





DRAFT
 Waste Management Activity
 Analysis – Part 2




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Introduction & Purpose and Key Findings

The following report presents Phase II of the Waste Management Analysis Report. This report is intended to evaluate the Solid Waste Management Department (SWMD) current programs and compare it to the long-term goals and objectives that have been established by the Citizens Task Force. Reports already prepared for the Citizen Task Force included an evaluation of future solid waste management needs and an assessment of existing solid waste management facilities that are used to manage the City's recyclable, organic and solid waste management needs. The Phase I Waste Management Analysis Report evaluated the City's Source Reduction & Reuse, Recycling, Organics Management and Construction & Demolition Recycling. This report includes an analysis of the following.

- Collection Program
- Transfer Stations
- Energy Recovery from Waste
- Solid Waste Disposal & Landfill Capacity
- Illegal Dumping
- Fiscal Analysis (under separate cover)

As with the Phase I report, this report evaluates the City's current program and presents draft metrics for evaluating the performance of the program in terms of achieving goals and objectives. Specific options are also identified that may be included in the final plan as steps toward achieving the City's goals and objectives.

1.1 Key Findings

The City provides collection, processing and disposal services to 396,730 households. This is more than any other city in Texas. However, the City's budget for municipal solid waste (MSW) management services on a per-household basis is approximately 50% of other major cities.

The City faces a number of solid waste collection and disposal issues both in the near-term and long-term. Actions by Houston residents to reduce the amounts of waste generated and recycle more can significantly reduce the severity of these issues. If Houston residents and businesses generate less waste it would result in the following beneficial outcomes.

- Fewer tons means collection trucks can collect from more households per route reducing the number of trucks and staff required for waste collection.
- Fewer trips are required to the transfer station or landfill thereby reducing air emissions and saving fuel.
- The City is able to preserve valuable landfill space and delays the time when a new capacity is required.
- The City reduces its costs to have waste processed at the transfer station and disposed at the landfill.

The City's collection fleet requires significant upgrading. The City's reliance on general fund appropriations for fleet replacement has led to an inconsistent investment program which results in the following.

- Inefficiencies in fleet operations
- Higher maintenance costs
- More overtime hours due to equipment failure
- Reduced service reliability for Houston residents

An internal assessment of necessary investment in the collection fleet indicates that \$22.7 million in fleet replacement and \$18.0 million in fleet right-sizing is necessary.

Staffing is another major issue confronting the SWMD. Following Hurricane Harvey, City crews worked approximately 379,000 hours to clean-up Harvey's impacts. When compared to other cities, Houston has by far the lowest FTE ratio per household. Overtime requirements are currently placing a substantial strain on current staff. Policies need to be put in place to encourage hiring and retention of solid waste crews and management.

As the City continues to grow, additional equipment and staff will be required. Over the course of the planning period, Houston's residential customer base is anticipated to increase by over 50,000 households. It is estimated that an additional 17 collection vehicles and drivers will be needed between 2020 and 2040 for just residential solid waste and recyclable material collection.

The City needs to increase the number of brush trucks in order to be able to more actively respond to major storm events. On average, 78% of the City's brush and bulky fleet is over 7 years old. Seven years is the optimal age to replace residential collection vehicles.



The City operates 6 depositories, 3 recycling centers, 1 reuse center and 2 environmental service centers. Increasing the availability of these facilities will allow for greater access to recycling by residents who live in multi-family households. The result would be to reduce illegal dumping and reduce the volume of wastes that are landfilled.

The City owns three transfer stations. The City contracts for operation of these transfer stations with Republic Services. In 2019, a request for proposals was issued for contracts to provide the operation of the transfer stations, construction of a new Northeast Transfer Station (to be located at 5711 Neches Street) and disposal services. The contract for services will provide the City with short-term to mid-term disposal options, address the need to provide some form of recyclable transfer capabilities and establish disposal costs for the short to mid-term.

The transfer stations were all permitted and built at the same time (1999). Because of the age of these facilities, investments in the structural and mechanical systems will be required in the very near future. With the exception of parts and equipment, the City has the responsibility to make structural repairs and improvements to the transfer stations. These improvements may include roadway repair, floor repair or replacement, structural and roof repairs, mechanical repairs, repairs and upgrades to scales and roadways. The operating contractor is responsible for repair and replacement of equipment and parts at the transfer stations.

Several of the landfills in the region are generating useful energy from waste decomposition at the landfills. They are either upgrading the gas to pipeline quality or using it to generate electricity on site. Based on TCEQ reports, a total of 2,671 million cubic feet of gas was distributed off-site and 141 million kWh of electricity was either used on-site or sold into the electric grid.

Other than landfill gas-to-energy projects, there are no other MSW-to-energy projects in the region. Current technologies for converting large quantities of waste to energy, are both capital intensive and much more expensive to operate than landfill disposal. There is ongoing research and development into chemical recycling, or pyrolysis, by the plastics industry. Given the large presence of the plastics industry in the Houston area, the City should monitor this technology and work with the private sector to implement these processes when they are both cost-effective and environmentally acceptable.

The City relies primarily on 4 landfills for the disposal of the 641,000 tons of single-family household trash and bulky waste. This does not include the over 3.4 million tons generated by the private sector (commercial and multi-family) that relies on every landfill in the region for solid waste disposal needs. Region-wide, there are 12 operating Type I landfills able to accept household municipal solid waste (MSW), with an average of 30-40 years remaining capacity. There are 15 Type IV landfills which accept only construction and demolition (C&D) waste, with an estimated 20 – 30 years of total remaining capacity. It takes approximately 15 years to secure new landfill capacity. Options to assure long-term disposal capacity include the following.

- Negotiating an agreement for long-term capacity at one of the region's landfills.
- Identifying a parcel of land (600 - 1500 acres) that the City can purchase and either permit and construct a landfill on its own or contract out for its permitting and development of a landfill to be owned by the City.
- Evaluating the potential of constructing and operating a rail transfer station to haul waste long distances for disposal.

The Department of Neighborhoods current data base as of May 7, 2019 identified 17,283 illegal dump sites reported over a period of 508 days, averaging 34 reports per calendar day. Of all those sites, 93% have been cleaned up. The sites that have been closed averaged 84 days from the date they were reported to the Department of Neighborhoods until they were cleaned up, or 54 days beyond the target of 30 days. Potential strategies for dealing with illegal dumping in the future include: a) increase the number of trucks and crews assigned to cleaning up illegal dumps; b) increase the number of depositories; c) increase staffing and camera surveillance program managed by the Harris County Environmental Crimes Unit; and d) finally, give Code Enforcement or others the authority to issue fines outside the Justice of Peace Courts and Environmental Courts.

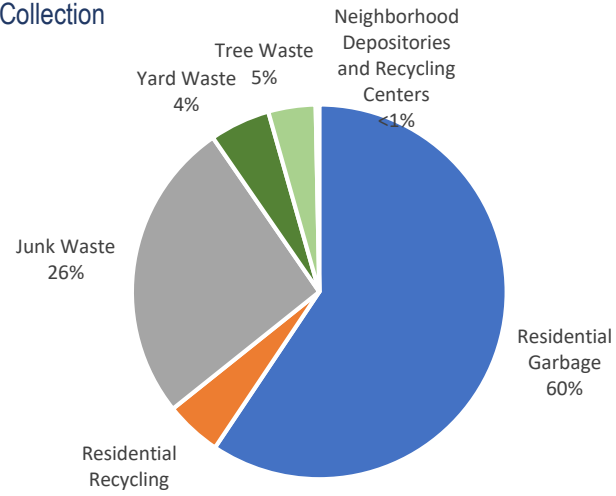


2.0 Collection & Transfer Program

2.1 Existing Program

In addition to 641,000 tons of municipal solid waste and junk waste, the City collects approximately 108,000 tons of material that is either recycled or processed into mulch or compost from residents. To provide these services, the City maintains a fleet of collection vehicles, three transfer stations, number of depositories and recycling centers and environmental service centers. Figure 2-1 illustrates the distribution of materials collected by the City. What is not shown in the figure is that the commercial sector, businesses and institutions including apartments, have the responsibility to provide for their own collection, recycling and disposal services. The figure does illustrate that approximately 14% is collected and sent to either FCC for recyclable material processing or to a Living Earth/Lector facility for wood and yard waste processing into mulch or compost. Eighty-six percent of MSW and bulky waste is sent to one of the City's three transfer stations (a small amount is sent to private transfer stations). Twenty-five percent of the bulky waste and MSW is sent directly to one of four landfills without passing through a transfer station.

Figure 2-1 Residential Waste, Recyclables & Organics Collection



Existing Program - Collection

The City's solid waste ordinance (Chapter 39 of the City Code) defines the services the City must provide as well as regulations related to solid waste management provided by both the public sector and the private sector. Table 2-1 presents a summary of the collection services that are provided by the City, frequency of collection, and types of materials selected. Table 2-2 presents a summary of the tonnages collected from these various programs.

Table 2-1 Houston Solid Waste Collection Services

Service	Frequency	Materials	Container
Residential Garbage	Weekly	Solid Waste	96-gallon carts
Yard Waste	Weekly	Grass clippings / leaves, brush	Compostable bags (not to exceed 50lbs) and small branches (less than 4' in length)
Residential Recyclables	Bi-weekly	Paper and cardboard, glass, plastics #1-5 and 7, metals	96-gallon carts
Bulky waste	Bi-monthly	"Junk Waste" is defined as items such as furniture, appliances, and other bulky material.	No more than 8 cubic yards may be placed at the curb at once
Tree waste	Bi-monthly	"Tree Waste" is defined as "clean" wood waste such as tree limbs, branches, and stumps. Lumber, furniture, and treated wood will NOT be accepted.	No more than 8 cubic yards may be placed at the curb at once
Dead animal collection	On-call service	For a fee, the City will collect large dead animals	NA
Neighborhood Depositories & Recycling Centers	Up to 4 times per month Hours of operation are Wed-Sunday 9:00 am – 6:00 pm (non-daylight savings time)	Junk waste, tree waste recyclables, used motor oil	Vehicles larger than two tons and trailers longer than 16 feet are not permitted to use facilities.



Westpark, Kingwood, Clearlake	Hours vary by location	Paper, cardboard, cartons, metal cans, glass, plastics, sharp metal, electronics, BOPA, tires	No junk waste, tree waste, or garbage accepted
Environmental Service Centers	Hours vary by location	Household hazardous waste	Limits on quantities of acceptable materials
Mobile BOPA Collection oil, latex paint and antifreeze)	Periodic collection dates throughout the City	Batteries, oil, paint, antifreeze, appliances and scrap metal	15-gallon limit on oil 15-gallon limit on paint and 15-gallon limit on antifreeze

Table 2-2 Annual Waste & Recyclables Collected by City of Houston 2017

Program	Tons	Percent of Total
Residential Garbage	445,397	59.4%
Residential Recycling	36,595	4.9%
Bulky Waste	195,829	26.1%
Yard Waste	30,61	5.2%
Tree waste	39,157	4.1%
Neighborhood Depositories and Recycling Centers	2,319	0.3%
Total	749,909	100%

Collection Service Territories

For management purposes, the City is divided into four service areas. In each of these service territories, a service center is located where collection vehicles are parked and serviced. Table 2-3 presents a summary of key data related to the collection services by Service District.

Table 2-3 Collection Data by Service Area

	Northwest	Northeast	Southwest	Southeast	Total
Number of Households Served	109,846	83,825	92,013	104,134	389,818
Average number of households per route – garbage	1188	1100	1083	1030	1102
Average number of households per route - recycling automatic side loader	1308	1200	1214	1271	1252
Number of Collection Vehicles	54	51	57	50	212
Miles driven / Year	749,424	685,222	629,954	643,766	2,708,366
% of Trucks over 7 Years Old	58%	64%	63%	57%	58%

2.1.1 Residential Program

The City’s residential sector generates comparable amounts of municipal solid waste compared to similar major cities. Table 2-4 provides a comparison of the tons of MSW, recyclables and brush/bulky waste collected by other cities.

- With the exception of Austin, Houston residents generate comparable amounts of solid waste per household.
- The amount of material collected per household as part of the City’s residential recycling program is lower than other cities. The City’s recycling program was interrupted by Hurricane Harvey.
- Houston’s budget per household for solid waste services is roughly half of the amount budgeted by San Antonio, Dallas and Austin. The levels of service may vary but, in general, the City’s \$84.9 million budget is significantly underfunded in comparison to these other cities.
- Houston also has approximately half the number of solid waste workers per household than the cities referenced above, with the exception of Fort Worth, which has a private firm provide collection services.



- It should be noted that in comparing these cities, there are variances in the level of services provided. Tipping fees paid at the landfill are generally equal across Texas.

Table 2-4 Waste & Recycling Collection Comparison to Other Cities

City	Houston	San Antonio*	Dallas	Fort Worth	Austin
Households Served	396,730	356,000	240,000	225,049	200,550
Annual MSW (Tons)	445,397	384,000	246,000	247,333	128,829
Annual Bulky Waste (Tons)	195,800	32,574	132,000	22,600	11,179
Annual Recyclables (Tons)	36,595	61,186	57,600	42,978	48,080
Annual Organics (Tons)	69,769	135,629	40,000	37,778	42,825
Total	747,561	613,389	475,600	350,689	230,913
Average Pounds/HH/Day					
Daily MSW/HH (Pounds)	6.2	5.9	5.6	6.0	3.5
Daily Bulky Waste/HH (Pounds)	2.7	0.5	3.0	0.6	0.3
Daily Recyclables/HH (Pounds)	0.5	0.9	1.3	1.0	1.3
Daily Organics/HH (Pounds)	1.0	2.1	0.9	0.9	1.2
Total	10.3	9.4	10.9	8.5	6.3
Annual Budget (\$ MM)	84.9	145	112.6	67.7	97.1
Annual Budget \$ / HH	214	407	469	301	484
Full Time Employees (FTE)	437	619	619	116	464
HH / FTE	908	575	388	NA	432
San Antonio only provides 2 per year bulky waste collection service					
Bulky waste numbers for Houston reflect Hurricane Harvey impacts					
Fort Worth relies on private sector collection contractor for residential collection					



2.1.2 Collection Fleet

Currently, the City is operating trucks that have been purchased between 2005 and 2018. Interviews with solid waste managers in other cities shows that it is generally desired to maintain a solid waste fleet of vehicles with 7 years or less years of operation. A review of the City's collection fleet shows that over 58% of the City's operating collection fleet is over 7 years old. Figure 2-3 shows the distribution of truck purchases since 2005. Ideally, a fleet replacement program results in a consistent replacement of trucks over the years. If this had been done since 2005, the City would replace 16 to 18 trucks per year. This level of replacement can only be achieved once the fleet has eliminated several of the older trucks. For the next five years, it may be necessary to replace between 20 and 30 trucks per year to get to a point where no trucks are more than 7 years old. Once these older trucks are replaced, the City will need to maintain a consistent rotation and add trucks to account for a growing number of residents.

If the City had a consistent truck purchase program it would require the purchase of approximately 18 trucks / year. However, the City will have to replace a significant number of older trucks in the first few years of the replacement program to eliminate older trucks that were purchased before 2007. It may be necessary to replace up to 30 to 40 trucks per year for the near-term period to eliminate older, non-efficient trucks.

The number of collection vehicles purchased by the City varies from year-to-year, often determined by the City's fiscal condition. This has resulted in a series of years when, in unfavorable budget conditions, no replacement trucks were purchased. In favorable economic times, the City has tried to catch-up and purchase a large number of trucks in one year. In 2019, the City will be adding new trucks to its fleet to replace some of the older trucks. So far in 2019, a total of 22 new trucks have been delivered. Another 10 trucks are anticipated to be delivered in the fall of 2019. Twenty-six are planned for 2020.



The advantages of a consistent program includes the following.

- Lower annual capital outlays for collection vehicles
- Reduced maintenance costs associated with maintaining older trucks. A review of fleet operating costs shows that trucks older than 7 years cost approximately \$1 per mile (approximately 30%) more to maintain than trucks less than 7 years old. Total miles driven by older trucks was 1.0 million miles of the total 2.6 million miles (note this is only for solid waste and recyclable collection and does not include brush and bulky collections).
- A more current fleet will be able to use advances in operating systems, including improved emission ratings.
- When the City's General Fund is stretched, funding of necessary trucks is often delayed, making the city rely on older, less reliable vehicles.
- Newer vehicle emissions are significantly less than older trucks.

2.1.3 Collection Staffing

The City currently has an overall staff of 437 in the Solid Waste Management Department. The majority of these staff provide collection services. Table 2-4 presents a comparison to other city solid waste staffing. On a per-household basis, Houston employees serve 937 households per FTE, while the average for San Antonio, Dallas and Austin is 456 households per FTE position. Fort Worth relies on private sector hauler so its FTE positions do not provide a reliable comparison. It should be noted that each city differs in the types of services provided; however, there is a clear difference in the level of staffing between these four cities. Currently, the City has a total of 437 positions open in the SWMD. Its current staffing is below the authorized staffing level. In 2019, the City budgeted the equivalent of 38 FTE positions in overtime costs. The following are issues affecting full staffing.

Fleet Maintenance

Because the City's fleet is an average of 7 years old, fuel & maintenance costs are considerable. The need to maintain the existing fleet, often leads to deferring on regular maintenance, leading to potential future breakdowns that might be avoided. In 2018, the City spent a total of \$10.6 million on its MSW and Recyclable fleet; and a total of over \$15.3 million on all of its equipment. A review of costs per mile for trucks older than 7 years, shows a dramatically higher per mile costs than trucks less than 7 years old. Updating the fleet could save between \$1 and \$2 million per year.



- Competitive salaries
- Perceived working conditions in solid waste business
- Low unemployment

Comparing Houston to San Antonio

The City of San Antonio provides residential services to the City to a total of 356,000 customers, compared to the City of Houston's 396,730 residential customers.

Table 2-5 Comparing Houston and San Antonio

Service	Houston	San Antonio
Residential Customers	396,730	356,000
Age of Residential Collection Fleet	Oldest operating trucks are 15 years old	Oldest operating trucks are 8 years old
Residential Services		
Residential Waste	Weekly	Weekly
Residential Recyclables	Every two weeks	Every two weeks
Residential Yard Waste	Weekly	Weekly
Residential Food Waste	Not provided	Weekly
Brush/Tree Waste	Every two months	Semi-annually
Bulky Waste	Every two months	Brush collected twice per year
Number of Side Loaders* (does not include 18 trucks that have arrived in 2019 to replace older fleet)	177*	185
Number of Rear Loaders	36	49
Number of Grapple Trucks** (70% are over 7 years old)	42**	44
Collection Rate (households / route)	1100	1250
Residential Collection Cost per Household	\$18.16 / month – based on City total solid waste budget / number of households	Variable Household Fee averaging \$27/month.

The number of total single family households is anticipated to increase from 462,736 in 2019 to 505,683 by 2040 (Source: Waste Generation Report). The City provides direct service to approximately 390,000 households, or 88% of the total single family households located in the City Limits. The remainder are collected through sponsorship arrangements in which the City partially pays for private collection for residents who request such service. Assuming that the City's market share remains constant over the planning time frame, it is estimated that the SWMD will provide service to 58,000 more households over the next 20 years. To serve this many more single family households, an estimated 20 more trucks, as well as more staff will need to be added to the City's fleet to provide solid waste, recycling and brush collection. Figure 2-4 presents the estimated number of residential garbage and recycling collection vehicles required between 2020 and 2040. This assumes a 20% reserve of vehicles; given the current fleet age, a higher reserve is required.



Figure 2-4
Projected Residential MSW & Recyclable Collection Vehicle Needs*
 *assumes 80% vehicle availability (900/1000)



2.1.4 Sponsorships

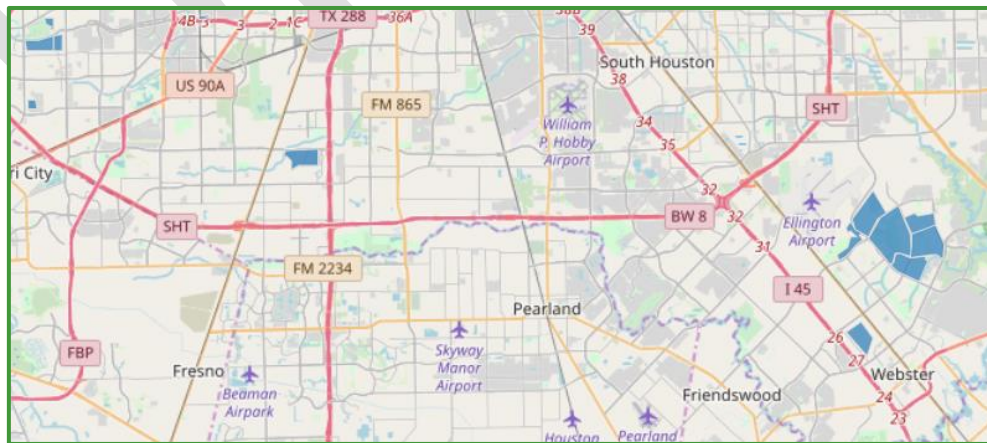
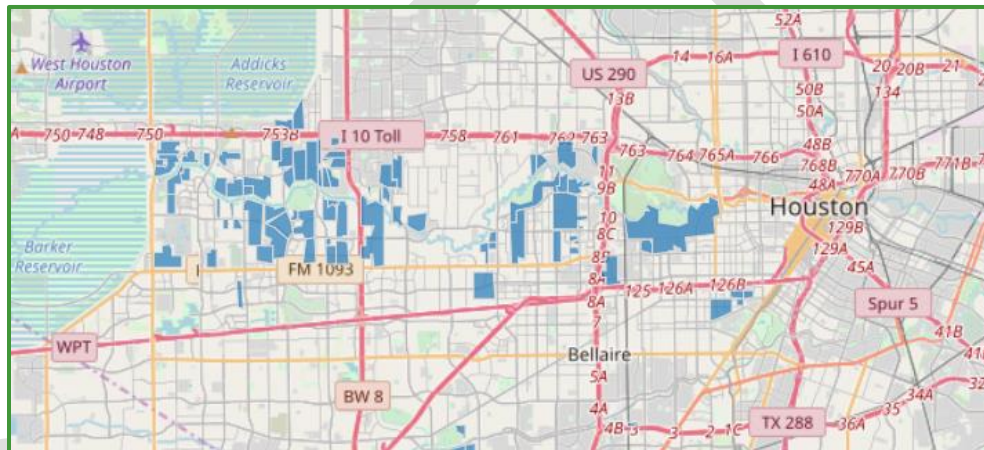
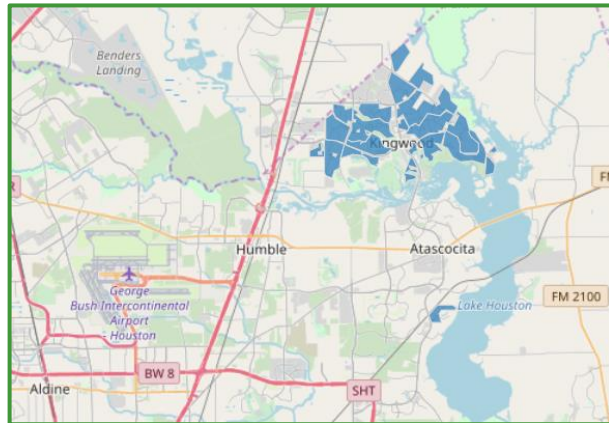
Section 39.-64 of the City’s code of ordinances allows Home Owner Associations (HOA) and one civic association (CA) to arrange for their own solid waste management services and be reimbursed at a fixed rate by the City. Sponsorship agreement means a reimbursement agreement between the City and a HOA or CA or other qualified entity for the purpose of partially offsetting the cost incurred by the association or qualifying entity in assuming the responsibility for all basic garbage collection service to residential units eligible for such service pursuant to Chapter 39 in certain defined areas of the city. A total of 50,511 households are currently served through sponsorships in 164 HOAs or CAs. Figure 2-5 illustrates the locations of areas currently provided service through Sponsorships (Source: Houston GIS).

If the City adopts a monthly solid waste management fee, new policies will have to be adopted as to the City’s relationship with homeowners who live in sponsorship areas.

HOA’s or CA’s act as independent entities and are responsible for the supervision and day-to-day administration of the collection service contracts. Private collection companies contract with the homeowners’ associations to provide service, and the city reimburses the associations for the cost of solid waste services provided, not to exceed an amount established by City Council. The communities served through homeowners’ associations are responsible for costs above the amount allocated by Council. Currently, the maximum amount reimbursable is \$6.00 per month per service unit authorized in the sponsorship agreement



2-5 Sponsorship Areas (highlighted in blue)





2.1.5 Recycling Collection Services

The City collects recyclable materials once every two weeks as discussed in the recycling section of this report. The City uses the same type of truck (side loaders and sometimes rear loaders) it uses for solid waste collection to collect recyclable materials. Key issues related to collection include the following.

- High levels of contamination in the material.
- As participation rates in the recycling program increase, more trucks and staff must be directed to the recycling program. This may or may not result in reductions in available garbage collection vehicles and staff.
- Distances that recyclables now have to be hauled as the City relies completely on the FCC facility which is located in northeastern Houston.
- In order to supplement City collection vehicles and crews, the City contracted for a private firm to provide recycling collection services in the northwest quadrant of the City. This is anticipated to be a short-term contract, with the City providing services as soon as fleet and staffing needs are addressed.

2.1.6 Tree Waste and Bulky Waste Collection Service

Houston provides residents receiving City collection service with collection of both tree waste and junk waste. Collection of tree waste occurs in January, March, May, July, September, and November. Bulky waste is collected February, April, June, August, October and December. The City maintains one fleet of trucks for collection and transport of tree waste and bulky waste. Some of the same issues related to age of fleet are true for these trucks as well. The SWMD has tree grapple trucks that were purchased in 2001. The median age of the 42 tree grapple trucks is ten years.

One of the advantages of splitting collection of tree / brush waste from bulky waste is that tree waste can be processed at one of the region’s composting/mulch operations. For the past 3 years, the amounts of tree waste collected has been approximately 38,000 to 40,000 tons per year. This material is taken to one of several Living Earth facilities located throughout the City. The distribution of Living Earth facilities allows the material not to be directed to a transfer station prior to recycling. The City does not enforce requirements that brush / tree waste not be set-out with bulky waste.

Bulky waste is either taken to a transfer station or directly to the landfill.

Table 2-6 Tree Waste and Bulky Waste Collection

Fiscal Year	Tree Waste Collected	Bulky waste collection
FY 16	38,611	287,064
FY 17	39,157	174,742
FY 18	22,215	195,829

* Tonnes affected by Hurricane Harvey

As with the residential solid waste collection fleet, the City’s fleet for bulky and tree waste collection is significantly outdated. A review of the City’s fleet shows that approximately 78% of the fleet, including tree grapple trucks, trailer land management trucks, roll-off trucks and roll-off containers are older than 7 years. Replacement of the older trucks in this fleet is estimated to cost approximately \$13 to \$15 million dollars. This does not include the need for additional collection vehicles to address growing population and to assist in resolving the City’s illegal dumping problem.



Table 2-7 Tree and Bulky Waste Collection Fleet Needs

Vehicle/Containers	# in Fleet	Older than 7 years	%	Latest Cost per Unit	Total Replace Cost to Replace Older Trucks
Tree Grapple Trucks	42	29	69%	\$ 177,272.00	\$ 5,140,888
Trailer Land Management	70	63	90%	\$ 62,500.00	\$ 3,937,500
Roll-off Truck (HVY)	31	10	32%	\$ 79,906.00	\$ 799,060
Truck Tractor	59	55	93%	\$ 82,893.00	\$ 4,559,115
Roll-off Containers	70	56	80%	\$ 5,663.00	\$ 317,128
Total	272	213	78%		\$ 14,753,691

2.1.7 Collection of Waste during Storm Events

Major Storm Events & Climate Change

Hurricane Harvey had a significant impact on the City’s solid waste management program. Since 2005, there have been an increasing number of storm events in the Gulf area. Since 2000, there have been 9 major flooding events in Harris County. Some of these events included the following

- Hurricane Allison 2001
- Hurricane Rita 2005
- Hurricane Ike 2008
- Memorial Day Flood 2015
- Tax Day Flood 2016
- Hurricane Harvey 2017

<https://www.hcfcd.org/flooding-floodplains/harris-countys-flooding-history/>

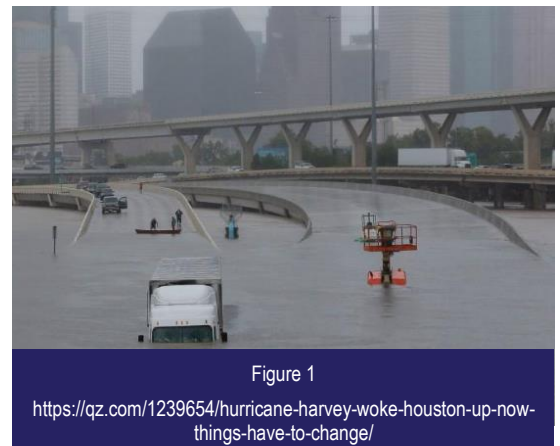
In addition to expected major storm events, weather forecasters are projecting that Texas temperatures are going to be climbing in future years due to climate change. “The U.S. government’s National Climate Assessment recently warned that, by the late 21st century, temperatures in Texas could climb by more than 8 degrees, with an additional 30 to 60 days of 100-degree-plus temperatures and extreme heat that could result in hundreds of more heat-related deaths and greater risks to outdoor agricultural workers.” The significance of this to Houston’s solid waste program is that as temperatures climb, safety of workers becomes increasing more important and the likelihood that additional workers will be required to collect waste.

In 2017, the City of Houston experienced one of its greatest natural disasters of its history. Hurricane Harvey brought unprecedented amounts of rain – 50 inches total. Some 208,000 homes were impacted, causing nearly \$16 billion in residential damage within the city limits alone. It is estimated that City of Houston crews worked a total of 390,000 hours of (equivalent to 188 full time workers).

Key Facts – Debris Removal (Category A)

- 575,000 tons of debris removed from Harvey-impacted neighborhoods
- 67,600 truckloads of debris collected citywide
- 21,000 tons of debris removed from Lake Houston
- 379,000 hours worked by City employees on Harvey debris removal
- 3 Mutual aid jurisdictions came to assist – City of San Antonio, City of Austin and TX DOT
- 15 months of debris removal
- Estimated \$259 million for debris removal activities in Houston
- 14 debris sites and landfills used for disposal

https://www.houstontx.gov/postharvey/public/documents/11.28.2018_progress_report_updated.pdf





2.1.8 Depositories and Recycling Center Access

The City currently operates six (6) neighborhood depositing and three (3) recycling centers and one reuse center. These facilities help reduce the amounts of illegal dumping by providing a convenient disposal alternative. They also provide recycling alternatives to residents in multi-family households. Access to the facilities is an important factor in their use. As the City expands its boundaries, access to more remote neighborhoods will become more difficult. Figure 2-6 illustrates the location of the current facilities. For facilities to be successful, they should be staffed to inspect materials that are brought to the site and that only eligible residents use the sites.

Factors that determine where it is appropriate to place a depository include:

- Proximity to high density multi-family households for recycling centers
- Proximity to large number of illegal dumping locations
- Proximity to other existing depositories or recycling centers

Neighborhood Depository & Recycling Centers

- North – 9003 N Main 77022
- Northwest – 14400 Sommermeyer 77041
- Northeast – 5565 Kirkpatrick 77028
- Southeast 2240 Central Street 77017
- Southwest - 10785 SW Freeway 77074
- South – 5100 Sunbeam 77033

Recycling Only Centers Drop-off Locations

- Westpark Center - 5900 Westpark 77057
- Clear Lake / Ellington Airport – Highway 3 @ Brantly Ave 77034
- Kingwood 3210 West Lake Houston parkway
- Reuse Warehouse - 9003 N. Main 77022
- HHW Collection
 - South ESC 11500 S. Post Oak Rd. 77035
 - North ESC 5614 Neches Street 77026

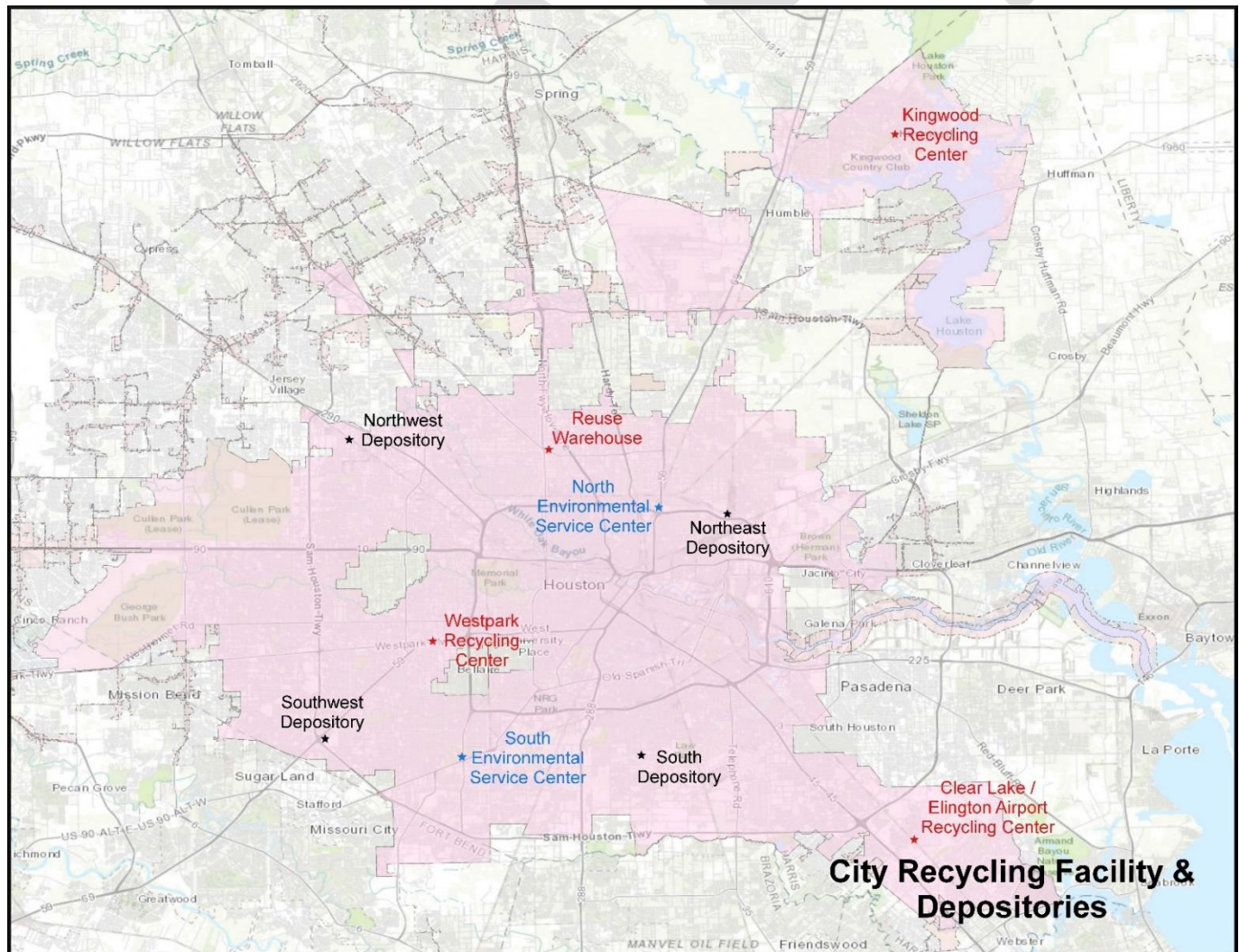




Figure 2-7 – Location of Depositories & Recycling Centers

2.1.9 Multi-family service

The number of Houstonians living in multi-family households is anticipated to increase from 1.0 million in 2019 to 1.6 million in 2040. By 2040, over half the population will live in multi-family households. Multi-family complexes are treated as a business, where the owner of the business is responsible for securing any solid waste or recycling collection services for residents.

Table 2-8 Projected Multi-Family Households & Waste Generation

	2019	2020	2025	2030	2035	2040
Population in Multi-family Households	1,070,119	1,090,697	1,199,631	1,326,114	1,503,522	1,649,287
# of Multi-family Households	478,538	488,601	540,884	599,117	682,942	758,524
Estimated MSW Generation (tons)*	626,662	638,712	702,504	776,572	880,462	965,823
% of Residential Waste Stream	45%	45%	47%	49%	52%	54%

Source: Waste Generation Report

There are only a small percentage of multi-family complexes that have recycling services available to their residents. The City does maintain recycling centers to provide recycling services to residents of multi-family units but residents must deliver their recyclables to them. Therefore, locating future recycling centers or depositories should take into consideration the concentration of apartment complexes now and in the future. This could change if the City were to adopt a regulation that requires apartment owners to provide recycling services to their residents. Similar ordinances are either planned or adopted in San Antonio, Austin, and Dallas. As mentioned in the Facilities Report, in addition to the City recycling facilities, there are a number of private-sector firms that recycle materials located throughout the City.

2.1.10 Private Sector Waste & Recycling Collection

Businesses in the City are responsible for arranging for the collection and proper disposal of municipal solid waste. Typically, businesses contract with a private hauler to collect their waste and recyclables if applicable. Rates for collection of materials in Houston are determined by the size of collection container and the frequency of collection. Based on the Waste Generation Report, approximately two-thirds of the waste collected and disposed in the City is generated by the private sector.

Private haulers providing services to businesses in the City must pay a franchise fee to the City. This franchise fee is to cover the cost associated with the haulers impacts to City streets. The fee is set at 4% of gross revenues from transporting commercial solid and industrial wastes that originate within the City limits. The FY 2019 total estimated solid waste franchise fees collected is \$8 million. Assuming a 4% rate, the total gross revenues generated by the 142 active solid waste haulers is \$200 million. In addition to the franchise fee, companies are required to secure annual dumpster permits that vary in proportion to the size of the containers. Figure 2.8 illustrates the franchise fees that have been generated over the past several years. The figure illustrates that since FY 2005, the fees have increased by 85% in actual value from \$4.1 million to \$8.0 million in FY 2020. When adjusted for inflation, these revenues increased only 36% from \$4.1 million to \$6.0 million. The estimated Harris County employments in 2005 was 5,646,000; employment in 2018 was 7,113,000. Adjusted for inflation, generation of tax revenue per employee increased from \$0.76 in 2005 to \$0.82 in 2018. This indicates that per employee generation of waste over this timeframe increased, not decreased. It should be noted that there are several factors that determine fee generation and that in recent years, the rate has shown to actually start decreasing.

Figure 2-7 Sources of Waste (2019) - Source: Waste Generation Report

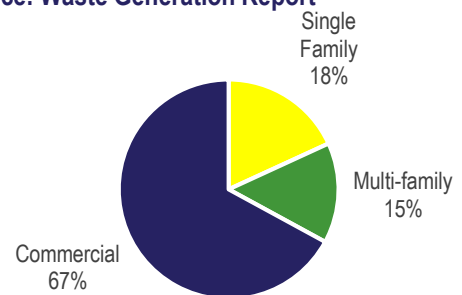
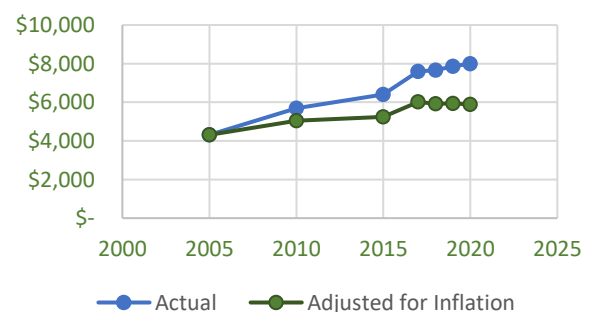


Figure 2-8 Historic Solid Waste Franchise Fees (\$1,000)





2.2 Key Regulatory Issues

State of Texas Health and Safety Code

Sec. 363.113. ESTABLISHMENT OF SOLID WASTE MANAGEMENT SERVICES. Each county with a population of more than 30,000 and each municipality shall review the provision of solid waste management services in its jurisdiction and shall assure that those services are provided to all persons in its jurisdiction by a public agency or private person.

HB 61 – This legislation, which was signed by Governor Abbot in 2019, included Slow Down to Get Around (SDTGA) language. The bill protects solid waste employees that provide collection services by requiring drivers to slow down near solid waste collection crews in the same manner that drivers must slow down for emergency responders and highway workers.

City of Houston Solid Waste Ordinance

Chapter 39 of the City's Code, Solid Waste and Litter Control defines the City's solid waste collection responsibilities and residential and commercial responsibilities related to solid waste management.

Key provisions of the City's solid waste ordinance as it relates to solid waste collection and recycling services include the following provisions.

- Article I – Definitions
- Article II – Department of Solid Waste Management
- Article III – Houston Clean City Commission
- Article IV – Collection Services
 - Division 1 – General
 - Division 2 – Containers, etc.
 - Division 3 – Other basic collection services
- Article VI – Screening of Bulk Containers
- Article VII – Commercial solid waste operators
- Article VIII – Storage, transportation and disposal of tires

2.3 Needs and Gap Analysis

As identified in this section, key gaps in the program include the following.

- Need to upgrade the City's solid waste collection fleet to provide efficient service to residents.
- Need for additional staffing to reduce overtime hours.
- Need to encourage residents to reduce the amounts of trash being generated and increase recycling.
- Compliance with City ordinances related to set-out of materials.

Metrics

Primary Metric	Type of Data	Proposed Metric
Number of Missed Collections per 1000 HH	311 call data	1 (1)
Collections / Route	Route data	900 (2)
Transfer Station utilization	Transfer Station utilization	75% (3)
Number of accidents / deaths	Human Resources	5 / 0 (4)
% of Apartments providing Recycling	Periodic survey	100% by 20xx
Collection costs / household	Budget data	\$ / household
HHW access to residents	Facility Location	Within 30 miles of all residents / quarterly local events for those not within 20 miles
Secondary Metric	Type of Data	Proposed Metric
Average age of collection fleet	Fleet maintenance	3.5 years
Truck availability %	Fleet maintenance	80% (maintained with 20% reserve fleet)
Labor Retention	Human Resources	
Labor Force %	Human Resources	
Preventive maintenance Compliance	Fleet maintenance	100%

(1) Fort Worth <1/1000; Dallas is 14.71 /10,000; San Antonio is 9 / 10,000



- (2) *City districts are reporting between 1125 and 1200; industry standards are between 900 and 1300- due to Houston's traffic congestion and distances to disposal centers, 900 HH is assumed*
- (3) *Based on City disposal records*
- (4) *Monthly report data*

Collection Goal: Continue to Provide Quality Solid Waste Service

Overall Objective: Provide quality and efficient collection of MSW and recyclables to Houston residents.

Specific Objectives / Strategies

1. Provide efficient once per week collection of municipal solid waste from residents. Address upcoming challenges associated with greater urban density, increased traffic and suburban sprawl.
2. Provide for the collection of recyclable materials in a manner that is both cost-effective and enhances the recovery of recyclable materials with low levels of contamination.
3. Provide for collection strategies that increase recovery of organics from residential and non-residential generators.
4. Provide for the cost-effective collection of bulky waste.
5. Reduce transportation costs associated with the collection and hauling of wastes and recyclable materials through efficient routes and strategic use of transfer stations.
6. Provide opportunities for the collection of recyclable materials at commercial and multi-family units.
7. Provide for the collection of household hazardous materials through City facilities and point-of-sale centers.
8. Provide for safe collection of municipal solid waste throughout the City.

2.4 Potential Future Actions

Replace older vehicles and invest in new trucks to meet future needs.

To collect waste and recyclable materials, the City operates and maintains a fleet of collection vehicles and other equipment. The City uses the same type of truck for the collection of solid waste as recycling.

For the majority of the City's 373 solid waste and 232 recycling routes, automated side loader vehicles are used for collection. However, for certain routes side loaders are not appropriate, such as routes that require alley collection, rear load vehicles are used.

Enhance periodic maintenance of the vehicles.

Provide full maintenance staff for the solid waste management vehicles. Currently, the City relies on the City's fleet department for fleet maintenance. Having dedicated fleet maintenance crews for solid waste vehicles would provide more accountability to the Department for meeting its fleet needs. It would also allow for scheduling of maintenance staff to perform tasks during the night when trucks are not being operated.

Establish Hiring and Employment practices that address current shortfall and increase staff retention. These policies may include:

- Incentive pay for new staff spread out over a period of time
- High base pay for collection staff
- Reduced overtime requirements
- Labor policies to ensure qualified staff and no vacancies

Implement data management program for solid waste collection vehicles. Monitor waste management data for trends and anomalies related to solid waste, recyclables and brush collection processing and disposal. Provide at a minimum, monthly reports to Director. The City currently has a management program, but it has been determined to be ineffective and is in need of either replacement or upgrade. The City has notified the system designer that corrective action is required.

Strictly enforce City's guidelines for collection of waste and recyclables to assure recyclables are taken to the Materials Recovery Facility (MRF), organic waste to the composting facility and MSW to an approved landfill.

Implement recommendations of routing study and periodically re-evaluate routes with increases in the number of households served.

Enforce the Slow Down to Get Around safety program



Consider the future conversion of the solid waste fleet to CNG. Evaluate the progress of this technology in other communities. Such a transition will require capital investment in fueling systems and maintenance equipment for these types of vehicles.

Enhance air quality, accelerate replacement of older collection vehicles with new, cleaner burning solid waste collection vehicles.

Enhance availability of depositories throughout the City. Evaluate how to increase the amount of materials being sent to these facilities.

Track performance of missed collections. Provide timely response to missed collections and coordinate with 311 to track calls, locations and reasons for missed collections.

Improve access to depositories and increase recycling centers in close proximity to multi-family housing units.

As markets develop, consider increasing the types of materials accepted at the recycling centers.

Evaluate managed competition of solid waste collection services. Managed competition provides the opportunity for the private sector to compete with the City to provide collection services. This practice is intended to encourage the public sector to operate in a competitive mode. This can be done on a city-wide basis or, as was recommended in the 2018 Fiscal report, for a quarter of the city.

Privatize certain neighborhoods of the City that are outside the City's core business area. As Houston expands, the number of neighborhoods that are outside the core business area (described as areas significantly outside the City's loop) could be provided service more efficiently from private haulers. These haulers would collect waste in these areas under contract. It would be at their discretion where the waste would be taken for final disposal.

DRAFT



3.0 Transfer Stations

3.1 Existing City Program

The City owns three transfer stations that are used to reduce haul costs from the points of collection to disposal. These transfer stations are operated under a contract with Republic Services. Approximately 75% of the City’s residential collection vehicles use the transfer stations. The other 25% take their waste directly to the landfill. The decision whether to use the transfer stations or direct haul to the landfill is determined by the distance from the end of the collection route, traffic conditions and the difference in the queuing time at the transfer stations and landfills. There is currently no ability to use the transfer stations for recyclables.

3.1.1 City Transfer Stations

Table 3-1 presents a summary of the waste accepted by the City’s three transfer stations. The table shows the amounts of waste the City of Houston delivers to each transfer station (includes both MSW and bulky waste), the amount of waste delivered by Republic who is the operator of the transfer station and the amounts of waste delivered to the site by other “third party” haulers. A total of 57% of the waste delivered to the transfer stations is from City haulers. Each of the City’s transfer stations has a capacity of 2000 tons per day. In 2017, the average throughput was approximately 700 to 750 tons per day (assumes 310 days of operation per year).

Table 3-1 2017 City Transfer Stations – Throughput by Hauler Type

	City of Houston	Republic Services	All Other Privates	Total Tonnage
Houston Northwest TS	86,988	117,418	18,212	222,619
Houston Southeast TS	194,057	34,927	11,053	240,039
Houston Southwest TS	113,734	80,306	38,397	232,438
Total	394,779	232,653	67,663	695,096
% of Total	57%	33%	10%	100%

Aging Facilities

All three of the City’s transfer stations were registered with the TCEQ in 1999. They have been in steady operation for over 18 years. These facilities also take on a considerable amount of structural stress as they accept a large number of heavy trucks per day and material is continuously pushed with large front-end loaders. In order to maintain the integrity of these facilities and allow for continued operation, the City will likely have to make periodic investments to upgrade the facilities, especially floors and roadways in and out of the transfer stations.





The City had a study of the facilities conducted in 2012. The study evaluated the condition of the three transfer stations and made several recommendations on improving the sites. Some of these recommendations included the following.

- Roof repairs
- Overhead door replacement
- Repair concrete pavement
- Repair sprinklers, support beams
- Repair buildings
- Relocate electrical panel and conduit
- Repair/replace push walls to provide column protection
- Repair concrete ramps and guardrails
- Replace lighting fixtures
- Add armor plate to loadout chutes/hopper
- Increase building ceiling height in original building
- Expand building to add tipping floor and chute for recyclables

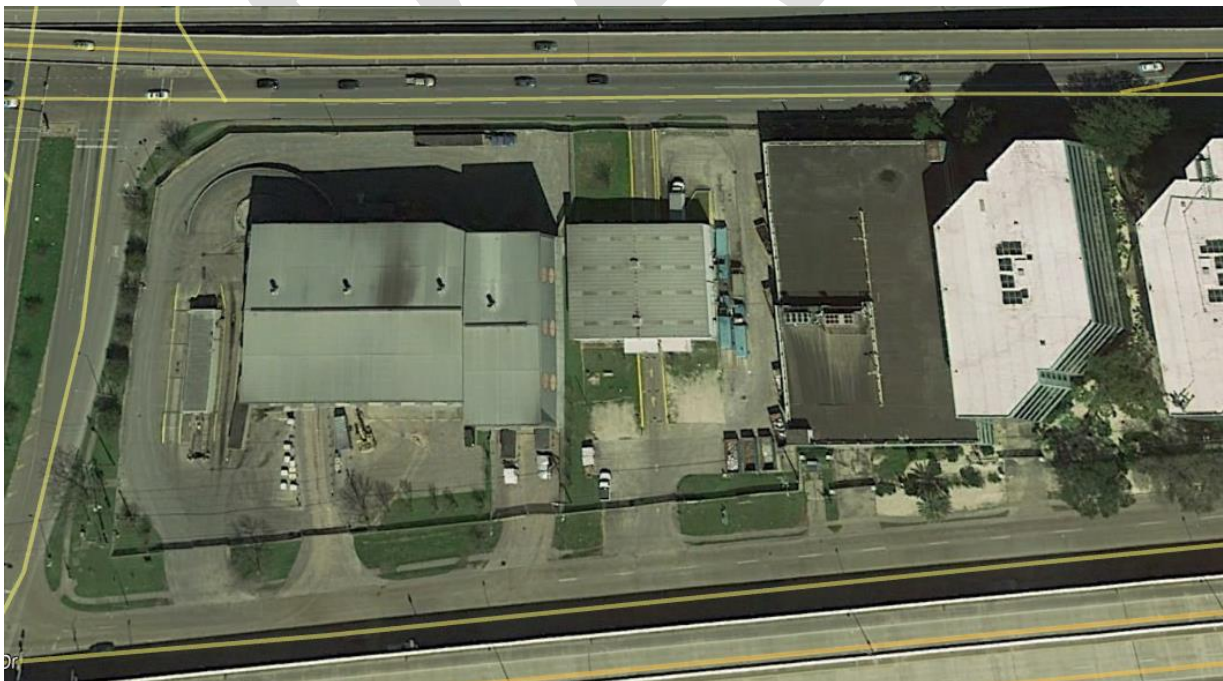
The estimated budget for these improvements are shown in Table 3-2.

Table 3-2 2012 Capital Improvement Recommendations for City Transfer Stations

Transfer Station	Summary of Improvement Capital Costs
Houston Northwest TS	\$4,143,000
Houston Southeast TS	\$3319000
Houston Southwest TS	\$561,000
Total	\$8,023,000

Southwest Transfer Station Queuing

The Southwest Transfer station is located on Westpark Drive. The transfer station has limited queuing space before the scale house. This results in periods of time when collection vehicles are lined-up onto Westpark Drive. Options for resolving this issue may include scheduling deliveries to the transfer station at non-peak hours but this would significantly affect collection schedules. Another option is the construction of a truck lane on Westpark for queuing vehicles.





Recyclable Material Long-Haul

Another collection challenge at the Southwest Transfer Station is that prior to the FCC Contract for recyclable material processing, the City was using three different material recovery facilities. One of those facilities was the Waste Management Brittmore facility which is located in close proximity to the South Environmental Service Center. The City now must haul its recyclable materials from the southwest region of the City to the northeast region where FCC is located. Due to the configuration of the Southwest Transfer Station it is not practical to transfer recyclable materials from collection vehicles to long-haul vehicles there. This means that recyclable collection vehicles have to haul their materials from the point of collection to the FCC facility, thereby requiring more collection vehicles for this part of town. The City does own the building for the Brittmore facility, but has two years remaining on a lease of the building to Waste Management. Recommendations are listed below.

- Add more collection vehicles to the Southwestern region for collecting recyclables as it will take longer times to haul materials from that location to FCC.
- Convert the Brittmore facility, once the lease has expired, to a recyclable material transfer facility.
- Construct a temporary transfer facility for recyclable materials at the South Environmental Service Center (evaluate what permitting requirements would be required for such a structure).
- Identify a warehouse that could be utilized temporarily for transferring recyclable materials (again, permitting may be an issue).

3.1.2 Regional Transfer Stations

Regionally, there are a total 21 operating transfer stations in the H-GAC region. A total of 2.5 million tons were sent to these 21 transfer stations before being disposed - 25% of the total 9.9 million tons disposed in the region in 2017. Table 6-2 presents a summary of the regional transfer stations. In the City of Houston, there is approximately 25,000 tons of daily transfer station capacity. This compares to a total waste generation rate of 16,500 tons per day (assuming 310 days of operation). Given seasonal peaks and daily peaks in generation, daily generation can be up to 30% higher on a monthly basis.

Table 3-2 H-GAC Transfer Stations Capacity and Throughput

	Name	2011 (TPY)	2015 (TPY)	2016 (TPY)	2017 (TPY)	Permitted Capacity (TPD)	2017 (TPD)
1	Houston SW Transfer Station	311,435	292,856	271,317	244,213	2,000	783
2	Houston NW Transfer Station	162,482	226,364	220,391	217,157	2,000	696
3	Houston SE Transfer Station	194,793	219,022	229,169	241,632	2,000	774
	City Transfer Station Total	668,710	738,242	720,877	703,002	6,000	2,253
4	Egbert Transfer Station	53,420	56,282	66,579	65,010	800	208
5	Excell Type V Transfer Station	43	17,515	14,622	12,110	1,000	39
6	Hardy Road Transfer Station	242,425	405,600	440,999	444,048	2,500	1,423
7	Koenig Street Transfer Station	107,954	157,777	145,461	123,166	2,500	395
8	Lone Star Recycling & Disposal	-	199,982	262,705	284,473	6,000	912
9	Ruffino Hills Transfer Station	218,146	422,691	407,809	389,326	2,000	1,248
10	R&J Transfer Station	-	-	-	4,598	125	15
11	Sam Houston Recycling Center TS	76,210	169,183	151,202	179,600	1,500	576
12	Sprint Recycling Center NE	25,723	128,800	20,450	19,473	1,000	62
13	Tanner Road TS	23,076	54,961	67,998	60,499	2,200	194
	Houston Private Sector TS	746,997	1,612,791	1,577,825	1,582,303	19,625	5,071
	City TS Total + Private Sector TS	1,415,707	2,351,033	2,298,702	2,285,305	25,625	7,325



14	Mid America Contractors	0	0	0	16,411	NA	45
15	City of Deer Park Transfer Station	-	16,092	18,254	17,541	NA	56
16	City of Galveston Transfer Station	80,765	90,163	94,891	97,560	NA	313
17	City of Hempstead TS	0	126	68	89	NA	
18	City of Huntsville Transfer Station	0	0	0	42,570	NA	136
19	Matagorda County TS	5,702	5,462	6,628	6,704	NA	21
20	City of Weimar	0	0	0	36,997	NA	118
21	Country Waste Inc.	8,747	7,959	6,540	6,451	NA	21
	Outside Houston TS Total	95,214	119,803	126,381	224,323		711
	Total Transfer Station	1,510,921	2,470,836	2,425,083	2,509,628		8,036

Note: Totals for Houston transfer stations may vary from Table 3-2 due to differences in reporting periods.

Table 3-3 Permitted Transfer Stations – Not Operational

	Name	Permit Status	Not Constructed or Inactive	County
22	Ralston Road TS	Issued	Not Constructed	Harris
23	Tall Pines TS	Issued	Not Constructed	Harris
24	Nexus Material Recovery & TS	Issued	Not Constructed	Harris
25	Holmes Road TS	Issued	Not Constructed	Harris
26	GW TS	Issued	Not Constructed	Harris
27	FCC Materials Recovery Facility*	Issued	Opened in March 2019	Harris
28	City of Sealy Transfer Station	Issued	Inactive	Austin
29	Sprint Fort Bend County TS	Issued	Inactive	Fort Bend
30	Gulfwest Waste Solutions TS	Issued	Not Constructed	Chambers
31	K2 Waste Solutions	Issued	Not Constructed	Liberty
32	Pintail Landfill TS	Issued	Not Constructed	Waller

Source: TCEQ *FCC is permitted as a transfer station, however it functions as a MRF. Became operational in March 2019.

3.1.3 City Request for Proposals for Transfer Station Operations

The City currently contracts with Republic Services for the operation of the three transfer stations. This contract expires in 2019. In May 2019, the City received proposals for the operation, maintenance, hauling and disposal of waste at the City's three transfer stations and the proposed NE transfer station.

Specific requirements of the RFP included the following:

- Operation of the three transfer stations
- Maintenance of the three transfer stations
- Hauling and disposal of waste received by the City
- Acceptance of solid waste from third party vendors and appropriate royalties to the City for this waste
- Expansion of transfer operations to include recyclable materials at the NW and SE transfer stations.
- Operation of the Gasmer facility as a recycled material transfer operation once the Waste Management contract has expired.



3.2 Existing Policies and Regulations

The City’s transfer stations are regulated under TCEQ 330.05. The construction of the new transfer station will require TCEQ authorization. The permit application will require the City to define the following.

- Address location restrictions for the transfer station
- Design Requirements
- Site Operating Plan
- Closure & Post-closure care
- Financial Assurance

3.3 Needs & Gap Analysis

Overall Objective: Provide efficient collection of MSW to all Houston residents.

Specific Objectives:

Reduce transportation costs associated with the collection and hauling of wastes and recyclable materials through efficient routes and strategic use of transfer stations.

Primary Metrics	Current Program	Program Gap
Time from collection point to disposal at transfer 45 minutes	Typically approximately 45 minutes	Increased traffic is likely to impact this travel time as well as the potential mid-term closure of McCarty Road Landfill
Tons collected station or landfill	75% utilization	75% utilization
Queuing time at transfer stations 20 minutes	Per contract meets this time	No gap
Queuing time at landfill 20 minutes	Per contract meets this time	No gap
Transfer station utilization 75%	At approximately 75%	No gap
Number of accidents or fatalities	0	No gap

Gap Analysis

Recyclable Material Transfer Capabilities.

Evaluate all service centers for potential recyclable material transfer operations. Provisions for adding this capability was included in the request for proposals for transfer station operations.

Northwest Transfer Station: An evaluation of the City’s growth patterns shows that the greatest amount of growth in the City is anticipated to occur in the north half. This will result in greater quantities of waste being generated in these two quadrants. The Northwest Transfer Station accepts approximately xxx tons per year. The waste that is generated in the northeast quadrant of the City is taken directly to the landfill. This landfill has approximately 15 years of remaining capacity.

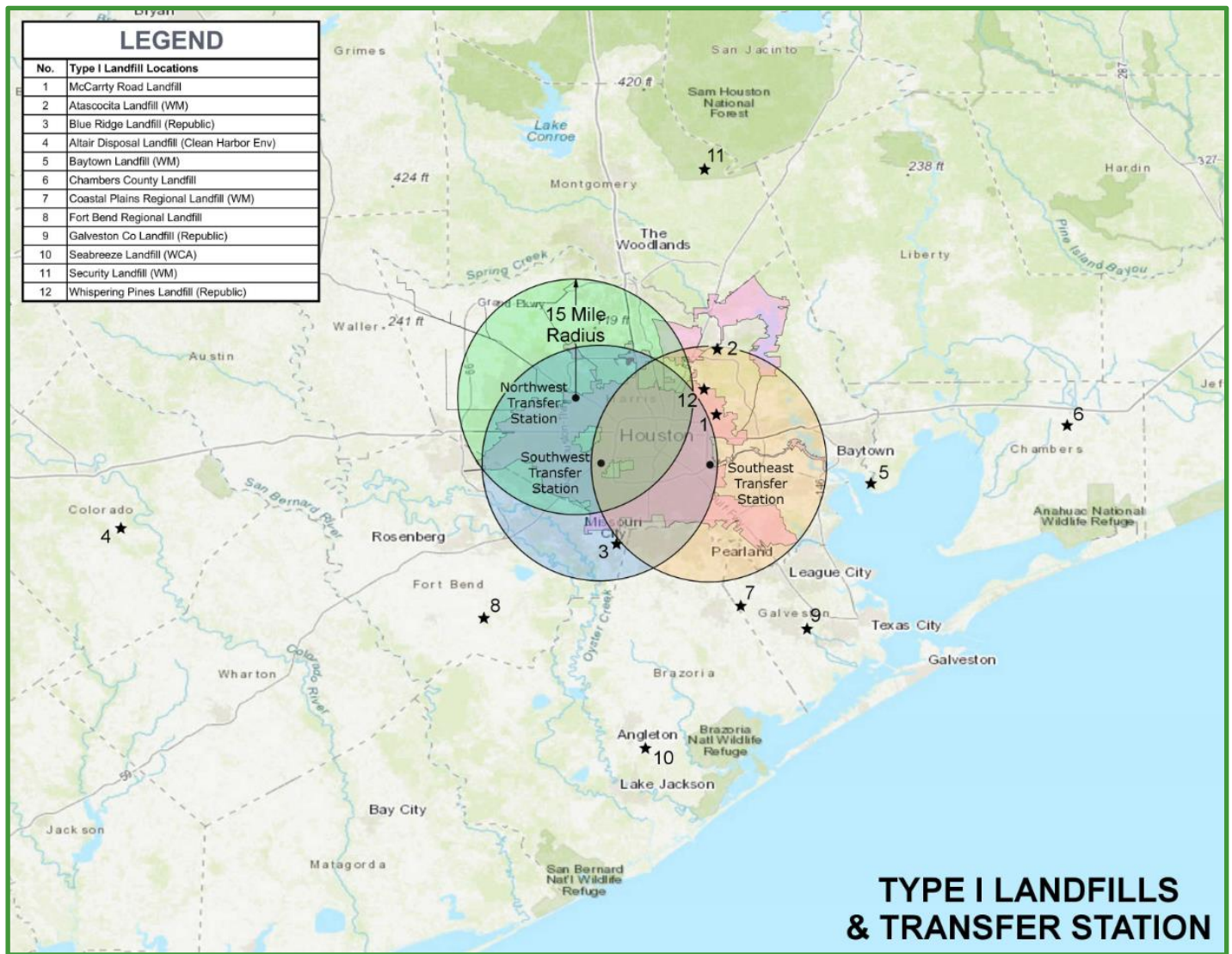
Northeast Transfer Station (new)

The City has plans to design and construct a new transfer station to be located in the northeast quadrant of the City. The new transfer station will be located at ((address)). The City has selected an engineering firm to develop a design for the facility. In the City’s recent request for proposals for the operation of the existing three transfer stations, the City also requested bid prices for the operation of a new transfer station. The design of the new transfer station will allow for flexibility to sort recyclables and transfer recyclable materials to the MRF.



Structural and Mechanical Reviews

Given the age of the transfer stations, the City should periodically review the structural, roadway and mechanical systems for improvements and upgrades. The 2012 report on the three transfer stations provides an example of what should be done annually.





3.4 Transfer Station Potential Future Activities

Build a NE Transfer Station.

This will require a careful evaluation of the selected site and the proposals recently submitted by private vendors for operation of the three transfer stations. The request for proposals (“RFP”) required that proposing vendors supply cost information for operating a potential new Northeast Transfer Station. The cost information will help determine the near-term feasibility of the new transfer station. The City will have to secure TCEQ authorization for the new transfer station before it becomes operational.

Develop capabilities for recyclable material transfer capabilities.

This option has already been recommended in the 2012 Asset Valuation Study for the SWMD and is a part of the request for proposals for the operation of the three transfer stations. Implementation of this recommendation has become more critical with the contract with FCC to process recyclable materials for the entire city. Barring the ability to implement transfer capabilities at these existing facilities, dedicated facilities should be identified and authorized by TCEQ to move recyclable materials from various parts of the city more cost effectively.

Evaluated Need and Feasibility of a New Rail Transfer Station Option.

Rail transfer stations are designed to transfer waste using rail cars from the point of generation to a remote final disposal site. Rail haul is being used mostly on the west coast of the US. The concept involves collecting waste and then loading the waste into intermodal transfer vehicles which are placed onto rail cars. Access to rail near the transfer stations is preferred to reduce haul costs. Waste is hauled to a location near the destination landfill. Trucks are taken off the rail cars and sent to the landfill where waste is offloaded and disposed. The intermodal trucks are then sent back to the point of origin. There are variations on the types of trucks or rail cars used for hauling the waste, but conceptually this approach is designed to haul wastes hundreds of miles from Houston to a landfill with adequate capacity and the infrastructure capable of accepting waste from rail cars. Because of the complexity and required investment, this would be a long-term option. Factors that will have to be considered in a rail haul option would include the following.

- Developing a concept for the type of rail haul option that would work best for the City
- The location of the rail haul facility
- Cost of constructing the infrastructure for the transfer station, as well as negotiated rates for haul and disposal
- Identifying a landfill capable of accepting waste from a rail transfer station
- Negotiating a contract with a rail company or waste management firm to haul waste
- Negotiating a long-term disposal contract for disposal of waste



4.0 Energy & Resource Recovery

4.1 Existing Program

There are technologies available to convert municipal solid waste to useful energy. The technologies used today are much more sophisticated in terms of environmental protection versus incinerators of the past. Incineration of waste without energy recovery was once a preferred method of significantly decreasing the volume of waste that requires disposal. In fact, there was an incinerator operating in Houston for solid waste management. This facility closed many years ago.

Many MSW landfills in the region that convert landfill gas to energy. Landfill gas is generated as a result of decomposition of the organic portion of the waste in a landfill. Landfill gas is about half methane which can be used as a fuel, either directly or indirectly through the generation of electricity. Landfills in the state of Texas are required to have a landfill gas management plan that addresses how these gases will be managed. Landfills are also required to implement gas control measures as part of their operating plans. As presented in the Facilities Report, there are seven regional landfills with energy recovery programs. (Refer to table below). Landfills that do have landfill gas energy recovery systems include the following.

Table 4-1 Energy Recovery from LFG Projects (Source TCEQ MSW Annual Report)

Facility	County	Gas Processed (Million cubic ft.)	Gas Distributed Off-Site (million cubic ft.)	Power Generated and Sold (million kWh)	Power generated and used onsite (million kWh)
Security Landfill Gas to Energy Facility	Montgomery			22.4	22.7
Blue Ridge Landfill Gas Compressor Station	Brazoria	1,347	0	42.3	2.2
Fort Bend Landfill Gas Treatment Facility	Fort Bend	410	225	0	0
Coastal Plains Landfill Gas to Energy Facility	Galveston	0	0	25	26.7
McCarty Road Landfill Gas Recovery Facility	Harris	2,493	1,401		
Atascocita Landfill Gas to Energy Facility	Harris				
Ameresco McCarty Energy Landfill Gas to Energy facility	Harris	1,045	1,045		
Total		5,295	2,671	89.7	51.6

There are alternative technologies to landfill disposal of waste. These options are at various stages of technological development, and have varying environmental impacts and financial feasibility. Table 7- presents a summary of technical options that can be used for energy recovery from waste.



Definitions

Thermal conversion processes are characterized by higher temperatures and conversion rates than biochemical processes. These technologies contain a continuum of processes ranging from thermal decomposition in a primarily oxygen starved environment (commonly referred to as pyrolysis/cracking processes) to partial oxidation in a sub-stoichiometric environment (or gasification processes). Energy recovery options that are available for converting municipal solid waste to energy include the following.

- **Mass Burn**
- **Refuse Derived Fuel**
- **Pyrolysis**
- **Gasification**
- **Anaerobic Digestion**

Mass Burn Technology: At an MSW combustion facility, MSW is unloaded from collection trucks and placed in a trash storage bunker. An overhead crane sorts the waste and then lifts it into a combustion chamber to be burned. The heat released from burning converts water to steam, which is then sent to a turbine generator to produce electricity. Currently, there are approximately 75 operating MSW Mass Burn facilities in the US.

Refuse Derived Fuel: Refuse derived fuel systems use mechanical methods to shred incoming MSW, separate out non-combustible materials, and produce a combustible mixture that is suitable as a fuel in a dedicated furnace or as a supplemental fuel in a conventional boiler system.

Other Technologies that are being developed include pyrolysis, gasification and anaerobic digestion. For municipal solid waste these technologies have been proven in Japan, Canada and Europe, but not in the US.

New technologies that are available for managing the municipal waste stream, or portions of the waste stream include pyrolysis, gasification and anaerobic digestion.

Some of the key factors that will need to be considered for to any new technology include these.

- Waste flow control
- Waste separation needs
- Tolerance for contamination or variation in waste stream
- End products and markets available for these products
- Technology advancement and scale-up
- Capital costs and Financing
- Operational costs

Edmonton Anaerobic Digestion Facility

This facility, located at the Edmonton Waste Management Centre, will expand the City's organics waste processing capacity and contribute to the goal of diverting 90% of waste from landfill.

The ADF will enable the City to:

- Process up to 48,000 tonnes of organic waste per year and divert it from landfill
- Create renewable energy in the form of electricity and heat
- Produce high quality compost for use in agriculture and horticulture
- Reduce greenhouse gas emissions
- Remove odours created during the process by using bio-filters

The construction of the new ADF is now complete. The facility is currently in the commissioning phase, processing organic feed stock from municipal solid waste and generating biogas. It will be fully operational later in 2019.

Source:

https://www.edmonton.ca/projects_plans/waste_drainage/anaerobic-digestion-facility.aspx

Table 4-2 Pyrolysis, Gasification & Anaerobic Digestion

Conversion Technology	Pyrolysis	Gasification	Anaerobic Digestion
Feedstock	Plastics	MSW	Organic wastes
Primary End Product(s)	Synthetic Oil, Petroleum Oil	Syngas, Electricity, Ethanol	Biogas and Electricity
Conversion Efficiency	62-85%	69-82%	60 – 75%
Facility Size (capacity)	10 – 30 tons per day*	75-330 tons per day	30 – 100 tons per day
Product Energy Value	15,000 – 19,000 Btu/lb.	11,500 – 18,800 Btu/lb.	6000 – 7000 Btu/lb.

Source: US Environmental Protection Agency



4.2 Legislation & Laws

Energy facilities processing municipal solid waste are generally required to secure a permit through the TCEQ in much the same fashion as a landfill or transfer station. These facilities are classified as Type V Processing Facilities. Regulations defining the requirements for Type V facilities are found in TAC 330.5.

“These facilities include processing plants that transfer, incinerate, shred, grind, bale, salvage, separate, dewater, reclaim, and/or provide other storage or processing of solid waste. Owners or operators shall follow the minimum design and operational requirements prescribed in Subchapter E of this chapter (relating to Operational Standards for Municipal Solid Waste Storage and Processing Units); Subchapter F of this chapter; Subchapter G of this chapter; Subchapter H of this chapter, if required; Subchapter K of this chapter; Subchapter L of this chapter, if financial assurance is required; Subchapter M of this chapter; and Chapter 37, Subchapter R of this title, except that owners and operators of recycling facilities who store combustible material are required to comply with Chapter 37, Subchapter J of this title (relating to Financial Assurance for Recycling Facilities). Groundwater monitoring may be required by the executive director and shall be maintained in accordance with the requirements of Subchapter J of this chapter.” Source: TCEQ Regulations.

In 2019, legislation was adopted that was advocated by the Texas Chemistry Council. HB 1953 was signed into law by Governor Abbott prohibits TCEQ from considering postconsumer polymers or recyclables, recoverable feedstocks as solid waste “if they were converted using pyrolysis or gasification into valuable product. TCEQ rules still apply to these technologies if they process unsorted municipal solid waste.

4.3 Gap & Needs Assessment

Overall Objective: Utilize environmentally acceptable and technologically feasible measures for resource recovery and energy from waste.

Specific Objectives:

1. Encourage the utilization of energy from waste in the form of landfill gas utilization throughout the region as a means of generating useful energy and reducing air emissions associated with municipal solid waste landfills.
2. Invest in environmentally sound alternative technologies for resource recovery as technologies evolve and the cost-effectiveness of these technologies improve.

Metrics:

Eventual use of landfill gas recovery technology by all landfills in the Region. Currently, seven of the twelve Type I landfills are using some form of energy recovery.

Use of energy from waste technologies when the technologies meeting technical, environmental and financial feasibility. Currently, there are technologies that are both technically feasible and environmentally acceptable, but not financially feasible in the Houston area.

4.4 Future City Options

The City of Houston does not own any landfills in the region. Therefore, to achieve this goal, the private sector must take actions to achieve this goal. City policies related to landfill gas utilization may include the following:

- Make it a requirement for landfill gas to energy system be part of a landfills operation before the City will use the facility
- Purchase landfill gas from the landfills for use in fleet operations.
- Provide financial incentives for producing gas.

Other Energy Recovery

Aside from landfill gas to energy programs there are no energy recovery programs currently operating in the City of Houston. Within the City of Houston there is one cement kiln that is using tire derived fuel for energy recovery as part of the cement process.



5.0 Disposal

5.1 Current Program

To meet the disposal needs of the first responsibility, the City relies on three primary landfills for municipal solid waste disposal: McCarty Road, Atascocita and Blue Ridge. The City's contract for management of the transfer stations provides the contractual framework for waste going to either McCarty Road or Blue Ridge. The Waste Management contract that the City is currently operating under allows the City to utilize the Hardy Road, Tanner Road, Indian Paint Brush, Green Shadow and Fairbanks Type IV landfills. This agreement was negotiated in 1988. In 1999, the Council approved an ordinance that merged the separate contract into a single contract that adjusted the contract term, disposal rates and contractor responsibilities. In 2014, the City for disposal services contract was extended to allow for both putrescible and non-putrescible waste at Waste Management Inc.'s Atascocita and Hawthorn landfills. It is a three year contract which expired June 30, 2017, with two, 1 year optional years. The contract will expire June 2019. The City is in the process of soliciting new bids for disposal services. The City has an agreement with Waste Management that provides the framework for disposal of waste to that facility.

**Figure 5-1
Landfill Current & Projected Capacity 2017-2040**

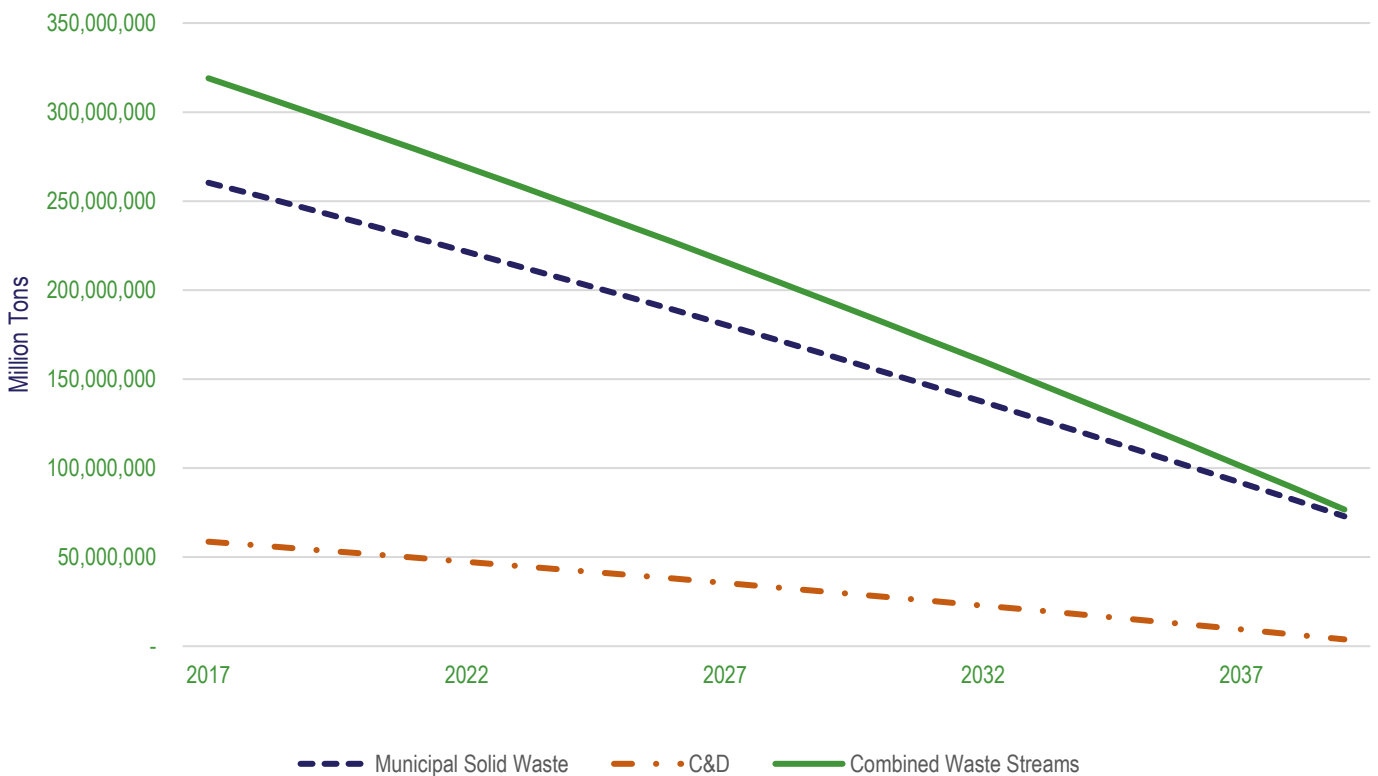




Table 5-1 Type I Landfills – Ownership & Capacity

Landfill	Owner	Remaining Capacity Tons	Remaining Capacity Cubic Yards	Remaining Capacity Years (2017)
McCarty Road	Republic	23,748,385	21,472,319	16
Atascocita	Waste Management of Texas	29,228,482	38,458,529	24
Blue Ridge	Blue Ridge Landfill TX, LP	87,275,249	142,373,978	88
Houston Primary Landfills		140,252,116	202,304,826	37
Altair Disposal Services Landfill	Altair Disposal Services, LLC	221,083	368,471	5
Baytown Landfill	USA Waste of Texas Landfills, Inc.	7,076,882	8,958,079	23
Chambers County	Chambers County	10,481,597	17,469,329	402
Coastal Plains Recycling and Disposal Facility	Waste Management of Texas	11,459,041	12,062,148	22
Fort Bend Regional Landfill	Fort Bend Regional Landfill, LP	31,476,496	35,973,138	29
Galveston County Landfill	Galveston County Landfill TX LP	27,813,032	37,084,042	53
Seabreeze Environmental Landfill	Seabreeze Recovery Inc.	18,667,822	21,334,654	28
Security Landfill RDF	TX LFG Energy, LP	9,350,389	12,848,470	24
Whispering Pines Landfill	Whispering Pines Landfill Tx, LP	10,902,299	10,902,299	10
Houston Secondary Landfills		127,448,641	157,000,630	40
Total*		267,700,757	359,305,456	37

Source: TCEQ Municipal Solid Waste – A Year in Review 2017. Assumes current rates of disposal



Table 5-2 Type IV Landfill Capacity

Landfill	Address	Tons of Capacity	Cubic Yards of Capacity	2017 Tons	Years Remaining Capacity
Addicks Fairbanks Landfill	6415 Addicks Fairbank Rd, Houston	47,633	75,608	56,929	1
Casco Hauling and Excavation Landfill	1306 E Anderson Rd, Houston	549,300	1,220,007	97,147	5.7
Cougar Landfill	8601 Mount Houston Rd., Houston	44,119	63,050	16	4
Dixie Farm Road Landfill	4649 Dixie Farm Road	817,564	1,858,100	48,519	17
Fairbanks Landfill	8205 Fairbanks N Houston Rd, Houston	13,029,083	17,751,880	176,600	37
Greenhouse Road Landfill	3510 Greenhouse Road, Houston	4,113,628	5,484,837	124,622	21
Greenshadows Landfill	70 Jana Lane, Pasadena, TX	2,141,828	2,549,795	101,900	19
Hawthorn Park Landfill	10550 Tanner Road, Houston	0	0	16	4
Lone Star Recycling & Disposal	4107 S Sam Houston Pkwy, Houston	5,479,259	10,958,517	303,486	16.1
North County Landfill	2015 Wyoming Street, League City	2,423,923	3,689,381	20	50
Ralston Road Landfill	6632 John Ralston Road, Houston, TX	1,092,410	1,456,546	127,157	3.5
Sprint Fort Bend County Landfill	16007 W Bellfort, Sugar Land	7,258,243	13,904,680	307,236	24
Sprint Montgomery County	17851 Highway 105 E, Conroe	20,292,681	40,585,362	8,857	50
Tall Pines Disposal Facility	18710 E Hardy Rd, Houston	1,318,835	1,758,447	344,369	3
WCT Greenbelt	600 Old Genoa Red Bluff Rd, Houston	2,215,513	2,954,017	155,381	12
Total		60,824,019	104,310,227	1,852,255	32



As stated, the City currently does not own or operate a landfill. It secures its disposal capacity from one of 12 municipal solid waste landfills in the region, as well as from one of the 14 construction/demolition landfills. The remaining capacity, with anticipated growth in the region is approximately 30 to 40 years for MSW landfills and 20 to 30 years for C&D landfills. A number of factors can affect the landfill capacity in the region, including the following.

- Current landfills are expanded or new sites are permitted. (Seabreeze, Greenhouse and Tall Pines are known to be seeking a permit amendment for expansions at this time.
- Continued growth in population and economic activity resulting in more waste being generated on a sustained level.
- Companies deciding to close their landfills.
- How efficient landfill operators manage air space.
- Changes in the types of waste generated.
- Major storm events similar to Hurricane Harvey and recent floods.
- Changes in regulations.

The City currently has a request for proposals for long-term solid waste disposal and operation of the City’s three transfer stations. The contracts have a xxx year term.

To provide the necessary long-term disposal capacity that the City needs, it has the following options.

Public vs. Private Ownership

Currently, the City relies completely on the private sector for disposal of waste at one of several landfills in the region. There are advantages and disadvantages associated with public versus private ownership of landfills.

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ Control over capacity ▪ Greater cost control in a less competitive overall landfill market as landfills close ▪ Revenue generation potential ▪ Ability to place additional waste management facilities at the site 	<ul style="list-style-type: none"> ▪ Environmental Risks ▪ Cost overruns ▪ Site selection process is highly political ▪ Capital cost requirements

There are three possible scenarios for Houston’s future waste management program:

1. Continued reliance on the private sector for disposal of waste.
2. City ownership of a landfill and public operations.
3. City ownership of a landfill, but private operations. This is similar to how the City manages its transfer stations.

Examples of landfill ownership and operation are presented in Table 5-1.

Table 5-3 Landfill Ownership for Major Texas Cities

	Public / Public	Public / Private	Private / Private
Austin			X
Arlington		X	
Corpus Christi		X	
Dallas	X		
El Paso	X		
Fort Worth		X	
Garland	X		
San Antonio			X
Houston			X



Request for Proposals

The City has recently requested proposals from private firms in the region for disposal capacity. The request for proposals sought prices for waste disposal for 3, 5 and 10 years. No firm commitment was made by the City related to tons of waste delivered to the site. The Request for Bids did require that the responding firms provide information related to their environmental compliance, financial history and history of operating municipal solid waste landfills. The RFB sought prices for MSW and C&D types of waste. Contracts are anticipated to be negotiated in 2019.

New Landfill Capacity

Whether public or private, the process for securing new landfill capacity is a complex process that requires between 10 and 15 years to go from initial concept through final operation. Landfills must meet a variety of regulatory requirements that were defined in the Facilities Report. In general, landfills must address a host of site selection, design, operating and closure and post-closure regulatory requirements that are defined in TCEQ regulations.

Critical phases in the landfill planning and implementation process includes the following.

Waste flow assessment. For a landfill to be economically feasible, the landfill must have a long-term flow of waste to pay generate revenues through tipping fees.

Site Design Configuration. Develop key design components, including size, access, processing capabilities, facility requirements and other site requirements.

Site Selection. Identify a site that can meet long-term solid waste disposal and processing needs. The site must be large enough to provide sufficient buffer areas from surrounding land owners and disposal operations. The site selection process must also take into consideration Environmental Justice considerations.

Permitting. Landfills are permitted through the Texas Commission for Environmental Quality (TCEQ). The permit requires that the applicant demonstrate compliance with a range of regulations including location restrictions, engineering design, ground and surface water protection, landfill gas management, closure and post-closure care, operational requirements and financial assurance. Depending on the complexity of the permit application, it can take between 3 and 5 years to go from initial development to TCEQ final approval. All new permits or major amendments to permits are subject to a public hearing process if requested by the public.

Construction & Operation. Once permitted, the owner can initiate construction and operation of the facility. The TCEQ will inspect the site prior to allowing the owner to begin accepting waste. Landfill operators are held responsible for meeting strict operating procedures.

Closure & Post-closure Care. The landfill owner is responsible for maintaining closure and post-closure care of the facility for a 30 year period, as well as demonstrate it has the financial resources to pay for both closure and post-closure activities.

Figure 5-2- illustrates the timeline required to site, permit and construct new landfill capacity.

Figure 5-2 Landfill Implementation Schedule

Activity	Years														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Site Selection	■	■	■												
Procurement				■											
Permitting (two years for hearing if required)					■	■	■	■	■						
Construction										■	■	■	■	■	



5.2 Regulatory Issues

5.2.1 State Regulatory Requirements

The TCEQ regulates landfills in Texas. Landfill regulations define location restrictions, other regulatory requirements, landfill design requirements, operational standards and closure and post-closure requirements.

Location Restrictions (code reference)

Landfills cannot be located in the following areas:

- Floodplains
- Wetlands & Waters of the US
- Seismic Impact Zones
- Unstable Geologic Conditions
- Close proximity to Airports

Design Requirements

Landfill design requirements are intended to protect the environment by requiring buffer zones around the landfill, a liner system and leachate collection system to protect groundwater resources and a gas management system to protect air quality.

5.3 Gap Analysis

Overall Objective: Assure Long-term Disposal Capacity, maintaining a minimum of 25 years disposal capacity for waste generated by City residents and businesses.

Specific Objectives:

1. Encourage efficient operation of landfills throughout the region.
2. Require landfill facilities to meet all state and federal regulations through local ordinances and contracts for service.
3. Assure environmental justice is taken into consideration for new landfill locations and expansions.

Metrics:

Primary Metric	Type of data	Proposed Metric
Available disposal infrastructure within the H-GAC region	TCEQ landfill records	25 years available capacity

Secondary Metric	Type of data	Proposed Metric
Landfills achieving above average densities	TCEQ landfill records	1500 lbs. / CY
Landfills having at least a “good” compliance history	TCEQ landfill records	Good rating
New landfills address Environmental Justice in permitting process	TCEQ permit application	EJ assessment and compliance

5.4 Potential Future Actions

Disposal Back-up Options

The need for additional long-term capacity can be reduced depending on the success of source reduction, recycling and organics management programs described earlier. However, none of these options are anticipated to eliminate the need for disposal capacity of non-recoverable materials.

Continuously monitor landfill capacity in the region.



Contract for the disposal capacity through both the transfer station contract and landfill disposal contract. As stated, the City is now in the process of selecting firms for operation of the City's three transfer stations and disposal at the landfills. These contracts can provide for short-to-mid-term disposal capacity.

Contract for disposal services for long-term.

Select a site for a potential landfill for future development should capacity reach low levels. The basic elements of a landfill include the following: an assured flow of waste to the facility to generate sufficient waste disposal revenues; a site that is approximately 600 to 1500 acres that meets location restriction requirements; capital costs for an investment of approximately \$20 to \$30 million for site selection, permitting and construction.

Contract for the selection, permitting and construction of a new privately or publicly owned landfill in the region for City use.

Negotiate long-term disposal contracts for facilities outside the region. Consider alternative transportation modes (including multi-modal or inter-modal transfer stations).

Evaluate the potential of constructing a multi-modal transfer station to allow for access to landfills out of the region

Build financial reserves for construction of new facilities required to deal with longer distances to new facilities and more trucks.

Regulatory Compliance. The City of Houston currently relies primarily on three privately owned and operated municipal solid waste landfills. The Type I landfills operating in the region are required to operate in accordance with TCEQ regulations for landfill operations. These regulations have specific requirements related to location restrictions, design and operation. Each of the landfills has a permit that is on file with the TCEQ. These landfills are also inspected by the TCEQ to evaluate operations.

Financial Sustainability

Overall Objective: Establish an affordable, sustainable financial program for meeting the City's long-term solid waste management program.

Specific Objectives:

1. Quantify the cost of any change in program services
2. Obtain buy-in for self-sustaining funding not dependent on the general fund. (Tipping fee, user fee, etc.)



6.0 Illegal Dumping

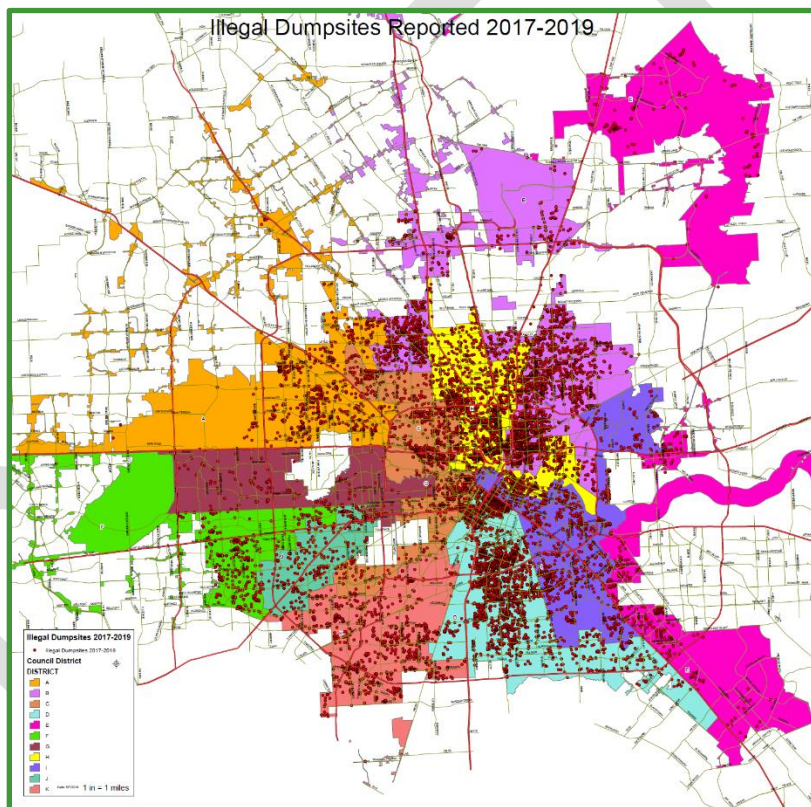
6.1 Existing Program and Results

Illegal dumps are cleaned up by the junk waste collection crews which operate only in odd-numbered months. The two agencies that cooperatively identify and report illegal dumping activity to the City for cleanup are the Department of Neighborhoods Inspection and Public Service Division and the Harris County Environmental Crimes Unit.

When the public calls the 311 call center to report illegal dump sites, the call center directs them to the Department of Neighborhoods. Illegal dump sites identified by the Harris County Environmental Crimes Unit are forwarded to the Department of Neighborhoods. The Department of Neighborhoods refers the information collected by both agencies to the Solid Waste Management Department who cleans up the illegally dumped material.

Figure 6-1 is a map prepared by Neighborhood Services of illegal dump sites reported between the beginning of 2017 and May 7, 2019.

Figure 6-1 Locations of Illegal Dump Sites Reported 2017-May7, 2019



According to the Harris County Environmental Crimes Unit, the average reported dump site is 75 pounds of material and the most commonly dumped items are mattresses and scrap tires. They also report that unmowed rights of way and unmowed vacant lots are the most common locations of illegal dumping activity. They report that many illegal dumps occur on a resident's own property and are reported to Code Enforcement who issues a fine. Frequently, the resident moves the material off of his or her property to another location where it is considered an illegal dump. Illegally dumped wastes on vacant lots or other public areas attract more dumping at that location by additional violators.

The number of illegal dump sites within the City is high for several reasons.

- Many residents do not know how to legally dispose of municipal solid waste either through the regular residential collection system or special collections for excess wastes, tree waste and heavy trash. In many cases this is due to the lack of appropriate public information reaching immigrants who come from cultures where wastes are handled differently, those who do not speak



English and those who are illiterate in any language. It is not possible to provide public information regarding how to legally dispose of municipal solid waste using billboards because there is a City ordinance prohibiting the City from using billboards for any purpose.

- Many residents are not able to access one of the six depositories during the four days per week that they are open. Some residents may be turned away for lack of proper documentation.
- Enforcement mechanisms are slow and cases are frequently dismissed in the Courts. When fines are issued, it is often long after the illegal dumping occurred. It is difficult to link cause (dumping) and effect (fines or imprisonment).

Effective enforcement is lacking. When Class A and Class B misdemeanors are referred to the District Attorney, the City has typically cleaned up the dump site by the time the matter is seen by a judge. At that time, judges typically dismiss cases because the illegal dump is no longer creating a public nuisance. Judges are more willing to issue fines for hazardous waste violations and dumping truck tires than for dumping solid waste. Although Code Enforcement can issue fines for code violations, they cannot issue fines for illegal dumping even though the responsible parties are often identified.

The Houston Police Department has Differential Response Teams who perform community policing using both traditional and non-traditional policing methods to address community crime. However, the Police Department does not accept responsibility for addressing illegal dumping. Therefore, the Department of Neighborhoods is currently taking 311 calls and addressing the issue.

6.2 Existing Policies and Regulations

The public may also report illegal dumping activity to the Harris County Environmental Crimes Unit, which relays the information to the Department of Neighborhoods Inspection and Public Service Division which, in turn, reports it to the Solid Waste Management Department for cleanup. These cooperating agencies report a good working relationship and effective communication. Both take illegal dumping cases to Environmental Court. The Environmental Crimes Unit reports illegal dumping activity of more than 5 pounds to the District Attorney. Illegal dumping of between 5 and 500 pounds of waste is a Class B misdemeanor. Illegal dumping of 500 to 1000 pounds is a Class A misdemeanor. Both Class A and Class B misdemeanors can command substantial fines and may include confinement in jail. Dumping of less than 5 pounds is a Class C misdemeanor and may be reported to the Justice of the Peace Courts. However, the Justice of the Peace Courts typically do not file such cases because they require two to four years to resolve and they are not considered significant. Penalties for illegal dumping by commercial businesses, such as private haulers, are substantially higher than for individual residents.

The Harris County Environmental Crimes Unit manages and monitors cameras located on utility poles and elsewhere, in areas where illegal dumping is likely or known to occur. This program has been successful at identifying illegal dumps and identifying responsible parties. They currently have 97 cameras and expect 22 additional cameras to be added soon. However, with six investigators and two sergeants there is a severe lack of staffing to monitor the cameras and investigate illegal dumping. The Unit reports that another six investigators are needed to staff the video surveillance system that they have, properly. Unfortunately, Staff in the Unit have no authority to enforce against illegal dumpers – specifically there is no ability for Harris County or the City to levy fines against violators who are identified. Instead, cases are referred to the District Attorney.

6.3 Needs & Gap Analysis

Metrics

The City has established for itself a target to clean up reported illegal dump sites within 30 days.

The following data allow comparison between the City of Houston illegal dumping programs and selected other cities.



Table 6-1 Comparison of Illegal Dumping (Houston & Fort Worth)

City	Sites Reported per day	Average Time to Clean Up	Dedicated Trucks	Enforcement	Fine
Houston	34	84 Days	0 (Tree Crews, only odd numbered months)	District Attorney for >5 lb.; JP Court for < 5 lb.	\$250 for <500 lb. \$XXX for >500 lb.
Fort Worth	18	80% <48 working hours	5 (2-man crews)	Code Enforcement Officer Citation	\$554 for <1000 lb.

Performance against metrics

The Department of Neighborhoods had a current data base as of May 7, 2019 of 17,283 illegal dump sites reported over a period of 508 days, averaging 34 reports per calendar day. Of all those sites, 93% have been cleaned up. The sites that have been closed averaged 84 days from the date they were reported to the Department of Neighborhoods until they were cleaned up, or 54 days beyond the target of 30 days.

6.4 Potential Future Actions

The following actions would decrease the number of illegal dumps in the City of Houston and shorten the time that it takes to clean up each one.

- Increase the number of trucks and crews assigned to cleaning up illegal dumps.
- Increase staffing at depositories to enable them to be open seven days per week and extended hours per day. Evaluate the potential need for additional depositories.
- Increase staffing of the camera surveillance program currently managed by the Harris County Environmental Crimes Unit
- Institute a comprehensive multilingual and ongoing public education program including billboards, announcements at public events such as sporting events, Public Service Announcements, printed materials, and social media campaigns. The purpose of this program would be to inform residents of how and when to dispose of excess trash, tree waste and heavy trash.
- Clearly identify responsibilities for illegal dumping between the Department of Neighborhoods and the Police Department's Differential Response Units.
- Give Code Enforcement or others the authority to issue fines outside the Justice of the Peace Courts and the Environmental Courts. Rapid penalties for illegal dumping will serve as a deterrent against future illegal dumping.



Appendix A – Sponsorships

	Sponsorship HOA or CA	House_Coun	Status
1	Bay Pointe CA	561	Current
2	Farther Point SP	15	Current
3	Northwest Landing TH	43	Current
5	Sanctuary HOA	11	Current
6	Park at Asbury CA	20	Current
7	Memorial Trails CC	50	Current
8	Charnwood CC	81	Current
9	Elm Grove THA	186	Current
10	Frontenac HOA	53	Current
11	Hawthorne Place CA	12	Current
12	Helena Park CA Inc	24	Current
13	Hunter's Cove CA	19	Current
14	Hyde Park West CA Inc	18	Current
15	Landing at LaBranch TH	15	Current
16	Albany Square HOA	24	Current
17	Ashford CA SP	932	Current
18	Ashford Forest Sec I & II CC	139	Current
19	Ashton Village HOA	286	Current
21	Augusta Landing CA SP	20	Current
22	Autumn Oaks CC SP	84	Current
23	Ballpark No. 3 CA	22	Current
24	Beall HOA	8	Current
25	Briar Manor HOA	27	Current
26	Centers at Courtyard Homes	15	Current
27	Yorkshire CA	160	Current
28	Wilchester West Fund	528	Current
29	Woodstream CA	695	Current
30	Westwick HOA	281	Current
31	Westchester Villa Maint	30	Current
32	Walnut Bend Home Association	985	Current
33	Village West HOA	424	Current
34	Village Place Community	525	Current
35	University Square HOA	42	Current
36	University Arms TH #2	24	Current
37	University Arms Town houses council of co-owners	22	Current
38	Trailwood Village Homeowners	794	Current
39	Townhouse Manor Fund	211	Current
40	The Colony THA	54	Current
41	Tanglewood Park HOA	15	Current
42	Suffolk Chase HOA	107	Current
43	Ashford Hills PO	139	Current



44	Southampton CC	613	Current
45	Memorial Thicket HOA	157	Current
46	Reserve At Kings Point CA	978	Current
47	Sleepy Hollow Woods Civic	16	Current
48	Sherwood Oaks Property	342	Current
49	Shepherd Trace HOA	72	Current
50	South Woodland Hills CA	1040	Current
51	Shadowbriar CA	409	Current
52	Sand Creek Village CA	1107	Current
53	Rustling Pines CA	158	Current
54	Memorial Plaza CC	229	Current
55	The Royden Oaks Association	214	Current
56	River Oaks Property	1658	Current
57	Regents Green HOA Inc	22	Current
58	Reflections HOA	194	Current
59	Pipers Meadow Community	951	Current
60	Nottingham West CC	350	Current
61	Nottingham Maint Fund	322	Current
62	Westchester Owners Committee	368	Current
63	Nottingham Forest HOA	304	Current
64	Nottingham Forest CA	631	Current
65	Northfork CA	1048	Current
66	Southbriar CA	766	Current
67	Midlane Square TH	17	Current
68	Thornwood Fund Inc	390	Current
69	Maplewood West CA	246	Current
70	Mamre CC Inc	46	Current
71	Sandalwood CC Inc	179	Current
72	Lake Houston CA	165	Current
73	Kingwood Place CA	341	Current
74	Kingwood Lakes CA	274	Current
75	Kingwood Greens Village CA	224	Current
76	Kings Crossing Patio HOA Inc	257	Current
77	Hunters Ridge Village	1030	Current
78	Broad Oaks CA	184	Current
79	Heathlake CA	315	Current
80	Hammersmith CIA	222	Current
81	Greentree Village CA	2245	Current
82	Gaywood CC	119	Current
83	Frostwood CIA	362	Current
84	French Quarter Townhouse Sp	19	Current
85	Kings Point CA	1421	Current
86	Fosters Mill Village	553	Current
87	Fondren Townhouse No. 2 Inc	25	Current
88	Fleetwood West Maintenance Association	90	Current



89	Fleetwood PO	314	Current
90	Epernay CA SP	157	Current
91	Edgemont CA	73	Current
92	Del Monte II PO	52	Current
93	Broken Bayou Inc	20	Current
94	Broadacres HOA	26	Current
95	Briar Meadow Community Improvement	685	Current
96	Briarhills PO	452	Current
97	Briarhills HOA SP	407	Current
98	Bunker Hill Woods CC	28	Current
99	Briarforest OA	27	Current
100	Briar Bend CIA	137	Current
101	Briar Park CA	768	Current
102	Brenner Creek Ct HOA	14	Current
103	Braeburn Valley HOA	532	Current
104	Braeburn Valley CA	98	Current
105	Bolton Place THA	23	Current
106	Bay Oaks CA	1166	Current
107	Bay Forest CA	836	Current
108	The Huntleigh Committee	72	Current
109	Washington Colorado THOA	22	Current
110	Houston Pine Shadowns CC Inc	149	Current
111	Longwoods Homes Association	53	Current
112	Wilchester OC	611	Current
113	Memorial Way CC	80	Current
114	Sherwood Forest HOA	114	Current
115	Rustling Oaks CA	128	Current
116	Barkers Landing HOA	368	Current
117	Briarcroft PO	283	Current
118	Tanglewood HOA	1213	Current
119	Lakeside Island Maintenance Association	21	Current
120	Middlebrook Community Management Service	909	Current
121	Brook Forest CA	1061	Current
122	Northbriar CA	480	Current
123	Briargrove PO	900	Current
124	Briargrove Park PO	1471	Current
125	North Woodland Hills Village	617	Current
126	Bear Branch Village CA	1115	Current
127	Kings Forest Estates	16	Current
128	Kings Forest CA	270	Current
129	Lakeside Improvement Association	550	Current
130	Pinewood Estates SP	82	Current
131	Buffalo Park HOA	25	Current
132	Drexel Place Homeowners Association Inc	4	Current
133	Founders Point Homeowners Association	12	Current



134	Hunters Park Property Owners Association	14	Current
135	Marilane Homeowners Association	6	Current
136	Oak Park Square HOA	44	Current
137	Park at Nance HOA	6	Current
138	Richton Green HOA	6	Current
139	Schuler HOA Inc	24	Current
140	Summer Gardens Homeowners	6	Current
141	Townplace HOA Inc	26	Current
142	Washington Square Community	24	Current
143	West Twenty-Sixth Street HOA Inc	21	Current
144	Tealwood OA	0	Current
145	Memorial Forest CC	334	Current
146	Waters Edge Master Homeowners Association	326	Current
147	Afton Oaks CC	531	Current
148	306 West 6TH ST Community Association Inc	12	Current
149	Briardale cc	0	
150	BRIMHURST BALDWIN SQ HOA	24	
151	Cherokee CC	34	Current
152	Chevy Chase CA SP	35	Current
153	City Park HOA	987	Current
154	Fairway HOA	49	Current
155	Fisher Street Estates Homeowners Association	6	Current
156	Lakeside Estates THA	129	Current
157	Pinewold Circle HOA	15	Current
158	Sagetown POA	33	Current
159	The Cityview Terraces Homeowners Association Inc	9	Current
160	Turkey Creek HOA	13	Current
161	Whispering Oaks Maintenance Association	154	Current
162	Royal Shores Community	191	Current
163	Royal Shores Community	191	Current
164	Mills Branch Village Community	1220	Current
165	Royal Brook	1220	Current
166	Kansas Court Gardens Homeowners Association	6	Current