and organizations that are actively involved in environmental activities.

Kathmandu has many community-based organization, NGOs and private companies involved in waste management. Some of them are listed below:

Nepal Bahu Udeshya Samuhik Sanstha in Samakhusi, ward No: 29 is involved in street sweeping, waste collection and waste transportation. It collects 10 tons of waste per day from 2000 households and the waste is transported to Teku transfer station. It also sweeps 7 km of the street in alternate days of a week with the help of broom and then the waste is collected in rickshaw.

Samyukta Services Pvt Ltd in Chabahil at kalopool is involved in street cleaning, waste collection and transportation within the municipality. It sweeps 8 km of street daily with the help of broom and the waste is collected in tricycle. It also collects 6 tons of waste per day from 1600 households and the collected waste is transported to Teku transfer station.

Mahila Batabaran Aviyaan in New Baneshwor at Suruchi tole-34 is involved in street cleaning, waste collection and transportation within the municipality. It sweeps 2 km of street 6 days a week with the help of broom and the waste is collected in rickshaw. It also collects 3 tons of waste per day from 450 households and the collected waste is transported to Teku transfer station.

Our cleaning campaign and service Pvt Ltd in Koteshwor-35 is involved in waste collection, transportation and composting within the municipality. It collects 6 tons of waste per day from 1300 households and the collected waste is transported to Teku transfer station. After manual waste separation, 12.96 m<sup>2</sup> of land is used for pile composting. It composts 100 kg of waste per day and the compost is used by the producers themselves.

Sagarmatha Environment Development Centre in Kalikasthan, Dillibazar is involved in street sweeping, waste collection, transportation, composting, research and advocacy within the municipality. It sweeps 1 km of street daily with the help of broom and the waste is collected in rickshaw. It also collects 6 tons of waste per day from 1000 households and the collected waste is transported to Teku transfer station using trucks or tricycles. Waste collected from 150 out of 1000 households are composted in community compost bin of 3000 litres capacity at Ratopul in the bank of Dhobi Khola. 250 kg of the waste is fed daily in the vessel and the producers themselves use the compost produced.

Cleaning campaign service Pvt Ltd at Hadigaun is involved in waste collection, transportation and composting within the municipality. It collects 4 tons of waste per day from 1650 households from ward 3, 5 and 7. The collected waste is transported to Teku transfer station using tippers, rickshaw and tricycles. 15- 20 kg of waste from household and vegetable market is composted in pit and pile. Composting is done in 1.5 Ropani land provided by ward and the producers themselves use the compost produced.

Kathmandu Mahanagar Solid waste Management Service in Naxal at Ward No:1 is involved in street sweeping, waste collection, transportation and public education within the municipality. It sweeps 18 km of street daily with the help of broom and the waste is collected in cart. It also collects 35-40 tons of waste per day from 1200 households and the collected waste is transported to dumping site using trucks, carts, shovel and rickshaw.

A to Z Cleaning Service in Newroad at Ward No:24 is involved in street sweeping, waste collection and transportation within the municipality. It sweeps 2.5 km of street daily with the help of broom and the waste is collected in rickshaw. It also collects 1 tons of waste per day from 1100 households and the collected waste is transported to dumping site using trucks, rickshaw and dust collector.

SILT Environmental Services Nepal Pvt Ltd at Baneshwor is involved in street sweeping, waste collection, transportation and composting within the municipality. It sweeps 18 km of street daily with the help of door-to-door waste collection and the waste is collected in rickshaw. It also collects 40 tons of waste per day from 3000 households and the collected waste is transported to Teku

transfer station using rickshaw and mini trucks. Waste collected from households is composted in pile. The compost produced is sold to the farmers in Rs 5000 per ton.

Nepal Pollution Control and Environment management Centre at Swayambhu is involved in street sweeping, waste collection, transportation and composting within the municipality. It sweeps 10 km of street once per week and the waste is collected in rickshaw. It also collects 9 tons of waste per day from 4000 households and the collected waste is either transported to Teku transfer station or dumping site using rickshaw and cart. Composting is in experimental phase and if it is successful then it will be applied in community level.

Public Awaken Sanitation Campaign at Baneshwor is involved in street cleaning, waste collection, transportation and public education within the municipality. It sweeps 1 km of street daily and the waste is collected in rickshaw. It also collects 6 tons of waste per day from 4200 households and the collected waste is transported to dumping site.

Baudha Yuba Samuha in Tinchule at Ward: 6 is involved in street cleaning, waste collection and transportation within the municipality. It sweeps 5-7 km of street daily and the waste is collected in tractor and truck. It also collects 7 tons of waste per day from 1900 households and the collected waste is transported to dumping site.

K-P Cleansing Services in Lainchaur at Ward: 2 is involved in street cleaning, waste collection and transportation within the municipality. It sweeps 1 km of street daily with the help of broom and the waste is collected in tricycle. It also collects 10 tons of waste per day from 400 households and the collected waste is transported to Teku transfer station.

Environment Conservation Centre in Basundhara is involved in street cleaning, waste collection, public education and research within the municipality. It sweeps 2 km of street daily with the help of broom and the waste is collected in tricycle. It also collects 3 tons of waste per day from 600 households and the collected waste taken to container where KMC picks it up.

## **8 Organizational and Financial Aspects**

The Environment Department, which is one of 13 Departments in KMC, is responsible for solid waste management in the city. The department has four sections. The Solid Waste Management Section is responsible for collection treatment and disposal of solid waste and Mechanical Section is responsible for maintaining more than 100 vehicles used for solid waste management. Within the Solid Waste Management Section is a Community Mobilization Unit, which is responsible for involving local communities in waste management and other environmental activities.

The Environment Department has about 1200 staff, out of which five are engineers. Most of the senior staff have received various training on solid waste management and are quite capable.

The municipality spends approximately Rs. 150 million per year on waste management. This is about 30 percent of the total annual municipal expenditure. KMC estimates that street sweeping and waste collection accounts for almost 84 percent of the total cost of SWM, while transfer and transportation accounts for approximately 8.7 percent and landfilling about 7.4 percent. The relatively low

cost of transportation and landfilling compared to the total SWM cost, is because currently the waste is being landfilled along the Bagmati River, which is only about 3 km from the city and the landfilling process is relatively crude and inexpensive. Once KMC starts taking its waste to Sisdol or Okharpauwa, transportation and landfilling cost will increase significantly.

## **9 Major Problems and Issues**

The main problem associated with solid waste management in Kathmandu is the lack of a central composting facility and landfill site. Other problems include the lack of a medical waste management system. The waste collection system also has to be improved. Most of the vehicles used for waste collection are old and need to be replaced. Although door-to-door collection has been introduced in most parts of the city in partnership with private sector, it has to be extended throughout the city. The city also needs to raise revenue from solid waste management fees so that the cost of waste management is reduced. Although KMC has done a good job to initiate private sector participation in waste management, the progress is slow.

## **10 Conclusion & Recommendations**

Because Kathmandu is a large and rapidly growing city, the challenges it faces regarding waste management is quite different from most other cities in Nepal. However, many of the basic principles of waste management that are valid for other municipalities are also valid for Kathmandu as well. These include maximizing of recycling, minimizing waste handling requirements and involvement of communities and private sector. Kathmandu has started several innovative programmes on waste management, such as involvement of private sector, promotion of household composting and mobilization of school children, youth and local communities. It needs to continue and expand these programmes. Most importantly, KMC should stop dumping waste in the Bagmati river and develop a central composting and landfilling facility.

Recommendations:

1. A central composting facility and a landfill is urgently required for KMC. A private party should be involved in establishing an operating the composting facility. The government should support by providing suitable land for these facilities.
2. The waste collection system should be improved so that waste is collected door-to-door throughout the city. Dumping of waste on the streets or vacant plots should be banned and waste should go straight from the source to the collection vehicle.
3. The municipality should introduce source-separated collection. This could be implemented in a phased manner. In order to make this effective, it should be supplemented by a public awareness campaign.
4. The municipality should also introduce alternate day collection system so that the cost of collection is reduced.
5. The tractors that are currently being used for waste collection are too old. These need to be replaced by more suitable vehicles. In the core area,

electric vehicles should be tried out to collect waste from the narrow lanes.

6. Medical waste management system should be implemented immediately. KMC already has the necessary guidelines and the equipment. These should be used. The waste generators should pay the waste management service.
7. The involvement of private sector in waste management should be expanded as quickly as possible. The municipality should actively monitor the activities of the private sector.
8. The community mobilization activities in Kathmandu are very good. These need to be continued and expanded so that it reaches out to all the people in the city.

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## Annex 1: Photographs



Collection Using a Bag System on a Rickshaw by a Private Company



A Rickshaw Used for waste Collection by a Private Company



**A Rickshaw with Baskets Used for Waste Collection**



**Loading Waste on to a Truck from a Temporary Transfer Station**



**Unloading Waste from a Tractor at the Teku Transfer Station**



**Unloading Waste from a Tipper at the Teku Transfer Station**



**A Multi Compactor Used for Haulage of Waste from Transfer Station to Landfill Site**



**Balkhu Dumping Site on the Banks of Bagmati River**



**Scavengers at Teku Transfer Station**



**A Scavenger Waits for Waste at the Balkhu Dumping Site**



**Covering of Waste at the Balkhu Dumping Site**



**Recovery of Recyclable Materials at the Balkhu Dumping Site**



**A Clean Up Campaign Organized by KMC and Local Groups**



**A Vermi Composting Training Organized by the Municipality**



**Compost Bin, Composting Equipment and Cloth Bag Being Sold by KMC**



**A Community Compost Bin Set Up By KMC and Operated By an NGO**

turn your **TRASH**  
into **CASH**

buy this attractive **Compost Bin TODAY**  
& get the following items **FREE**

- A cloth bag
- One kg compost
- A set of gardening tools
- Effective Micro-organisms (EM) to produce high quality compost

**Special Price**  
~~Rs. 1000~~  
**750**

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An Advertisement for Compost Bin Produced by KMC



School Children Learn about Waste and Compost During a Visit to a Plant Making Compost from Slaughter House Waste