WASTE MANAGEMENT REPORT

2019-2020

Dhaka South City Corporation

Waste Management Department (WMD)

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LIST OF ACRONYMS

ACWMO	Assistant Chief Waste Management Officer
Ad. CWMO	Additional Chief Waste Management Officer
CI	Conservancy Inspector
CO	Conservancy Officer
CWMO	Chief Waste Management Officer
DCWMO	Deputy Chief Waste Management Officer
DNCC	Dhaka North City Corporation
DoE	Department of Environment
DSCC	Dhaka South City Corporation
ED	Engineering Department
EE	Executive Engineer
FTFP	Fixed-Time Fixed-Place
FY	Fiscal Year
GoB	Government of Bangladesh
HCE	Health Care Establishment
HQ	Headquarter
JICA	Japan International Cooperation Agency
LFS	Landfill Site
LGD	Local Government Division
MBDT	Million Bangladeshi Taka
MT	Metric Ton
NGO	Non-Government Organization
PCSP	Primary Collection Service Providers
SCP	Secondary Collection Point
SE	Superintendent Engineer
SPD	Store and Purchase Department
STS	Secondary Transfer Station
SWM	Solid Waste Management
TD	Transport Department
WBA	Ward-Based Approach
WMD	Waste Management Department
WtE	Waste-to- Energy

WASTE FACTS AT A GLANCE

Total Area		109 sq. km
Population[1]		6.3 million
Average Population density		57,798 per sq. km
Total Number of Zone		10
Total Number of Ward		75
Total Amount of Waste Generation		3,256 Ton/day
Waste Collection Growth		7.7 %
Waste Collection	Total amount	927,100 Ton
	Percentage	78%*
Total Trip Generation		232,940 nos.
Waste Collection	Highest in a month	89,235 Ton (August 2019)
	Lowest in a month	55,927 Ton (February 2020)
DSCC Cleaners		5,168 nos.
Number of Sanitary Landfill		One (Matuail Landfill Site)
Load Per Trip		3.98 Ton/trip
Waste Generation During Eid-ul-Adha		19,200 Ton
Number of Waste Collection Vehicles		307 (Arm Roller: 12; Compactor: 58; Container Carrier: 74; Dump Truck: 112, Open Truck: 10, Heavy Equipment: 41)
Container Box		360 nos.
Average Waste Disposal in Landfill		2,540 Ton/day
Landfill Operation Cost		426 Taka/Ton

* Mostly uncollected from drain, waterbodies, canals, and newly extended area.

http://www.dscc.gov.bd/

[1] UN World Population Prospects

MESSAGE FROM HONORABLE MAYOR

Waste management is a concern for all city dwellers as it assures the safety to the health and the living environment. Every citizen should aware of the overall situation of waste management in the city. Similarly, City Corporations should also disclose information to the general citizen and related stakeholders about their activities to improve the solid waste management with people's support. This is implemented by a comprehensive annual waste management that Waste Management Department of Dhaka South City Corporation (DSCC) prepares.

Around 3,300 tons of waste are managed by DSCC every day, and WMD controls them through waste collection, transport and disposal considering environmental regulations as well as public health. With the rapid growth of urbanization and economy, although it becomes challenging to keep the waste management under control, WMD is making efforts to continue the service with more modern and dynamic approach at all levels.

Soon after I have taken my chair and responsibility, we have taken the initiatives to improve the current waste management system. We have changed the waste collection, transport, and disposal time from day shift to night shift for the smooth execution of waste management, and we have brought the door-to-door waste collection to formal sector by allowing single PCSP to collect waste from each ward. DSCC is now constructing secondary transfer stations in every ward to improve the secondary collection system. DSCC is taking a Ward Based Approach in waste management.

WMD of DSCC is regularly striving to provide the best service, and we are moving forward from the traditional management to the modern system with digitization and better technology with the support of local experts and foreign donors like JICA. We are committed to the citizen of DSCC for proving sustainable, clean, and livable Dhaka City, and I hope that we can achieve our goal with everyone's collective effort.

SHEIKH FAZLE NOOR TAPOSH (Barrister-at-Law)
MAYOR

MESSAGE FROM CHIEF EXECUTIVE OFFICER

Waste management plays an important role in the City Corporation's overall activity to keep a clean and safe environment for the citizens as effective solid waste management reflects overall standards of the DSCC's commitments to provide public services to the citizens. For better waste management, it needs multidimensional approach including environmental, technical, cultural, and socio-economic aspects.

In Dhaka, being one of the most densely populated cities in the world with the rapid economic growth and urbanization, waste management becomes even more challenging for the Waste Management Department (WMD) of DSCC. Identifying the diversified communities, WMD over the years has been proactive in continuing our service stable.

Our city corporation is committed to keep its activities and work transparent and accountable to our city dwellers, achieving it through an annual report on waste management to compile all WMD's activities and analysis. This annual report is the first of its kind that has been compiled with the available waste management data and published for the readers. The report also describes DSCC's future to improve the waste management.

DSCC is committed to implement Honorable Mayor's vision, and the waste report would help everyone assessing our activities and exploring feasible ways that one can do for clean Dhaka.

A. B. M. AMIN ULLAH NURI
CHIEF EXECUTIVE OFFICER

INTRODUCTION TO WASTE REPORT

The Waste Report of DSCC is a mirror for the Waste Management Department (WMD) that reflects the activities related to waste management of DSCC. Waste Report 2019-2020 has been prepared with the aim to inform the public about the activities of DSCC regarding waste management. Population being the pivotal point of Waste management the report focuses the urbanization, population, waste generation and overall management by the DSCC.

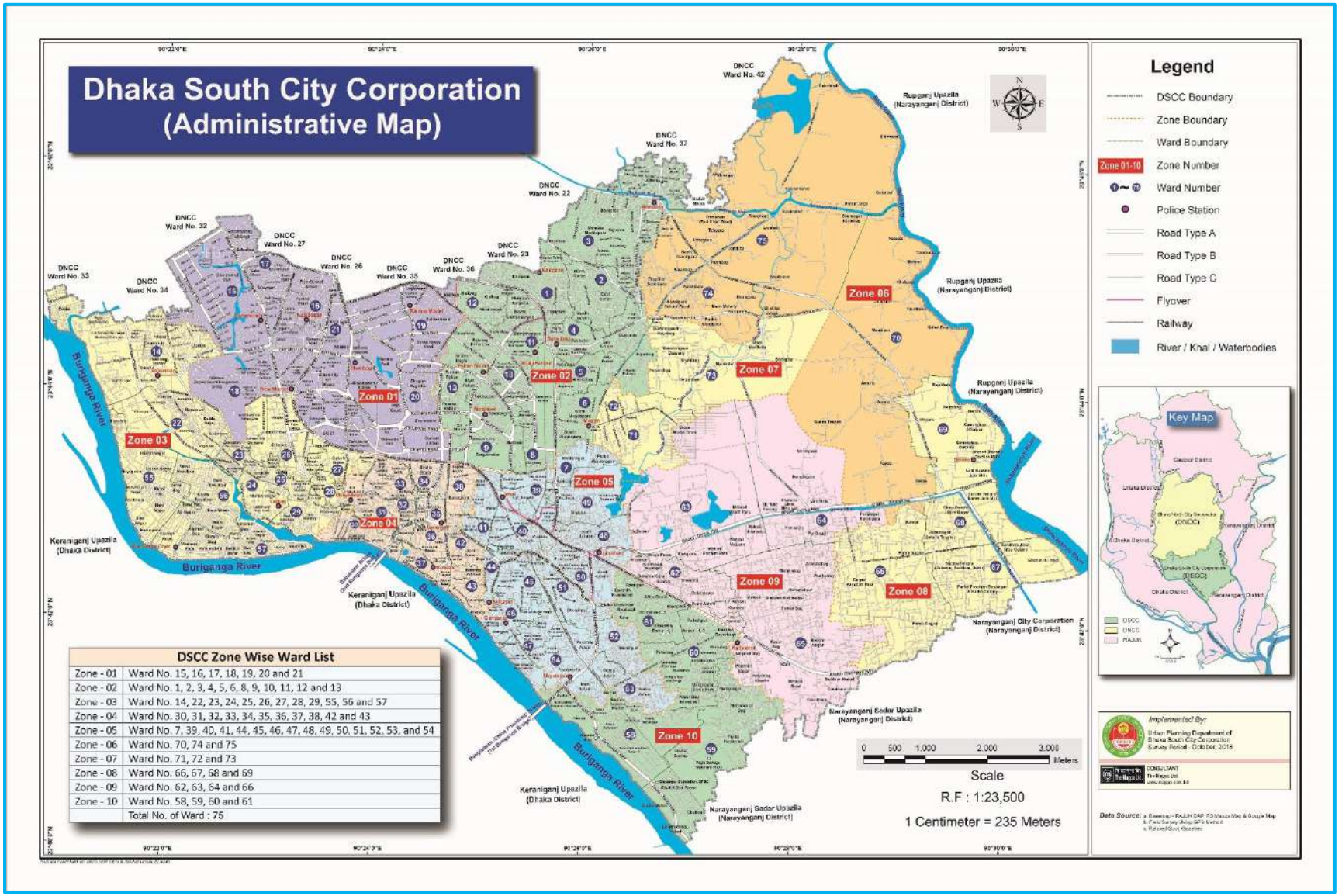
With the rapid development of the country the standard of living in Dhaka city is also improving, and rate of per capita waste generation has also increased over the years. Moreover, 18 wards of newly included area with the DSCC will come under the waste management system soon and will be needed to put additional effort for sound disposal of this increased waste. With the current organizational structure of WMD, it would be challenging job for DSCC to bring this issue under manageable condition.

Besides solid waste, WMD is also focusing on the management of other categories of waste like hazardous medical waste, electronic waste, industrial waste, construction waste etc. Hazardous Medical waste being the most dangerous to the public health has been brought under control managing through PRISM Foundation Bangladesh. At present, DSCC does not have adequate resources to manage all the categories of the waste; however, our efforts are on to bring those under positive control.

This report is first in its type for DSCC and intended to give some preliminary idea to the citizen regarding the management of waste in DSCC area so that the citizen can appreciate the waste situation and DSCC's efforts and understand how much our effort is to manage those effectively. WMD, DSCC is committed to ensure a clean, pollution free and healthy living environment for the valued citizens of Dhaka south City. More on this report will contribute in awareness building of the citizens as well as encourage them in the participation in Waste Management of the City Corporation.

AIR COMMODORE MD. BADRUL AMIN
CHIEF WASTE MANAGEMENT OFFICER

AREA MAP OF CITY CORPORATION



1.0 OVERVIEW OF SOLID WASTE MANAGEMENT

1.1 Function of Waste Management Department

The waste in DSCC is comprised of different types such as municipal solid waste, electronic waste, hazardous medical waste, food waste, construction waste, and industrial hazardous waste. Among all types, municipal solid waste is the majority of the waste that Waste Management Department (WMD) mainly deal with. Composition of the municipal solid waste includes 'anything' that people throw into DSCC's waste bins, collection points and other open places.

WMD covers the following areas:

- Provision of waste collection services in coordination with the Transport Department (TD), the Engineering Department (ED) and relevant other departments of DSCC;
- Regular street sweeping and drain cleaning;
- Monitoring of primary waste collection activities implemented by DSCC-contracted PCSPs;
- Transport of waste from the secondary transfer stations to the landfill site;
- Construction, operation and maintenance of waste management infrastructures, i.e., ward offices, STSs, workshops, landfill components;
- Procurement and maintenance of waste collection vehicles and landfill equipment;
- Operation and maintenance of Matuail Landfill site with protection of environment by leachate treatment, soil covering, greenery program, post closure of landfill area;
- Promotion of occupational health and safety for the WMD staffs and cleaners;
- Capacity building of the WMD officials through national and international trainings, seminars, site visits;
- Public awareness raising on solid waste management for the citizens;
- Planning of waste management activities and budgeting; and
- Monitoring of medical waste management.

The WMD, comprising the Engineering Division and the Conservancy Division, has been successfully collecting and disposing of to the Matuail landfill site around 2,540 tons of waste per day in close collaboration with other departments of DSCC. In general, the Engineering Division is responsible for the mechanization of the waste collection and transport system, while the Conservancy Division for street and drain cleaning, and monitoring the primary collection system.

The collection and transport vehicles are being repaired and maintained by the Mechanical Department. Transport Department is responsible for the vehicle operation and the Store and Purchase Department is responsible for procurement of the small cleaning tools such as brooms, shovels, and spades.

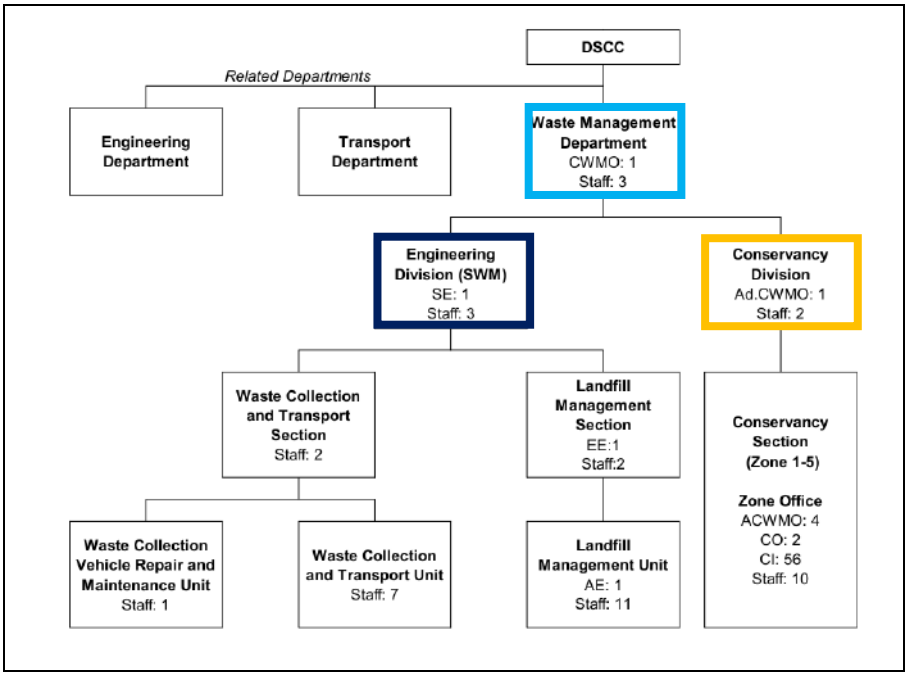


Figure 1: Existing organogram of WMD

1.2 Central Government's Regulatory Framework

The Government of Bangladesh (GoB) has formulated various regulatory documents such as policies, acts, rules, and strategies related to waste management, as shown in Table below. Draft Solid Waste Management Rules 2018 has been formulated as a fundamental law of waste management and is currently in the process of endorsement. The waste management-related laws define the responsibility on SWM regarding waste collection and transport in addition to waste treatment and disposal. Despite the case that the regulation appoints the central government agencies as a supervising authority, City Corporations are often involved in its supervision.

Table 1: Regulatory Documents related to Solid Waste Management

Title/Contents	Year	Organization
Bangladesh Environment Conservation Act 1995, amended in 2000, 2002, and 2010	1995	DoE
National Environmental Management Action Plan	1995	DoE
Environmental Conservation Rules 1997	1997	DoE
Lead Acid Battery Recycling Related Circular	2006	DoE
Medical Waste (Management and Handling) Rules 2008	2008	DoE
National 3R Strategy for Waste Management 2010	2010	DoE
Local Government (City Corporation) (Amended) Act 2011	2011	LGD
Hazardous Waste and Ship Breaking Waste Management Rules 2011	2011	DoE
Ship Breaking and Recycling Rules 2011	2011	Ministry of Industries

Title/Contents	Year	Organization
National Environmental Policy 2013	2013	DoE
Seventh Five Years Plan (FY 2016–FY 2020)	2015	Ministry of Planning
Electrical and Electronic Product Induced Waste (E-waste) Management Rules 2017	2017	DoE
Draft Solid Waste Management Rules 2018	2018	DoE

Local Government (City Corporation) (Amended) Act 2011:

According to Section 92 of the Local Government (City Corporation) (amended) Act 2011, all the acts mentioned in the fifth schedule would be regarded as punishable offence. Section 13 of the fifth schedule finds littering as an offence. It states that "it is an offence if a person throws or keeps rubbish on the street or any place other than that prescribed by the City Corporation." Section 93 states that where there is no express provision as to punishments of any of the offences, then he/she may be liable to a fine not exceeding Taka 5,000. If the offence is repeated, then the fine shall have increments of Taka 500 every day.

1.3 Per Capita Waste Generation and Waste Collection in 2019-2020

The amount of waste in DSCC is increasing day by day due to increased number of infrastructure developments, shopping complexes, restaurants, markets, bazaars along with roadside tea-stalls, floating vendors, and flower markets on the footpath. Due to economic and employment opportunities, people's lifestyle have been changed in Dhaka City. In 2019-2020, per capita per day waste generation is found 0.72Kg which was previously 0.65Kg and 0.575Kg in 2018-2019 and 2017-2018 respectively.

Per capita waste generation varies from ward to ward due to the economic status and lifestyle pattern. People in Ward-37 and Ward-20 have been generating much more waste compared to other wards and per capita per day waste is 3.6Kg and 2.3Kg respectively. These wards cover places like Sadarghat and Topkhana road where a lot of floating markets, restaurants and commercial spaces can be found. Whereas only 0.26 kg and 0.32 kg per capita waste is being generated from Ward-24 and Ward-2. The highest and lowest top 5 per capita waste generating wards are depicted in the following bar charts:

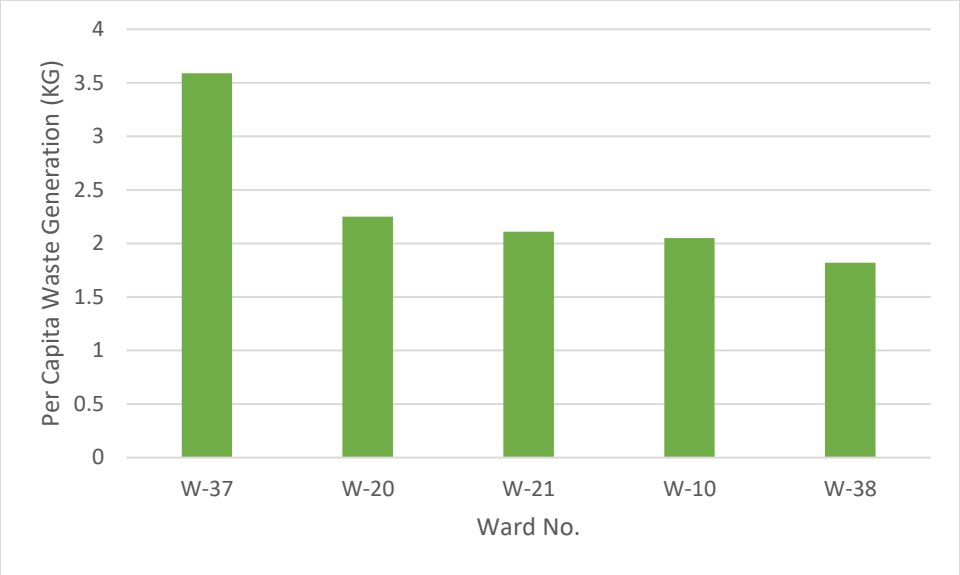


Figure 2: Highest per capita waste generating 5 wards.

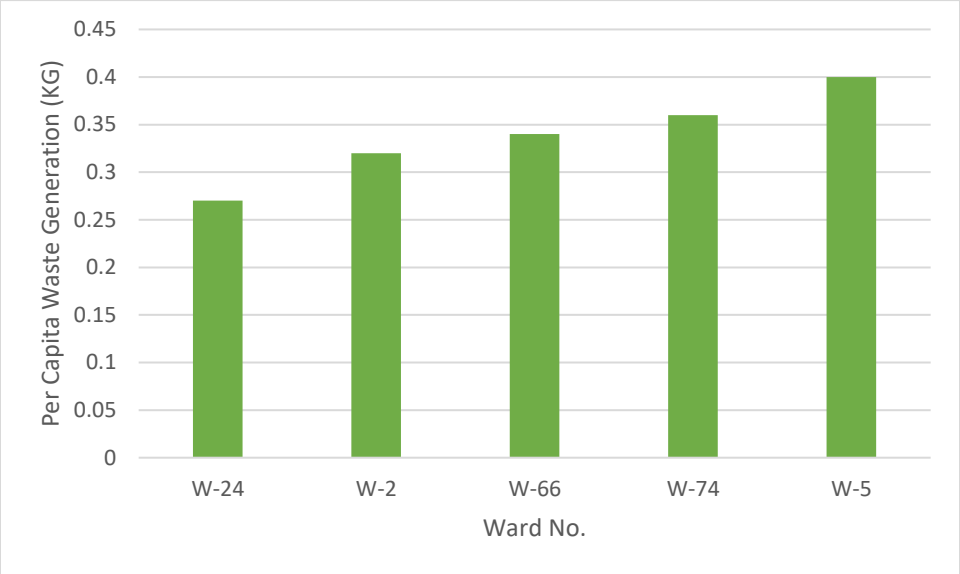


Figure 3: Lowest per capita waste generating 5 wards.

Though DSCC collects municipal solid waste that citizens generate every day, citizens often discharge waste into open spaces, drains, canals, or own backyard rather than to dump in DSCC's designated secondary collection points. The highest and the lowest amount of waste is collected from Ward-15 and Ward-3 respectively in FY 2019-2020. The highest and lowest top 5 ward-wise amounts of waste collected in FY 2019-2020 are presented in the subsequent chart.

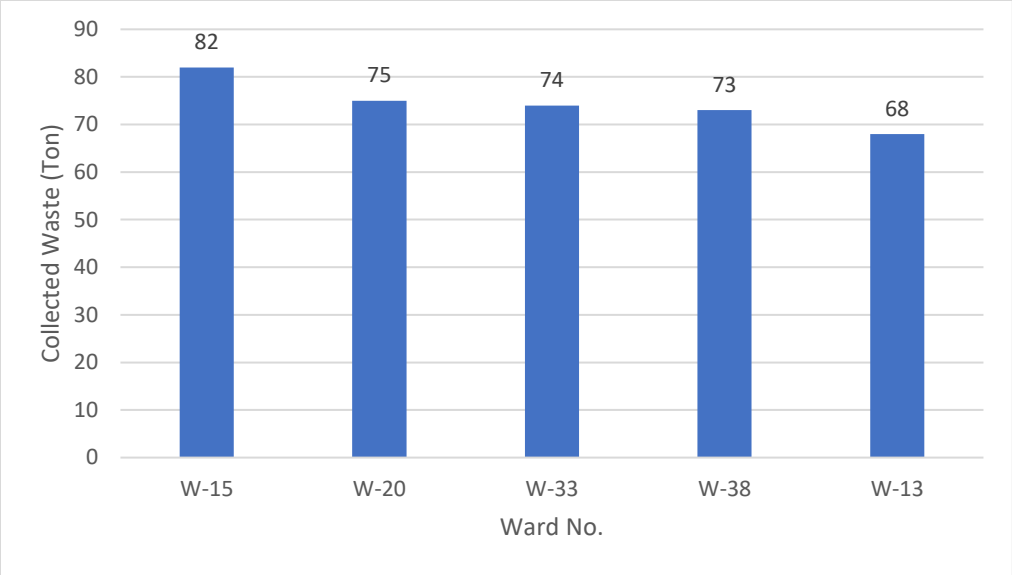


Figure 4: Highest amount of waste collecting 5 wards.

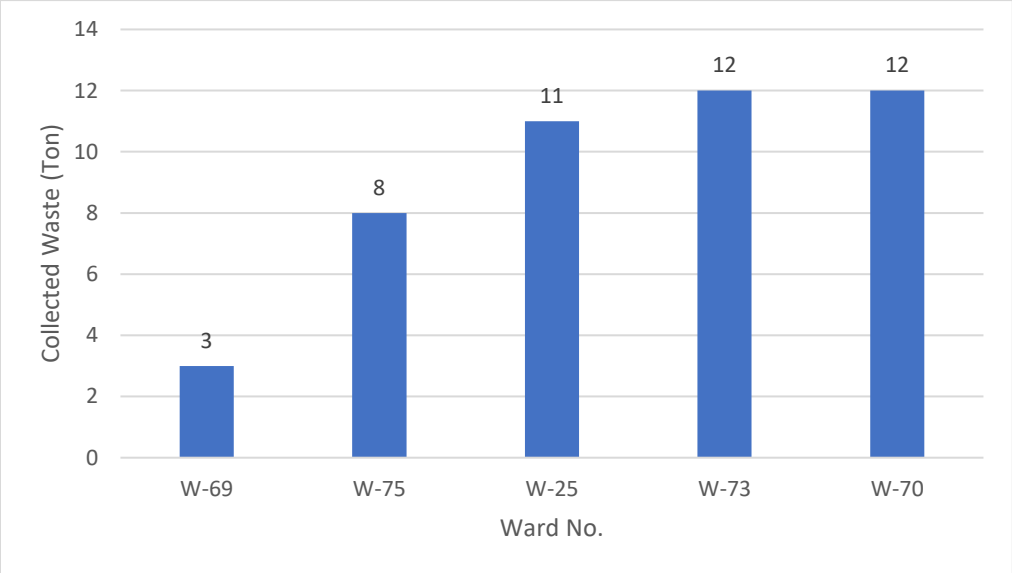


Figure 5: Lowest amount of waste collecting 5 wards.

1.4 Waste Collection Trend

DSCC currently collects 78% of solid waste by using their available vehicles. 90% collection rate could be achieved by introducing more vehicles and adopting more efficient and modernized collection system in the city. The waste collection growth rate since FY 2015-2016 is shown in table and graph below. The solid waste sources and their final disposal scenario is depicted in the waste flow diagram for the FY 2019-2020 as shown below.

Table 2: Yearly Waste Collection Amount

Year	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Total Waste Collection (Ton/year)	687,466	768,030	784,750	860,305	927,100
Monthly Average Collection (Ton/month)	57,289	64,002	66,650	73,067	78,740
Daily Average Collection (Ton/day)	1,883	2,104	2,150	2,357	2,540
Waste Collection Growth	-	12%	4%	9.6%	7.7%

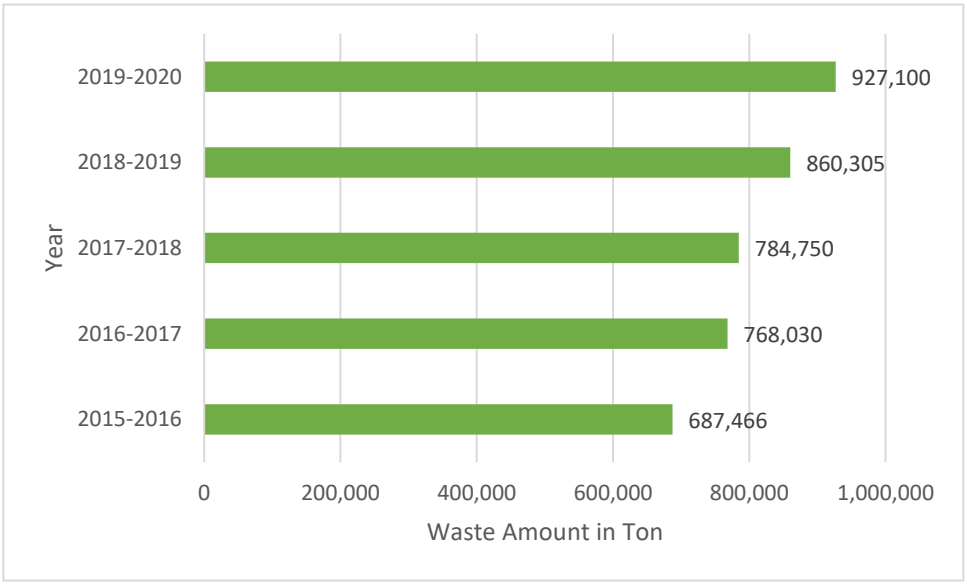


Figure 6: Waste collection trend

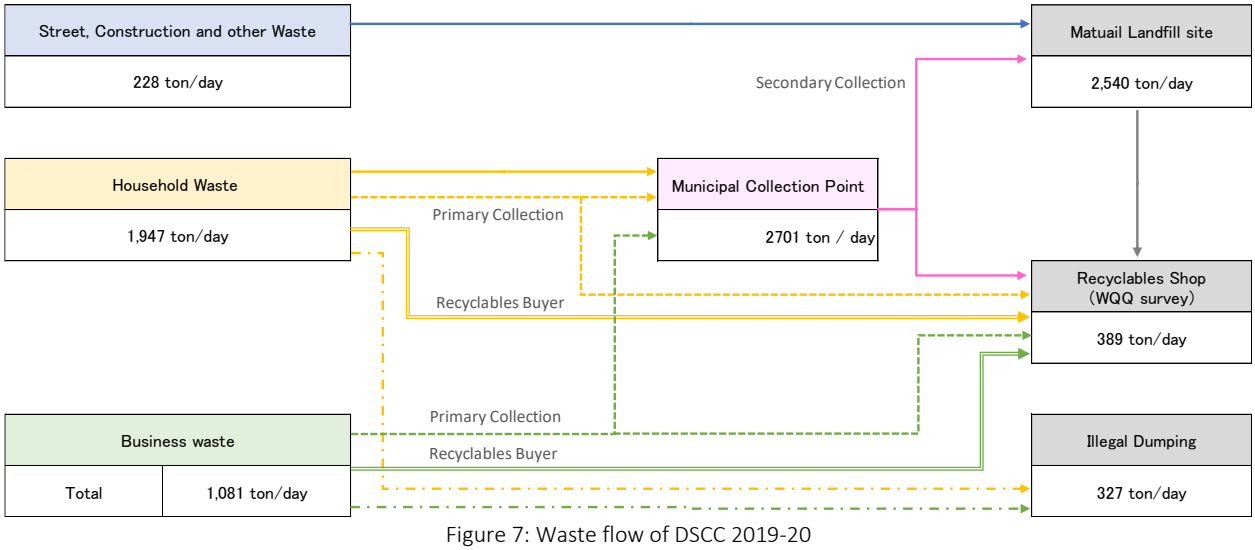
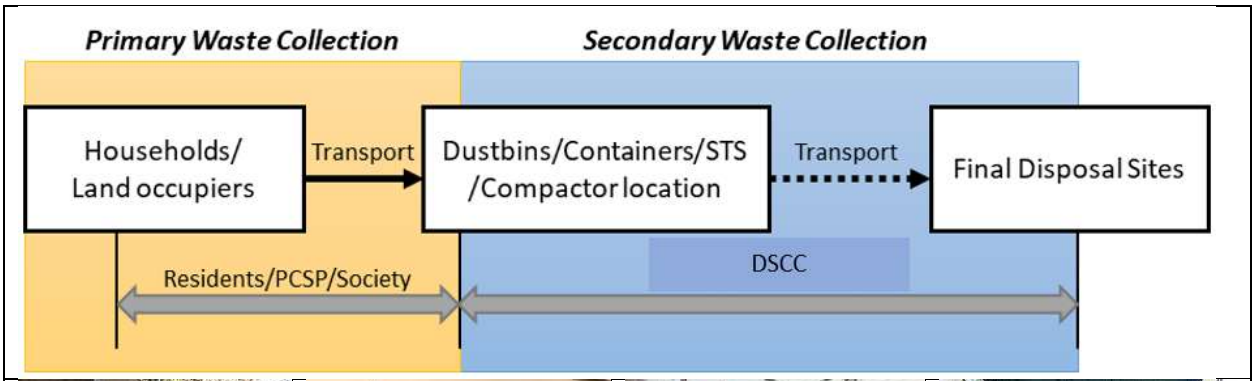


Figure 7: Waste flow of DSCC 2019-20

1.5 Schematic Diagram of Collection, Transportation and Disposal System

In DSCC, waste collection consists of two parts, namely primary collection, and secondary collection. DSCC is responsible for secondary waste collection to remove waste from STSs, dustbins, and containers, and transport it to the final disposal site. For the primary collection, waste generators, particularly residents, are responsible for bringing their waste to DSCC's waste collection points or receptacles such as dustbins, containers, or STSs. Though, DSCC is not collecting the waste from the Households but is responsible for supervising the performance and activity of the PCSPs. In practice, Primary Collection Service Providers (PCSPs) collect waste from door-to-door and transport the waste to dustbins, containers, or sometimes to vacant lands, by rickshaw vans.



Households

PCSP

Secondary Collection Point/ STS

Matuail Landfill

Figure 8: Schematic Diagram of Collection, Transportation and Disposal System

1.6 Expenditures Related to SWM

The total SWM expenditures have increased since FY 2012–2013 and reached approximately 4.65 billion BDT in FY 2016–2017, of which 86% and 14% were revenue and development expenditures, respectively. In FY 2016–2017, more than 5.0 billion BDT of the budget was allocated for land acquisition and development of the Matuail LFS expansion in accordance with the approved Development Project Proposal (DPP). The conservancy tax income of DSCC in FY 2017-2018 was 573 million BDT, which is insufficient for

covering the total expenditures of SWM. The gap of SWM budget is covered by allocating budget from the central budget as special cleaning activities of DSCC.

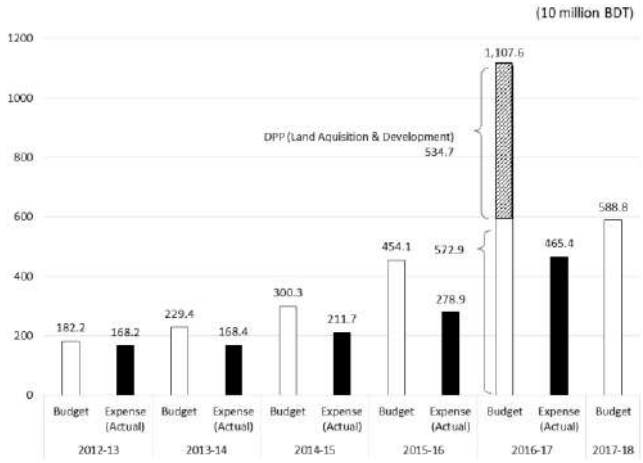


Figure 9: Budget & expenditure for SWM

Source: DSCC Budget Book 2017–2018

The SWM operation in DSCC is categorized into four types: i) Cleaning of roads and drains, ii) Collection and transport, iii) Landfill operation, and iv) Repair works. The first category accounts for 59%, the second for 25%, the third for 14% and the last for 2%. The operation-wise expenditures of SWM are shown in the chart below.

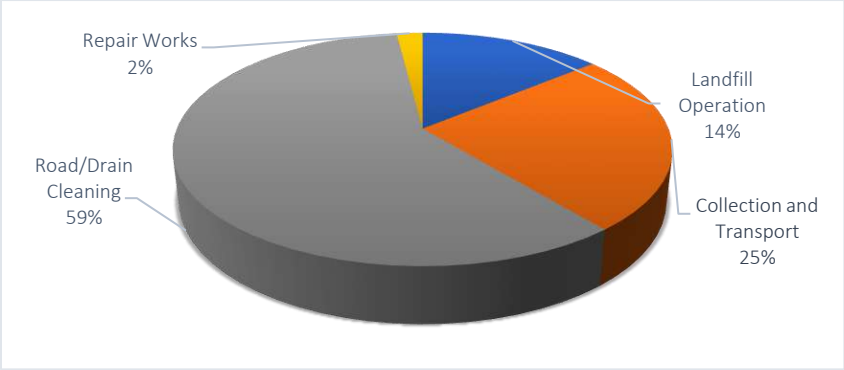


Figure 10: Breakdown of SWM expenditure

Operation-wise Solid Waste Management Expenditure for FY 2019-2020 is listed in the table below.

Table 3: Operation-wise SWM expense in 2019-20 FY

Operation	Yearly Expenditure (MBDT)
Cleaning of roads and drains	397.38
Collection and transport	1,966.80
Landfill operation	251.50
Repair works	69.00
Total*	**2684.68**

Source: JICA Project Team analysis based on the DSCC Budget Book 2016–2017

2.0 TRENDS OF POPULATION

Mega city Dhaka is one of the largest and most densely populated cities in the world. DSCC being the older part of the Dhaka Mega city has highest density of population and thickly structured with installations. The rapid urbanization of Dhaka city mostly impacts in the DSCC area resulting miscellaneous difficulties in the waste management system. Dhaka city is an attractive destination that offers employment opportunities, health care services, and educational services, and encourages human settlement. Understandably, the current rapid economic growth and overflow of population has exerted tremendous pressure on SWM becoming increasingly complicated and diverse, resulting in more waste generation.

Population of DSCC has been estimated as 6.3 million with average population density of 57,798 per sq. km in FY 2019-2020[1], with maximum and minimum population of 234,875 and 2,466 per sq. km in Ward-33 and Ward-69 respectively. Population and population density wise top ten wards are shown in charts below.

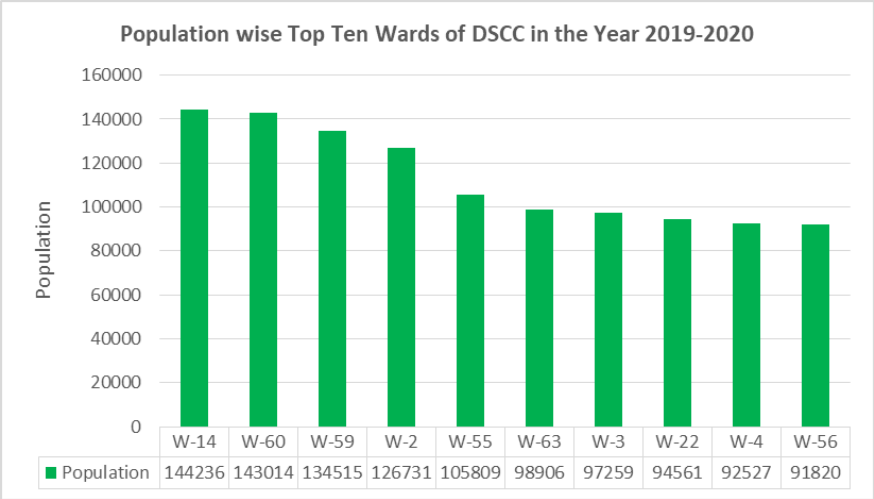


Figure 11: Population-wise top 10 wards of DSCC

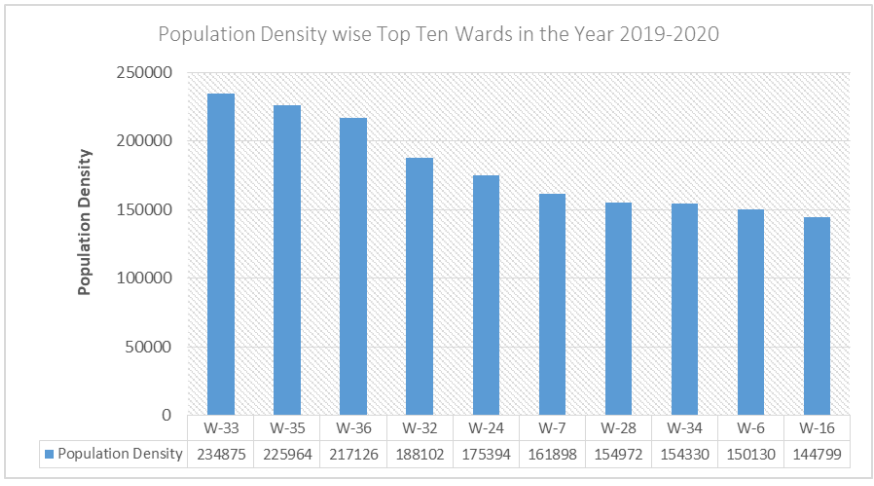


Figure 12: Population density -wise top 10 wards of DSCC

3.0 PRIMARY WASTE COLLECTION

Waste collection from the points of generation, households and buildings is typically called as primary collection when such wastes are disposed to a secondary collection point of municipal services of DSCC. The door-to-door waste collection is common at almost all the wards of DSCC. It is prevalent due to high pressure of population density, and distance of secondary collection point from waste generators. The entities providing primary collection or door-to-door collection services are recognized as Primary Collection Service Providers (PCSP). There are around 75 PCSPs are regularly working in DSCC.


Figure 13: Primary Collection by Rickshaw Van

Zone Wise Statistics of Primary Collection Service Providers:

There are registered or unregistered individual person, organization, and association with one or more rickshaw vans and with or without hand trolleys. The pattern of primary collection service varies amongst the wards, and it greatly depends on each community's favor.

PCSPs are gradually shifting from informal to formal sectors by having various recognition and registration from the different body of the government. DSCC is trying to improve PCSP's service through capacity building and empowerment activities such as registration system, training, stakeholders' dialogues etc. In 2020, DSCC has appointed 75 PCSPs in 75 different wards with tendering process. As a result, DSCC has not only ensured a source of revenue but also formalized the activity and the scope of work of the primary waste collectors.

Zone Wise Cleaners Statistics:

In 2020, the total number of 5,346 cleaners are regularly working relentlessly for the common goal, to clean Dhaka city. The cleaners are responsible for street, drain, truck and STS cleaning. Zone wise distribution of cleaners has been shown in the following table:

Table 4: Zone-wise cleaner number

Zone	DSCC					Total Cleaner
	Street Cleaner	Drain Cleaner	Truck Cleaner	STS Cleaners	Others Cleaners	
1	711	33	179	11	94	1028
2	888	25	120	15	60	1108
3	657	31	85	12	8	793
4	734	26	111	25	100	996
5	886	25	133	13	186	1243
Total No of Cleaners						5168

4.0 SECONDARY WASTE COLLECTION

Waste accumulated in Secondary Collection Points (SCPs) (Secondary Transfer Station (STS), Container and dustbins) are categorized in three major types based on the source of waste: household waste, street waste including sludge from drainage, and business waste. There are four different types of secondary collection receptacles: concrete bins/dustbin, containers, arm roll containers, and compactors for direct transport without waste storage. Open curbside waste accumulation is sometimes used at designated points for areas where container placement is difficult. It is noteworthy that, dustbin and dumping sites closure are ongoing with the DSCC initiative. Thus far, 225 dustbins and more than 30 containers have been removed from the streets since 2018. Some collection routes have been reformed accordingly to improve the collection efficiency by introducing compactors with Fixed-Time Fixed-Place (FTFP) collection.

List of Collection Vehicles:

There are altogether 265 waste collection and transport vehicles in DSCC among which 243 vehicles are under operation, 2 compactors are under repairing process and 20 new dump trucks are yet to be distributed. DSCC is gradually shifting towards waste collection and transportation by compactor considering the environmental friendliness. There are altogether 58 compactors in DSCC which is 22% of the total waste collection vehicles. The summarized list of the collection and transport vehicles of DSCC is stipulated in the following table:

Table 5: Summary of DSCC Waste Collection Vehicle

SL	Item	Total	Under Operation	Under Repairing
1	Container Carrier	74	74	0
2	Arm Roll	12	12	0
3	Compactor	58	58	0
4	Open Truck	10	10	0
5	Dump Truck	112	92	0
	Total	266	244	2

Note: Japan Grant Aid vehicles are Operated by Transport Department

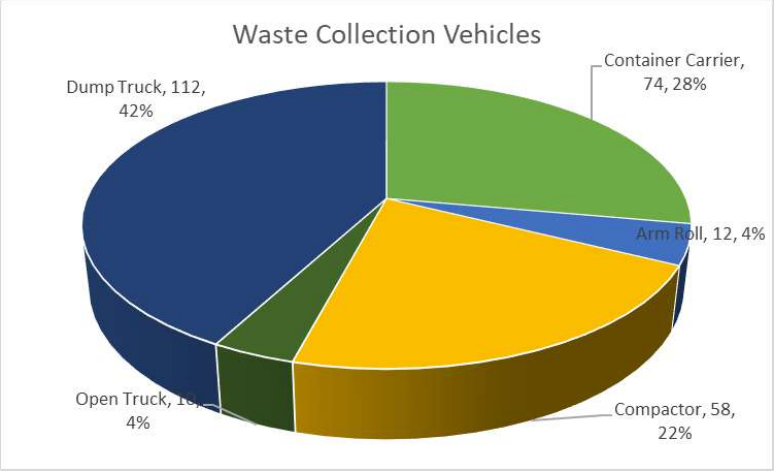


Figure 14: Percentage of waste collection vehicle

Snippets of Waste Collection Vehicles

Container Carrier

Arm Roll

Compactor

Open Truck

Dump Truck

Container Carrier = 74

Arm Roll = 12

Compactor = 56

Open Truck =10

Dump Truck = 112

Landfill Heavy Equipment

Excavator

Wheel Loader

Figure 15: Snippets of waste collection vehicles & heavy equipment

Ward Wise Secondary Transfer Station (STS):

DSCC constructed the first STS to avoid open dumping in designated and undesignated spots in 2017. Before that, both designated and undesignated spots were in open environment, mostly large concrete bins or containers either on footpath or roadside. At the first instance, shifting those open spots to an enclosed area was very challenging because of insufficient land in all wards to build STS.

The location of the STSs is provided in the following table:

Table 6: List of STS location

Zone	Ward	STS Locations	Zone	Ward	STS Locations
1	15	Kalabagan, Dhanmondi	4	43	Gudaraghat, Ultinganj
	19	Sabji Bagan (East side of T&T office)	5	41	Under Mayor Hanif Fly-over (close to super hotel)
	21	Dhaka Medical College (Emergency Gate)		46	Old Loharpool
2	3	Meradia		48	Kalapotti, Jatrabari (north)
	12	Under Malibag Mouchak Flyover		42	Narinda Truck Stand
3	14	Beribadh (Close to Shikder Medical College)		49	Dhalpur Staff Quarter
	22	Progoti Dairy Farm		50	Jatrabari Crossing (Under fly-over)
	22	Matador More, Hazaribag		50	Dayaganj Crossing (Under fly-over)
4	33	Bongshal		54	Close to Zurain Graveyard
	33	South of Anandabazar		39	Under Mayor Hanif Fly-over (close to RAB-3 office)
	35	French Road (Adjacent to Janata Market)			Under Mayor Hanif Fly-over (opposite to Central women's University)

As of today, despite all the difficulties DSCC constructed 23 STSs. In addition, DSCC plans to construct STS in every ward in recent years.

Figure 16: Secondary Transfer Stations

Manual Street Sweeping:

DSCC cleaners are often reviled for the nuisance they create by leaving a choking, eye-watering cloud of dusts behind them when at work. Love them or hate them, those men and women in green uniforms provided by DSCC are probably some of the few people who work hard to keep the city clean and hygienic for its dwellers. Equipped with brooms and sweeps, they clean the dirt left by millions of city dwellers in the neighborhoods. The city corporation aimed to make Dhaka residents of cleanliness. To do that, around 3,876 street cleaners of DSCC (responsible for 57 wards) start their job at 4 am in the morning and finish by 8 am. They are engaged with street sweeping along with removing trash and street garbage, waste collection and disposal activities. Rest of 1292 cleaners are involved in drain cleaning, truck cleaning and STS cleaning.

Figure 17: Hare Road Sweeping

Figure 18: Suhrawardy Udyan Cleaning Campaign

Figure 19: Motijheel Foot Over Bridge after cleaning

Figure 20: Street cleaning under Mayor Hanif Fly Over

Figure 21: Water-Wash after sweeping

Figure 22: Panthokunjo Park after sweeping

Cleaners face difficulties and challenges in taking care of the littering of floating vendors, scattered street hawkers, legal or illegal road-side tea stalls and hotels/shops, markets, shopping mall, bazar, hotel and restaurants at the time of street sweeping. Besides that, digging and cutting of city roads/streets and dumping or storage of construction materials on the main road/city create cleaners' job more problematic and challenging. Almost 180-200-ton street waste (including construction materials, tree leaves etc.) have been collected at each day.

Figure 23: Floating Fruit Shops on Footpath

Figure 24: Construction Residue

Figure 25: Potholes on Main Road

Figure 26: Stagnant Water

Figure 27: Broken Footpath

Figure 28: Narrow Street

Figure 29: Construction Residue near Dustbin

Figure 30: Footpath occupied by Construction Material

Figure 31: Waste in between Containers

Figure 32: Uprooted Trees with Base Slab

Activities to Clear the Drain Blockage:

Drain cleaning is one of the major activities of WMD. Unlike street cleaning drain cleaning is not a daily job but periodically and upon necessity. There is 170 drain cleaners dedicatedly working manually and mechanically to solve the drain blockage and water stagnation issues.



Figure 33: Manual Drain Cleaning

DSCC is gradually shifting towards automatic drain cleaning system from the manual drain cleaning with mechanized jet and sucker machine from the year 2018.


Figure 34: Mechanized Jet and Sucker Clearing the Blocked Drain

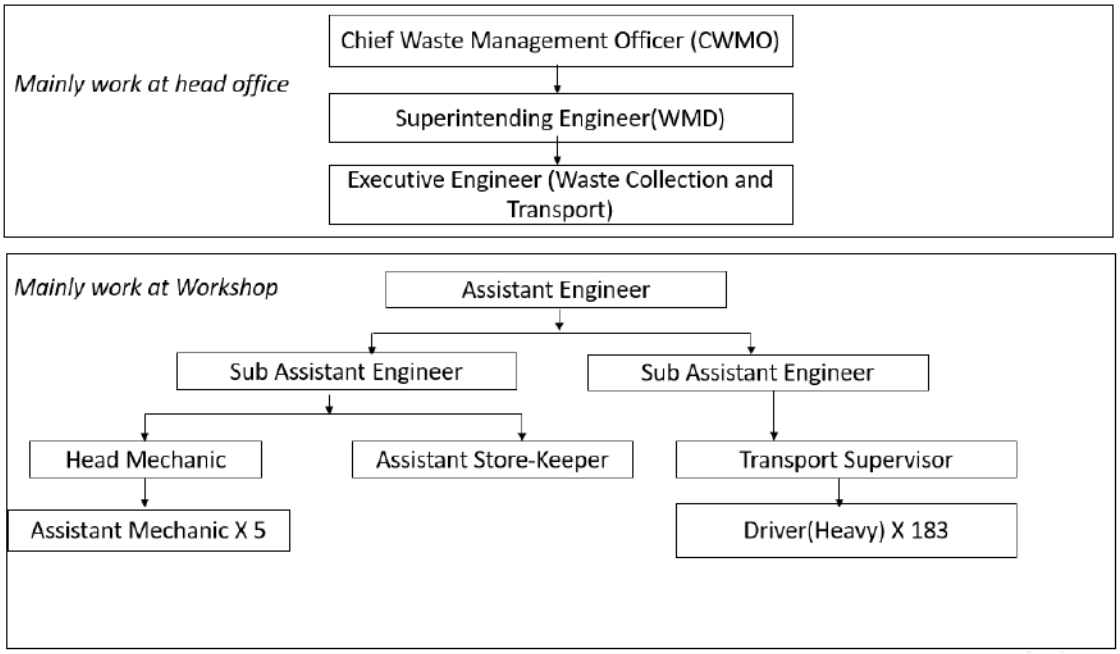
5.0 WMD WORKSHOP

DSCC has a functional workshop in Dhalpur for the maintenance of their vehicles with only six mechanics. Two workshop buildings are under construction in the Matuail LFS. Of the two under construction workshop of Matuail LFS, one workshop is aided by the JICA Grant Aid program. The JICA Grant Aid project is almost completed, and it will be operational soon after completion of some finishing works. It is noteworthy that the WMD officials of Matuail LFS have already started using some of the completed office rooms of the JICA Grant Aid workshop. Snippets of under construction workshop at Matuail LFS and typical staffing pattern of workshop are shown below.

Figure 35: JICA Grant Aid Workshop (Under Construction)

Figure 36: GoB funded Workshop (Under Construction)

Table 7: Organogram of Workshop



6.0 FINAL DISPOSAL SITE

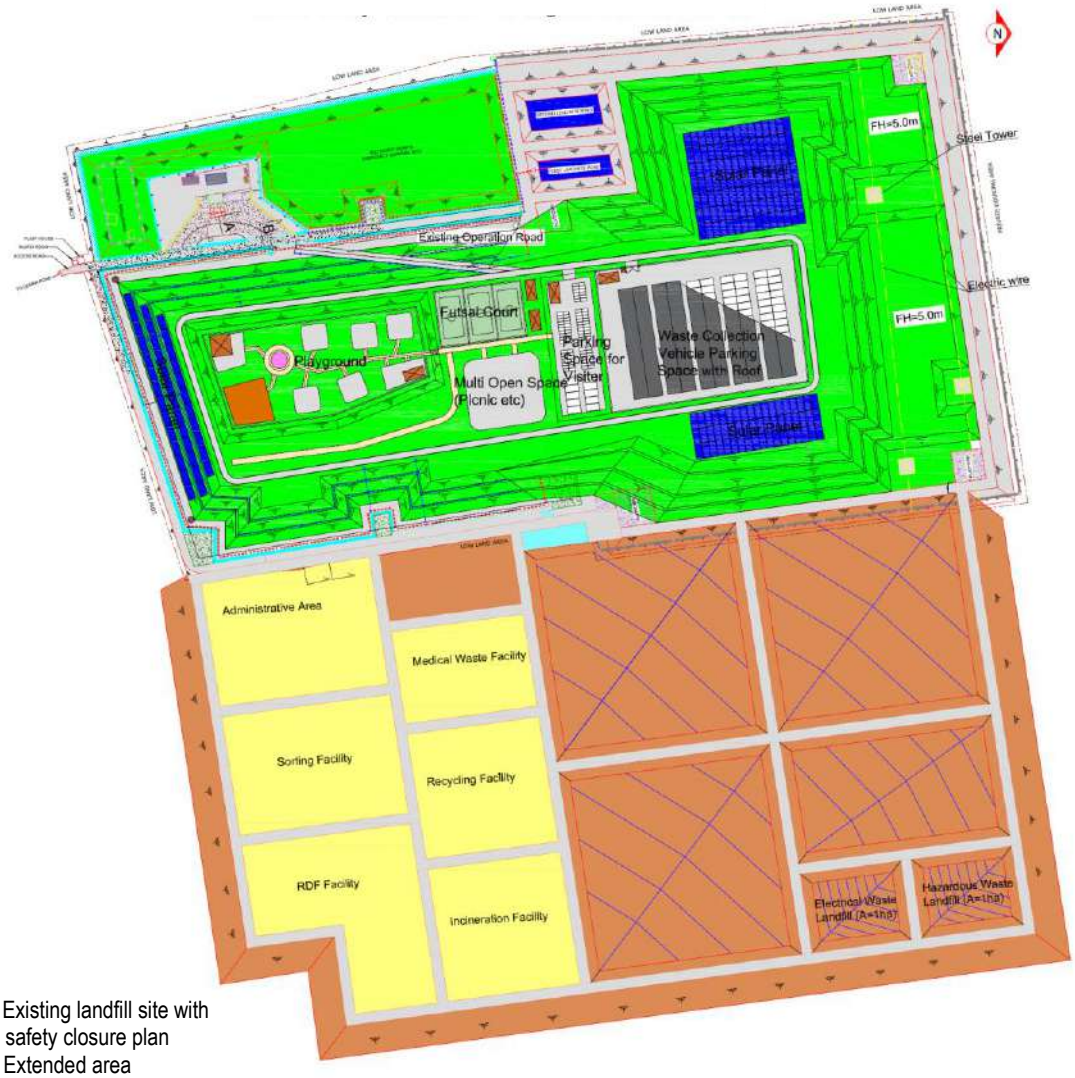
6.1 Components of Matuail Landfill Site

Matuail Landfill Site (LFS) is the ultimate disposal site of solid waste for DSCC. Waste dumping in Matuail LFS started in 1993, and improved afterwards from an open dumping site to a sanitary landfill which became the first sanitary LFS in Bangladesh in 2007. At present, DSCC is utilizing 39 hectares of land for the management of solid waste in the LFS. It is a controlled sanitary landfill where all the required systems have been incorporated for safer waste disposal addressing all probable measures to prevent the adverse effect on environment.

Main facilities of the Matuail LFS are listed below:

- Embankment
- Rain Water Drainage Facility
- Leachate Collection Facility
- Leachate Treatment Facility
- Leachate Re-circulation Facility
- Gas Collection Facility
- Weigh Bridge to measure the weight of the waste
- Platform to drop off the waste i.e. dumping platform
- Car Wash Facility
- Close Circuit TV Monitoring Facility

Over the years, the existing landfill area is getting exhausted, and it is estimated that by 2020 the entire 39 hectares area is likely to be filled up. Anticipating the future requirement, DSCC has taken a project to extend the landfill area and the project has acquired additional 81 acres of land beside the existing landfill. The project DPP amendment has been approved in December 2019 and the land acquisition cost has been submitted to the Deputy Commissioner of Dhaka on 4th June 2020 from the Honorable Mayor of DSCC. As per the DPP, the expected completion of the project was the end of 2020. Due to the amendment and approval of DPP, the project starting works delayed almost four years and expected to complete the project works by 2024.



Green area: Existing landfill site with safety closure plan
Brown area: Extended area

Figure 37: Layout of Matuail LFS

6.2 Weighbridge

Matuail LFS has two operational weighbridges for weighing the collected waste.

Figure 38: Weighbridge of Matuail LFS

6.3 Leachate Treatment Plant

Leachate Treatment Plant has been designed to treat the effluent from the entire Matuail LFS leachate with the following scale:

- Type of Effluent- Matuail LFS Leachate
- Effluent Rate- 100 m^3/hr
- Operation Hour- 10 hrs./day
- Treatment Method - Activated sludge process followed by biological treatment.

Figure 39: Leachate Treatment Plant in Matuail LFS

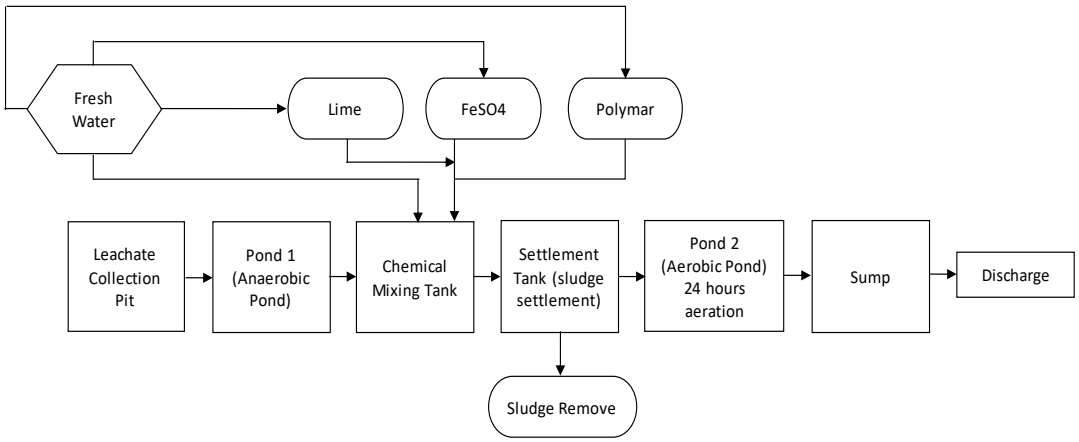


Figure 40: Leachate Treatment Flow Diagram

6.4 Washing Bay

A Car wash pool with three sets of high-pressure machines is in operation for 24 hrs basis. This facility is used for washing the tires of waste collection vehicles after each trip before they exit the landfill site for parking in the garage.

6.5 Soil Cover and Greenery

The existing Matuail LFS is in post closure now. Waste dressing, drainage facilities, soil covering, turfing activities are underway. This post closure works will create a new look of the landfill of Matuail LFS.

Figure 41: Soil Covering and Greenery in the Landfill Site (Post Closure Area)

6.6 Landfill Operation Monitoring

A computerized monitoring system with CC TV has been set up around the landfill site. This allows 24 hours online monitoring of entry, exit, weighbridge, general area of dumping and personnel on duty.

6.7 Landfill Operating Cost

Generally, a sanitary Landfill involves high operating cost as multiple types of vehicles are engaged round the clock. This cost is minimized through careful planning, leachate treatment and regular supervision of the landfill activities. Landfill operating cost for per ton waste is 271.29 in 2019-20 FY. The landfill operation cost of 2019-2020 is listed below.

Table 8: Landfill Operation Cost of Fiscal Year 2019-2020

Sl. No.	Item of Expenditure	Cost (Million BDT)
1	Staff Salary	20.00
2	Fuel Cost for Landfill Operation	54.50
3	Electricity Bill	2.00
4	Development, Repair & Maintenance Cost	75.00
5	Equipment's Depreciation Cost	100.00
6	Total Cost in the Year of 2019-2020	251.50

7.0 WARD-BASED APPROACH IN WASTE MANAGEMENT

7.1 Components of WBA

The people's participation in SWM was realized over time for the improvement of waste collection, transportation and disposal through a community participatory framework known as the Ward-based Approach (WBA). The WBA aims to build a synergy of related activities in the wards (field level) and headquarter by synchronized intensive resource input, which includes the four major components that are interlinked. The four components of WBA are as follows

WBA 1: Construction and management of ward SWM office
WBA 2: Safety education for cleaners and establishment of safety and sanitation committee
WBA 3: Public awareness raising for community participation in SWM
WBA 4: Improvement of waste collection service

WBA drives field-level activities that cover the entire DSCC jurisdiction under the WMD and is a key tactic for boosting the community participatory SWM for Dhaka's clean environment as well as the CI's work efficiency. The WBA activities are outlined as an official work of DSCC by office order. All stakeholders for the WBA including DSCC officials, CIs, COs, and cleaners as well as ward councilors need to work together for successful WBA activities. Through the success of WBA activities, overall SWM can be improved.

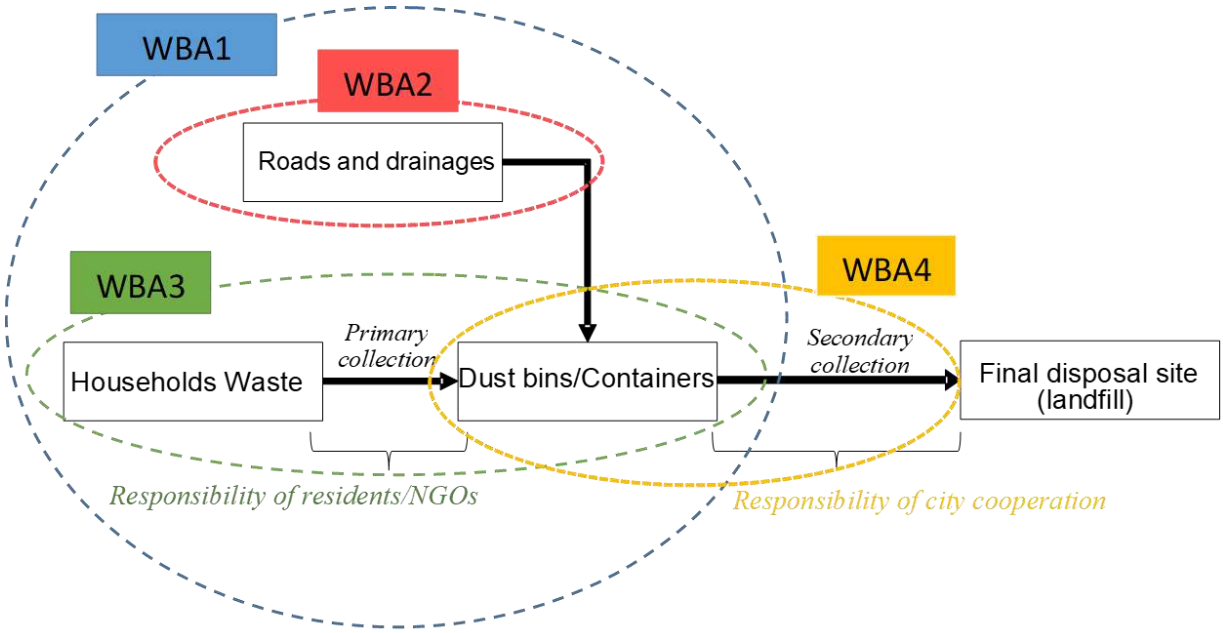


Figure 42: Interrelation among WBA components

7.2 Construction and Management of Ward SWM Office (WBA-1)

The first component of WBA aims to strengthen the ward office management for handling various types of SWM activities in each ward office such as SWM data management, cleaner management, and communication with communities for problem solving and complaint response. The function of the

Conservancy inspector has been consequently changed from mere supervision of cleaner's work to overarching ward wide SWM, aiming to make DSCC less centralized. The first ward office in Dhaka was constructed in 2008 and 24 ward offices have been built in DSCC since then. Still some Conservancy Inspectors use community centers as temporary ward offices, and rest of them have no offices. DSCC is planning to construct 46 additional ward offices in FY 2020-2021.


Figure 43: Ward SWM office Ward-3


Figure 44: Ward SWM office Ward-10


Figure 45: Ward SWM office Ward-17

Table 9: List of DSCC SWM Ward Offices

Sl. No.	Ward Office	Sl. No.	Ward Office
1	Ward-1 (Khilgaon)	13	Ward-19 (Moghbazar, Baily Road, DIT Colony, West Malibagh)
2	Ward-3 (Meradia)	14	Ward-21 (Dhaka University)
3	Ward-4 (Basabo, Madartek)	15	Ward-22 (Enayet Ganj, Hazaribagh)
4	Ward-6 (Mugdapara)	16	Ward-24 (Shahidnagar)
5	Ward-8 (Motijheel, Kamlapur)	17	Ward-26 (Azimpur, Dhakeshwari)
6	Ward-9 (Bangabhaban, Arambagh)	18	Ward-27 (Nazimuddin Road, Bakshi Bazar)
7	Ward-10 (TNT Colony, Motijheel Colony)	19	Ward-30 (Mitford, Sowari Ghat)
8	Ward-13 (Bijaynagar, Purana Paltan, Naya Paltan, Shantinagar)	20	Ward-31 (Central Jail, Begum Bazar)
9	Ward-15 (Dhanmondi-15)	21	Ward-33 (Bangshal Road, Chankharpool)
10	Ward-16 (East Green Road, Hatirpool)	22	Ward-38 (Kaptan Bazar)
11	Ward-17 (Kalabagan, West Green Road, Sobhanbag)	23	Ward-48 (Sayedabad, Jatrabari)
12	Ward-18 (Elephant Road, BCSIR, Dhaka College)	24	Ward-54 (Jurain)

7.3 Safety Education and Health Care Services for Cleaners' (WBA-2)

To ensure the health and safety of the cleaners DSCC has been organizing cleaners' workshop throughout the year. These workshops and safety training basically focused on cleaners' safety and sanitation issues to enhance work efficiency, to motivate and encourage them by providing safety gears and raising awareness to ensure cleaners' better working environment. Therefore, providing necessary safety gears, such as masks, gloves and first aid boxes to prevent such incidents are essential for improving the workplace

environment for the field workers of the waste management department. In the Corona Virus (COVID-19) pandemic period DSCC has organized cleaners' workshop in every wards.

Figure 46: Cleaners' Safety Education and Training Program

DSCC distributed a worker's manual that contains work procedure at the start, health and safety instructions and safety measures while working in a team to avoid accidents and casualties. The WMD encourages each cleaners and cleaner's group to support each other, for example, helping other group's work after finishing own work. Such an on-job training contributes to changing mind setting of the cleaners for mutual assistance and respect and to better organizational governance.

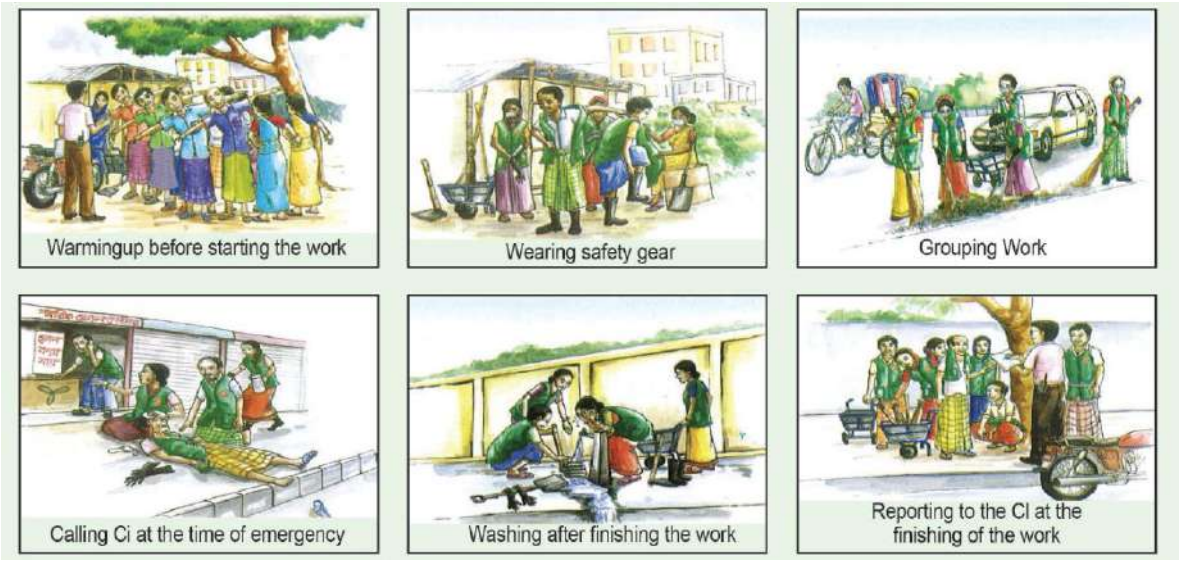


Figure 47: Cleaners Working Manual

Sometimes cleaners face road accidents and casualties while working in the main and busy roads. Some accidents are fatal, while some are injurious. DSCC in association with Mahanagar Hospital has taken initiatives to provide health care services to DSCC cleaners. Mahanagar Hospital has offered the Cleaners and their family members to get special discount on pathological test and treatment.

The cleaners work hard to keep the city clean, garbage-free and malodor-free. To give them a better life, DSCC have taken the initiative to build residential buildings in FY 2018-2019. The honorable Ex. Mayor (Sayeed Khokon) of DSCC has inaugurated six cleaner colony (six-storied building) in Dhalpur, Lalbagh and

Ganaktoli for DSCC cleaners. Besides that, the construction work of six more buildings in Ganaktoli, three buildings in Miranjalla Cleaner Colony and two more six-storied buildings in Dhalpur are going on for cleaner's accommodation facilities.

Figure 48: Prime Minister Sheikh Hasina inaugurated Dhalpur cleaners' colony through live conference

7.4 Community Involvement for Participatory SWM (WBA-3)

DSCC has continued to periodically hold public meetings in which the Mayor, CWMO, Councilors, and WMD officials respond to the community's opinions and stakeholder concerns in zones and wards. In addition, Eid-related workshops, PCSP meetings and workshops, special cleaning programs, and environmental education programs in schools are occasionally organized by the WMD to increase the awareness of the citizens. DSCC has been conducting the following activities to strengthen community SWM activities:

- Community engagement program for solid waste management
- Promotion of 3R and waste segregation
- Promotion on littering offence
- Compactor allocation and promotion program

DSCC introduces city surveillance 24/7 Facebook group for receiving complain and suggestions from citizens.

a b c d

Figure 49: Open discussion with (a) citizens for involvement in SWM (b) community ambassadors to support DSCC works (c) Imam for Qurbani Waste Management and (d) PCSP owner for smooth functioning of collection system

Special cleaning activity has been conducted periodically in each ward to ensure the city clean involving ambassadors, councilors, citizens of certain wards. DSCC has started cleaning of several canals occupied by waste that causes waterlogging. Honorable Mayor of DSCC, Barrister Sheikh Fazle Noor Taposh inspected canals such as Jhilpar khal, Kalunagar Khal, Basabo Khal, Indupur khal, Dholaipur Kutubkhali Canal for special cleaning as well as to raise awareness campaigning among citizens. DSCC has recovered a lot of waste like mosquito nets and even furniture while cleaning these canals.

Figure 50: Honorable Mayor visited Jhilpar Khal and Special Cleaning Campaign for Dholaipar Kutubkhali Canal

7.5 Introduce New Collection System with Compactor and Improve Existing Collection System (WBA-4)

Aiming to improve the waste collection efficiency, DSCC has adopted Fixed Time Fixed Place (FTFP) collection system with compactor trucks (WBA 4A) and making effort for improving existing/traditional collection system ((WBA 4B) through removing dustbins, containers and closing open spots. Thus far, 225 dustbins and more than 30 containers have been removed from the streets since 2013[2]. Dustbin and undesignated dumping sites closure are ongoing with the DSCC initiative. Meanwhile, almost all the wards are having facilities of FTFP compactor collection system.

DSCC organized compactor promotion program at Ward-10, Ward-13, Ward-15, Ward-16, Ward-18, Ward-19, Ward-27 and Ward-40 to let community know about the environment friendly collection system through compactor provided by JICA since 2007. Before compactor promotion, Conservancy inspector of certain wards have arranged several meetings with Councilor and community representatives about Compactor timing and placing. Some collection routes have been reformed accordingly to improve the collection efficiency by introducing compactors with FTFP collection. Finally, DSCC has arranged the compactor Kick off meeting inviting representatives from different society for open discussion.

Figure 51: Compactor base waste collection system at Ward-15 (Beside Dhanmondi Lake)

7.6 WBA Core Group Members and Meeting

DSCC has formulated WBA core group comprising of HQ officials (CWMO, SE, EE) and field level officials (ACWMOs, COs and CIs). WBA core group meeting takes place once or twice in a month depending on the necessity of discussions and tasks. In the meeting, both HQ and field level officials share their municipal waste related issues, challenges, problems, and suggestions regarding. In some cases, CWMO or any other HQ officials provide practical instructions to field level officials to solve issues on community involvement, labor management, street sweeping, waste collection etc. On the other hand, ACMOs have meeting with their COs and CIs in the zone offices on urgent issues or challenges related to waste management.

Figure 52: WBA core group meeting

[2] Future Vision of Solid Waste Management in Dhaka South City (New Clean Dhaka Master Plan 2018-2032)

8.0 MUJIB-YEAR ACTIVITIES OF DSCC

Grasping the opportunity of ensuring "Mujib Borsho," or Mujib Year; the birth centenary of Father of the Nation Bangabandhu Sheikh Mujibur Rahman, the GoB focused on implementing a nationwide "Clean Village-Clean Town" program in 2020, among all ministries and government organizations, to inspire all to keep them and their surroundings neat and build a clean Bangladesh. As a part of this program, LGD issued a letter to all city corporations, municipalities and upazilas to take necessary actions to make this program successful.

According to the LGD's issued letter, WMD took initiatives of short-, mid-, and Long-term action plans. The activities under the mentioned action plans are as follows:

Short-term action plan (3 Month program):

- Ward-wise weekly community meeting to discuss on citizen participation in SWM
- Ward-wise weekly institutional program (school, college, university, hospital, office, shopping complex etc.) with special cleaning in corresponding premises.
- Ward-wise weekly special cleaning campaign
- Waste segregation campaign in ward level (four times at each ward in a year)
- Ward-wise public awareness campaigning on Bio-degradable waste bag instead of using polythene/plastic bag (Slogans are like that: "Stop using Polythene, Heal Dhaka City"/ "Don't be a plastic junky"/Say No to Plastic/" Avoid Plastic, Make Dhaka Green and Clean"/" Think before you trash it"

Mid-term action plan (1 Year program):

- Ward-wise awarded best institution and society (twice in a year)
- Zone-wise ward contest (three times in a year)
- Zone-wise special cleaning (one critical ward from each zone)
- Make ZERO OPEN DUMPING DAY in every ward.
- Ward-wise Dumping Station/STS/Designated Spot special cleaning campaign (Once in a month)
- Ward-wise Cleaners' workshop (trice in a year)
- Ward-wise Primary Collection Service Provider (PCSP) training (twice in a year)

Long-term action plan (Continuous):

- Zone-wise awarded best institution and society (twice in a year)
- Clean Dhaka ward contest (once in a year)
- Waste free day/clean Dhaka clean day program in central level with participation of all kind of government officials and general people

Special Cleaning Activities for Mujib-Year:

With the Corona virus spreading in Bangladesh and considering the outbreak across the world, DSCC as well as the GoB decided to postpone all public gathering related activities. In such a difficult situation, Honorable Mayor of DSCC has inaugurated some yearly special cleaning activities as a part of the Mujib Year activity.

Figure 53: Inaugural ceremony of various special cleaning activities with Honorable Mayor of DSCC

9.0 QURBANI WASTE MANAGEMENT

One of the major activities of WMD is to organize the synchronization of the management of generated waste of sacrificial animals during this festival. Over the past few year's government has been taking the initiative to aware citizens to slaughter at designated spots to ensure a smooth conduct of cleaning to bring back livable environment immediately after the religious ritual. DSCC has been improving consistently since government imposed new regulations for the Eid ul Adha. In 2019-2020. Approximately 223,677 animals were sacrificed, and 21,400-ton waste was transported to Landfill.

Year	Sacrificial Animal	Waste Generation and Collection
2018- 2019	267,105	25,000 tons
2019 -2020	223,677	21,400 tons

Figure 54: Qurbani waste management

All stakeholders work closely with the corporation and interest to for the betterment of city dwellers during this time by a formulated action plan. For motivating people to accept and make the best use of the facilities, the following tools were used.

- Two weeks long sponsor based motorized announcement
- Communicating message through
    - Leaflets
    - Household waste collectors
    - Media reports
    - Rally
    - Imams at the mosque raising awareness during the last three Jummah before the Eid ul Adha

Service provided by DSCC to the citizens are as follows:

- 200,000 bags were distributed house to house by the respected Councilors with the help of ACWMOs and Cis.
- For raising awareness, 100,000 leaflets were distributed in the South City.
- Facebook page, DSCC apps, official numbers of officers were available throughout to make the communication with the public more convenient.

- Free vehicle service was provided by the Councilors to fasten the removal of waste from the respective areas.

For the fast removal of waste within 24 hours, DSCC had many waste collectors and cleaners tagged for this festival. The workforce involved were:

DSCC cleaners: 5,336
Contracted Cleaners: 9,536
Total 14,872

Cleaning materials and waste bag distributed to the citizens are mentioned in the table below:

Figure 55: Cleaning materials and waste bag distribution for Qurbani waste management

While, DSCC has experienced a positive approach from the city dwellers for cooperating, there are areas for improvement in the future which could eventually lead to a better management of waste during Eid ul Adha. The areas of improvement are given in the following:

- Not pouring adequate water over blood
- Not blocking the road and footpath by keeping the sacrificed animal
- Not slaughtering the animals other than the allocated designated spots
- Not discharging cow dung or leftovers into the drain
- Not spreading lime on the blood immediately after slaughter

Table 10: Summary of the Kurbani Waste Management

Preparation started	90 Days ahead of Qurbani
Designated Slaughtering spots	520
Total waste collection in three days	19, 200 tons
No. of cleaners employed	14,872
Cattle Markets	14

10.0 REMOVAL OF UNAUTHORIZED BANNER FESTOON DISPLAY/ OVERHANGING CABLES

As per the Local Government (City Corporation) (Amended) Act 2011, the unauthorized banners, festoons, graffiti, posters, overhead signboards, and billboards are illegal ways of branding and publicity. These pollutants are damaging natural beauty of the city and are making sight pollution. Government organizations, political parties, private enterprises, and individuals often apply this illegal way for branding and publicity.

Applying relevant laws, DSCC has been removing such illegal materials every day. Moreover, DSCC removes illegal displays and structures if it is not authorized. Especially, the city takes the worst look at the time of national and local election along with other political programs out of that time. Various trans-national corporations and local companies are also involved in creating these types of pollutants.

Figure 56: Removal of Banner Festoon

11.0 ACTIVITIES INITIATIVES DURING THE COVID-19 PANDEMIC

The Corona virus pandemic was first confirmed in Bangladesh on 8th March 2020, by The Institute of Epidemiology, Disease Control and Research. To stop the spread of this virus, there are lots of actions being taken by the GoB such as regional or national quarantine throughout the country and the world, travel restriction, hazard control in the workplace, cancellation and postponements of events, curfews, border enclosure, and screening at airports and train station, etc. In addition, to prevent the outbreak of the Corona virus, the GoB also declared ten-day shut-down on 22nd March 2020 which was valid from 26th March to 4th April. Later, the shut-down was increased incrementally up to 30th May 2020. WMD contributed great effort from the beginning of the COVID-19 pandemic. WMD officials showed their dedication and devotion to their regular responsibilities as well as special duties and tasks assigned by Honorable mayor of DSCC even in the peak situation of spreading the Corona virus. The activities carried out by WMD as per the directions of the LGD in consultation with Honorable mayor of DSCC are highlighted as follows:

Storage and distribution of PPE and Masks: DSCC has a stock of 5,410 personal protective equipment (PPE) and 60,700 masks collected from the Directorate General of Health Services, DSCC, and other donor and local agencies till June 30, 2020. So far, DSCC has distributed 4,226 PPEs and 60,700 masks among cleaners and other field level officials as well as WMD and health officers.

Liquid Disinfectant Spray: WMD sprayed liquid disinfectants using water bowser throughout the city since March 2020. However, DSCC emphasized on regular spraying to all important roads, footpaths, foot over bridges, quarantine areas, surrounding of important hospitals, markets, mosques, bus terminals, dustbins, secondary transfer stations and slums. DSCC instructed markets/bazars, hospitals, residential and commercial buildings, mosques, and other religious institutions to provide arrangement of hand washing facilities before entrance or after exit. Furthermore, citizens are requested to wash their hands thoroughly with ordinary soap or hand wash keeping social distance from others at all time.

Figure 57: DSCC spraying liquid disinfectants in Dhaka University (left) and streets (right) by water bowser

Special drain cleaning Activities: DSCC has continued daily cleaning activities of street sweeping and drain cleaning as well as taking initiatives of special drain cleaning activities to prevent dengue, water logging and COVID-19. Along with this, some councilors of DSCC have taken initiative to accelerate the drain cleaning in this pandemic and dengue outbreak situation by running a special deep drain cleaning program.

Figure 58: Some snippets of special drain cleaning activities under WMD of DSCC

Figure 59: Monitoring of special drain cleaning activities by ward councilors of DSCC

Safety training to Field level officials: Field level officials (ACWMOs/COs/CIs) of the city corporation manage cleaners as well as maintain SWM of each ward. WMD arranged and provided training to ward level officials on cleaners' management and safety precautions of cleaners and workers during the COVID-19 pandemic situation. In addition, HQ officials of WMD distributed and explained the safety gear monitoring sheet and health monitoring sheet as well as to maintain and to keep record of practicing safety gear and analyzing cleaner's health condition (i.e. body temperature).

Figure 60: Zone level training to trainers of WMD field level officials

Safety Gear Training for Cleaners and PCSP drivers: Cleaners as well as PCSP van drivers have been trained and directed to use safety gears to ensure not only their own safety but also to ensure better working environment. Cleaners and primary waste collection van drivers have been instructed to follow hygiene rules (i.e. hand washing instructions, wearing masks and gloves, prevent to touch infective materials, maintaining social distance etc.) while working and after working. The importance of safety gear (i.e. masks, gum boots, hand gloves) during current COVID-19 pandemic situation was the main topic that has been discussed in the training. Higher officials from city corporations (Councilor, DCWMO, ACWMO), field level officials (CO, CI/CS) also attend in the training.

Figure 61: Safety Gear Training provided by DSCC Councilor (left) and WMD officials (right)

Safety Training to LFS and workshop workers: DSCC arranged safety training for landfill and workshop staffs. Importance of usage of PPE and safety gear during COVID-19 and regular period have been elaborately discussed through on-stage training. Landfill engineers and workshop officials of WMD facilitated and conducted the training.

Figure 61: Safety Gear Training at Matuail LFS workers (left) and workshop staffs (right)

12.0 COVID-19 CRISIS RESPONSE from DONORS AND LOCAL AGENCIES

Technical Support from JICA:

JICA has been providing technical assistance to DSCC for strengthening of waste management since 2017. As a technical assistance, JICA SWM project prepared 6 separate leaflets for citizens, cleaners, waste collection workers, drivers and helpers, workshop workers and landfill workers of DSCC and two pocket size manuals for cleaners and landfill workers. Those leaflets and pocket books were used in the safety gear training of WMD officials and cleaners.

JICA has given 10,000 citizens leaflets to DSCC to raise awareness among the city dwellers. The main purpose of this citizen's leaflet is to inform the city dwellers about household waste disposal management to prevent the spread of the Corona virus. It also provides ideas on how to store household waste without mixing it with infectious waste such as used masks, gloves, tissue, PPE.

Figure 62: Citizens Leaflet

Figure 63: Cleaners Leaflet

Figure 64: Leaflet for Waste Collection Workers

Figure 65: Driver's leaflet

Figure 66: Leaflet for Workshop Workers

Figure 67: Leaflet for Landfill Workers

In addition to raising awareness among the city dwellers about waste management during the Corona period, 3 separate leaflets have been prepared to raise the awareness among cleaners, waste collection workers and drivers and helpers of waste collection vehicles under waste management. These leaflet trio has been created based on why and how these frontline workers need to aware of general instructions and avoiding infectious waste to prevent the spread of the Corona virus during work. Even leaflets designed for cleaners have been set in every ward office so that every cleaner can be aware of COVID-19 situation. Two separate leaflets have been prepared for the staff and officials involved in the waste management workshop and landfill. It has been mentioned how the landfill workers as well as waste pickers will be alert and aware about what to do during their work in current pandemic situation.

Cleaners and landfill workers are directly involved in handling and managing solid waste that creates most vulnerable and risky situation during works. JICA has developed two separate manuals to ensure their health and safety. The general guidelines and other hygiene guidelines, as well as what to do at the beginning of work, during work hours and at the end of work, and what to do for the officers involved in conducting their activities are described in the manual.

Figure 68: Pocket Size Manual for Cleaners (Left) and Landfill Workers (Right)

Cleaners, waste collection workers, drivers and helpers and landfill workers and workshop staffs are considered at a high risk of getting the virus through disposed masks, gloves, and tissues. JICA prepared guidelines for solid waste management to continue the waste management services of City Corporation with minimum impact by COVID-19, as well as to prevent the spread of COVID-19 as much as possible for protecting people's life and health during the COVID-19 pandemic situation. JICA also prepared a technical guidance for medical waste management response to COVID-19 aiming to clarify the CC's medical waste management response strategy, including emergency measures to secure the supplemental treatment capacity of infectious waste. This technical guideline will also help city corporations for the management of the quarantine areas medical waste.


Technical Guidance: Medical Waste Management Response to COVID-19
July 2020

1. BACKGROUND

In Dhaka North City, Dhaka South City and Chattogram City, medical waste, including infectious waste due to the COVID-19, is rapidly increased. It causes unsafe situation by illegal dumping of medical waste in public places. Although the Government of Bangladesh is developing a draft medical waste management guideline for COVID-19 related services at the national level, there is a lack of official guidance on how to adapt regular medical waste management services to pandemic situation at the city corporation (CC) level with a limited existing capacity of medical waste treatment facilities. This guideline will also help city corporations for the management of the quarantine areas medical waste. This guidance is aiming to clarify the CC's medical waste management response strategy to the COVID-19 situation, including emergency measures to secure the supplemental treatment capacity of infectious waste. For the detail information of solid waste management in CCs against the COVID-19, please refer to *"Guidelines for Solid Waste Management During the COVID-19 Pandemic"*.

2. BASIC STRATEGY

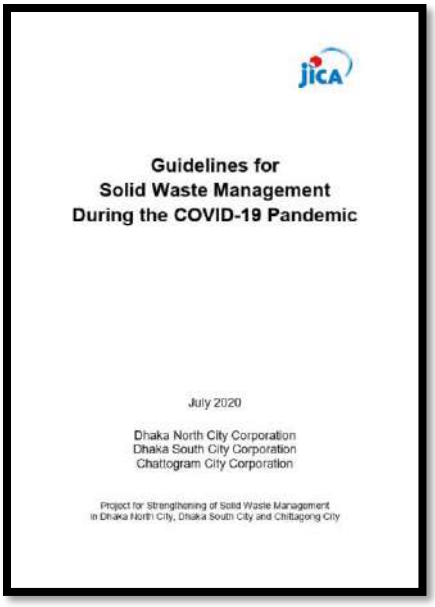
CCs will build a cooperative relationship with the Health Care Establishments (HCEs) and the Designated Medical Waste Management Organizations (DMWMOs) to establish appropriate medical waste management system. Basic strategy describes main messages from CCs to HCEs and DMWMOs in principle based on their role and responsibility for medical waste management.

Health Care Establishments (HCEs):

a) Infectious medical waste due to the COVID-19 can be treated in the same as other infectious waste.
b) All HCEs (hospitals and clinics) should have their own treatment facilities of medical waste on site or contract with the DMWMO.
c) HCEs should obey the discharge rules of medical waste (segregation at source). Ideally, all potentially infectious waste should be isolated and sealed.
d) In the case of Institutional/Home Quarantine centers/area, infectious waste due to COVID-19 should store in a separate bag and DMWMOs should collect that waste.
e) A record should be maintained of waste generated from COVID-19 isolation ward/ quarantine area.

The Project for Strengthening of Solid Waste Management in Dhaka North City, Dhaka South City and Chittagong City

Figure 69: Technical Guidance on Medical Waste Management response during COVID-19


Guidelines for
Solid Waste Management
During the COVID-19 Pandemic

July 2020

Dhaka North City Corporation
Dhaka South City Corporation
Chattogram City Corporation

Project for Strengthening of Solid Waste Management
in Dhaka North City, Dhaka South City and Chittagong City

Figure 70: Guidelines for SWM during COVID-19 pandemic situation

PPE Distribution from JICA:

JICA Senior representative Koji Mitomori handed over Personal Protective Equipment (PPE) to Chief Executive Officer (CEO) of DSCC for cleaners as well as for landfill staffs to keep them contaminated from the Corona virus. The protective equipment includes 190 PPE gowns, 190 pairs of gumboots, 190 goggles, 790 pairs of gloves, 40 hand sanitizers, 28,650 masks, 60 thermometers, 59 liquid soaps and 190 bags.

Figure 71: PPE Handing Over Ceremony at DSCC

PPE Distribution from UNDP:

UNDP, with support from Australia, has provided 5,000 PPE packages for urban waste cleaning workers of DSCC, DNCC, Chattogram City Corporation and Narayanganj City Corporation. Sudipto Mukerjee, Resident Representative of UNDP Bangladesh handed over the PPE to Md Tazul Islam MP, Minister, LGD in presence of other high officials from the Government and UNDP. These additional supports of the PPEs from UNDP and the Australian Government for the protection of cleaners further intensify DSCC effort.

Among 5000 PPEs, DSCC received 1000 packages. UNDP provided the PPEs with a guideline on how to wear or take off these PPE along with its reuse management system. The list of PPE materials of each package is as follows:

- 1 pc washable, viable and reusable safety gown and shoe cover
- 1 pc waterproof and durable gum boots
- 1 pc safety Goggles
- 1 pc washable and reusable mask
- 1 pair of washable, durable and reusable rubber hand gloves
- 200 mm Hand sanitizer
- 1 carrying bag

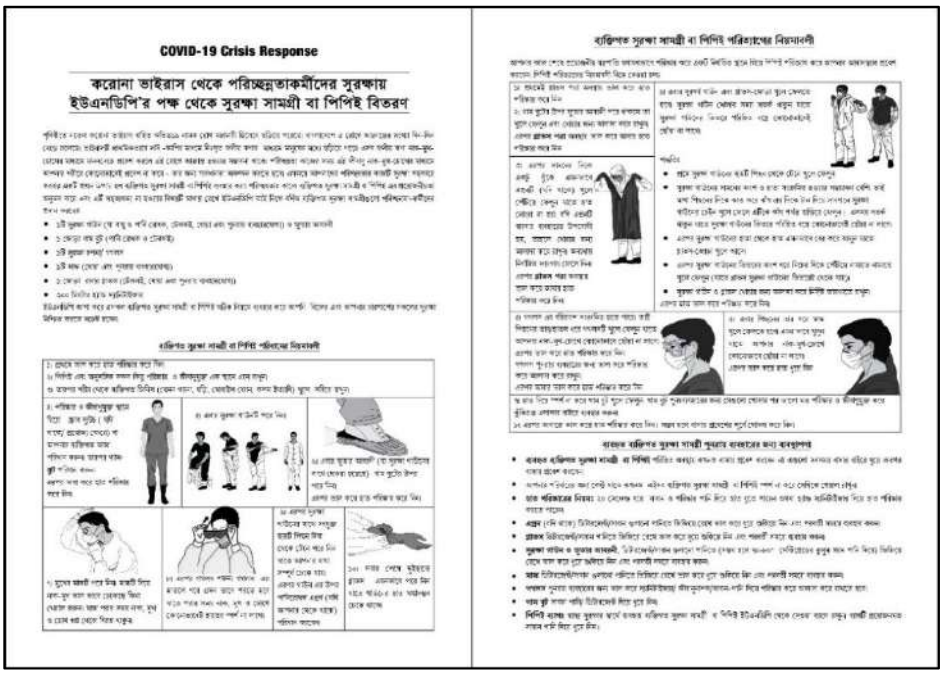


Figure 72: Instruction and guideline on PPE usage rules prepared by UNDP

13.0 MEDICAL WASTE MANAGEMENT

Medical waste generated in the Health Care Establishments (HCEs) in Dhaka is growing. The PRISM Bangladesh, NGO, has been engaged with DSCC since 2005 for collecting and disposing off medical waste generated in entire Dhaka City. These HCEs are registered in DSCC. The proportion and number of the HCEs is shown in the following pie chart.

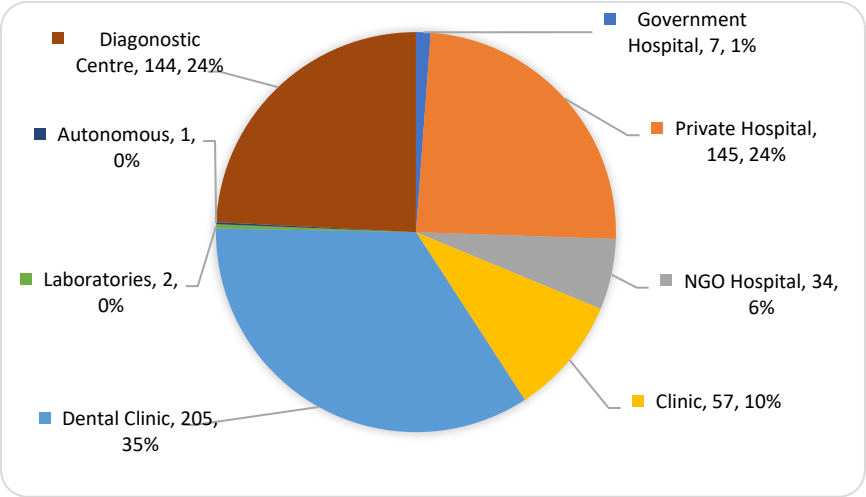


Figure 73: Proportion and number of HCE in DSCC

The daily amount of medical waste generation in DSCC is 3573.24 kg in the year 2019. Amount of infectious, sharps, and recyclables waste are 2626.8 kg, 560.12 kg and 386.32kg respectively in the same year. The following tables highlights the daily average waste generation in different types of the HCEs and yearly medical waste generation including the growth rate. Though hazardous fraction of medical waste is very small less than 1% but overall waste of the city might be very risky if this small fraction is not managed properly.

Table 11: Daily average Waste of Dhaka South City Corporation

Types of HCE	General (Kg)	Infectious (Kg)	Sharp (Kg)	Recyclables (Kg)	Total Medical waste (Kg)	Total Waste (Kg)
Government Hospital	3740	513.7	75.9	68.2	657.8	5055.6
Private hospital	7642	1135.2	352	229.9	1717.1	11076.2
NGO Hospital / clinic	515	107.8	14.3	5.5	127.6	770.2
Clinic	970	167.2	31.9	19.8	218.9	1407.8
Dental Clinic	784	135.3	0	0	135.3	1054.6
Laboratories	14.3	3.3	0.22	0.22	3.74	21.78
Autonomous Hospital	880	93.5	2.2	3.3	99	1078
Diagnostic Center	2935	470.8	83.6	59.4	613.8	4162.6
Total	17480.3	2626.8	560.12	386.32	3573.24	24626.78

Source: Medical Waste Management Survey by PRISM

PRISM has set up a medical waste management plant at Matuail LFS in coordination with DSCC, Ministry of Health and other donor organization in one-acre area with all required treatment facilities.

Onsite storage, sorting and management:

Following the Medical Waste Management Rule 2008, many of HCEs are using color-coded bins/containers for onsite storage. The color codes, category of waste, organizations are responsible to treat the waste, and the present situation is in the following Table. The most onsite treatment system is limited to the needle cutting and some sort of sterilization or autoclaving in limited scale. The in-house management i.e., the segregation at source according to the color codes, internal transportation and storage is the responsibility of the respective HCEs.

Figure 74: Medical Waste Generator

Figure 75: In-house Transportation

Figure 76: Source segregation at source

Figure 77: Storage Facilities at Dhaka Medical College Hospital

Table 12: Color Codes and Category of Waste

Color Codes	*Category of Waste*	Responsible Organization	Present Situation
Black	General	City Corporation/ Paurashava	City Corporation/ Paurashava
Yellow	Infectious	City Corporation/ Paurashava	PRISM on behalf of City Corporation
Red	Sharp	City Corporation/ Paurashava	PRISM on behalf of City Corporation
Green	Recyclable	City Corporation/ Paurashava	PRISM on behalf of City Corporation
Blue	Liquid	Hospital ETP	No Treatment
Silver	Radioactive	Bangladesh Atomic Energy Commission	Bangladesh Atomic Energy Commission

Note. Details of Color codes and types of waste to be managed according to the codes are clearly mentioned in the rules

Treatment system:

The fully segregated medical waste is transferred for autoclaving, incineration, chemical disinfection according to the category of waste. The partially segregated waste needs a secondary sorting to segregate the waste according to the category and then transferred for autoclaving, incineration, chemical disinfection, deep burials etc. The treatment method is designed and being executed in accordance with the Medical Waste (Management and Processing) Rules 2008 to have the compliance of the Department of Environment following the table summarized below.

Figure 78: Secondary Sorting of Medical Waste

Figure 79: Shredding

Figure 80: Incineration

Figure 81: Autoclaving

Figure 82: Chemical Disinfection

Table 13: Treatment Method and corresponding type of Waste at Medical Waste Treatment Plant

Method	Category of Waste	Final Disposal	Treatment Facility
Autoclaving	Infectious with high moisture	Secondary land filling	2500 Liter-1 1500 Liter-1
Incineration	Infectious without moisture or less moisture	Ash and residue in deep burial	135 Kg/hour-1 60 Kg/hour-1
Chemical Disinfection	Recyclables	N/A (take to shredding)	Tank 1- 3m3
Effluent Treatment	Generated wastewater	N/A	2000 Liter/hour-1
Shredding	Recyclables e.g., plastics	Sale to manufacturer	1
Burial	Sharps, ashes	Burial	12 pits
Landfill	Ashes	Secondary land filling	DSCC LFS

Disposal:

The medical waste after the successful autoclaving and ash or residue after the incineration process, the treated waste is buried in a specially prepared deep hole, disposed in the waste landfill area, and covered with soil. The recyclables are segregated according to the category of raw materials of products after the chemical disinfection and shredded to make its chips to use for recycling products. The processed recyclables are then sold to the potential manufacturer of plastic items or the relevant products.

Issues:

There are still many issues such as mix waste from HCEs creates the job labor-intensive and risky; many HCEs do not have any temporary storage facilities; lack of cooperation in discharging full amount of waste to the treatment system; diversion of untreated waste from the treatment flow which happen mostly at the point of generation etc.

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14.0 WMD DIRECTIVES

The main objective of WMD directives is to ensure safe human health with sound environment. The WMD shall take the necessary actions and measures to ensure that waste management is carried out without endangering human health or harming the environment, in accordance with the objectives and strategies laid down in the Directives. The first WMD Directives was developed in 2008 with the help of JICA's Technical Assistance Project, which stipulates establishment of the WMD, and implementation of priority activities based on the first Master Plan. In 2012, the Directives was then amended exclusively for DSCC in consideration of the WMD's activities and surrounding circumstances, introducing the WBA concept through series of stakeholder consultation e.g. BUET, DU, Professionals, Elite citizens etc.

The new WMD directives 2019 is the third Directives, lay down objectives and strategies in ten key components, which are stated in the New Clean Dhaka Master Plan 2018-2032 (in approval process with LGD) to reduce adverse environmental impacts of solid waste by introducing an integrated and sustainable management system together with involving the citizens and adopting appropriate technology. The components of the third directives of DSCC includes:

1. Public Relation, Public Awareness and Public Involvement
2. WBA Activity Implementation
3. Waste Reduction
4. Waste Collection
5. Collection Vehicle Maintenance
6. Intermediate Treatment (Eco-Town)
7. Final Disposal
8. Rules and Regulations
9. Organization
10. Financial Management

15.0 ADMINISTRATIVE PROCEDURE BOOK

The SWM administrative procedure book referred to as "Admin Book," portrays the formal steps and the authority of the administrative procedures which helps to provide a mutual understanding between the applicants and approvers of the proposal. The Admin Book was developed on the basis of the enacted laws, regulations, and rules related to SWM. The first draft was prepared in 2012 with the support of JICA. On the basis of the first draft, the first edition of the Admin Book was prepared in Bengali in 2018.

The Admin Book will be revised regularly in accordance with the revision of laws and orders, and with practical experiences. Training sessions and workshops for DSCC staff and related stakeholders are required to disseminate the process written in the Admin Book. A review committee for the development of the Admin Book will be established to include the CWMO, sub-group leaders of the WBA Core Group, legal staff, and financial staff. DSCC will establish the review committee for the development of the Admin Book soon.

16.0 FUTURE WASTE MANAGEMENT PLAN

Future Waste Management Planning for Existing and Extended Wards (Resource Recovery Facilities: Introduce 3R with Intermediate Treatment System (Eco-Town Scenario)

General Information

Considering the lack of land availability in Dhaka, source separation as well as a significant waste reduction through intermediate treatment is unavoidable to secure final disposal sites. As the most powerful solution to reduce and diversify waste, the 3R concept with Waste to Energy (WtE) is introduced with Eco-Town scenario. The following figure, shows a conceptual waste flow of the Eco-Town Scenario which contains various intermediate treatment options, such as WtE, food waste treatment, recycling, and medical waste treatment. As per JICA expert study[3] these waste reduction menus in assumption with reasonable treatment capabilities, the Eco-Town scenario could achieve 61% of waste reduction by waste recycling and source reduction.

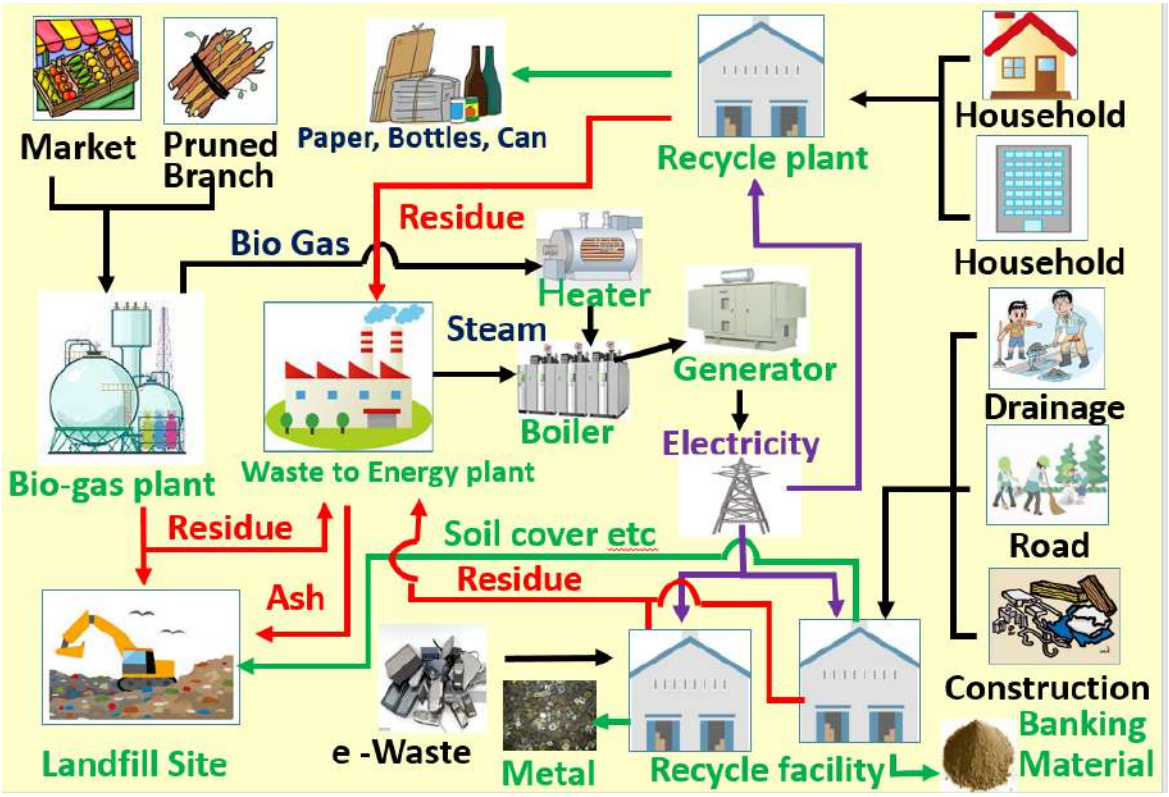


Figure 83: Eco-Town Concept of DSCC

[3] The master plan preparation study in "Project for Strengthening of Solid Waste Management in Dhaka North City, Dhaka South City, and Chittagong City"

Conceptual Waste Flow of the Eco-Town Scenario

Three intermediate treatment methods can be considered in the said Eco-Town Scenario.

Waste-to-Energy Plant

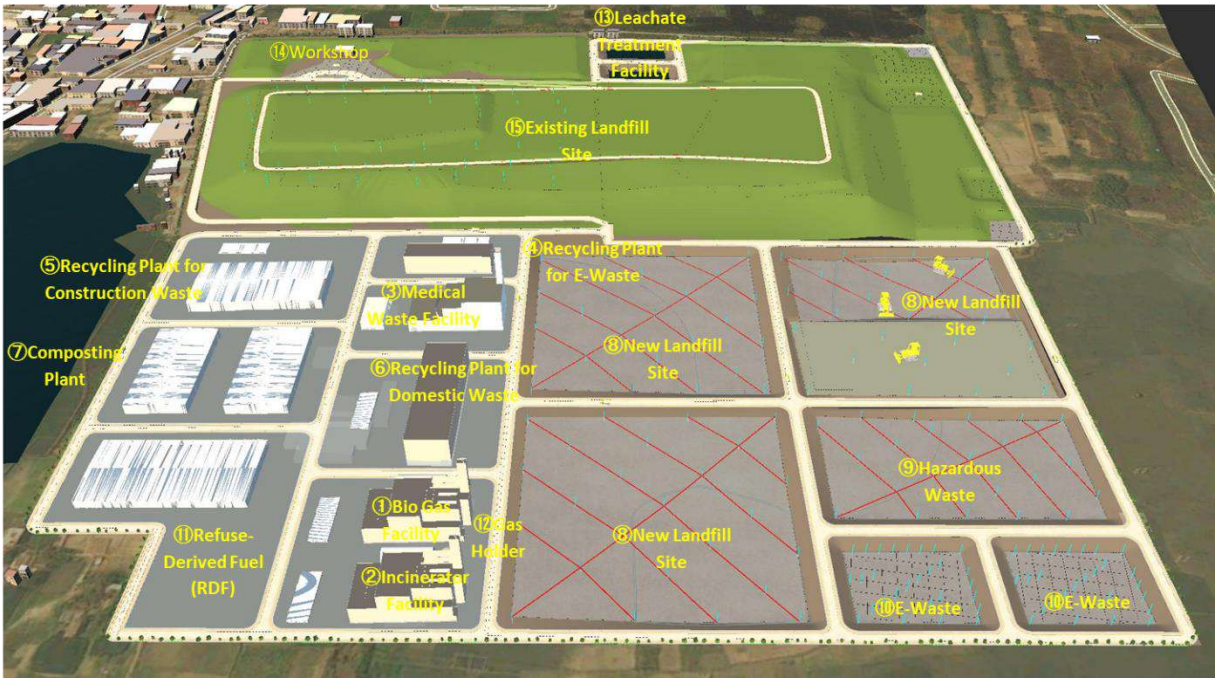
WtE plant, or incineration plant with electricity production, has significant potential to reduce waste to one-tenth of the original volume. It is costly on both the construction and operation and the DSCC does not have any experience yet on such a high-end technology implementation. Biogas from a biogas plant may be used as supplemental fuel to WtE.

- Food Waste Treatment

Food waste from restaurants and markets that produce large amount of food waste with less contamination can be treated in a composting plant. The compost is used as organic fertilizers.

- Recycle Plant

Waste from drainage, road cleaning, and construction sites is sorted and recycled at the recycling plant. After waste sorting, some of the organic items such as construction waste, can be used as raw materials or filling materials for the LFS. Sorted recyclables such as paper, bottles, cans, and plastics are sent further to process for recycling.



17.0 STAKEHOLDER ENGAGEMENT

Aiming to ensure a clean city, the first and foremost important activity is believed to be community participations. In Dhaka, varieties of stakeholders exist and they are associated with municipal solid waste management. Their participation degree can be taken to higher level with improved effort of stakeholders' engagement of the City Corporation through the spectrum of WBA. The stakeholders are, for example:

- Individual citizen of the City Corporation;
- Primary collection service providers;
- Housing societies;
- House owner's association;
- Market association;
- Shop owners associate;
- Sports club;
- Mosque committees;
- Various religious institutional committees;
- Neighborhood associations or Community Based Organizations and NGOs;
- School, College, University students;
- Ward councilors and female councilors etc.

WBA can give a platform to engage the stakeholders with planning and implementing community-based participatory solid waste management (WBA 3) following its guidelines. Community action plans are made with the participation of key stakeholders where city corporation staff and community leaders can play facilitation roles. And community or waste generator can take the decision-making role of their community SWM system design in terms of waste disposal or transshipment-points, discharge methods, collection time and method along with social mobilization or behavioral changes of polluters. Fixed time and fixed place collection with compactor trucks are a good example of stakeholders' engagement in ward level solid waste management under WBA. Regular cleaning or waste collection is important but at the same time, keeping or maintaining the community's areas' cleanliness is more important so that it does not get dirty again quickly which is only possible where stakeholders are positively and voluntarily engaged themselves.

In this year, public awareness activities was planned under the Mujib year activities, but most of the activities were suspended due to the COVID-19 spreading. Instead, the honorable Mayor has conducted several meetings with the citizens, and cleaners inspectors are regularly communicating with the citizens for disseminating public awareness related to the COVID-19 wastes etc. A waste segregation piloting plan and training works through JICA solid waste management team were on board in lane-28 of Ward-15 in close coordination with the Community representative of the paricchonnota.28.

Figure 84: Community participation in SWM

Figure 85: Involvement of DU students in SWM

18.0 WAY FORWARD

A. Short Term

- Execution of Master Plan, the Directives, related policies, and guidelines for DSCC solid waste management;
- Waste management related database management system development and application in monitoring and planning through the adoption of Management Information System;
- Development and conceptualization of Administrative Procedure Book aiming to enlighten all the WMD staff on administrative and procedural guidelines such as labor law, taking leave, promotion, equipment purchase, data management, information disclosure etc.;
- Managing the waste considering the philosophy of the megacity such as decentralization to institutionalize each ward's waste management through Ward Based Approach;
- FTFP collection system promotion in each ward gradually;
- Promotion of integrated SWM through adoption of 3R concepts with strong organizational support and back up;
- Advocacy and campaign to mobilize the society regardless the age and gender through PR and awareness planning and implementation using effective information education and communication tools and techniques;
- Inclusion of more jet and sucker machines for drain cleaning.
- Introduction of compression container at STS for clearing secondary storage location and cleaner transshipping between primary and secondary phases thereby reducing leachate volume and treatment cost in landfill operation;
- Inclusion of more mechanical street sweeper which are efficient and easy to operate.

B. Long Term

- Gradual maximization of compactor truck-based waste collection system with minimization of other modes of collection i.e. open truck, dump truck etc. and removal of container and dustbins;
- To make massive volume reduction in the LFS by introducing the concept of the Eco-Town through the combination of the incineration, WtE, composting, construction waste recycling etc. processes;
- Ensure highest ethical compliance in waste management through transparency and accountability in steps of management through publishing reports or sharing information in websites;
- Ensure service benefits of all officials such as the regular provision of safety gears, insurance of cleaners, CIs, and landfill staffs etc.;
- Vehicle operation and management to be in a unified system of WMD.

Technical Support: JICA Solid Waste Management Project Team