

# THE SOLID WASTE MANAGEMENT SYSTEM

## BACKGROUND

Greater Noida is a Greenfield township located in Gautam Budh Nagar district, Uttar Pradesh. Setup in 1991 under the Industrial Area Act of Uttar Pradesh, the township is spread over about 90000 acres.

The Authority, in fulfilling its responsibility of creating requisite infrastructure for ensuring good quality of life, has adopted an efficient solid waste management system in Greater Noida. The system addresses Solid waste collection, transportation, treatment (depending on the nature of waste generated) and disposal.

## Segments for Solid Waste Management

- The four segments for solid waste management programme are:
- Urban and Rural Residential segment, which will cover all urban residential sectors and a few select urban villages
- Industrial estates of Greater Noida and UPSIDC
- Commercial, Institutional and Medical establishments
- Main Roads, viz., SK road, DSC road and other critical roads
- **Solid Waste Management - Activity modules**

- **SALIENT FEATURES**

- **Fundamental Tenets of the system**
  - Inculcate civic discipline through education
  - Principle of 'Reduce - Reuse - Recycle' (RRR)
  - 'Let Polluters pay'
  - Strengthen Regulatory framework to facilitate implementation of system, collection of user fee and imposing penalty for violation of rules
  - Facilitate partnership among the service provider(s) and user segments involving resident welfare associations, markets / industries associations and village panchayats in the solid waste management system
- **Salient features of the Operational system**
  - Waste shall not be dumped on streets / footpaths, open spaces, drains or water bodies
  - Specify time schedules for the various activities to the service provider & most importantly - People
  - Segregation shall be done at source
  - Two-bin segregation system shall be followed, viz., Dry waste (Recyclables) and Wet waste (Kitchen waste / Bio-degradables)
  - Standardise the colour, size & capacity of bins for households, shops & institutions.

The solid waste management programme addresses the following activity modules:

- Waste collection (Primary and Secondary)
- Sweeping of main roads, internal roads, open and green areas
- Segregation of waste
- Transportation of waste
- Treatment of organic waste to maximise 'life' of landfill sites
- Scientific disposal of waste, wherein, domestic, industrial and bio-medical waste shall be disposed as recommended by Central Pollution Control Board (CPCB) through its various Acts and guidelines / rules.

## **(A) URBAN RESIDENTIAL SECTORS and URBAN VILLAGES**

### **A-1 Waste collection from Households**

A-1.1 The Urban and rural households produce the following types of waste (Refer Annexure A-I for list of domestic wet, dry (recyclables) and hazardous wastes:

A-1.2 Wet Waste – Organic / Kitchen wastes (Rejects of Vegetables, Fruits, etc.)

A-1.3 Dry Waste – Recyclable waste (Metals, Plastics, Paper, etc.)

A-1.4 Hazardous waste – Discarded medicines, batteries, etc.

### **A-2 Systems at the household level**

#### **A-2.1 Two – bag segregation system at source**

A-2.2 Every household to use **2 bags** (Blue and Green) of 10 – 15 litres capacity each (for a family size of 5 persons). The blue and green bag shall be used for dry and wet waste respectively. The bags shall be tied up before handing over the waste to the waste collectors.

A-2.3 Hazardous waste to be stored in black bags, as and when produced. (Refer Annexure A-I for list of hazardous products)

A-2.4 These bags shall be standardised and supplied by GNIDA.

### **A-3 Systems for collection of waste**

A-3.1 Door-to-door collection of waste for both plotted and flatted households of urban sectors on daily basis between 7 AM to 12 noon.

A-3.2 Minimum number of waste collectors – 75 households per collector.

A-3.3 In Urban villages, waste shall be collected from 7 AM to 12 noon.

A-3.4 Tempos / closed body utility vehicles could be used for door-to-door collection, which shall have two containers / in-built partitions for wet and dry waste and place to keep one large bag / sack for hazardous waste. Every collector shall collect waste in bags and put them in the respective container / partition in the tempo / utility vehicle. One tempo / utility vehicle shall be able to service 300-400 houses covered by about 4-6 waste collectors. This norm would vary with population density of the sector. The waste collected (in tied bags) from households shall not be opened or mixed, at any stage before the treatment / disposal site.

A-3.4.1 The containers / partitions in the tempo / utility vehicle shall be colour-coded (Blue containers for dry waste and Green containers for wet waste) indicating the type of waste stored.

A-3.4.2 Each waste collector shall also have 1 large sack / bag to store hazardous domestic waste (Black plastic bag).

- A-3.4.3 The hazardous waste, whenever given, shall be stored in the black sack / bag and never mixed with dry or wet waste.
- A-3.5 The waste collectors shall be given a bell / whistle, which he shall ring / blow to announce his arrival. The people on hearing the bell / whistle shall put their bags outside the main gate of their house. This would help in minimising the 'lead time' for door-to-door collection of waste.
- A-3.6 The households shall keep the bags tied up outside the main door if they are not going to be at home at the time of waste collection.
- A-3.7 The waste collection agency shall also be responsible for segregation of waste. This is necessary to ensure that the waste collectors do not mix waste after collection.

#### **A-4 Systems for sweeping of internal roads / streets / open areas / green areas at urban sectors / urban villages**

- A-4.1 Sweeping of internal roads / streets / open areas shall be done on daily basis.
  - A-4.1.1 Sweeping of roads of ROW greater than 60 metres shall be done using mechanised road sweeping machines. Roads of ROW less than 60 metres shall be done manually by sweepers using appropriate tools, .
  - A-4.1.2 The waste collected while sweeping shall be segregated by the sweepers.
  - A-4.1.3 The handcart / rickshaw with closed containers could be used for storing the segregated waste collected while sweeping.
- A-5 In the Urban sectors, sweeping shall be done between 6 AM to 9 AM
  - A-5.1 Each sweeper shall be given 1000 running metres (1 Km) of road length depending on the population density of the area.
  - A-5.2 Wherever there is a road divider / median, the two 'carriage-ways' shall be treated as two roads. Hence, 1-running Km of such a road shall be cleaned by 2 sweepers.
  - A-5.3 For open and green areas (parks and gardens), one sweeper could be given about one acre for cleaning and sweeping. In large public gardens / parks, composting could also be practiced by the gardeners for captive consumption of compost.
  - A-5.4 It is advised that same set of sweepers / waste collectors be used for primary waste collection and sweeping (in a sector). This would not only aid in efficient utilisation of labour time but also in ensuring accountability among the labour force.
  - A-5.5 Each sweeper shall be given a long-handled broom, as they are more convenient to use. Each sweeper shall also be given a metal tray and metal plate for facilitating easy transfer of street sweeping from the streets into the rickshaw.
- A-6 In the Urban villages, sweeping shall be done between 10 AM to 1 PM
  - A-6.1 Based on the size of these urban villages, a minimum of two sweepers shall be deployed for each villages
  - A-6.2 These two sweepers shall be responsible for waste collection from households and sweeping / cleaning of roads and drains.
  - A-6.3 The waste collectors are also required to collect animal waste from the households, internal roads, streets and drains. The households who wish to store animal waste shall do so only within their premises.

#### **A-7 Systems for cleaning surface drains / Underground Drains / Manholes**

- A-7.1 The surface drains shall be cleaned regularly to prevent disposal of waste into the surface drains. In the urban villages of Greater Noida, the surface drains run parallel to the roads. Hence, the scope of work for the sweepers shall include drains along with streets and roads.
- A-7.2 Open surface drains in urban sectors shall be cleaned once in every 10 days.
- A-7.3 The closed drains shall be cleaned once in 4 months using mechanical system. However during the rainy season, GNIDA could increase the periodicity on need basis
- A-7.4 However, the drains / Nullahs in the urban villages shall be cleaned on daily basis through out the year.
- A-7.5 Mechanical systems shall be used for cleaning large trunk drains and closed drains in the urban sectors.
- A-7.6 Cleaning of drains could be done through out the day.
  - The following norms could be adopted
  - (a) 500 metres per person in day for drains with depth more than 60 cms.

- (b) 1000 metres per person in day for drains with depth less than 60 cms
- (c) Surface drains of more than 2 feet depth shall be done in supervision of the Urban services department of GNIDA

A-8 Every drain cleaner shall be given the following tools

- A-8.1 A cycle rickshaw and a shovel for transferring the silt to sites identified for depositing it.
- A-8.2 The waste (silt) removed from the drains shall not be kept on the street / footpath (for drying) for more than 4 hours. The wet / semi-solid silt shall be loaded on to the rickshaw using shovel.
- A-8.3 The silt collected shall be transported to the identified site, where the waste shall be transferred to a large container using shovels.
- A-8.4 The containers thereof could be transferred to the landfill site, where it could be used as landfill cover.

## **A-9 Systems for intermediate storage of waste**

- A-9.1 At the residential sectors, the use of intermediate storage bins (dumper bins) has been eliminated. The objective is to facilitate smooth transfer of waste from the 'source' to the treatment and disposal sites.
- A-9.2 Only 1-2 temporary intermediate storage points may be permitted on the route to the treatment / disposal site. However, permanent dumper bins shall not be allowed. The waste collection agency shall be allowed the following:
  - A-9.2.1 To identify these intermediate points based on the transportation logistics (route) and inform GNIDA of the same.
  - A-9.2.2 GNIDA / private collection agency shall bring the tempos / utility vehicles to these intermediate points and transfer the segregated waste to trucks / tractor trolleys for load consolidation. (in case, the service provider prefers to transport the waste in tempos / utility vehicles directly to the treatment / disposal site, he may be allowed to do so)
  - A-9.2.3 If unloaded from the tempos / utility vehicles at these intermediate points, the segregated waste shall be kept only in the closed plastic containers and in no case shall be left loose on the ground.
  - A-9.2.4 The waste at these intermediate points shall not be left unattended and in no case, shall the storage be more than 2 hours.

**LIST OF DOMESTIC WET WASTES**

1. Food wastes of all kinds, cooked and uncooked, including eggshells, bones
2. Flower and fruit wastes including juice peels and house-plant wastes
3. House sweepings (not garden sweepings or yard waste: dispose on-site)
4. Sanitary towels
5. Disposable diapers and incontinence pads
6. Ashes

**LIST OF DOMESTIC RECYCLABLE WASTES**

1. Paper and plastic, all kinds
2. Cardboard and cartons
3. Containers of all kinds excluding those containing hazardous materials
4. Packaging of all kinds
5. Glass, all kinds
6. Metals, all kinds
7. Rags, rubber, wood
8. Foils, wrappings, pouches, sachets and tetrapaks (rinsed)
9. Cassettes, computer diskettes, printer cartridges and electronic parts
10. Discarded clothing, furniture and equipment

**LIST OF DOMESTIC HAZARDOUS WASTES**

1. Aerosol cans
2. Batteries from flashlights and button cells
3. Bleaches and household kitchen and drain cleaning agents
4. Car batteries, oil filters and car care products and consumables
5. Chemical and solvents and their empty containers
6. Cosmetic items, chemical-based
7. Injection needles and syringes after destroying them both
8. Insecticides and their empty containers
9. Light bulbs, tube-lights and compact fluorescent lamps (CFL)
10. Medicines, discarded
11. Paints, oils, lubricants, glues, thinners and their empty containers
12. Pesticides and herbicides and their empty containers
13. Photographic chemicals
14. Styrofoam and soft foam packaging from new equipment
15. Thermometers and mercury-containing products

## **(B) HAZARDOUS and NON-HAZARDOUS INDUSTRIAL WASTE FROM INDUSTRIAL ESTATES**

### **B-1. Types of industrial wastes**

- B-1.1** Industrial units produce mainly three types of industrial waste
- B-1.1.1** Hazardous waste – Process residuals comprising of harmful chemicals, such as, Lead, Mercury, Oil mixtures, etc.
  - B-1.1.2** Recyclables – Paper, Cardboard, Glass, process scrap, etc.
  - B-1.1.3** Organic waste – Mainly Kitchen waste (Fruits and Vegetables leftovers)
- B-1.2** In the context of industrial waste, hazardous industrial wastes need to be carefully handled and disposed. The various types of hazardous industrial wastes are provided as Annexure B-I.
- B-1.3** The occupier / operator of the industrial unit shall ensure that the hazardous waste is not mixed with other wastes.
- B-1.4** The disposal of hazardous wastes shall be done in accordance with CPCB's Hazardous Waste (Management and Handling) Amendment Rules, 1999. In the event of any further amendments to these rules by Central Pollution Control Board (CPCB) or any other pertinent regulatory body of State or Central Government, the occupier shall change the treatment and disposal process accordingly.

### **B-2 Systems at industrial units**

- B-2.1** The industrial units shall be responsible for segregation of waste at source.
- B-2.1.1** Organic waste in blue plastic containers with a lid and handle on the top or on the sides. The capacity of these containers shall be 50-100 litres depending on the number of employees.
  - B-2.1.2** Recyclables shall be stored in green plastic containers (open or closed) with features and capacity similar to the containers for organic waste. Most of the industrial units produce process scrap that has significant economic value. Hence, the industrial units shall be given the option of selling their recyclables. However, hazardous waste shall not be sold without GNIDA's written permission.
  - B-2.1.3** Hazardous waste – The Occupier or operator shall ensure that the hazardous wastes are packaged, based on the composition in a manner suitable for handling, storage and transportation. The following rules shall be followed (as recommended by CPCB's Hazardous Waste (Management and Handling) Amendment Rules, 1999) or any further amendments to these rules by Central Pollution Control Board (CPCB) or any other pertinent regulatory body of State or Central Government
    - B-2.1.3.1** Labeling and packaging shall be in accordance with the provisions of the rules made by the Central Government under the Motor Vehicles Act, 1988 and other guidelines issued from time to time.
    - B-2.1.3.2** Labeling and packaging shall be easily visible and be able to withstand physical conditions and climatic factors.
    - B-2.1.3.3** All hazardous waste containers shall be provided with general label as given in Form 8 of CPCB's Hazardous Waste (Management and Handling) Amendment Rules, 1999.
    - B-2.1.3.4** The occupier shall enclose six copies of the manifest (Form 9 of CPCB's Hazardous Waste (Management and Handling) Amendment Rules, 1999) as per the colour codes with every consignment of hazardous waste given to waste collector / transporter.
    - B-2.1.3.5** The occupier shall provide the waste collector / transporter with relevant information in Form 10 of CPCB's Hazardous Waste (Management and Handling) Amendment Rules, 1999, regarding the hazardous nature of the wastes and measures be taken in case of an emergency.

### **B-3 Systems for Waste collection from industrial units**

- B-3.1 Waste shall be collected from 10 AM to 2 PM on daily basis from all industrial units.
- B-3.2 The trucks used for transportation of hazardous waste shall not be used for other types of domestic or industrial waste
- B-3.3 The waste collector / transporter shall collect six copies of the manifest as per the colour codes indicated below:

Copy 1 (White)	Forwarded to the Pollution Control Board by the industrial unit
Copy 2 (Light yellow)	Signed by the transporter and retained by the industrial unit
Copy 3 (Pink)	Retained by the operator of the landfill site
Copy 4 (Orange)	Returned to the transporter by the operator of the landfill site after accepting waste
Copy 5 (Green)	Forward to Pollution Control Board by the operator of landfill site after disposal
Copy 6 (Blue)	Returned to the industrial unit by the operator of landfill site after disposal

- B-3.4 The hazardous waste shall not be mixed with non-hazardous industrial waste or domestic waste. The waste shall be transported to the secured landfill site for hazardous waste.

#### B-4 GNIDA's role as facilitator for disposal of hazardous industrial waste

- B-4.1 GNIDA shall facilitate formation of 'association of industries' in Greater Noida, which shall play an active role in waste management related issues.
- B-4.2 GNIDA shall identify landfill site for disposal of hazardous waste and facilitate development of secured landfill site.
- B-4.3 The costs of development and maintenance of secured landfill site shall be fully recovered from the industries.

#### B-5 Systems for sweeping of internal roads / open area / green area in industrial estates

- B-5.1 The internal roads / open area / green area in industrial estates shall also be swept / cleaned atleast twice a week.

##### ***B-5.2 Sweeping shall be done from 6 AM to 10 AM*** in the morning.

- B-5.2.1 Sweeping of roads of ROW greater than 60 metres shall be done using mechanised road sweeping machines. Roads of ROW less than 60 metres shall be done manually by sweepers using appropriate tools.
- B-5.2.2 As a norm, minimum of 1 sweeper shall be allotted 1 acre of open area or area under roads in about 3 hours.
- B-5.2.3 The waste collected while sweeping shall be segregated by the sweepers
- B-5.2.4 The sweeping shall also include periodic cleaning of the community litterbins and the segregation of waste thereof.
- B-5.2.5 Each sweeper shall be given a long-handled broom, as they are more effective for improving productivity. Each sweeper shall also be given a metal tray and metal plate for facilitating easy transfer of street sweeping from the streets into the cycle rickshaw.
- B-5.2.6 Sweeping shall be done by the same set of people responsible for waste collection. The cycle rickshaw with closed plastic containers shall be used for storing the segregated waste collected while sweeping.

## LIST OF PROCESSES GENERATING HAZARDOUS WASTES

S.No.	Processes	Wastes
1.	Petrochemical processes and pyrolytic operations	1.1 <b>Oven debris</b>
		1.2 Oil-water sludge mixture
		1.3 Oil-containing bleaching earth
		1.4 Acid tar
		1.5 Sulphur- containing residue from sulphur removal
		1.6 Oil-water mixture
		1.7 Oil-containing sludge
		1.8 Oil emulsion
		1.9 Oil-containing acid
		1.10 Tar residue made with coal tar
		1.11 Sludge from waste water purification
		1.12 Residual liquid and paste-like organic substances made with aromatic, aliphatic and naphenic hydrocarbons
		1.13 Residue from alkali wash of fuels
2.	Natural gas production	2.1 Mercury-containing sludge
		2.2 Mercury-containing filter material
		2.3 Sulphur containing residues
3.	Production or use of zinc; production of zinc oxide	3.1 Zinc ashes
		3.2 Zinc slags
		3.3 Jarosite
4.	Production or use of lead	4.1 Lead ashes
		4.2 Lead slags
		4.3 Lead-containing filter material
5.	Production or use of cadmium	5.1 Cadmium-containing filter material
6.	Production or use of arsenic	6.1 Arsenic-containing filter material
7.	Production of cast iron	7.1 Cupola oven dust
8.	Production of crude iron and steel with oxy-steel converters or electro-ovens	8.1 Blast-furnace gas dust
		8.2 Filter material
		8.3 Fly ash
		8.4 Other exhaust dust
9.	Production of aluminium (primary or secondary production)	



		9.1	Filter material
		9.2	Cathode residues
		9.3	Overn debris
10.	Non-ferro metallurgical processes	10.1	Heavy metal-containing oven debris arsenic chalk
11.	Hardening of steel	11.1	Cyanide, nitrate-, or nitrite-containing sludge
		11.2	Hardening salt
12.	Production or use of asbestos-containing materials	12.1	Asbestos-containing residue
13.	Production of chlorine by means of the diaphragm-electrolyses process	13.1	Asbestos-containing residue
14.	Phenol production	14.1	Phenol mixture
		14.2	Phenol-water mixture
15.	Metal working	15.1	Selenium-containing metal waste
		15.2	Beryllium-containing metal waste
		15.3	Coolant made with oil products
		15.4	Oil-water sludge mixture
16.	Metal surface treatment, such as stching, staining, polishing, galvanising, cleaning, degreasing and hot dip galvanising	16.1	Acid, acid residue or acid mixture
		16.2	Alkali, alkali residue or alkali mixture
		16.3	Galvanicbath and (half-) concentrate made with sulphide, chromium (VI), cyanide, copper, zinc, cadmium, nickel or tin
		16.4	Copper etching fluid
		16.5	Halogen-free sludge from a bath which used organic solvents
		16.6	Halogen-containing sludge from a bath with organic solgents
		16.7	Phosphating sludge
		16.8	Halogen-containing organic degreasing bath
		16.9	Sludge from staining bath
17.	Treatment of galvanis and similar with baths and water purification in metal surface treatment	17.1	Metal hydroxide sludge chromium, cadmium copper, zinc, nickel or silver
		17.2	Heavy metal-containing eluate from ion exchanges
		17.3	Heavy metal-containing half- concentrates from membrane systems
18.	Production of acids or ammonia		

19.	Production or use of solvents	18.1	Acid-containing residues
		18.2	Ammonia-containing residues
		19.1	Contaminated halogen-free aromatic, aliphatic or naphthenic solvents
		19.2	Contaminated halogen-free solvents made with phenols, ketones, ethers, acetates, alcohols, or glycols
		19.3	Contaminated halogen-containing aromatic, aliphatic or naphthenic solvents
		19.4	Contaminated halogen-containing solvents made with phenols
		19.5	Contaminated solvents or mixtures of solvents made with organic nitrogen-containing aromatics, naphthenes or aliphatics
20.	Removal of coatings from ships, bridges and locks, electricity pylons and road markings by blasting	19.6	Contaminated solvents or mixtures of solvents made with organic sulphur compounds
		19.7	Distillation residue
21.	Production or use of coatings paints, lacquers, varnishes and plastics and of inks	20.1	Blasting material contaminated with coating residues
		21.1	Residues of coatings or such as inks if not completely hardened
22.	Production or use of glues, cements, adhesive and resins	21.2	Sludge from waste water purification in production processes
		22.1	Glue, cement or adhesive residue (not made with vegetable or animal materials) if not completely dried out
		22.2	Resin oil residue
23.	Production or use of latex	23.1	Latex or latex emulsion residue if not completely polymerised or coagulated
24.	Production or use of paint removers	24.1	Paint remover residue
25.	Printing and copying with liquid toner	25.1	Printing ink residue
		25.2	Silkscreen printing ink residue
		25.3	Lacquer residue
		25.4	Liquid toner residue
		25.5	Residue of cleaning agents made with organic solvents
		25.6	Etching fluid residue

26.	Production or use of photo-chemicals	25.7	Dispersive oil residue
		25.8	Oxidising agent residue
27.	Production or use of organic peroxides	26.1	Developer residue
		26.2	Fixer residue
		26.3	Bleaching fixer residue
28.	Production or use of halogen-containing hydrocarbons or of aromatic, aliphatic or naphthenic hydrocarbons	27.1	Organic peroxide residue
		28.1	Residue of fluid or pasty organic materials made with halogen-containing hydrocarbons
29.	Production or use organic nitrogen compounds or organic	28.2	Residue of fluid or pasty organic materials made with aromatic, aliphatic or naphthenic hydrocarbons
		29.1	Residue of fluid or pasty organic materials made with oxygen compounds organic nitrogen or oxygen compounds (other than vegetable or animal carbohydrates, proteins, fats and fatty acids)
30.	Production or use of materials made with silicones (excluding cements)	30.1	Silicone oil residue
31.	Production of canvas and textiles	30.2	Silicone-containing residues
		31.1	Textile chemical residues
32.	Production or use of plastics or raw materials for them	32.1	Halogen-free residue of additives for plastics (e.g. dyestuffs, stabilisers, or flame retardants)
		32.2	Halogen-containing residue of additives for plastics
		32.3	Halogen-free residue of plasticisers for plastics
		32.5	Residue from the preparation of acrylonitrile monomer
		32.6	Residue from the preparation of acrylonitrile monomer
		32.7	Residue of liquid or pastry rubber emulsion or rubber solution if not polymerised
		32.8	Sludge from waste water purification from rubber production if not

		polymerised
		32.9 PVC-containing residues if not polymerised
33.	Production of cosmetics	33.1 Residue of chemical raw materials and additives (other than vegetable and animal carbohydrates, proteins, fats and tatty acids)
34.	Production of pharmaceuticals	34.1 Residues from the production of medicines (other than vegetable and animal carbohydrates, proteins, fats and tatty acids)
35.	Production, formulation of pesticides	35.1 Production or formulation use of pesticides residue
		35.2 Sludge from waste water treatment
		35.3 Hexa or hexa-containing residue made with hexa-chlorocyclohexane or hexachlorobenzene
		35.4 Residues from the use of pesticides
36.	Production, formulation or use of wood preservatives	36.1 Production and formulation residue
		36.2 Sludge from the waste water purification
		36.3 Residue from the use of wood preservatives
		36.4 Wood alkali bath
37.	Cleaning, emptying and maintenance of tanks and separators of vessels vehicles and of mobile and stationary storage tanks, washing water	37.1 Oil-containing cargo residue, washing water and sludge
		37.2 Chemical-containing cargo residue and sludge
		37.3 Oil-water sludge mixture and oil-containing air filters from oil, fat, sludge or petrol separation
38.	Cleaning of barrels which have held chemical substances	38.1 Chemical-containing residue from barrel cleaning
		38.2 Sludge from waste water purification
39.	Purification procession for air and water	39.1 Sludge from waste water treatment from artificial fertilizer production
		39.2 Sludge from the treatment of waste

		water containing hydrofluoric acid
	39.3	Heavy metal-containing residue from used-ion exchange material in the water purification
	39.4	Flue gas cleaning residue
40.		Waste treatment processes, e.g. incineration, distillation and separation and concentration techniques
	41.1	Sludge from the incineration of exclusively chemical waste
	41.2	Fly ash from incineration of waste, except exclusively communal sewage sludge, flue gas cleaning residue
	41.3	Residue from the burning of cables
	41.4	Battery acid
	41.5	Distillation residue from the work-up of
	41.6	Contaminated halogen-free organic solvents distillation residue from the work-up of
	41.7	Contaminated halogen-containing organic solvents
42.		The shredding of object made chiefly of metal, plastic or rubber
	42.1	Shredder waste
43.		Performance of maintenance and repair work on vehicles and
	43.1	Oil-water mixtures, oil-containing sludge and oil emulsion
	43.2	Filters and filter material which have organic liquids on them, e.g. mineral oil, synthetic oil and organic chlorine compounds
44.		Every action relating to and every use of lubricating and system oil
	44.1	Spent oil
	44.2	Other spent lubricating and system oil

**LIST OF WASTE SUBSTANCES WITH CONCENTRATION LIMITS****Class A****Concentration limit : 50 mg/kg**

- A1 Antimony and antimony compounds
- A2 Arsenic and arsenic compounds
- A3 beryllium and cadmium compounds
- A4 Cadmium and beryllium compounds
- A5 Chromium (VI) compounds
- A6 Mercury and mercury compounds
- A7 Selenium and selenium compounds
- A8 Tellurium and tellurium compounds
- A9 Thallium and thallium compounds
- A10 Inorganic cyanide compounds (cyanides)
- A11 Metal carbonyls
- A12 Naphtalene
- A13 Anthracene
- A14 Phenanthrene
- A15 Chrysene, benzo(a) anthracene, fluoranthene, benzo(a) pyrene, benzo (K) fluoranthene, indeno (1, 2, 3-ed) pyrene and benzo(ghi) perylene
- A16 Halogenated fused aromatic rings, e.g. polychlorobiphenyls plus derivatives
- A17 Halogenated aromatic compounds
- A18 Benzene
- A19 Dieldrin, aldrin, and endrin
- A20 Organotin compounds

## **Class B**

**Concentration limit : 5,000 mg/kg**

- B1 Chromium (III) compounds
- B2 Cobalt compounds
- B3 Copper compounds
- B4 Lead and lead compounds
- B5 Molybdenum compounds
- B6 Nickel compounds
- B7 Tn compounds
- B8 Vanadium compounds
- B9 Tungsten compounds
- B10 Silver compounds
- B11 Organic halogen compounds
- B12 Organic phosphorus compounds
- B13 Organic peroxides
- B14 Organic nitro and nitroso-compounds
- B15 Organic azo-and azo-oxy compounds
- B16 Nitriles
- B17 Amines
- B18 (Iso-and-thio-) cyanates
- B19 Phenol and phenolic compounds
- B20 Merceptans
- B21 Asbestos
- B22 Drilling, cutting, grinding and rolling oil or emulsions thereof
- B23 Halogen-silanes
- B24 Hydrazine(s)
- B25 Fluorine
- B26 Chlorine
- B27 Bromine
- B28 White phosphorous
- B29 Ferrosilicon and alloys
- B30 Manganese-silicon
- B31 Halogen-containing substances which produce acidic vapours on contact with damp air or water, e.g. silicon tetrachloride, aluminium chloride, titanium tetrachloride

## **Class C**

**Concentration limit: 20,000 mg/kg**

- C1 Ammonia and ammonium compounds
- C2 Inorganic peroxides
- C3 Barium compounds, except barium sulphate
- C4 Fluorine compounds
- C5 Phosphorus compounds, except the phosphates of aluminium, calcium and iron
- C6 Bromates, (hypo) bromites
- C7 Chlorates, (hypo) chlorites
- C8 Aromatic compounds

- C9 Organic silicon compounds
- C10 Organic sulphur compounds
- C11 Iodates
- C12 Nitrates, nitrites
- C13 Sulphides
- C14 Zinc compounds
- C15 Salts of per-acids
- C16 Acid halides, acid amides**
- C17 Acid anhydrides

#### **Class D**

**Concentration limit : 50,000 mg/kg**

- D1 Sulphur
- D2 Inorganic acids
- D3 Metal bisulphates
- D4 Oxides and hydroxides except those of: hydrogen, carbon, silicon, iron, aluminium, titanium, manganese, magnesium, calcium
- D5 Aliphatic and naphthenic hydrocarbons
- D6 Organic oxygen compounds
- D7 Organic nitrogen compounds
- D8 Nitrides
- D9 Hydrides

#### **Class E**

**No concentration limit**

- E.1 Highly flammable substances
- E.2 Substances which generate dangerous quantities of highly flammable gases on contact with water or damp air.



**(C) WASTE MANAGEMENT – COMMERCIAL AND INSTITUTIONAL (EXCEPT MEDICAL) POCKETS/MARKETS/INSTITUTIONAL AREA (Shops / Offices / Institutions / Schools / Colleges / Training Centres / Workshops)**

**C-1** The commercial pockets and markets produce the following types of waste:

C-1.1 Wet Waste - Organic waste (Rejects of Vegetables, Fruits, etc.)

C-1.2 Dry Waste – Recyclable waste (Plastics, Paper, Cans, cardboard, etc.)

C-1.3 Hazardous waste - Batteries, etc.

**C-2** Systems at each commercial outlets / shops

C-2.1 Two – bag segregation system at source.

**C-2.2** Every shop or commercial outlet to use 2 closed bags (Blue and Green). The capacity of bags shall be on the basis of the persons employed. As an approximate norm, the capacity of each bag shall be 15 litres for every five people employed. The blue and green bag shall be used for dry and wet waste respectively. The bags shall be tied up before handing over the waste to the waste collectors.

**C-2.3** Hazardous waste to be stored in black plastic carry-bags, as and when produced.

**C-2.4** These bags shall be standardised and supplied by GNIDA.

**C-3** Systems at each Commercial pocket / Markets / Offices / Banks

C-3.1 Closed Plastic litter bins of about 30-40 litres capacity shall be installed in commercial pockets and marketplaces as ‘community bins’. These closed containers shall have handles on the top or on the sides.

C-3.2 These bins shall be used by the visitors to the market / commercial area.

C-3.2.1 These bins shall be located at regular intervals (about 25 - 250 metres) depending on the size and nature of the market.

C-3.2.2 GNIDA shall fully recover the costs of these litter bins by involving private sector and giving them advertisement rights or allowing them to put their name on the bins for a specific period.

C-3.3 All the open restaurants and eating outlets shall place one or two large open plastic containers for the people to throw the leftovers. The capacity of these containers shall be about 50 - 100 litres depending on the size of shop and number of visitors.

**C-4** Systems for sweeping and waste collection at commercial pocket / Markets / Offices / Banks

**C-4.1** Waste collection system

C-4.1.1 Door-to-door collection of waste on daily basis.

C-4.1.2 In the morning, waste will be collected between 10 AM to 12 noon.

C-4.1.3 Minimum number of waste collectors - 40 shops per collector

C-4.2 Tempos / closed body small utility vehicles shall be used for door-to-door collection, which will have two containers / in-built partitions for wet and dry waste and place to keep one large bag / sack for hazardous waste. Every collector shall collect waste in bags and put them in the respective container / partition in the tempo / utility vehicle. Tempo / utility vehicle shall be

parked at the commercial pocket / market. The waste collected (in tied bags) from households shall not be opened or mixed, at any stage before the treatment / disposal site.

C-4.2.1 The containers / partitions in the tempo / utility vehicle shall be colour-coded (Blue containers for dry waste and Green containers for wet waste) indicating the type of waste stored.

C-4.2.2 Each waste collector shall also have 1 large sack / bag to store hazardous domestic waste (Black plastic bag).

C-4.2.3 The hazardous waste, whenever given, shall be stored in the black sack / bag and never mixed with dry or wet waste.

Sweeping of market area shall be done twice in a day.

C-4.3 Sweeping shall be done from 6 AM to 9 AM in the morning. In the afternoon, the sweeping shall be done between 2 PM to 5 PM. As a norm, minimum of 1 sweeper shall be allotted 25000 sq. feet of market area.

C-4.3.1 The waste collected while sweeping shall be segregated by the sweepers

C-4.3.2 The sweeping shall also include periodic cleaning of the community litterbins and the segregation of waste thereof.

C-4.3.3 Each sweeper shall be given a long-handled broom as they are more effective for improving productivity. Each sweeper shall also be given a metal tray and metal plate for facilitating easy transfer of street sweeping from the streets into the cycle rickshaw.

C-4.3.4 The rickshaw with the closed plastic containers shall be used for storing the segregated waste collected while sweeping.

## **C-5 Fruits / vegetables and Meat / Fish Markets**

**C-5.1 Every shop shall have a dedicated bin of 75-100 litres capacity for fruits and vegetables or meat / fish products, depending on the case. Each bin shall have a lid and handle on the top or on the sides.**

**C-5.2 Vendors selling Fruits and Vegetables (F and V) on carts shall have a large canvas bag (of about 10-15 litres capacity) for storage of F and V rejects.**

**C-5.3 The waste collection and cleaning/sweeping shall be a continuous process through the day. Hence, dedicated sweepers shall be deployed for such markets. As a norm, 1 sweeper shall be given about 10000 to 15000 sq. feet of area. These sweepers are also required to collect waste from shops and vendors (including carts) twice (once in the afternoon and then in the evening) in a day.**

## **C-6 'Mandis' of Fruits and Vegetables / Grains**

C-6.1 'Mandis' of Fruits and Vegetables / Grains shall be cleaned / swept once in a day at the end of business hours, i.e. after 12 noon.

C-6.2 As a norm, 1 sweeper shall be given about 10000 to 15000 sq. feet of area.

C-6.3 If such a market also operates as regular Fruits and Vegetables market during the rest of the day, then the system as recommended for Fruits and Vegetables market shall be adopted.

## **C-7 Hotels and Restaurants**

**C-7.1 Hotels and Restaurants shall not throw waste on the streets, footpaths, open or green areas and roads.**

**C-7.2 All restaurants and hotels shall also adopt a 2-bin segregation system for wet and dry waste. Each bin shall have appropriate handle or handles at the top or side and rim at the bottom for ease of handling. Hazardous waste, if produced, shall be stored in bags.**

**C-7.3 All the hotels and restaurants shall not mix the various types of waste and shall be responsible for segregation at source.**

**C-7.4 The capacity of the bins shall be 75 to 100 litres. However, large hotels and restaurants shall adopt bins with larger capacity.**

C-7.5 These bins shall be supplied by GNIDA and the costs shall be fully recovered and collected at the time of approval of their license /permit.

## C-8 Banquets / Marriage halls / Community halls

C-8.1 The owners of such facilities are directed to install 50-litres closed containers with handles at the top or side at multiple points.

C-8.2 Such facilities shall not be allowed to dispose their waste in community bins or on streets / roads, etc.

C-8.3 The owners shall, in advance, inform GNIDA's waste collection agency about the function and its duration.

C-8.4 The waste collection agency shall send waste collectors with cycle rickshaw and containers. Segregation shall be done, at source, by these collectors and transported to the intermediate storage points. This service shall be provided within 12 hours of the completion of the function.

C-8.4.1 The waste collection agency will prepare 4 copies of the voucher:

C-8.4.1.1 1<sup>st</sup> copy shall be retained by the owner

C-8.4.1.2 2<sup>nd</sup> copy shall be retained by the waste collection agency

C-8.4.1.3 3<sup>rd</sup> copy shall be sent by the owner to GNIDA along with the service fee.

C-8.4.1.4 4<sup>th</sup> copy shall be sent by the waste collection agency to GNIDA.

C-8.4.2 Every owner is required to submit consolidated quarterly statements of the functions held at their facility.

C-8.5 GNIDA shall levy penalty on the owners for violation of any of these rules.

## C-9 Systems for transportation / intermediate storage of waste

C-9.1 1-2 temporary intermediate storage points shall be permitted on the route to the treatment / disposal site. However, permanent dumper bins shall not be allowed. The waste collection agency shall be allowed the following:

C-9.1.1 To identify these intermediate points based on the transportation logistics (route and quantum of waste collected from consolidation point of view) and inform GNIDA of the same.

C-9.1.2 GNIDA/private collection agency shall bring the tempos/utility vehicles to these intermediate points and transfer the segregated waste to trucks / tractor trolleys for load consolidation. (in case, the service provider prefers to transport the waste in tempos / utility vehicles directly to the treatment / disposal site, he may be allowed to do so)

C-9.1.3 If unloaded from the tempos / utility vehicles at these intermediate points, the segregated waste shall be kept only in the closed plastic containers and in no case shall be left loose on the ground.

C-9.1.4 The waste at these intermediate points shall not be left unattended and in no case, shall the storage be more than 2 hours.

## (D) BIO - MEDICAL WASTE FROM HOSPITALS / NURSING HOMES

### D-1. Responsibility of Occupier

D-1.1 List of bio-medical waste is provided as Annexure D-I.

**D-1.2 The occupier of an institution generating bio-medical waste which includes hospital, nursing home, clinic, dispensary, veterinary institution, animal house,**

pathological laboratory, blood bank, etc. be responsible for safe handling, storage and transportation of all forms of bio-medical wastes.

**D-1.3** The occupier shall ensure that the Bio-medical waste is not mixed with other wastes.

## **D-2 Segregation, Storage, Treatment and Transportation of Bio-medical waste**

D-2.1 Every occupier, where required, shall either set up requisite bio-medical waste treatment facilities like incinerator, autoclave, microwave system for the treatment of waste or use GNIDA's centralised treatment facility.

D-2.2 If the occupier does not have in-house treatment plant then it would be mandatory (for the occupier) to use GNIDA's private service provider for transportation of waste.

D-2.3 Segregation of bio-medical waste shall be done in containers / bags at the point of generation in accordance with Schedule II of Bio-medical Waste (Management and Handling) Rules, 1998, prior to storage, transportation, treatment and disposal,

D-2.4 The containers / bags shall be labelled according to Schedule III of Bio-medical Waste (Management and Handling) Rules, 1998.

D-2.5 Transportation of untreated bio-medical waste shall be transported only in such vehicles as may be authorised for the purpose by GNIDA.

D-2.6 Untreated bio-medical waste shall not be stored beyond a period of 48 hours. Provided that if for any reason it becomes necessary to store the waste beyond such period, the occupier must take permission of GNIDA.

D-2.7 The treatment and disposal of bio-medical wastes shall be done in accordance with Schedule I of Bio-medical Waste (Management and Handling) Rules, 1998 and in compliance with the standards prescribed in Schedule V of the same rules. In the event of any amendments to these rules by Central Pollution Control Board (CPCB) or any other pertinent regulatory body of State or Central Government, the treatment and disposal process and the various standards shall be changed accordingly by the service provider.

## **D-3. Annual report and Maintenance of records**

D-3.1 Every occupier / operator shall submit an annual report to GNIDA (in Form II of Bio-medical Waste (Management and Handling) Rules, 1998) by 31st January every year, to include information about the categories and quantities of bio-medical wastes handled during the preceding year.

D-3.2 Every occupier or authorised person shall maintain records related to the generation, collection, storage, transportation, treatment, disposal and any other form of handling bio-medical waste in accordance with Bio-medical Waste (Management and Handling) Rules, 1998. All these records shall be subject to inspection and verification by GNIDA at any time.

## **D-4 GNIDA's role as facilitator in collection and disposal**

D-4.1 GNIDA shall lay the role of facilitator in this context by

D-4.2 Identifying landfill site for disposal of bio-medical waste.

D-4.3 Initiating dialogue among the various institutions / association of these institutions for the installation of a common treatment facility.

D-4.4 Setting-up this centralised treatment plant for bio-medical waste and select a suitable private sector agency for providing this service (construction and operations and maintenance)

D-4.5 Appointing a collection agency for *collection of treated bio-medical waste* and disposal in secured landfill sites thereof.

D-4.6 GNIDA shall involve pertinent medical association for supervising such common facilities for treatment and disposal.

D-4.7 All these services shall be provided on full-cost recovery basis.

## CATEGORIES OF BIO-MEDICAL WASTE

Option	Waste Category	Treatment and Disposal
Category No.1	<b><u>Human Anatomical Waste</u></b> (human tissues, organs, body parts)	incineration <sup>@</sup> /deep burial*
Category No.2	<b><u>Animal Waste</u></b> (animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospitals, animal houses)	incineration <sup>@</sup> /deep burial*
Category No.3	<b><u>Microbiology and Biotechnology Waste</u></b> (wastes from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer cultures)	local autoclaving/ micro-waving/incineration <sup>@</sup>
Category No.4	<b><u>Waste sharps</u></b> (Needles, syringes, scalpels, blades, glass etc. that may cause puncture and cuts. This includes both used and unused sharps)	disinfection (Chemical treatment <sup>@@</sup> / auto claving/ micro-waving and mutilation/ shredding <sup>##</sup>
Category No.5	<b><u>Discarded Medicines and Cytotoxic drugs</u></b> (wastes comprising of outdated, contaminated and discarded medicines)	incineration <sup>@</sup> / destruction and drugs disposal in secured landfills
Category No.6	<b><u>Solid Waste</u></b> (items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, beddings, other material contaminated with blood)	incineration <sup>@</sup> autoclaving/ microwaving
Category No.7	<b><u>Solid Waste</u></b> (Wastes generated from disposable items other than the waste sharps such as tubings, catheters, intravenous sets etc.)	disinfection by chemical treatment <sup>@@</sup> autoclaving/ microwaving and mutilation/ shredding <sup>##</sup>
Category No.8	<b><u>Liquid Waste</u></b> (waste generated from laboratory and washing, cleaning, house keeping and disinfecting activities)	disinfection by chemical treatment <sup>@@</sup> and discharge into drains
Category No.9	<b><u>Incineration Ash</u></b> (ash from incineration of any bio-medical waste)	disposal in municipal landfill
Category No.10	<b><u>Chemical Waste</u></b> (Chemicals used in production of biologicals, chemicals used in disinfection, as insecticides etc.),	chemical treatment <sup>@@</sup> and discharge into drains for liquids and secured landfill for solids

@@ Chemicals treatment using at least 1% hypochlorite solution or any other equivalent chemical reagent. It must be ensured that chemical treatment ensures disinfection.

## Multitilation/ shredding must be such so as to prevent unauthorised reuse.

@ There will be no chemical pretreatment before incineration. Chlorinated plastics shall not be incinerated.

Deep burial shall be an option available only in towns with population less than five lakhs and in rural areas.

## **OTHER GENERAL CONDITIONS APPLICABLE TO ALL CATEGORIES OF OCCUPIERS**

### **(E) CONSTRUCTION MATERIALS/CONSTRUCION DEBRIS and DEMOLITION WASTES**

#### **E-1 Responsibilities of the owners / builders**

E-1.1 No person shall dispose construction materials / construction debris or waste on the streets, public space, footpaths or pavement.

E-1.2 For all builders / owners of Group housing projects / multi-storey apartments

E-1.2.1 Construction materials during the construction period shall be stored within the premises of the plot.

E-1.3 For all builders / owners of independent houses

E-1.3.1 Owner/ Builder shall store construction materials at the 'Patri' of the road by paying non-refundable stacking fee, as per GNIDA's building regulations. In no case, the owner / builder be allowed to store materials on the 'metal' portion of the road.

E-1.3.2 Penalty shall be levied for storing construction materials on the streets, public space, footpaths or pavement

#### **E-2 Role of GNIDA**

E-2.1 GNIDA shall offer 'pick-up service' of construction debris/waste and subsequent transportation and disposal through private agency.

#### **E-3 Systems for management of construction debris / waste**

E-3.1 GNIDA shall *notify the rate per MT for collection, transportation and disposal* of construction debris and waste to the people.

E-3.2 Every person who is likely to produce construction waste may deposit an approximate amount in advance at the rate prescribed by GNIDA. This amount shall be deposited at the time when building permission is being sought and in cases where such permission is not required, at any time before such waste is produced.

E-3.3 The charges for removal of construction debris shall be doubled for those who fail to deposit the amount in advance.

#### **E-4 VALUE-ADDED SERVICES**

##### **E-4.1 Customer service office**

E-4.1.1 The private service provider shall open a customer service office for registering written or telephonic complaints.

E-4.1.2 The service provider shall service the complainer within 24 hours of the complaint's registration.

**E-4.2 Trucks and sweepers on call service** for the following

E-4.2.1 Removal of dead animals / birds within 6 hours of the complaint's registration.

E-4.2.2 Removal of construction debris / demolition waste within 6 hours of the complaint's registration.

E-4.2.3 Removal of waste from marriage halls, community halls and open grounds (after public functions) within 6 hours of the complaint's registration.

E-4.3 All the cases of these complaints and the remarks shall be documented and the efficiency in service delivery will be one of the criteria governing the performance of service provider.

E-4.4 The service provider shall attend periodic meetings organized by GNIDA for solid waste management. These meetings shall focus on understanding the issues, needs and concerns of users and also the service provider(s).

## **E-5 ROLE OF GNIDA**

### **E-5.1 Educating people**

E-5.1.1 GNIDA shall involve resident welfare societies, village panchayats and associations of industries, medical establishments and markets in creating awareness among people.

E-5.1.2 GNIDA shall educate people on the systems for the various segments through brochures, pamphlets, road shows, etc.

E-5.2 Regulatory framework shall be evolved to facilitate implementation of these systems with provision for

E-5.2.1 Collection of user fee from the various segments through the water bill.

E-5.2.1 Imposing penalty for violators

E-5.2.1.1 Penalty of Rs 5000 shall be collected as 'arrears of land revenue' from industrial, institutions and commercial segments for violation of these rules / law.

E-5.2.1.2 Penalty of Rs 100 from households for violation of these rules / law.

E-5.3 Organising periodic meetings with various user segments and service provider(s) to address issues and concerns of various interest groups.