Reimagined and Renewed

DRAFT
Facility Report

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1.0 Introduction and Summary

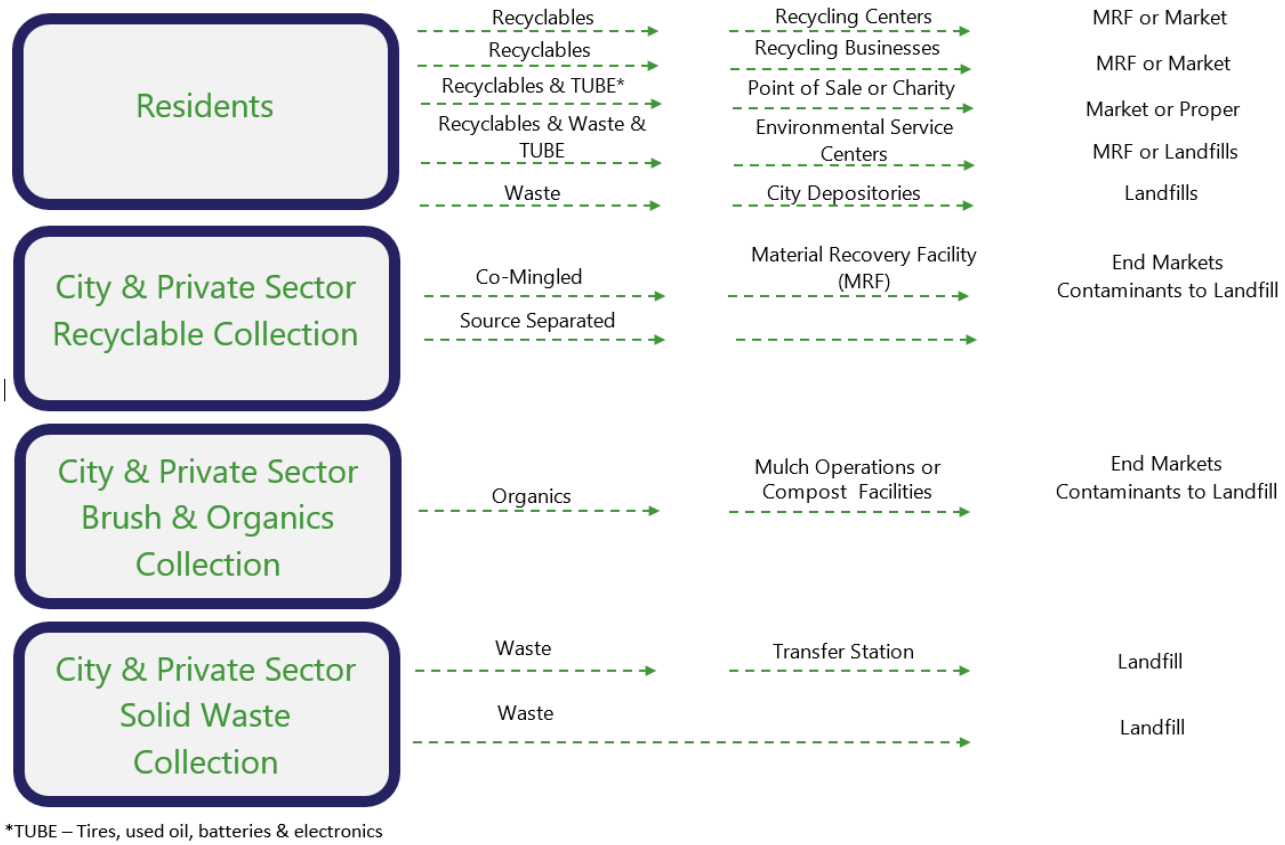
1.1 Introduction

This Facilities Report is prepared as part of the City of Houston's overall Integrated Resource Recovery & Management Plan (Plan). The Plan will address the City's current and long-term solid waste management needs and the resources required to manage these needs. This report focuses on the City's current and planned solid waste infrastructure.

1.2 Report Summary

Houston residents, businesses and institutions generate approximately 6.2 million tons of municipal solid waste per year. Figure 1-1 illustrates the flow of recovered materials and wastes. In addition to the curbside collection of recyclable materials and municipal solid waste, residents have several other options to either recycle materials or dispose of waste. Houstonians can recycle materials at recycling centers, point of sale recycling locations, charitable organizations, the City's Environmental Service Centers and businesses that operate to recover and recycle materials. Residents can also use one of six depositories to dispose of certain wastes. Other facilities that are a vital part of Houston's solid waste management infrastructure include material recovery facilities, composting and mulch operations, transfer stations and landfills. There are also a number of facilities that are designed to manage unique waste streams including medical waste, batteries, ash, used oil, used tires and household hazardous wastes. This report does not address industrial and hazardous waste.

Figure 1-1
Houston Waste Flows



According to TCEQ records, there are 111 TCEQ permitted or authorized municipal solid waste (MSW) management facilities located in Houston (excluding liquid waste facilities). In the Houston-Galveston Area Council of Governments Region (Region), there are 230 facilities (refer to Table 1-1).

Of the 111 Houston facilities, 41 are TCEQ-authorized recycling and resource recovery (RR) facilities. These 41 facilities include mixed waste processing facilities and material recovery facilities, electronic recycling, construction & demolition recycling, and shingle recycling.

In addition to these 41 authorized facilities, there are recycling facilities that do not require TCEQ authorization such as the City's Westpark Consumer Recycling Center and a number of private recycling businesses. A Houston-Galveston Area Council (H-GAC) data base identifies over 32 recycling drop-off centers in Harris County, 21 of which are located in Houston. A review of local data also identified between 150 and 200 businesses that provide some form of recycling services.

There are approximately 18 Houston facilities that either mulch wood or produce compost (52 regionally). Composting and wood grinding facilities process yard waste, brush and tree waste, biosolids (digested wastewater treatment plant sludge) and a small amount of food residuals.

The Westpark Consumer Recycling Center is one of only several options that Houstonians have to recycle materials.

The use of transfer stations allow short-haul collection vehicles to transfer waste to larger, more efficient trucks. Given Houston's traffic conditions, these facilities are especially important to reduce the cost of hauling waste and reduce vehicle emissions. The City owns three transfer stations and is planning a new facility in northeast Houston. There are 13 operating MSW transfer stations in the City of Houston and 21 operating in the Region. An additional eleven transfer stations are permitted regionally but are either inactive or not constructed. In 2017, a total of 2.5 million tons were sent to transfer stations in the Region before being sent to a landfill.

Municipal solid waste that is not recovered is disposed at one of the 28 operating landfills located in the Region. Thirteen of these are municipal solid waste landfills (Type I) and 15 are construction and demolition waste landfills (Type IV). Regionally, over 9.9 million tons of waste were disposed in 2018.

TCEQ-authorized facilities also manage specific waste materials including household hazardous wastes ("HHW"), medical wastes, grease and grit trap wastes and tires. With the exception of nine permitted landfill gas-to-energy operations in the Region, there are no known energy from waste facilities operating in the region.

Table 1–1
TCEQ-Authorized Regional Waste Management Facilities

Type of Facility	# Authorized in Houston	# Operating in Houston	# in H-GAC Authorized Regional	# Operating in H-GAC Regional
Recycling & Resource Recovery(1)	41 (1)	40 (1)	76 (1)	74
Composting Operations	19	18	54	52
Medical Waste Transfer & Processing	3	3	5	5
Grease & Grit Trap Waste Transfer & Processing	8	5	8	5
Transfer Stations (2)	19	13	31	21
MSW Landfills – Type I (3)	2	2	14	13
Construction & Demolition Landfills – Type IV	12	10	17	15
Landfill Gas Recovery	2	2	9	7
Citizen Convenience Centers & Low Volume TS	0	0	11	11

(1) Includes C&D recycling, electronics recycling, shingle recycling, mixed waste processing and material recovery facilities. A breakdown of these facilities is presented later in this report. Total operating facilities is uncertain as there are no reporting requirements for these facilities.
(2) FCC's Material Recovery Facility and Republic's Resource Renewal Complex are authorized as transfer stations but only manage recyclable materials from single stream residential recyclables collections and commercial sector recyclables. Thirteen (13) of the nineteen (19) permitted Houston transfer stations accepted MSW in 2018.
(3) One is permitted but not constructed (Darrell Dickey Landfill). Includes one that is an industrial waste landfill (Conroe Industrial Non-hazardous Landfill).
(4) Refer to Appendix A for listing of TCEQ authorized facilities.

1.3 Key Findings

1. Management of municipal solid waste requires a complex infrastructure, including facilities to collect, process, recover, transfer and dispose of wastes.

2. The City relies on facilities throughout the region to meet is needs. Based on TCEQ reports, all of the municipal solid waste landfills in the H-GAC region report they accept waste generated in Harris County. Waste is also imported from other counties to the McCarty Road Landfill located in Houston.

3. The private sector has a critical role in meeting Houston's municipal solid waste management needs. This includes hundreds of recycling businesses as well as material recovery facilities, mulch and composting operations, transfer stations and landfills. This fact has both benefits and risks to the City that will be evaluated later in the planning process.

4. The City-owned facilities, including recycling drop-off centers, depositories and environmental service centers help facilitate recycling, and proper management of household hazardous waste.

5. There is approximately 500,000 tons of annual capacity at material recovery facilities (MRFS) in the Region. The majority of this capacity is located within the City of Houston. These facilities process comingled recyclable materials for market. Prior to March 2019, the City relied on three MRFs to process co-mingled recyclables. In March 2019, the residential co-mingled recyclable materials collected by the City are being taken to the newly constructed FCC

The management of MSW in Houston requires a regional complex, integrated waste management system to meet the MSW needs of Houston's residents and businesses.

Houstonians might be surprised at the amount of recycling taking place in the H-GAC region. Over **800,000 tons of organics** are recovered; over **2.5 million tons of C&D** are processed and recycled; and over **300,000 tons of materials** such as paper, metals and plastics are recovered at Houston material recovery facilities and that does not include private sector recycling such as scrap businesses. Still, over 9.7 million tons of waste are landfilled in the region.

MRF located in northeast Houston. The FCC facility has a capacity of 145,000 tons per year.

6. The growth of the mulch and composting industries in the last few years has had an impact on the quantities of materials that would otherwise require disposal. In 2017, over 800,000 tons of material regionally were processed and marketed instead of being landfilled.

7. In addition to the City's three transfer stations, there are 10 privately operated transfer stations in Houston and 8 located outside Houston. Twenty-six percent of the waste collected in the region is taken to a transfer station for haul to one of the area's regional landfills. An additional transfer station is planned for northeast Houston at the City's Northeast Service Center.

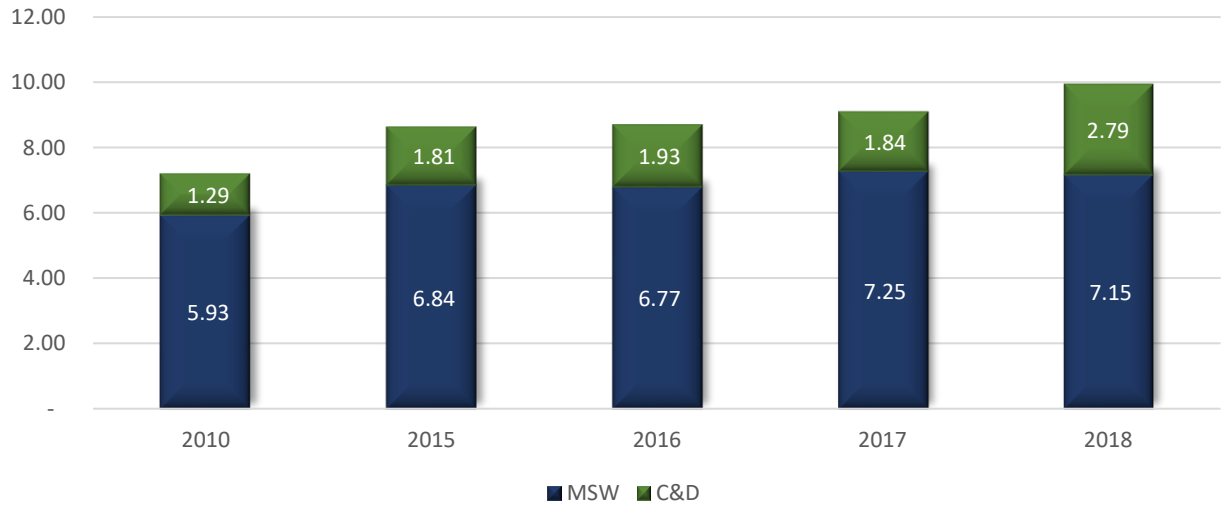
8. City crews collected 445,000 tons of waste in 2018 (Source: City of Houston). Currently, the City relies primarily on the McCarty Road, Blue Ridge or Atascocita Landfills for disposal of waste collected by City crews, which is primarily residential waste. These landfills have a combined capacity of 140.2 million tons of waste, or approximately 37 years at current rates of disposal. The McCarty Road Landfill has 13 to 16 years capacity and the Atascocita Landfill has 24 years of remaining capacity. (Source: TCEQ MSW Landfill Annual Reports) It generally takes between 10 to 15 years to secure new capacity under today's political and regulatory climate. There are a total of 13 operating municipal solid waste landfills in the H-GAC region with a combined remaining capacity of between 35 to 40 years assuming current per capita disposal rates.

   A total of 2.8 million tons of construction and demolition (C&D) waste is disposed at one of the 15 operating Type IV C&D landfills in the region. Regionally, these facilities have an estimated 25 to 30 years remaining capacity.

9. Hurricane Harvey resulted in approximately 1.0 to 1.3 million tons of additional waste being generated in the region. This represents an 14% increase in annual waste disposal.

10. **In 2010, a total of 7.2 million tons of waste were landfilled in the H-GAC region; in 2018, 9.9 million tons were landfilled** (Source: TCEQ Annual Municipal Solid Waste Report & Landfill Annual Reports to TCEQ). This increase is largely attributed to increases in population and economic activity. Also, tonnages associated with Hurricane Harvey are reflected in the fiscal year 2018 figures, explaining the increase in C&D disposal quantities from 1.8 million tons to 2.8 million tons**. Regionally, the per capita disposal rate for MSW also increased from a rate of 5.22 pounds per capita per day (pounds per capita per day) in 2010 to 5.52 pcd in 2018**. In 2038, the estimated regional population is projected to be 9.0 million. Assuming no change in the disposal rate per capita, this is equal to approximately 229 million tons requiring disposal between 2018 and 2038. Current Type I and Type IV landfill capacity is 328.5 million tons.

Figure 1-1
Disposal Quantities in H-GAC Region
(million tons/year)



2.0 Purpose and Methodology

2.1 Purpose

The City's municipal solid waste management program prioritizes reducing the amount of waste generated by residents and businesses. This reduces the amount of waste collected, processed and disposed. For the remaining waste, the City relies on an integrated management system. The purpose of this report is to evaluate the current and planned infrastructure for managing waste and recovered materials. Specific issues addressed in this report include the following.

1. Identify the City's infrastructure for managing municipal solid waste and required materials.
2. Identify gaps that exist in meeting the City's long-term needs.
3. Identify any planned expansions, opportunities for expansions and constraints to expanding capacity.
4. Evaluate transportation system in relationship to facilities and sources of waste.
5. Validate waste generation assumptions.
6. Identify key issues associated with meeting the City's solid waste management goals and objectives.
7. Evaluate environmental impacts and regulatory constraints.

The scope of this plan is to evaluate the municipal solid waste stream and does not include Industrial and Hazardous wastes as defined by TCEQ.

2.2 Methodology

To identify solid waste facilities in the City, Harris County and the H-GAC region, the Project Team evaluated a number of local, regional and state-wide data bases and conducted a series of interviews with key stakeholders in the region. Specifically, the Project Team undertook the tasks listed below. It should be noted that the industry is constantly evolving. Records from certain sources, including TCEQ, are being reviewed and updated on a weekly basis. TCEQ is also in the process of revising certain classifications which makes it difficult to categorize every facility identified in this report. The analysis is a snap shot of current conditions, and as significant changes take place over the planning process, the project team will recognize these in the final report.

- Interviewed a number of facility owners and operators
- Reviewed TCEQ records and permits
- Conducted on-site evaluations of City-owned facilities
- Performed an evaluation of landfills and transfer station facilities
- Reviewed City, H-GAC and TCEQ resources and documents related to solid waste facility locations
- Conducted transportation assessments by distance and time for transfer stations and landfills

The report provides a description of waste management facilities that the City relies on for material recovery and waste disposal. These facilities include the following.

- Recycling & environmental service centers
- Material recovery facilities
- Mulching and composting facilities
- Transfer stations and City service centers
- Landfills
- Other Waste Management Facilities

2.3 What are City's Needs?

In 2017, City single family residents and businesses generated a total of 4.4 million tons of municipal solid waste, excluding materials recovered through recycling and organics recovery. Specific information on waste quantities is presented in the Waste Generation Report.

2.3.1 Residential Waste

- Collection of municipal solid waste from 386,830 residences (Source: FY 2019 City of Houston budget). This waste is either transported to one of three City-owned transfer stations or directly to one of the region's municipal solid waste landfills.
- Collection of recyclables from 386,830 residences. This material is currently transported to either the Waste Management Gasmer material recovery facility (MRF), the Independent Texas Recyclers or the WM Brittmore MRF. In early 2019, all of these materials will be sent to the new FCC MRF for processing.
- Annual collection of yard waste which is collected weekly in green waste compostable bags. The material is transported to mulching facilities. Wood waste collected with bulky waste collections is not included in this amount and is taken to an area landfill with the bulky waste.
- Collection of bulky wastes every other month and transport to landfills.
- Collection of HHW and other special wastes at the two Environmental Service Centers.
- Collection of residential wastes at six neighborhood depositories / recycling locations.
- Collection of waste tires. These tires are sent to either the landfills or waste tire processors.
- Collection of useable construction material at the City's Reuse Warehouse
- Emergency response to disaster events such as Hurricane Harvey
- Collection of waste disposed illegally at illegal dump sites throughout the City.
- The City also participates in Keep Houston Beautiful events that are designed to collect waste from illegal dump sites.

Table 2-1
2018 Houston Waste Collections

Material	Tons
MSW	445,397
Recyclables*	36,595
Yard Waste	36,612
Bulky Materials	195,829
Total	**708,433**

*** Recyclable collections curtailed due to Hurricane Harvey for 2 months; total for 2017 was 54,569 tons**

Source: City of Houston Solid Waste Management

Table 2-1 summarizes the major waste streams that the City is responsible for collecting. Once collected, the materials are taken to either material recovery facilities, composting and mulching operations, transfer stations or a municipal solid waste or C&D landfill.

2.3.2 Non-Residential Waste Collection & Management

Non-residential waste accounts for approximately two-thirds of the waste generated in Houston. This includes waste from apartments, commercial establishments, institutions such as schools, hospitals and industries.

The City's Solid Waste Ordinance (Chapter 39) requires that "Property owners shall ensure that solid waste collection services are provided on a regularly scheduled basis to collect all solid waste generated or accumulated on their property. Such schedule will be established to ensure that solid waste is collected at least one time per week or more frequently if required..." Waste generated by non-residential sources and multi-family residences are collected by the private sector and taken to one of the several facilities identified in this report for either recycling, processing or disposal.

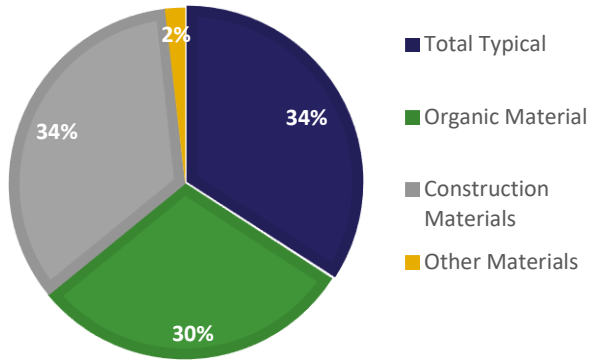
3.0 Recycling Facilities and Environmental Service Centers

3.1 Background

Recycling is the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products (Source: EPA). Houston's recycling infrastructure includes material recovery facilities, recycling centers, businesses that pay for recycled materials and processors of materials into new products. According to a TCEQ sponsored report (*Study on the Economic Impact of Recycling- July 2017, TCEQ*), 9.2 million tons of material were recycled in the state of Texas – compared to 31 million tons of waste landfilled state-wide in 2015. This is equivalent to a 23% recycling rate state-wide.

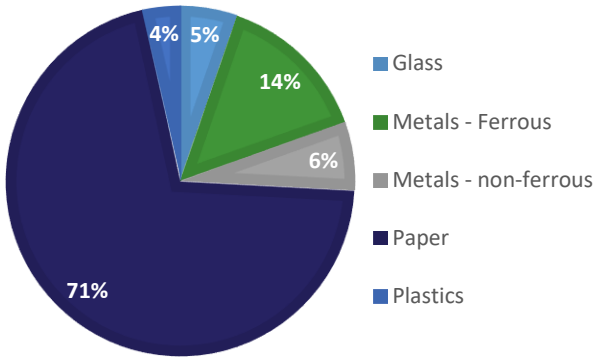
Houston's population of 2.3 million is 8% of the state's population of 28.3 million. Using a simple ratio to estimate the City's total recycling quantities, it is estimated that approximately 740,000 tons of material are recycled in Houston annually. ***However, based on data collected as part of this report, Houston's recycling rate is much higher than 740,000 tons per year.***

Figure 3-1
Texas Recycles
9.2 Million Tons In 2015



The *Study on the Economic Impact of Recycling* also reported the distribution of materials. Figure 3-1 shows the distribution by major categories of recyclables. ***Typical materials*** such as paper, glass, plastics and metals accounted for approximately 34% of the recycled materials (refer to Figure 3-2 for a distribution of typical recyclable materials). ***Organics recycling,*** including yard wastes, brush, food wastes and biosolids accounted for 30%. ***Construction and demolition material recycling*** accounted for 34%.

Figure 3-2
Typical Recyclables



3.1.1 Residential Recycling

In Houston, recyclable materials from 386,830 single family households (Source: FY 2017 Budget) are collected every two weeks in 96 gallon carts. In FY 2017, an average of 3,135 tons per month were collected (excluding months when recycling was curtailed due to Hurricane Harvey). This does not include materials collected at the City's depositories, drop-off centers or the environmental service centers. For people that live in apartments, they are able to use drop-off boxes at their complex or take materials to one of several local recycling centers.

This report focuses on municipal facilities currently available for collection of recyclable materials. As mentioned, there are hundreds of businesses located throughout the City that provide recycling services that are not required to secure a permit and identifying all of these operations is beyond the scope of this project.

3.1.2 Commercial Recycling

The majority of waste generated in Houston is from private businesses, so too are the quantities of materials recycled. For several years, businesses have captured recyclable materials including old corrugated containers (OCC), office paper, scrap metals, construction debris, wood waste and other materials and sold them to businesses that market these materials. In its 2018 Financial Report, the Institute of Scrap Recycling of Industries reported over 125 million tons of scrap metal, paper, plastics, glass, electronics, and tires were recycled nationally in 2017. Examples of commercial recycling include the recovery of OCC at large shopping centers

that have designated compactors for these materials; office paper collection and recycling; the recovery of scrap metal during the production of goods and sale to scrap metal dealers; and the recovery of wood, concrete and other materials from construction sites.

A review of Houston businesses through internet searches and other data identifies between 150 and 200 businesses that specialize in the collection, processing and sale of recyclable materials. These businesses recycle paper, metals, glass, plastics, wood, C&D materials, electronics, shingles, tires, used oil and other recyclable materials.

OCC represents 17% of the total amount of material recycled state-wide

3.2 Facility Definitions

A Recycling Facility is a facility used as a collection and / or processing point for only source-separated recyclable material. These may or may not be commercially operated facilities. Materials typically accepted at these facilities include paper, OCC, metals (steel and aluminum), plastics, electronics, construction materials, brush, tires and used motor oil. For many private recycling facilities, only one of a few of these materials may be collected at the site. Private facilities often offer payment for materials delivered.

3.3 City-Owned Facilities

Table 3-1 lists the City's Neighborhood depository / recycling centers (6), Neighborhood Recycling Drop-off Centers (4) and Environmental Service Centers (2). Figure 3-3 illustrates a map of City owned and operated facilities.

Table 3-1
City Recycling Facilities & Depositories

Neighborhood Depository / Recycling Center	Address
North	9003 N Main
Northwest	14400 Sommermeyer
Northeast	5665 Kirkpatrick
South	5100 Sunbeam
Southwest	10785 SW Freeway
Southeast	2240 Central Street
Neighborhood Recycling Drop-off Center	Address
Westpark Recycling Center	5900 Westpark
Clear Lake/Ellington Airport Recycling Center	Highway 3 @ Brantly Avenue
Kingwood Recycling Center	3210 West Lake Houston Parkway
Reuse Warehouse	9003 N. Main
Environmental Service Centers	Address
North Environmental Service Center	5614 Neches Street
South Environmental Service Center	11500 S. Post Oak Road

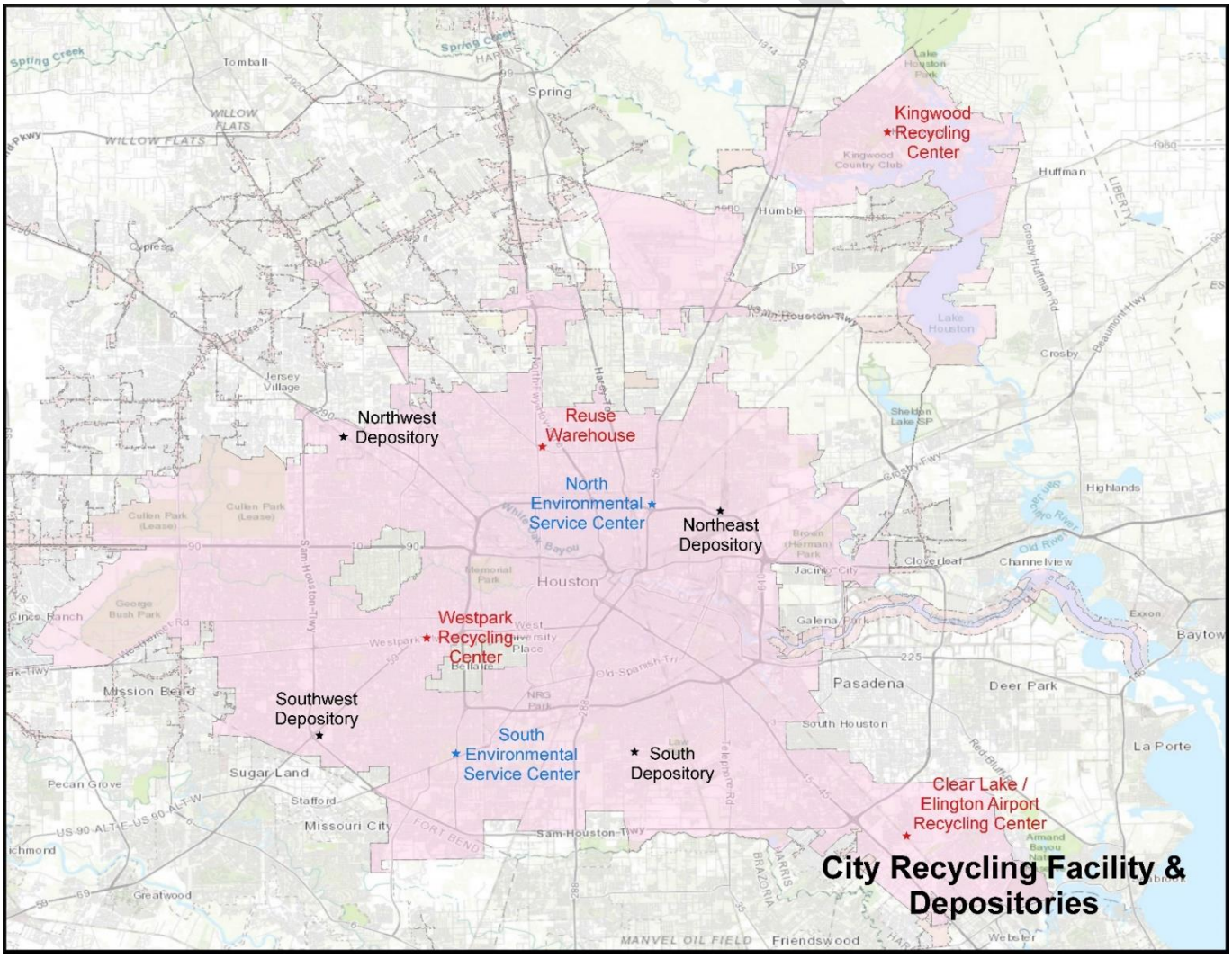
3.3.1 Depositories

Houstonians may use the depositories up to four times per month. Contractors are not allowed to use the depositories. In addition to collecting recyclable materials, these facilities also provide residents with the opportunity to dispose of the following wastes.

- Concrete
- Mattresses
- Tree waste
- Junk waste
- Furniture
- Refrigerators (must be tagged indicating the refrigerant has been removed)
- Household appliances (Stoves, Washers, Dryers)
- Passenger tires (five per household, per visit, total of ten per month)
- Used motor oil
- Wood fencing (must be broken down)
- All loose materials, such as shingles and drywall/ sheetrock, must be placed in a container or bag

Figure 3-3

City Owned Recycling Centers, Depositories & Environmental Service Centers



3.3.2 Neighborhood Recycling Drop-off Centers

Materials accepted at the neighborhood recycling drop-off and depositories include the following.

- Metals: Aluminum & ferrous
- Plastics: #1 - 5 and 7 (rinsed drained)
- OCC – Carton – Cardboard boxes and cartons from items such as milk, juice
- Paper - Newspaper, catalogs, magazines and phone books

3.3.3 Environmental Service Centers

The City owns and operates two Environmental Service Centers are listed below.

- ESC South – 11500 Post Oak Road, Houston, TX 77035, and
- ESC North – 5614 Neches Street, Houston, TX 77026.

These facilities allow Houston residents to bring certain household hazardous wastes, electronics and other materials for recycling or proper disposal.

Table 3-2
Acceptable Materials at Houston Environmental Service Centers

Acids	Cooking oil	Helium tanks	Metal/wire clothes hangers
Aerosol cans	De-greasers	Herbicides	Microwaves
Antifreeze	Drain cleaners	Monitors	Household chemicals
Certain batteries	Electric appliances (small)	Kerosene	Motor oil
Brake fluid	Electronic scrap	Lawn equipment (all fluids removed)	Paint
Car waxes	Florescent bulbs	Mercury	Paint stains/thinners
Computer equipment & components	Fuels	Metal polish	Pest strips
Plastic film	Telephone equipment	Printers	Turpentine
Pool chemicals	Thermostats	Propane tanks (5 gallon max)	TV
Power steering fluid	Tires (5 per resident per month)	Solvents	Varnishes
Styrofoam blocks			

Household hazardous waste or residential electronic scrap items may not be placed on the curb or in your automated container for garbage collection or tree waste/junk waste pickup. Residential electronic scrap items accepted for recycling at the ESCs include:

- Monitors
- CPUs
- Televisions
- VCR/DVD/Blu-Ray players
- Small Electrical Appliances
- Stereo Equipment

The ESC can accept most household hazardous wastes. However, there are some materials the ESCs are not authorized to accept as shown in Table 3-3.

Table 3-3
Unacceptable Materials at Environmental Service Centers

Ammunition	Medical waste	Foam rubber sheets	Propane and butane cylinders
Business waste	Packing peanuts	Freon containing appliances	Radioactive waste
Dioxins	PCBs	Large appliances	Smoke detectors
Explosives	Pharmaceuticals		

Materials accepted at the ESCs are subject to certain limitations and maximum quantities.

- City of Houston residential customers only; no business waste
- Vouchers (must be purchased in advance by participating communities; non-Houston residential customers only)
- Total weight of materials not to exceed 100 pounds
- No individual item to exceed 50 pounds
- Individual household quantities only
- No area wide or commercial quantities
- HHW Materials: ½ pickup truck load, 1 trunk load or approximately 100 pounds total weight
- Paint: 25 gallons per visit
- Tires: 5 tires per residence, per month, no commercial vehicle tires

Houston Environmental Service Center - South

3.3.4 Reuse Chemical Take-away at ESC South Only

Every Friday from 9 am – 12 pm, household chemicals and paint that were brought to the ESC for disposal but appear to be in good condition are made available for citizen reuse. Citizens may take away these items at no charge. A signed liability waiver is required before removing materials from the site. There is a limit of six (6) chemical items and a cart load of paint per week.

3.3.5 Restore - Craft Items, Books, Post-Consumer & Industrial Scrap

The ReStore, which acts as a book swap, a recycling information library, as well as a repository for craft items and post-consumer and postindustrial scrap (useful for art projects), is now located at the ESC- South. Items can be dropped off at Westpark and the ESCs during normal service times. Items can be taken away from 9am – 12 noon every Friday during the Reuse Chemical Take-Away.

3.3.6 Houston Depository / Recycling Facility Summaries

Table 3-4 provides a summary of the quantities of each type of materials that are accepted at the City's ESCs, depositories and recycling centers.

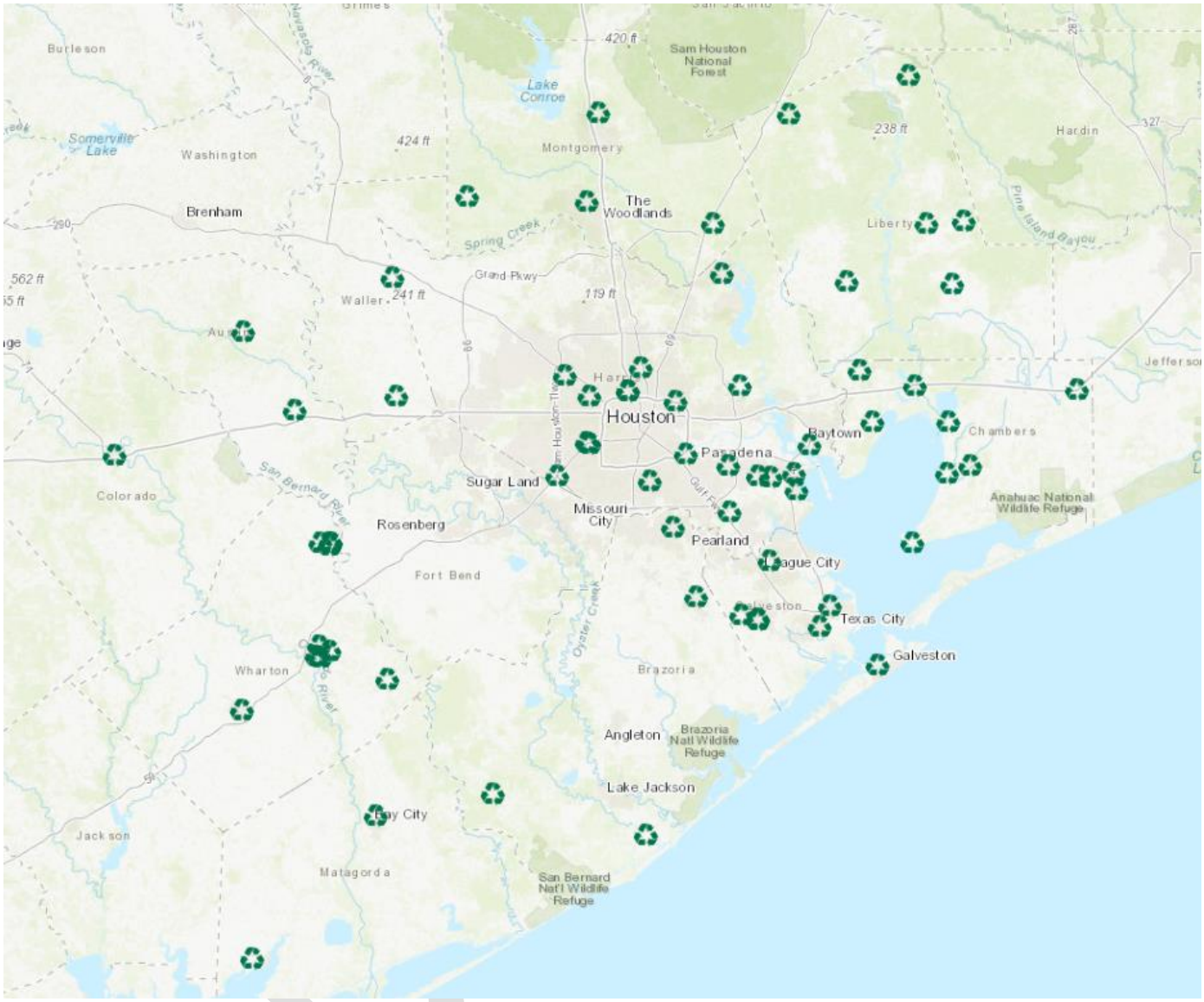
3.4 Regional Facilities

Table 3-4 presents a list of other drop-off centers in the Harris County that are available to Houston residents. The table illustrates that there are a number of regional facilities available to residents of both single family and multi-family households. Figure 3-4 shows the location of these facilities.

Table 3-4
Regional Recycling Drop-off Centers (Source: H-GAC)

Center Name	City	Paper	Card board	Plastics	Glass	Brush/ Wood	Yard Waste	Lawn Chemicals	Scrap Metal	Cans	Aerosol Cans	Batteries	Car Batteries	Anti-freeze	Oils		Tires	Paint	Construction Waste	Furniture	Mattresses	Electronics	Small Appliances	Stoves
															Motor	Cooking								Refridgerator
Baytown Green Center	Baytown	*	*	*	*	*	*			*														
City of Deer Park Drop off Center	Deer Park	*		*	*			*		*		*	*		*			*	*					
Hardy Service Center	Houston	*	*	*	*	*	*		*	*							*		*	*	*			
City of Houston Center Street Neighborhood Recycling Center	Houston	*	*	*	*					*	*													
City of Houston Central Street Neighborhood Depository/ Recycling Center	Houston	*	*	*	*		*			*	*				*		*			*				*
City of Houston North Main Neighborhood Depository/ Recycling Center	Houston	*	*	*	*	*				*	*				*		*			*			*	
City of Houston Building Materials Reuse Warehouse	Houston																		*	*			*	*
City of Houston Environmental Service Center North	Houston							*				*		*	*	*		*				*	*	
City of Houston Kirkpatrick Neighborhood Depository/ Recycling Center	Houston	*	*	*	*		*			*	*				*		*			*			*	
City of Houston Sunbeam Neighborhood Depository/ Recycling Center	Houston	*	*	*	*		*			*	*				*		*			*			*	
City of Houston Ellington Airport Clearlake Neighborhood Recycling Center	Houston	*	*	*	*					*	*													
City of Houston Environmental Service Center South	Houston							*				*		*	*	*		*				*	*	
City of Houston Sommermeyer Neighborhood Depository/ Recycling Center	Houston	*	*	*	*	*	*			*	*				*		*			*			*	
Harris County Multi Use HHW Collection Facility	Houston							*				*	*	*	*	*	*	*						
Harris County Precinct One Miller Road Camp	Houston	*	*	*	*	*	*		*	*							*			*	*			
Greenstar Recycling	Houston	*	*	*	*					*									*					
City of Houston Kingwood Neighborhood Recycling Center	Houston	*	*	*	*					*	*													
CompuCycle Inc.	Houston	*		*						*												*	*	*
City of Houston Westpark Consumer Recycling Center	Houston	*	*	*	*					*	*	*		*	*		*	*				*		*
City of Houston Southwest Neighborhood Depository/Recycling Center	Houston	*	*	*	*	*				*	*				*		*			*			*	
Houston Furniture Bank	Houston																				*			
R.A.K.I. Computers	Houston												*									*		*
Jesse H. Jones Park & Nature Center	Humble	*																						
City of La Porte Public Works Recycling Center	La Porte	*	*	*	*				*	*		*	*		*	*	*					*		
Water Well at 10215 Hillridge Road	La Porte														*									
Water Well at 8610 Bandridge Road	La Porte														*									
Howard's Hardware	La Porte														*									
Lomax School Road & North P Street	La Porte														*									
Allen and Kerber Auto Supply	La Porte														*									
City of Pasadena Recycling Center	Pasadena	*	*	*	*									*	*									
City of Pasadena Public Works	Pasadena	*																						
Clear Lake Park Recycle Drop-Off Center	Seabrook	*																						

Figure 3-4
Regional Recycling Centers and Landfills Source: H-GAC April 2019



3.5 Private Sector Recycling Facilities

There are between 150 and 200 businesses in Houston that provide recycling services for materials ranging from paper, metals, plastics, glass, organics, electronics, tires, shingles, used oil and construction & demolition material. Businesses that only accept source separated materials, such as scrap dealers, are not required to secure a TCEQ authorization. However, facilities that *separate* recyclable materials from a municipal solid waste stream must be authorized by the TCEQ. A preliminary assessment of the authorizations shows that the majority of facilities are vegetative organics such as wood grinding / mulching operations and certain composting operations (organics are discussed in more detail in section 5.0), C&D recycling or material recovery facilities / mixed waste processing facilities. Refer to Figure 3-4 for a distribution of TCEQ permitted and registered recycling facilities.

Of the businesses providing recycling services, 41 are authorized as recycling facilities (76 in H-GAC Region). These include scrap metal dealers, paper recyclers, used oil recycling, electronic recycling, mulching facilities, shingle recycling, construction & demolition material, tire recycling and others.

If a company receives, processes, and returns to use only non-putrescible source-separated recyclables, it generally does not require a formal authorization. However, these businesses must comply with storage, recordkeeping, and reporting requirements. Examples of common source-separated recyclable materials include cardboard, paper, glass, plastic, aluminum, and metals that are separated from the solid waste stream at the point of generation.

3.6 Environmental Impacts & Regulatory Issues

3.6.1 Environmental Benefits

Recovering materials for future use has several environmental benefits, including the following.

- Reduces the amounts of waste going into landfills
- Conserves natural resources used in the production of goods
- Reduces greenhouse gases associated with the mining and production of goods
- Conserves water and energy

Locating a recycling facility or depository is a means of reducing the overall environmental impacts associated with waste management facilities. Here the northwest depository is located adjacent to the City's Northwest Transfer Station

3.6.2 Environmental Impacts and Mitigation Measures

On a local level, there are environmental issues that should be addressed when selecting sites for facilities and operating these facilities. They must reduce the impacts to air quality, land use and water quality. The size of recycling facilities varies widely throughout the City, ranging from collection sites with less than an acre in size to larger industrial sized processing facilities that store and process a range of materials. Given, this variability, there are very site specific environmental issues that need to be addressed. Table 3-6 identifies some general issues that should be taken into consideration when selecting sites and operating recycling facilities.

Table 3-6
Environmental Impacts and Mitigation Measures

Environmental Impacts	Mitigation Measures
Land Use	Site facility in either industrial setting or at existing MSW facility
Land use compatibility	Design facility to incorporate appropriate buffer zones
Air Quality – potential odors from facilities if materials not properly managed	Proper management of materials, especially minimal time that materials are stored on site. Limiting the materials accepted to non-organic materials that could decompose and generate odors
Air emissions from residential vehicles and collection vehicles.	Place sites in areas where traffic is conducive to quick turn-around to avoid auto or truck air emissions.
Water Quality **Storm water pollution**	Design facilities for proper management of storm water. Cover facilities that accept MSW so that storm water does not come in contact with MSW, or the storm water is collected and treated.
Traffic and Transportation **Increased traffic from facility use**	Site facilities that have easy access and allow for quick turn-around.
Nuisances **Blowing litter and odors**	Design facilities so that blowing litter is controlled. Operations plans to include daily litter pick-up of the site.
Noise	Enclosed building with open doors facing property line with fewest and farthest neighbors. Limit hours of operation.
Environmental Justice	Take into consideration the location of facilities so that they don't disproportionately impact EJ communities, but also assure access of this service throughout the community.

It should be noted that in addition to the environmental impacts associated with collection and storage facilities, there are unique environmental issues associated with the manufacture of products from recycled materials. These facilities include paper mills, steel mills, plastic manufacturing and other resource related industries.

3.6.3 Regulatory Issues

Regulations addressing recycling, specifically are found in 30 TAC 328. These rules are designed to support recycling while protecting public health, safety and the environment. Rules addressing various types of authorizations available to recycling facilities are found in 30 TAC 330. Mulch and compost facilities processing organics are regulated primarily by the provisions of 30 TAC 332. They may be authorized as recycling facilities or as composting facilities at various authorization tiers, depending on the feedstocks.

4.0 Material Recovery Facilities

4.1 Definition

The EPA defines a Material Recovery Facility ("MRF") as *"a central operation where commingled and/or source separated recyclables are processed mechanically or manually. Here a separation and/or beneficiation of recyclable prepares them to meet market specifications for sale."*

The City's curbside recycling program collects comingled recyclable materials that are put at the curb in a single container. This is why the program is called "single stream." These comingled materials are transported to a Material Recovery Facility (MRF).

Most operational MRFs include both manual and mechanical separation techniques. MRF design configuration vary considerably depending on the level of sophistication, the types and quantities of materials, levels of contamination and end-market specifications.

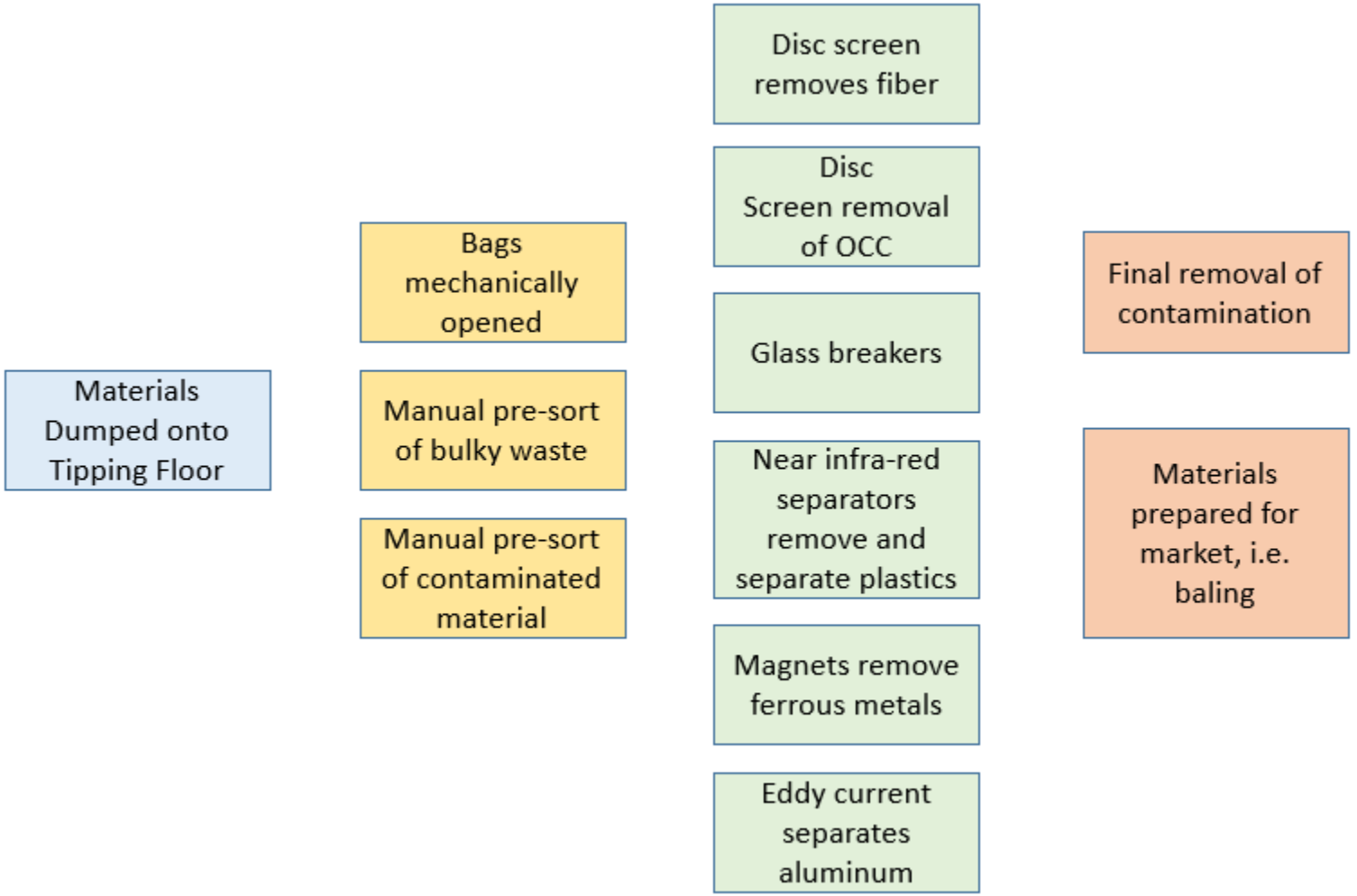
MRF designs incorporates both manual and mechanical separation

Below is the general material flow through at the FCC MRF based on its TCEQ permit application.

- Materials are deposited onto a tipping floor.
- Materials are loaded into a metering bin that can mechanically open bags.
- Manual pre-sort of bulky materials.
- Disc screen removes OCC.
- Glass breaker breaks glass and separates from the remaining material stream.
- Disc screen removes fiber portion of the material stream.
- Near Infra-red separators remove and separate PET, HDPE and other plastics.
- Magnets are used to separate ferrous.
- Eddy current separator collects aluminum.
- The remaining waste stream – currently approximately 25% is contaminated material which is sent to the landfill.

Figure 4-1 presents a conceptual flow diagram of a MRF process.

Figure 4-1
Generic MRF Flow Diagram

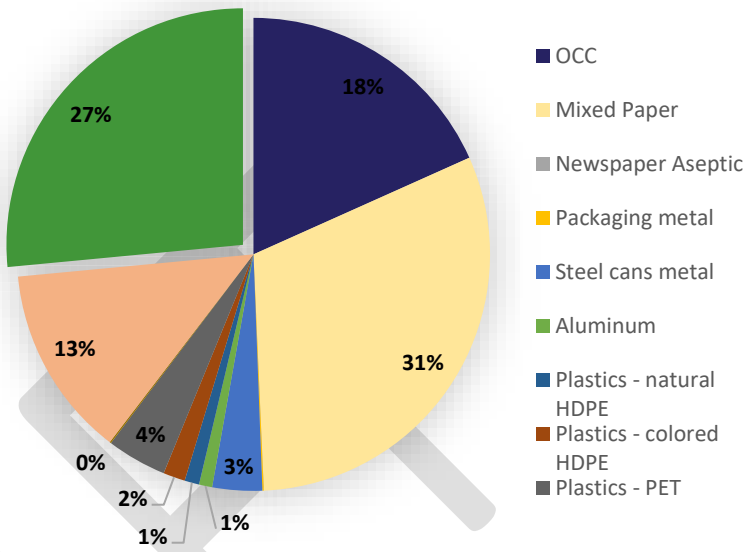


4.2 Regional Material Recovery Facilities and Capacity

Prior to March 2019, the City utilized three MRF's for processing its residential, co-mingled materials. They included the Waste Management Gasmer Facility; the Waste Management Westside MRF (Brittmore) and the ITR MRF. In 2017, the City collected a total of 51,497 tons of material that were processed at one of these three MRFs. On average a total of 4290 tons of materials is collected monthly. Starting in the spring of 2019, all of the City's co-mingled materials will be sent to the new FCC MRF.

An analysis of materials accepted at a MRF from 2013 to 2016 is shown in Table 4-1 and Figure 4-2. These data are from the FCC contract with the City and based on actual sampling of materials. The majority of materials collected is mixed paper which is between 28% and 41%, and OCC is between 17% to 18.3%. Therefore, paper is over half of the total material processed at the facility. The next highest quantity of material accepted at the MRF is contaminated or unacceptable materials. This material must be separated from the acceptable material and taken to a landfill.

Figure 4-2
Composition of Single Stream Materials
April 2016



It should be noted that glass accounted for up to 18.7% (by weight) of the mixed waste stream until it was removed from the City's single stream recycling program in July 2016 due to market conditions. The FCC contract requires that these materials be processed at the MRF, so the percentage of glass will increase when that facility becomes operational.

Table 4-1

Single Stream Material Composition

Single Stream Audit Data for City of Houston	Oct 2016	July 2016	April 2016	January 2016	January 2014	March 2013
Percent of Material Sampled by Weight						
OCC	16.7%	17.80%	18.30%	16.80%	18.00%	17.50%
Mixed Paper	41.4%	31.50%	31.00%	28.00%	37.10%	39.30%
Packaging metal	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
Steel cans metal	2.00%	3.20%	3.40%	3.40%	2.00%	1.90%
Aluminum	1.00%	1.00%	0.90%	0.80%	1.20%	1.40%
Plastics – natural HDPE	1.20%	1.30%	1.00%	1.60%	1.50%	1.80%
Plastics – colored HDPE	1.70%	1.70%	1.50%	1.80%	1.80%	1.20%
Plastics – PET	4.40%	4.00%	4.10%	4.50%	3.80%	4.90%
Plastics – Comingled	1.90%	1.70%	0.10%	1.50%	0.80%	1.60%
Glass – 3 mix	4.90%	8.80%	13.10%	18.70%	15.50%	12.90%
Trash	24.90%	29.10%	26.50%	22.80%	18.20%	17.60%
*Glass removed from single stream effective 7/23/16						

Source FCC Contract

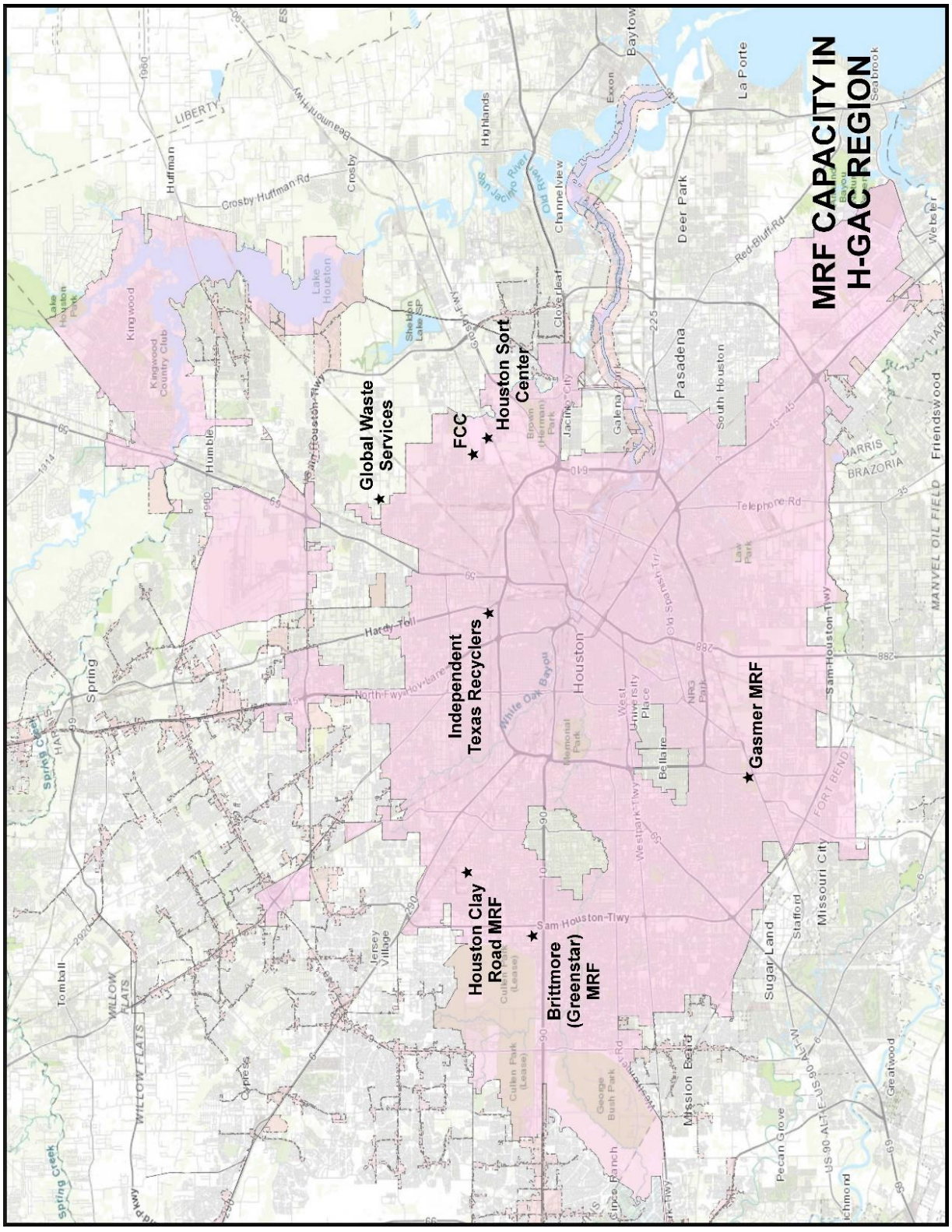
Table 4-2 presents a summary of material recovery facilities located in the Houston area and these locations are shown in Figure 4-3. ***It should be noted that these facilities are designed to process recyclables from both the residential and commercial sectors.*** Companies that collect recyclable materials are often delivered them to these facilities. Representatives of the industry have indicated that the flow of materials from the commercial sector have been on the increase in recent years as corporations take actions to reduce their environmental impacts.

Total capacity of these facilities is over 494,000 tons per year, or 1590 tons per day assuming an 8 hour operating shift. Additional hours of operation can increase daily and annual throughput of these facilities. There is a reported 307,000 tons of material processed, or 62% of capacity.

Table 4-2
MRF Capacity in H-GAC Region

MRF	Address	Owner	2017 Tons Recovered	Capacity Throughput
Gasmer MRF	4939 Gasmer Drive Houston	WM	78,000	120,000
Houston Clay Road MRF	9590 Clay Road Houston	WM	105,000	204,000
Westside (Brittmore) MRF	1200 Brittmore Road Houston	WM	87,000	120,000
Global Waste Services	7172 E Mt Houston Road Houston	WCA	na	na
Houston Sort Center	5757 B Oates Road Houston	Republic	37,580	50,000 tpy
Independent Texas Recyclers	6810 Irvington Boulevard Houston	Independent Texas Recyclers	na	na
FCC	9170 Ley Road Houston	FCC	Opened March 2019	145,000 tpy

Figure 4-3
Material Recovery Facilities



4.3 C&D Recycling & Processing

The majority of this report focuses on the municipal solid waste stream. Approximately 480,000 tons of C&D material were disposed in Type I landfills, approximately 7% of the total disposed in Type I facilities. In 2018, an estimated 2.8 million tons of C&D were disposed at Type IV landfills (Source: TCEQ Annual Reports). There are businesses that are currently processing construction & demolition waste in the region. Based on interviews with representatives from some of these firms and data from the TCEQ, approximately 2.5 million tons of C&D are processed and recycled.

Cherry Companies

Cherry Companies represents the largest C&D processor in the region. The company has eight locations in the region. Cherry recycles concrete, asphalt, steel, composition asphalt shingles and tires. At their 9 Houston area recycling centers, they annually recycle:

- More than two million tons of concrete for use in road base material
- About 30,000 tons of reclaimed asphalt paving for use in hot mix material
- Over 50,000 tons of steel to fabricate new steel products
- Approximately 25,000 tons of composition asphalt shingles for use in hot mix material
- Nearly one-half million automobile and truck tires for alternative fuel

Sprint Fort Bend

The Sprint Fort Bend Landfill reports that it recovers construction / demolition waste at its Type IV landfill. In 2017, it reported a total of 69,931 tons of C&D (17,795 tons), white goods (35.4 tons), tires (0.3 tons), shingles (2170 tons), and concrete (49,931 tons). It also composted 1120 tons of material and crushed 64,931 tons of concrete at this site. (Source: TCEQ Annual Report).

Sprint Montgomery County

The Sprint Montgomery County Landfill reported that they recovered 135 tons of C&C in 2017; this is anticipated to increase to 3750 tons in 2018 based on their report to TCEQ.

Lone Star Disposal

Lone Star operates a Type IV landfill, a Type I landfill and a construction/demolition material processing facility. The processing facility recovers approximately 1800 cubic yards per day, equivalent to approximately 900 to 1800 tons per day. Assuming 310 days of operation per day, this is equivalent to approximately 279,000 to 558,000 tons per year.

4.4 Environmental Impacts & Regulatory Issues

4.4.1 Environmental Benefits

The advancement of material recovery technologies over the years has contributed greatly to the increase in the amounts of materials collected as part of both residential and commercial recycling programs. These facilities reduce the amount of source separation required at the household, making it more convenient to participate in recycling programs. This level of convenience has come at a cost for processors, as the levels of contaminated materials included in the recycling stream has reached levels of approximately 25%. Reducing contamination levels continues to be a challenge for local governments and processors.

4.4.2 Environmental Impacts and Mitigation Measures

Environmental Impacts	Mitigation Measures
Land Use **Land use compatibility**	Site facility in either industrial setting or at existing MSW facility Design facility to incorporate appropriate buffer zones
Air Quality **Potential odors from facilities if materials not properly managed** **Air emissions from collection trucks and transfer vehicles.**	Proper management of materials, especially minimal time that materials are stored on site. limiting the materials accepted to those that will not generate odors. Place sites in areas where traffic is conducive to quick turn-around to avoid increased truck air emissions. Adequate ventilation systems for odor control and dust control.
Water Quality **Storm water pollution** **Drainage, Floodplains, Wetlands and Waters of the US**	Design facilities for proper management of storm water. Cover facilities that accept MSW so that storm water does not come in contact with MSW, or the storm water is collected and treated. Facilities must not impact surrounding property owners drainage. Sites cannot be located in a floodplain, wetland or waters of the US.
Traffic and Transportation **Increased traffic from facility use**	Site facilities that have easy access and allow for quick turn-around. Permit application requires demonstration of adequacy of roads and transportation system.
Nuisances **Blowing litter** **Noise**	Design facilities so that blowing litter is controlled. Operations plans to include daily litter pick-up of the site. Design of facilities must mitigate noise impacts caused by operating large pieces of equipment.
Environmental Justice	Take into consideration the location of facilities so that they don't disproportionately impact EJ communities, but also assure access of this service throughout the community.
Safety	Worker safety training Reliance on mechanical systems to do most dangerous aspects of operation Material screening prior to processing Adequate personnel safety equipment

4.4.3 Regulatory Issues

The majority of the material recovery facilities in the region meet the requirements for Processing Facility that are exempt from permitting or registrations. Facilities must meet the storage requirements as defined in 33 TAC 330.285 discussed earlier. If they are unable to meet the storage requirements, the MRF is defined as a transfer station. If the amount of waste exceeds the 10% level, the facility is then considered a "transfer station" even though its primary purpose is to process recyclable materials. FCC had to permit as a transfer station primarily due to the fact that based on sampling of Houston's single stream content, it will exceed the 10% level for a registration as a resource recovery facility.

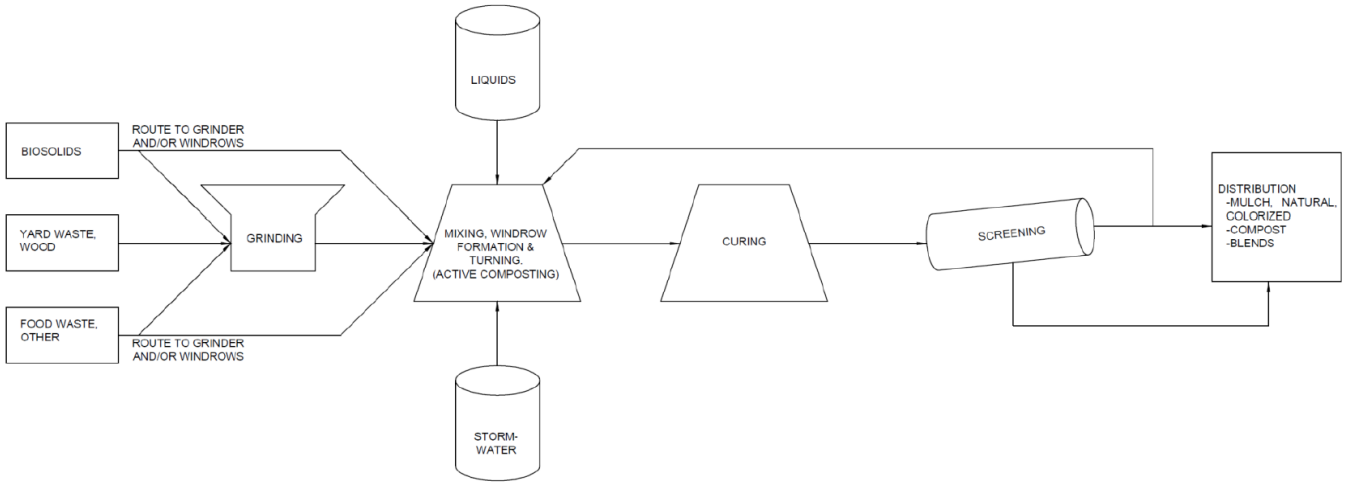
5.0 Organics Processing Facilities

5.1 Background

Organic wastes or residuals are often disposed in landfills. However, organics processing facilities are proliferating in the H-GAC region. In the region, the vast majority of organic wastes and residuals are recycled through the manufacture of mulch and compost rather than being disposed. Approximately 30% of wastes recycled in Texas in 2015 and voluntarily self-reported to TCEQ for the Study on the Economic Impact of Recycling was organic materials (See Figure 3-1). That percentage is likely to be higher in the Houston area because of the accessibility and capacity of organics processing facilities. There is also a greater percentage of organic materials available in the Houston market as due to its climate and types of vegetation found in the Houston area versus other parts of Texas. There are no anaerobic digestion or other energy-from-waste facilities in the H-GAC region.

Figure 5-1 is a schematic diagram illustrating a typical, windrow process for production of compost and mulch.

Figure 5-1
Schematic of Typical Windrow Processing Operation



5.2 Types of Organic Wastes or Residuals

Organic waste and residuals managed in the MSW management realm are typically made up of three major categories – yard and wood waste, food residuals and biosolids. They may be generated by residential, commercial or industrial sources. These materials are typically the feedstocks for mulch and compost manufacturing facilities.

- Yard and Wood Waste - made up entirely of vegetative materials such as trees, brush, grass, leaves and other plant-based materials

Yard and Wood waste may be generated by homeowners, landscape contractors, land clearing operations or right-of-way/utility clearing crews. Wood waste may also include lumber; however, treated lumber is not suitable as a compost feedstock.

Mulch manufacturers receive clean wood and grind or shred it to make various types of wood mulch for market. Some mulch manufacturers produce colorized mulch, as well. Mulch may be marketed at the wholesale or retail level, bagged or in bulk.

Compost manufacturers are typically also mulch manufacturers because grinding wood feedstocks is typically the first step in the composting process. If the manufacturer receives more wood than is required in the manufacture of compost, the excess ground material is typically sold as mulch. Different types of yard waste and wood waste exhibit unique characteristics. However, yard waste is generally considered to be a compost feedstock with higher carbon content than most other feedstocks. It generally has lower odor potential but requires more time in the composting process. Wood waste, in particular, is the most common source of necessary bulking material in the composting process.

Yard and wood waste may be processed as mulch or composted at municipal solid waste processing facilities authorized by TCEQ at any of the four tiers of authorization applied to such facilities – Exempt (Notice of Intent for Recycling), Notification (NOI for Composting), Registration or Permit.

Some landfills grind yard and wood waste or produce compost and are not separately authorized by TCEQ as mulch or composting facilities. Table 5-1 includes the tons of brush reported to be disposed and recovered at the Type I and Type IV landfills in the region. It is presumed that the recovered brush quantities are ground into mulch with the exception of Coastal Plains Type I landfill, which manufactures only compost.

Table 5-1
Brush Disposed and Recovered at Type I and Type IV Landfills in the H-GAC Region in Tons per Year

	2015	2016	2017
Type I Landfills Brush Disposed	58,567	15,004	10,903
Type IV Landfills Brush Disposed	-	1,556	9,852
Total Disposed	58,567	16,560	20,755
Type I Landfills Brush Recovered	0	3,297	2,945
Type IV Landfills Brush Recovered	14,211	24,657	14,397
Total Recovered	14,211	27,954	17,324

(Source: TCEQ Landfill Annual Reports)

- Food Residuals - made up of materials that originated as part of the human food chain, from farm/ranch/aquaculture to table, that might have been disposed if not recycled, repurposed or reused

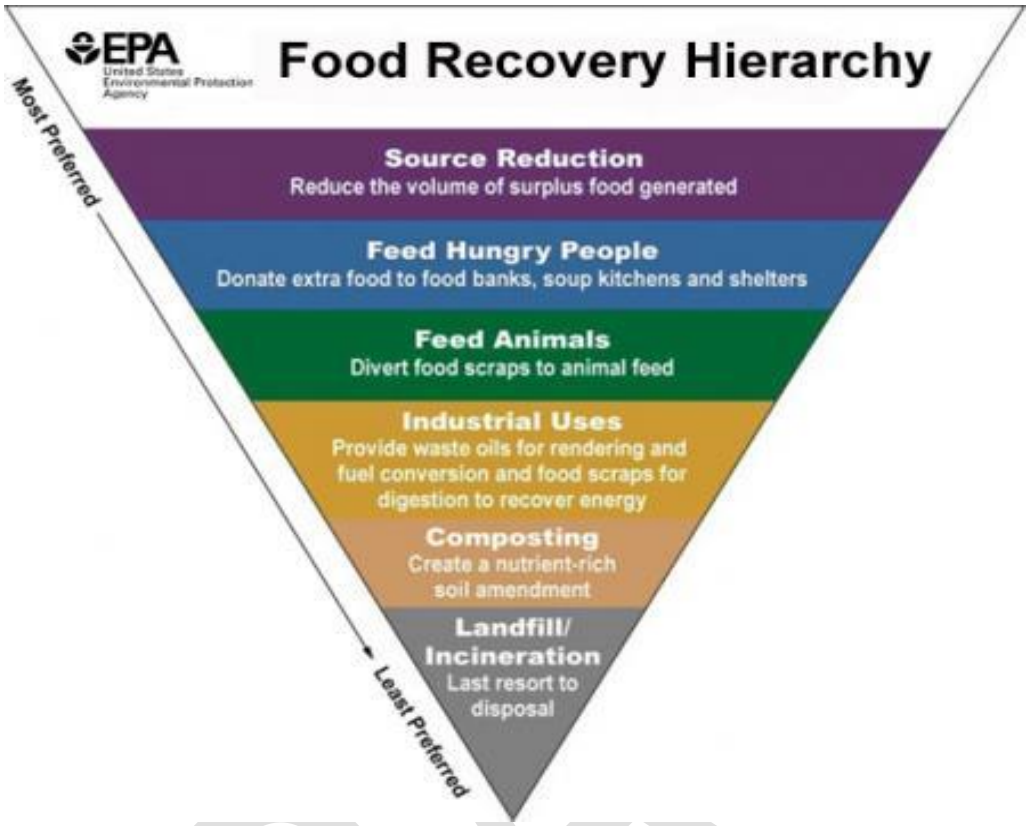
It is estimated that about 62.5 million tons of food is wasted in the United States per year (Source: *A Roadmap to Reduce Food Waste by 20%.* ReFed. 2016) Figure 5-2 is the Food Recovery Hierarchy developed by the U.S. Environmental Protection AgencyPA (Source: EPA).

Food residuals may be processed through composting. Source separated food residuals may be composted at any of the four tiers of authorization listed above if they are entirely made up of vegetative materials. They must be processed at composting facilities at the Notification (NOI for Composting), Registration or Permit levels if they include meat, dairy, fats, oils or dairy materials. Food residuals are typically high in moisture, heavy, and higher in nitrogen than many other compost feedstocks.

Pre-consumer food residuals are generated by commercial/industrial food and beverage processors, grocery stores, commercial and institutional kitchens, and any other sources associated with food before it is served. Post-consumer food residuals are generated by the residential sector and food service establishments after food has been served, such as uneaten food from front-of-the-house restaurant operations. Pre-consumer food residuals are easier to recover than post-consumer food residuals because they are much less contaminated. Residential food residuals, in particular, are difficult to recover because of the high contamination rate.

Contamination by packaging, service ware, and other inorganic materials is the most problematic aspect of processing food residuals, especially post-consumer materials.

Figure 5-2
Food Recovery Hierarchy



- Biosolids – made up of residuals from municipal wastewater treatment processes which have been digested, typically in anaerobic digesters located at municipal wastewater treatment facilities.

Although biosolids are not generated, hauled or managed by the City of Houston Municipal Solid Waste Management Department, they are addressed here along with other organic wastes and residuals because they are often disposed in Type I Municipal Solid Waste Landfills and may be processed along with yard and wood waste, and food residuals at composting facilities. Approximately 30% of the biosolids generated by the City of Houston wastewater treatment plants (WWTPs), approximately 32,000 dry tons per year, are currently disposed at landfills. The remaining 70%, all generated at the 69th Street and Almeda Sims WWTPs, is heat treated, pelletized, and marketed as a fertilizer product. (Source: Houston Public Works, 2018)

Like food residuals, biosolids are typically high in moisture, heavy and higher in nitrogen than many other compost feedstocks. Feedstocks that are higher in nitrogen and moisture, such as food residuals and biosolids, require careful management in the initial stages of composting in order to manage odors effectively. However, they also speed up the composting process, thereby increasing throughput capacity at composting facilities, and they can contribute to a compost product considered by many to be more beneficial to soil health and plant growth. Compost containing biosolids cannot be labeled "organic."

Other types of organic residuals are listed in the following section addressing regulatory tiers of authorization. However, those most pertinent to the City of Houston's municipal solid waste management system are three: yard and wood waste, food residuals and biosolids.

5.3 Organics Processing Facilities in the H-GAC Region

Organic wastes and residuals can be processed or recovered through many different techniques. These include mulching, composting, anaerobic digestion, pyrolysis, incineration with energy recovery and many others. In the H-GAC Region, organic wastes and residuals are recovered at a number of mulching and composting facilities – large and small. These facilities are currently diverting materials from landfill disposal and conserving a significant portion of the available landfill capacity available in the Region. These facilities produce end products – mulch, compost and blends – which are valued for their ability to increase the water-holding capacity of soils, reduce the use of synthetic agricultural and horticultural chemicals, improve water quality, improve plant growth and hardiness and decrease soil erosion.

Composting is defined by the US Compost Council as follows.

> *Compost – is the product manufactured through the controlled aerobic, biological decomposition of biodegradable materials. The product has undergone mesophilic and thermophilic temperatures, which significantly reduces the viability of pathogens and weed seeds, and stabilizes the carbon such that it is beneficial to plant growth. Compost is typically used as a soil amendment, but may also contribute plant nutrients. (Source: USCC 2018)*

There are 52 known mulch and compost manufacturers in the H-GAC Region which are available to process organics generated within the City of Houston and divert materials from landfills available to receive the City's Municipal Solid Waste for disposal. Table 5-1 presents a summary of facilities in the H-GAC region based on TCEQ records and interviews with various organics in the region. The following sections provide more detail on the types of facilities and results of interviews.

Table 5-1
Organic Facilities in Houston and H-GAC Region.

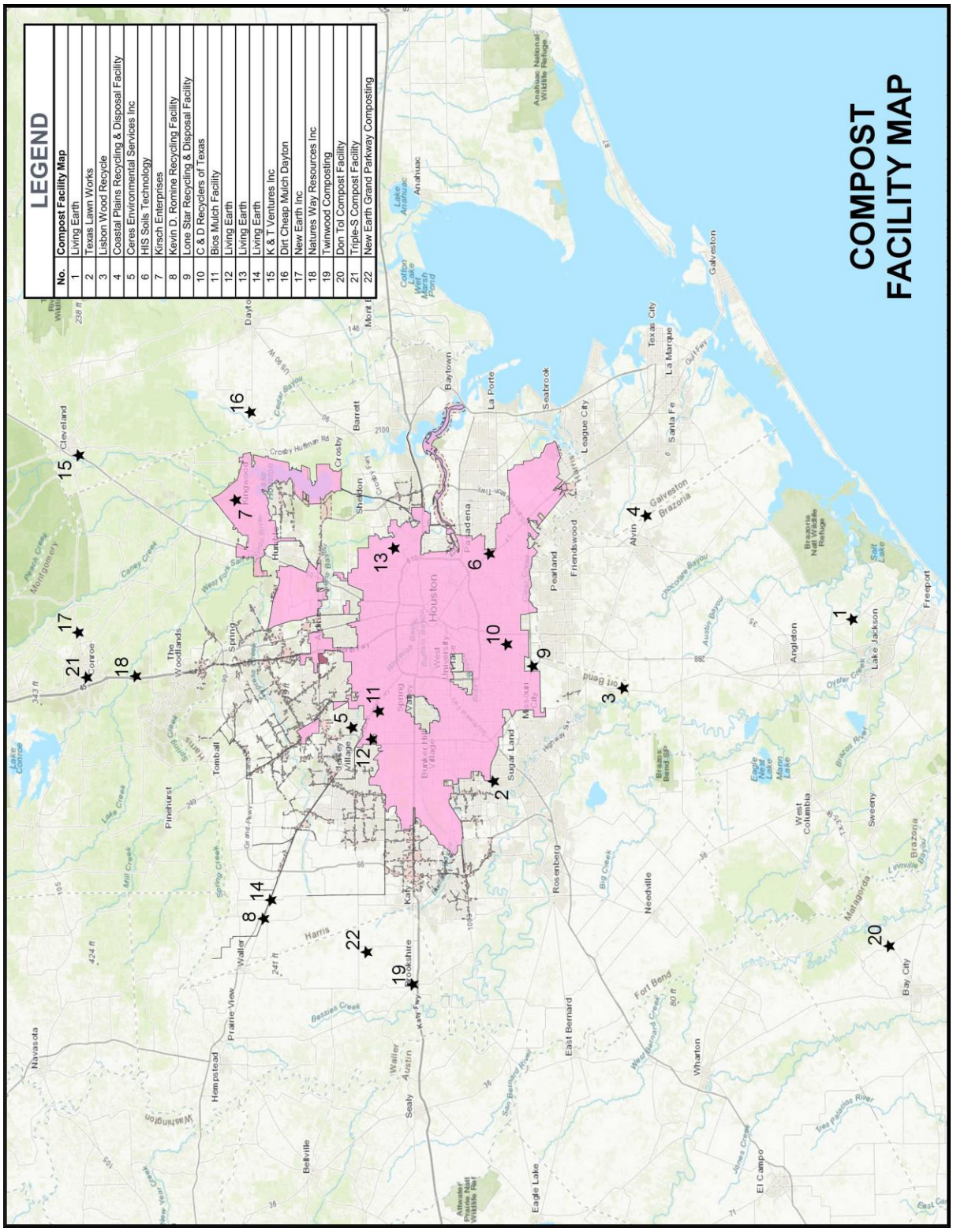
Organics Facilities	Houston	H-GAC Region*
Permit	0	1
Registration	0	2
Notification	2	4
Exempt**	16	45
Total	**18**	**52**
*Inclusive of Houston **Approximate		

Figure 5-3 is a map of Living Earth/LETCO facilities in the region. The Katy West facility is only a retail site and not a processing site. The Pineland site is listed but is not in the Region.

Figure 5-4 is a map of the other, known mulch and compost manufacturing facilities in the H-GAC region.

Figure 5-3
Living Earth/LETCO Facility Map (Source: Living Earth/LETCO)

Figure 5-4
TCEQ Authorized Organic Facilities in the H-GAC Region



5.3.1 Exempt Tier Processors (NOI for Recycling)

Living Earth/LETCO operates 14 processing facilities in the region plus one retail site. Their facilities are authorized at the Exempt regulatory tier and are authorized to accept brush leaves, grass, stable bedding and vegetative material. Living Earth processes approximately 35,000 tons per year of wood and yard waste collected by the City of Houston Solid Waste Management Department from residential sources as well as tree waste collected at the City's depositories. The City of Houston collects yard waste from residences in compostable plastic bags. Crawford Road, Missouri City, McCarty, New Caney and South Beltline receive yard waste and tree waste collected by City forces from the four quadrants of the City. Beaumont Highway and Cutten Road are located within the City Limits of Houston. Together, these seven facilities accept materials generated within the City Limits of Houston. In total, they accepted approximately 184,000 tons per year of vegetative material at the facilities within the City Limits of Houston in 2018. Of that, approximately 18,000 tons per year is estimated to be pre-consumer produce primarily originating at Produce Row and the Farmers' Market. Living Earth/LETCO facilities do not process post-consumer produce. They report additional capacity in the entire region of approximately 300,000 to 400,000 tons per year.

Living Earth/LETCO pays the City of Houston $6.00 per ton for materials and charges other generators such as landscapers $14.00 per ton for materials delivered to their facilities to be processed. They donate 10 cents to the City of Houston recycling program for every bag of mulch from Houston's feedstocks that is sold in the City. Approximately 65% of their product is mulch with the remainder compost. Living Earth/LETCO reports that they have existing capacity at their regional facilities to process up to an additional 300,000 to 400,000 tons per year of vegetative material spread across all 14 facilities in the region.

There are three large mulch and compost manufacturers in the Region which operate at the Exempt tier (NOI for Recycling). Nature's Way is in Conroe and The Ground Up has a facility on Windfern and one on Westpark Tollway. In addition, Kirsch Enterprises is located in Humble but no detailed information is available for this facility.

Nature's Way is a static pile operation that accepts wood and yard waste, pre-consumer produce, stable bedding, and dairy and soft drink rinse water. Nature's Way processes approximately 40,000 tons per year of unground feedstocks and could double that throughput on the current facility. The facility does not accept significant amounts of material from inside the City of Houston. It has rail access.

The Ground Up is unique in that it is owned by a debris management firm and has access to up to 20 grinders. They process approximately 35,000 to 40,000 tons per year of loose (unground) wood and yard waste. They feel that they could increase their throughput by 40%-50% using their current process or by 100% with process modifications, on their current sites. Mulch makes up 60% of their product with compost products making up the rest.

Farm Dirt Compost also operates at the Exempt authorization tier (NOI for Recycling), but it is quite different from Nature's Way and The Ground Up. It is a very small facility, operating on only one acre of land using the Aerated Static Pile process. The facility operates at full capacity at 1000 tons per year. The owner accepts ground wood from utility line clearing crews and operates its own collection for brewery waste, small restaurant vegetative waste, and unusable food generated by the Montgomery County Food Bank. All feedstocks except from the food bank are generated within the city limits of Houston. Farm Dirt Compost commands a premium price for its compost to customers at garden centers who value high-quality compost. Farm Dirt Compost represents the micro-compost movement operating at the community level. Such operations are valuable, among other reasons because they demonstrate at a community level the value of organics recovery and the benefits of compost and mulch in a sustainable urban setting.

5.3.2 Notification Tier Processors (NOI for Composting)

Waste Management operates the WMI Coastal Plains composting facility at the Notification tier of authorization. The operation is on 7 acres within the permitted area of the WMI Coastal Plains Landfill. That facility processes wood and yard waste, and food waste primarily made up of brewery waste. Most feedstocks come from Brazoria and Galveston Counties. The facility is open to the public but wood and yard waste feedstocks are almost entirely delivered by Waste Management collection vehicles. WMI Coastal Plains produces compost but no mulch. There are no plans to expand the composting operation at this time but WMI would be willing to expand if they could obtain more food residuals in order to increase nitrogen levels in their feedstocks and speed up the composting process. They currently process approximately 9,000 to 10,000 tons per year of wood and yard waste, and approximately 3,000 cubic yards per year (estimated 1,500 tons per year) of food residuals, mostly brewery waste but also some other food residuals. At the Notification tier, the facility is authorized to accept meat, dairy, grease and oils in addition to vegetative food residuals.

Lone Star Recycling is another organics processor operating within the permit limits of a landfill. Detailed information is not currently available for this facility. However, the TCEQ Annual Report for landfills states that the landfill reported recycling 5,000 tons per year of brush at the landfill. This is assumed to be through the production of mulch or compost on-site.

5.3.3 Registration Tier Processors

New Earth operates two facilities in the H-GAC Region – one in Conroe and one in Katy. Both operate at the Registration tier of authorization and process wood and yard waste, pre-consumer food residuals and biosolids. The Conroe facility accepts biosolids primarily from municipal wastewater treatment facilities and the Katy facility accepts biosolids primarily from wastewater treatment facilities owned by Municipal Utility Districts. Both produce a wide range of products including mulches, composts and blends which they market in bulk and bagged through wholesale and retail markets. The two facilities combined are authorized by TCEQ to process approximately 175,000 to 225,000 wet tons per year of biosolids (approximately 28,000 to 38,000 dry tons per year) and report the ability to process hundreds of thousands of tons of other materials per year. New Earth reports that they have expansion capability at their facility in Katy and are always open to the possibility of expansion through development of new facilities in the Region. They report that they would be able to process even more organic wastes and residuals at both facilities under current conditions if they received more high-nitrogen feedstocks such as biosolids. This is because higher nitrogen in the compost feedstock speeds up the composting process and thereby increases a site's capacity. Some feedstocks may be generated inside the city limits of Houston.

Don Tal Compost Facility is authorized under the Registration Tier. It processes approximately 3,500 tons per year of feedstocks and is located in Wharton County. It does not accept feedstocks from Harris County.

5.3.4 Summary

Table 5-2 presents data on the quantities of organics managed at major facilities in the region. Over 235,000 tons were processed at facilities located in Houston and an additional 314,000 tons were processed at facilities located outside the City limits, for a total regional quantity of 549,000 tons. It should be noted that some material produced in Houston is being processed by facilities located outside the City's boundaries.

Table 5-2
Organics and Capacity of Major Facilities

		Throughput (Tons/yr)	Capacity (Tons/yr)
In Houston			
	Living Earth/Letco (7 sites)		375,000
	The Ground Up		100,000
	Lone Star Disposal		5,000
	Farm Dirt Compost		1,000
	Total In Houston	**>235,000**	**481,000**
Outside Houston			
	New Earth (2 sites)		350,000
	Nature's Way		50,000
	Living Earth/LETCO (7 sites)		375,000
	WMI Coastal Plains		40,000
	Don Tal		NA
	Kirsch		NA
	Total Outside Houston	**>613,500**	**>815,000**

Table 5-3
Feedstocks for Facilities in H-GAC Region

Facility	Feedstocks
Living Earth/Letco (7 sites)	yard/wood, pre-consumer food
The Ground Up	yard/wood, pre-consumer food, liquids
Lone Star Disposal	not reporting
Farm Dirt Compost	yard/wood, food
New Earth (2 sites)	yard/wood, pre-consumer food, biosolids
Nature's Way	yard/wood, pre-consumer food, manure
Living Earth/LETCO (7 sites)	yard/wood, pre-consumer food
WMI Coastal Plains	yard/wood, pre-consumer food
Don Tal	NA
Kirsch	yard/wood

5.4 Organics Processing Capacity

The City of Houston currently collects approximately 54,500 tons per year of yard waste and wood waste from single family households collected by the City's collection crews and at depositories. In addition, it generates an average over the years 2012-2017 of 45,429 dry tons per year of biosolids at its municipal wastewater treatment facilities (Source: Houston Public Works, 2018). Total food residuals are very difficult to quantify but it is estimated nationally that approximately 22% of all municipal solid waste landfilled in 2015 was made up of food residuals (Source: US EPA. National Overview: Facts and Figures on Materials, Wastes and Recycling. 2018). Applying this percentage to the total municipal solid waste generated in the City of Houston, it can be roughly estimated that 1.5 million tons per year of food residuals are currently landfilled.

A rough total of the current organic feedstocks processed in the H-GAC Region into mulch and compost products is estimated to be approximately 670,000 tons per year. Based on reports from the processors listed above, there is the potential for at least several hundred thousand tons per year of additional capacity for organics processing in the Region.

5.5 Environmental Impacts and Regulatory Issues

The use of mulch and compost have numerous environmental benefits. Diversion of organics from landfill disposal results in greenhouse gas emission reductions because organics decomposing in a landfill under anaerobic conditions generate methane; whereas, organics decomposing through aerobic composting generate carbon dioxide. Like methane, carbon dioxide is a greenhouse gas but it is much less detrimental in comparison.

The use of both mulch and compost reduce erosion and increase water holding capacity of the soil. This reduces the need for irrigation and reduces flooding. Compost improves soil health and improves plant vigor, reducing the need for synthetic fertilizers, pesticides and herbicides. Less synthetic chemical use in agriculture and horticulture results in less contamination of surface water and ground water. It also reduces exposure to harmful chemicals on the part of agricultural and horticultural workers.

However, there are potential negative environmental impacts associated with the manufacturing of mulch and compost. Proper design and operation of mulch and compost manufacturing facilities reduce or eliminate these negative effects. TCEQ regulations are designed to ensure that operations do not negatively affect the quality of surface water and ground water. They are also designed to prevent nuisance conditions such as odor, dust and noise. The regulations also address compost quality, testing, reporting and appropriate end uses.

Depending on the feedstocks processed, compost manufacturers provide varying levels of detail to TCEQ in terms of facility design and process description. Processes must be designed to provide the appropriate balance of biological, chemical and physical conditions to ensure disinfection and product quality. There are few location restrictions other than those associated with general regulatory protection of natural resources such as wetlands, threatened and endangered species and flood storage. Compost manufacturers that accept biosolids as feedstocks are required to operate on low-permeability surfaces to protect groundwater quality.

The following table provides potential negative environmental impacts associated with mulch and compost manufacturing facilities. It also provides corresponding environmental protections to mitigate impacts.

Table 5-2
Potential Environmental Impacts and Mitigation of Compost/Mulch Manufacturing

Potential Negative Environmental Effects	Mitigation
Groundwater	▪ Operating pad design if appropriate
Surface water	▪ Erosion and sedimentation control (SWPPP) ▪ Drainage design
Air	▪ Fire prevention and control ▪ Improved surfaces or watering roadways ▪ Efficient turn-around time for vehicles
Land Use	▪ Industrial zoning, undeveloped, co-located with MSW facility, or buffer from residences
Environmental Justice	▪ No disproportionate impact to EJ communities ▪ Access by EJ communities
Nuisance – ▪ Odor ▪ Dust ▪ Noise ▪ Visual ▪ Traffic and Transportation	▪ Adequate C:N ratio, aerobic conditions, proper storage/blending of feedstocks ▪ Misters/spray bars on grinders/screens, adequate moisture in feedstocks ▪ Siting, buffer areas ▪ Berms, vegetation, siting, buffer areas, layout ▪ Access design to prevent off-site queuing/congestion/unsafe traffic patterns

5.6 Regulatory Tiers of Authorization for Organics Processing Facilities

The following are the four tiers under which TCEQ authorizes processors of organic residuals. Each tier is defined by the listed feedstocks accepted.

Exempt (NOI for Recycling)

- Clean wood material
- Vegetative material (This could be from food.)
- Paper

- Manure and paunch manure
- Yard trimmings

Notification (NOI for Composting)

- Everything in Exempt
- Source separated meat, fish, dead animal carcasses, oils, grease, dairy materials (This would include pre- and post-consumer food that is not necessarily all vegetative.)

Registration

- Everything in Notification
- Municipal wastewater sewage sludge/biosolids
- Positively sorted organic material from municipal solid waste stream (such as from a material recovery facility/recycling facility)
- Source separated organic materials from the MSW stream
- Disposable diapers
- Paper mill sludge

Permit

- Everything in Registration
- Mixed municipal solid waste
- Grease trap waste defined as "material collected in and from an interceptor in the sanitary sewer service line of a commercial, institutional or industrial food service establishment, including the solids resulting from dewatering processes"

All composting facilities, regardless of tier, must prevent nuisance conditions such as odor, noise and dust. Each successive tier requires more detailed information to be submitted to TCEQ and more rigorous operational and design controls than the previous tier. Only facilities at the Permit tier may be required to hold public hearings prior to authorization. All facilities must be designed and operated to protect ground water and surface water, and comply with all other, applicable State and Federal environmental regulations.

6.0 Transfer Stations

6.1 Facility Definitions

Transfer stations are designed to improve collection efficiency by transferring waste from collection vehicles to more efficient long-haul vehicles. This allows the collection vehicles to spend more time collecting waste, versus hauling long distances to the landfill. There are a total of 21 operating transfer stations in the H-GAC region, three of which are owned by the City of Houston. Regionally, approximately 26% of the waste collected from the residential and commercial sectors goes to a transfer station before it is sent to a landfill.

Transfer stations are relatively low-tech facilities. The process generally includes the following steps.

1. Collection vehicle enters the site and is weighed.
2. Collection vehicle enters the facility and disposes its load onto a tipping floor.
3. Collection vehicle exits the facility and may be weighed prior to leaving the site.
4. Waste is loaded directly into a hopper using front-end loaders or with grapple crane. The hopper loads directly into a transfer vehicles.
5. Transfer vehicles haul waste to a landfill.

A conceptual layout of a transfer station is shown in Figure 6-1. This figure illustrates the City's Southeast Transfer Station. The photo above shows the tipping floor for the transfer station.

Figure 6-1
SE Transfer Station Layout

Transfer stations can be designed to recover materials including brush and construction / demolition wastes. In 2017, four of the region's transfer stations reported recovering for diversion 37,370 tons of material sent to the transfer station. Most of the recovered material was either construction demolition material or brush. Two of the City's transfer stations are located next to either a depository or a recycling center. The City's Southwest Transfer Station is located next to the Westpark Recycling Center and the Northwest

Transfer Station is located adjacent to the Sommermeyer Depository. The Southeast Transfer Station is located at the City's Southeast Service Center.

6.2 City of Houston & Regional Transfer Stations

6.2.1 City of Houston Transfer Stations

The City's three transfer stations are these.

- Northwest Transfer Station (14424 Sommermeyer Street)
- Southeast Transfer Station (9225 Lawndale Street)
- Southwest Transfer Station (5904 Westpark Drive)

The City's transfer stations were permitted in 1999 and are operated under contract by Republic Services (last negotiated in 2009). The Southeast and Southwest Transfer Stations are direct-dump operations where waste is deposited on the tipping floor and front-end loaders push the waste into hoppers that direct the waste into transfer trailers. The Northwest Transfer Station is designed to have a grapple crane load the waste into the transfer vehicles. None of the City's transfer stations are currently designed to segregate waste for recovery.

Table 6-1 presents the waste throughput for the City's transfer stations in 2017. The City's transfer stations had a combined throughput of 695,096 tons (Source: City of Houston). Of the 695,096 tons, City trucks delivered 394,779 tons, or 57% of the waste going to these facilities. The City's contract with Republic Services allows it to use the facility for its collection vehicles and other private sector haulers. Approximately 43% of the waste taken to the City's three transfer stations is from private haulers.

Table 6-1
2017 – City Transfer Stations

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

In 2018, the City issued a request for proposals for the design of a new transfer station to be located in northeast Houston. The planned facility location is 5711 Neches Street, Houston, Texas.

6.2.2 Regional Facilities

Table 6-2 provides a summary of transfer stations in the H-GAC region. There are 31 permitted transfer stations in the H-GAC region, however only 20 are accepting waste. A total of 2.3 million tons of waste were directed to these transfer stations in 2017, which is equal to 26% of the total amount of waste (MSW + C/D) that were disposed in the Region for that year. On average, 7300 tons per day are sent to regional transfer stations.

The City currently relies primarily on their own facilities, but at times have used private transfer stations including the Rufino Transfer Station. Approximately 2/3 of the City's MSW is sent to a transfer station before going to the landfill.

Table 6-2
H-GAC Transfer Stations

	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**

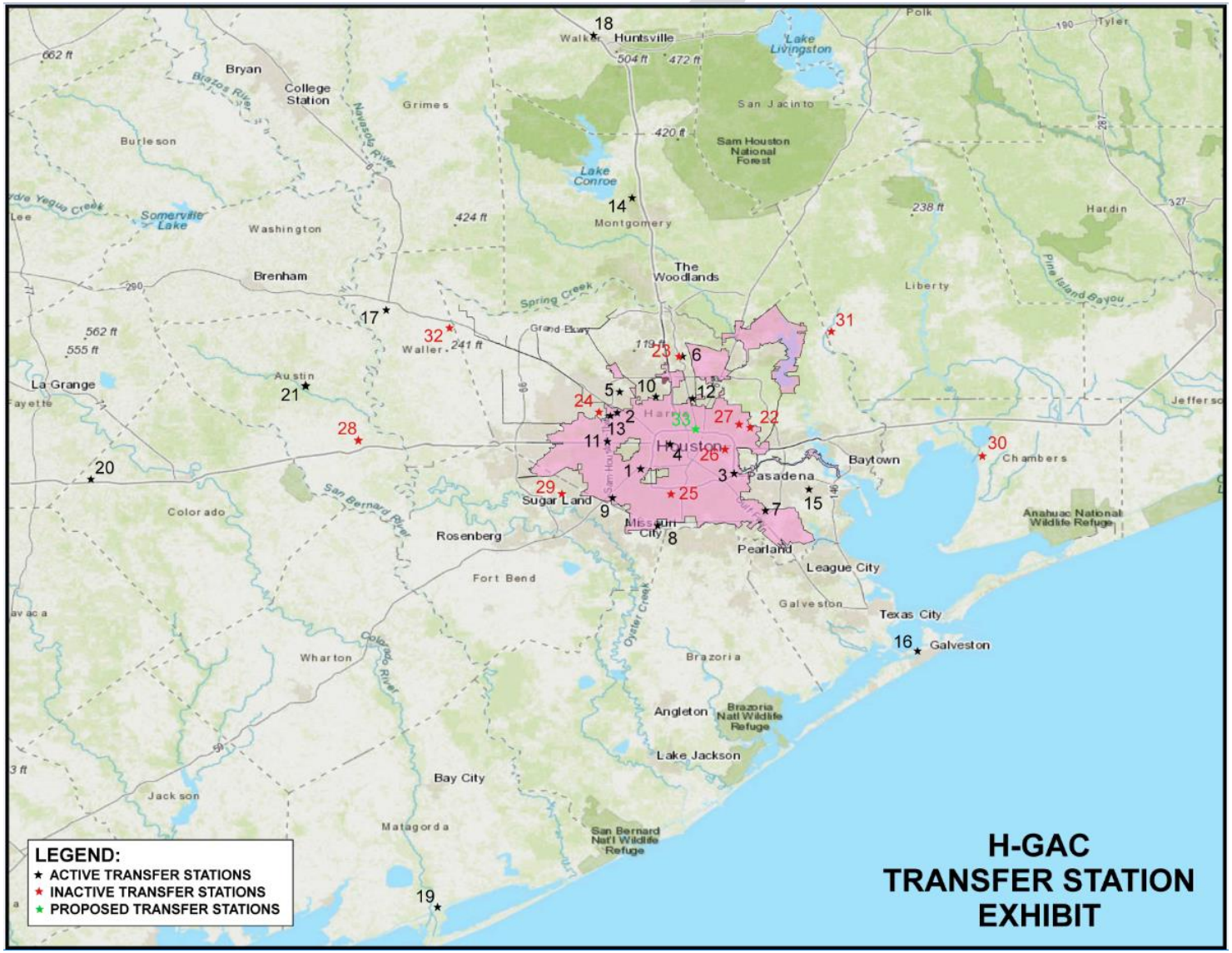
Note: Totals for Houston transfer stations may vary from Table 6-1 due to differences in reporting periods.

Table 6-3
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 will function as a MRF. Became operational in March 2019.

Figure 6-2
Location of Regional Transfer Stations



6.3 Transfer Station versus Direct Haul

Transfer stations can reduce the cost of hauling waste to a landfill, especially in heavily congested metropolitan areas. The decision to use a transfer is based on comparing the cost of using the transfer station versus hauling waste directly to the landfill. Transfer station costs include capital costs for the construction of the facility, operation of the facility, purchase and maintenance of the transfer vehicles and landfill tipping fees.

Figure 6-3 - As distances from collection point to landfill increase, it becomes less costly to use transfer stations to haul waste to the landfill

Figure 6-3 illustrated the basic economic model of direct haul versus transfer haul. The model shows that for short distance hauls, it is more economical to direct haul waste to the landfill. This reduces the number of times the waste has to be dumped and loaded. The cost benefits of a transfer station are realized when collection vehicles have to spend considerable amounts of time hauling waste, instead of collecting waste from their routes.

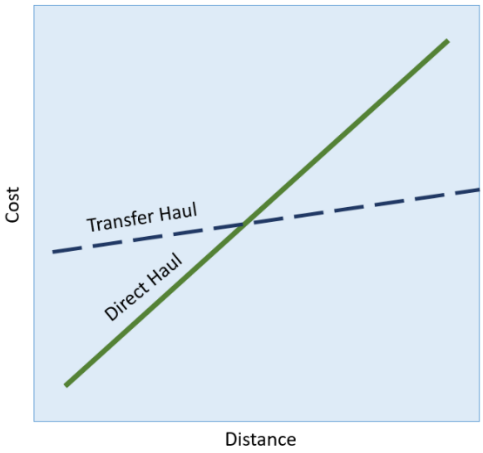
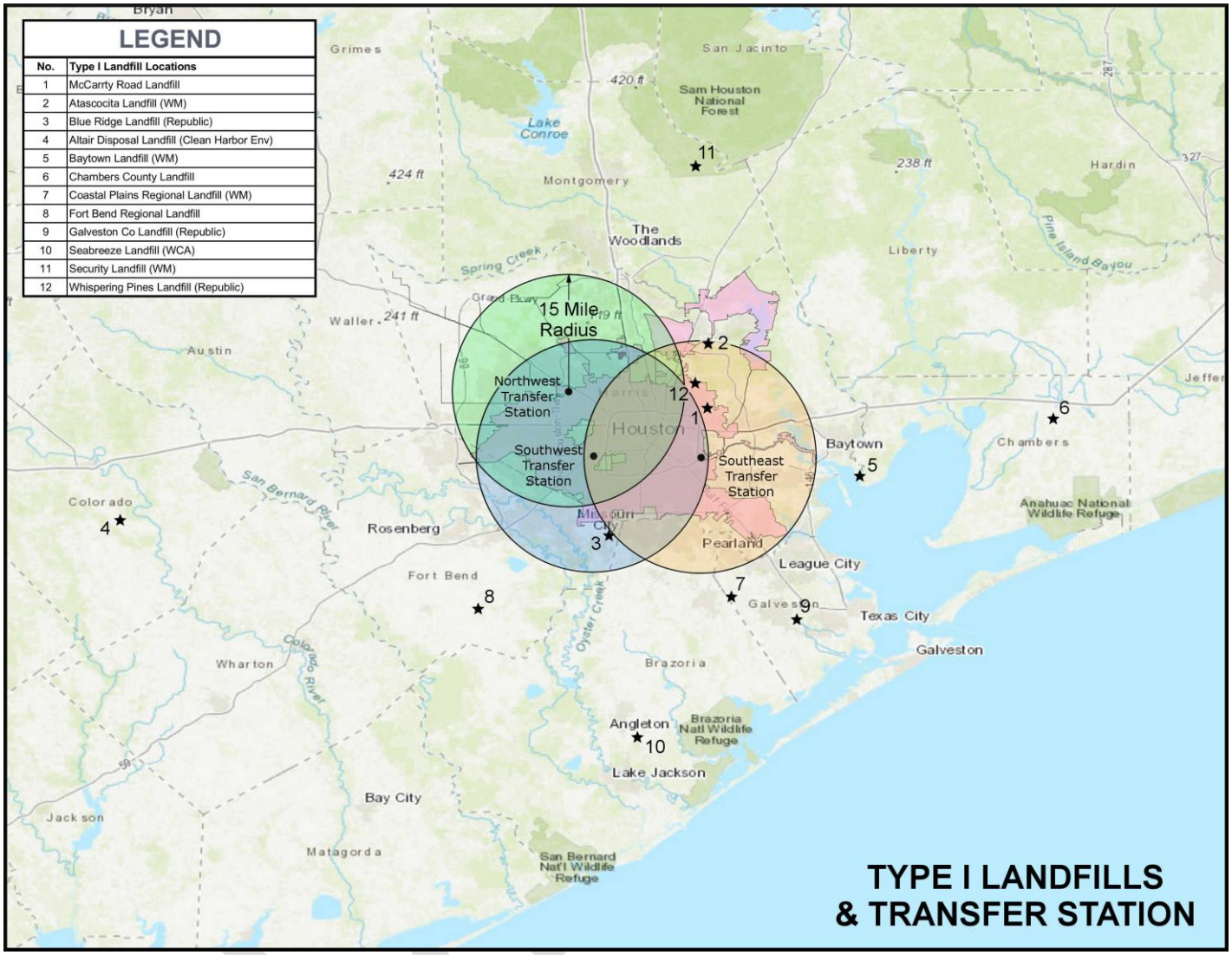


Table 6-3 presents the estimated distance and time required to haul waste from the City's transfer stations to regional landfills. The City uses three MSW landfills for the residential waste it collects: McCarty Road Landfill Atascocita Landfill and Blue Ridge Landfill. Because its current contract will soon expire, the City will be selecting landfills to use for the disposal of waste. The determination of which landfill is selected is largely based on the tipping fees charged at the facility. However, other factors, including the distance and time required to get waste to the site are also factors.

Table 6-3
Distances & Times from Transfer Stations to Landfills

Landfill	Houston SW			Houston NW			Houston SE		
	Miles	Time (1)	Time (2)	Miles	Time (1)	Time (2)	Miles	Time (1)	Time (2)
McCarty Road	21.0	33	27	25.5	34	30	13.5	21	19
Blue Ridge	22.7	34	25	33.4	45	35	20.5	31	27
Atascocita	27.0	37	31	28.7	32	32	28.2	33	31
Altair	69.0	73	73	77.3	72	73	92.7	91	89
Baytown	44.2	57	47	49.4	59	57	34.4	42	34
Chambers Co.	64.3	70	65	69.7	73	71	54.7	57	58
Coastal Plains	37.9	49	48	49.6	61	60	34.5	43	44
Fort Bend Regional	31.8	37	38	45.1	57	48	53.7	60	55
Galveston Co.	41.6	52	47	50.7	61	61	30.2	36	37
Seabreeze Environmental Landfill	55.1	58	59	69.3	78	72	56.7	61	58
Security Recycling and Disposal	37.9	49	63	53.0	63	60	55.1	63	64
Whispering Pines	22.0	30	27	12.7	27	24	35.4	43	41
Time 1 - Oct 31 2:00pm-2:30 pm									
Time 2 - Nov 12 10:00am-10:30am									

Figure 6-3
City Transfer Stations & Type I Landfills



6.4 Environmental Impacts

6.4.1 Environmental Benefits

The major environmental benefits associated with transfer stations are the reduced number of collection vehicles on the roadways. Transport via transfer trailers reduces the number of trucks on the City's roadways reducing traffic congestion and accompanying air emissions.

6.4.2 Environmental Impacts

Transfer stations require approximately two to ten acres of land to efficiently manage the waste stream. More land increases the amount of buffer that can be used to screen the facility. The City's SW Transfer Station is on a 2 acre tract of land; the NW Transfer Station is on 5 acres of land; the SE Transfer Station is on 4.5 acres.

Transfer stations operate in an enclosed building to reduce any environmental issues including blowing litter, odors or impacts on surrounding land uses.

Traffic at the site is one of the major environmental issues associated with transfer stations. A 2,000 ton per day facility can process waste from between 250 and 300 trucks per day (including both collection vehicles and transfer vehicles).

Table 6-4

Environmental Impacts and Mitigation Measures

Environmental Impacts	Mitigation Measures
Land Use **Land use compatibility**	Site facility in either industrial setting or at a solid waste operations center Design facility to incorporate appropriate buffer zones for screening
Air Quality **Air emissions from collection trucks and transfer vehicles.**	Place sites in areas where traffic is conducive to quick turn-around to avoid increased truck air emissions.
Water Quality **Storm water pollution** **Drainage, Floodplains, Wetlands and Waters of the US**	Design facilities for proper management of storm water. Cover facilities that accept MSW so that storm water does not come in contact with MSW, or the storm water is collected and treated. Facilities must not impact surrounding property owners drainage. Sites cannot be located in a floodplain, wetland or waters of the US. Control and treatment of any water used for wash down of facilities.
Traffic and Transportation **Increased traffic from facility use**	Site facilities that have easy access and allow for quick turn-around. Permit application requires demonstration of adequacy of roads and transportation system. Avoid situations where trucks are queued on public roadways. Avoid potential conflicts with rail lines and collection or transfer vehicles.
Nuisances **Blowing litter** **Noise/Odor**	Design facilities so that blowing litter is controlled. Operations plans to include daily litter pick-up of the site. Design of facilities must mitigate noise impacts caused by operating heavy pieces of equipment and employ odor suppression misting systems.
Environmental Justice	Proper management of materials, especially minimal time that materials are stored on site. Include in site design to include adequate ventilation. Take into consideration the location of facilities so that they don't disproportionately impact EJ communities.

6.4.3 Regulatory Issues

Transfer stations require either a TCEQ permit or a registration to operate. TCEQ approval requires that transfer stations address requirements for location restrictions, design, operation and closure. Key points of these issues is presented below.

Location Restrictions

Buffer Zones: Except for facilities that are authorized by a notification, the owner or operator shall maintain a minimum separating distance of 50 feet between feedstock or final product storage areas; solid waste storage, processing,

Floodplains: Municipal solid waste storage and processing facilities shall be located outside of the 100-year floodplain unless the owner or operator can demonstrate that the facility is designed and will operate to prevent washout during a 100-year storm event or obtains a conditional letter of map amendment from the Federal Emergency Management Administration administrator.

Endangered or Threatened Species: A facility and the operation of a facility shall not result in the destruction or adverse modification of the critical habitat of endangered or threatened species, or cause or contribute to the taking of any endangered or threatened species.

Wetlands & Waters of the US: Municipal solid waste storage or processing facilities shall not be located in wetlands.

To meet permit requirements, the facility owner must also demonstrate that the facility is compatible with surrounding land uses and zoning.

Other criteria to be considered for a transfer station include:

- Adequate roadways, access and traffic impacts
- Local land use
- Environmental justice issues
- Drainage impacts
- Adequate site size & buffer areas
- Ability to include other waste management activities such as material recovery, citizen drop-off, others

Design Requirements

Transfer station owners must address the following issues in the facility's design as part of the permitting process.

- Facility access and waste movement
- Ventilation and Odor control
- Storage of grease, oil and sludge
- Noise pollution control
- Controlling surface water drainage
- Wash down capabilities
- Endangered species project
- Flood control protection

Site Operating Plan Requirements

Transfer stations must also include a site operating plan in their permit application. The SOP generally requires the following be addressed.

- Record Keeping
- Facility generated waste
- Contaminated water management
- Fire Protection plan
- Access Control
- Unloading of waste
- Spill prevention and control
- Facility operating hours
- Site Sign
- Nuisance control
- Overloading & Breakdown
- Sanitation

7.0 Landfills

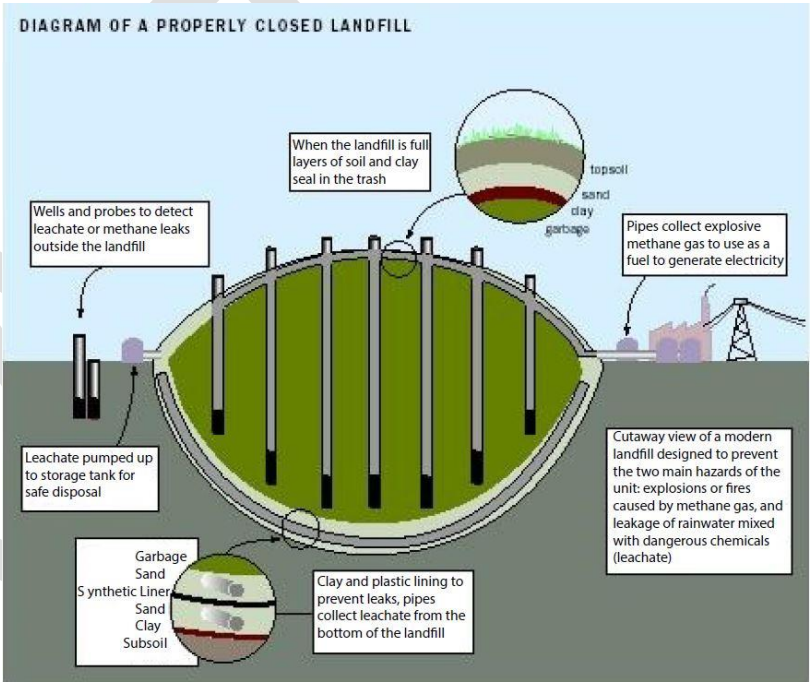
7.1 Definition

The majority of Houston's waste is disposed in one of the 12 municipal solid waste landfills (Type I) or 14 construction / demolition landfills (Type IV) in the H-GAC region. A landfill is an engineered facility for the disposal of waste. MSW landfills are designed to mitigate potential environmental consequences of disposal, including impacts to water quality, air and land resources. This is accomplished through the use of liner and leachate collection systems, operating practices and ultimately closure and post-closure care of the site. The basic components of a landfill are presented below. It should be noted that the requirements for Type I and Type IV landfills are different because of the differences in the types of waste accepted at the sites.

MSW Landfill Requirements

- **Composite liner requirements**— typically includes a flexible membrane (i.e., geo-membrane) overlaying two feet of compacted clay soil lining the bottom and sides of the landfill. They are used to protect groundwater and the underlying soil from leachate releases.
- **Leachate collection and removal systems** sit on top of the composite liner and remove leachate from the landfill for treatment and disposal.
- **Operating practices**—include compacting and covering waste frequently with several inches of soil. These practices help reduce leachate generation and odors, control litter, insects, and rodents, and protect public health. The image shows a cross-section of a municipal solid waste landfill.
- **Groundwater monitoring requirements**—requires testing groundwater wells to determine whether leachate has escaped from the landfill.
- **Landfill gas management** – as waste decomposes, it produces a gas similar to natural gas. This gas must be managed, including collection and processing for potential energy recovery.
- **Closure and post-closure care requirements**—include covering landfills and providing long-term care of closed landfills.
- **Financial assurance**—provides funding for environmental protection during and after landfill closure (i.e., closure and post-closure care).

Figure 7-1 Landfill Design Concept
Source: US Environmental Protection Agency



It takes approximately 10 to 15 years to site, permit and construct a new landfill.

7.2 Regional Landfill Capacity

7.2.1 Current Capacity and Disposal Rates

The City of Houston does not own or operate either a Type I or a Type IV landfill. The City relies primarily on three landfills for the disposal of residential waste collected by City crews. These facilities include McCarty Road, Atascocita and Blue Ridge. With the exception of the Chambers County Landfill, all of the landfills in the region are owned and operated by private entities. Figure 7-2 illustrates the location of Type I and Type IV landfills in the H-GAC region.

Figure 7-2
Type I & Type IV Landfills

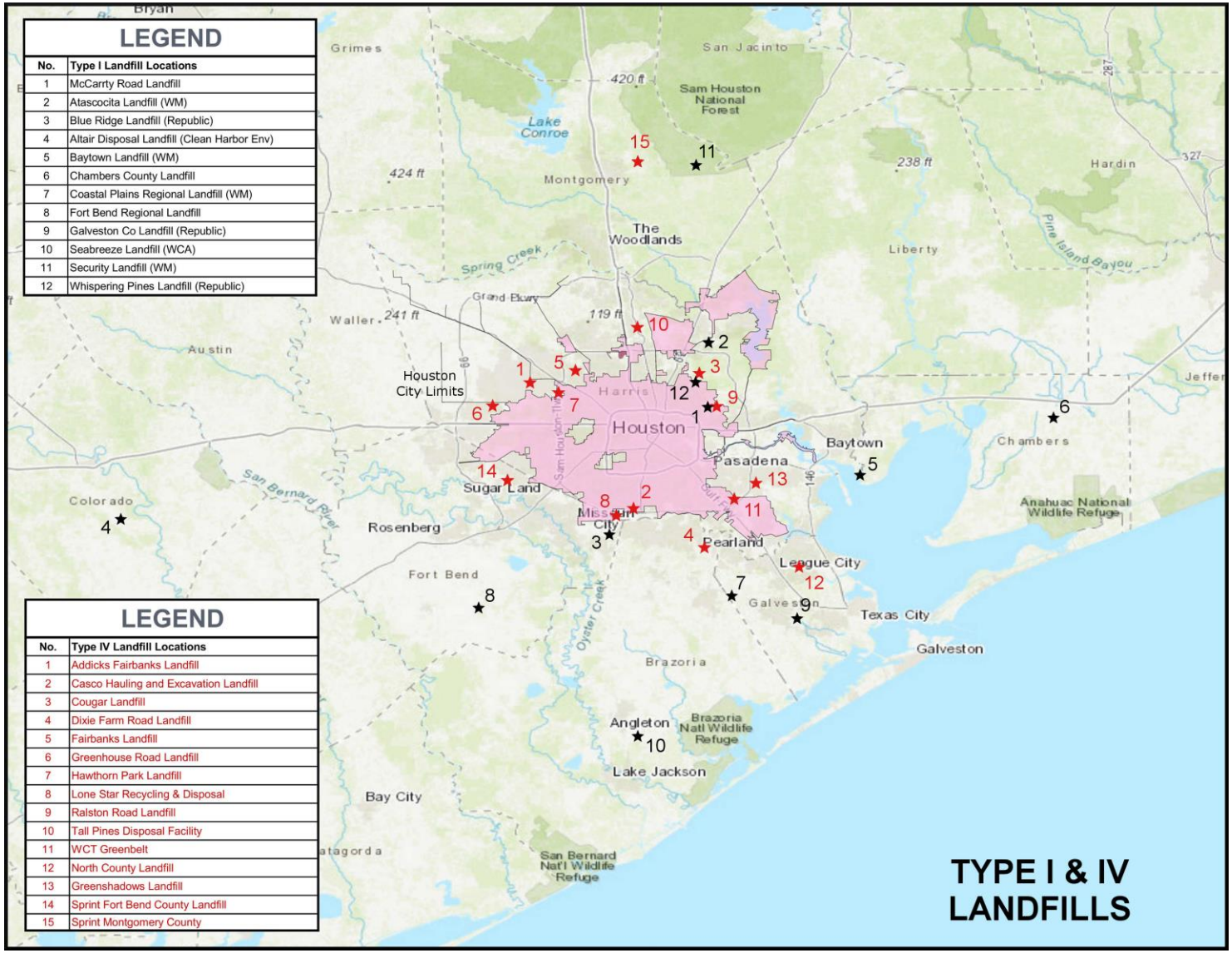


Table 7-1 presents data on landfill locations and remaining capacity. The three landfills that the City relies on for residential waste disposal have a combined capacity of approximately 38 years. The McCarty Road Landfill has 18 years remaining capacity at current rates of disposal; the Atascocita Landfill has remaining capacity of 24 years at current rates of disposal. The Blue Ridge Landfill ha a reported 88 years of capacity at current rates of disposal. On a regional basis, three other landfills (Altair Disposal Services Landfill, Galveston County Landfill and Chambers County Landfill) have 20 years or less remaining capacity. It should be noted that as one landfill reaches its capacity, the waste from that landfill will be directed to another landfill, thereby increasing its annual disposal quantities and accelerating the time this landfill reaches capacity.

Table 7-1
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.

*Does not include Conroe Industrial Non-hazardous Waste Landfill with a capacity of 5.7 million tons and accepted 49,300 tons in 2017

Table 7-2 presents data on historic waste disposal quantities in the H-GAC region. A key assumption used by the TCEQ in determining landfill life is that disposal rates remain constant over the life of the facility. However, the continued growth in population and economic activity has resulted in increased annual disposal quantities in the Region. In 2010, the H-GAC region disposed of 5.93 million tons of waste in Type I landfills. By 2017, this quantity increased to 6.97 million tons, a 17.5% increase. Over the same period of time, the population of the H-GAC region increased from 6.1 million in 2010 to 6.9 million in 2017, a 13% increase (Sources: Texas Demographic Center & Texas Water Development Board). Therefore, on a regional basis, waste disposal per capita increased from 5.3 pounds per capita per day (pcd) in 2010 to 5.5 pcd in 2017. The impacts of anticipated growth in the region is discussed later in this report.

Table 7-2 also shows the distribution of market share for these landfills. The three landfills that the City relies on for its disposal accounted for 55% of the waste disposed in the Region. The McCarty Road Landfill owned by Republic Services decreased from 30% of the region's market share in 2010 to 21% in 2017. The Blue Ridge Landfill, also owned by Republic Services increased from 9% in 2010 to 16% in 2017. And other than the increase in Fort Bend Regional Landfill's market share going from 10% to 15%, there have not been major shifts in waste flow over the period 2010 to 2017.

Table 7-2
Type I Landfills – Annual Throughput

Historical Throughput	2010	2015	2016	2017	2018	2010% Market Share	2018% Market Share
McCarty Road	1,793,086	1,426,088	1,116,310	1,364,814	1,619,174	30%	23%
Atascocita	939,804	1,242,928	1,253,621	1,209,440	1,248,556	16%	17%
Blue Ridge	516,629	1,060,899	1,176,325	1,244,016	1,115,761	9%	16%
Subtotal	**3,249,519**	**3,729,915**	**3,546,256**	**3,818,270**	**3,983,491**	**55%**	**56%**
Altair Disposal Services Landfill	37,786	34,708	54,897	48,629	48,764	1%	1%
Baytown Landfill	343,409	314,510	289,103	315,000	259,473	6%	4%
Chambers County	30,753	22,690	22,901	26,091	41,960	1%	1%
Coastal Plains Recycling and Disposal Facility	523,005	421,864	456,613	521,025	455,410	9%	6%
Fort Bend Regional Landfill	567,146	1,012,929	1,076,624	1,080,773	1,282,304	10%	18%
Galveston County Landfill	258,025	403,513	357,493	393,882	154,927	4%	2%
Seabreeze Environmental Landfill	546,014	487,123	523,376	686,618	571,974	9%	8%
Security Landfill RDF	372,515	408,828	447,184	364,400	315,401	6%	4%
Whispering Pines Landfill	48	30	20	24	41,248	0%	0%
Subtotal	**2,678,701**	**3,106,195**	**3,228,211**	**3,436,442**	**3,171,461**	**45%**	**44%**
Total	**5,928,220**	**6,836,110**	**6,774,467**	**7,254,712**	**7,154,952**	**100%**	**100%**

7.2.2 Impacts of Growth

Table 7-2 shows that the anticipated remaining capacity of the facilities in the region is approximately 37 years. This assumes that annual waste quantities do not increase above the 2017 rate. However, as demonstrated between 2010 to 2017, waste quantities have continued to increase, even at a rate higher than the increases in population. For the planning period, 2018 -2038, population in the H-GAC region is anticipated to increase from 6.9 million to over 8.8 million. Assuming no increase in waste disposal rates per capita, municipal solid waste quantities will increase from 6.9 million tons per year ("tpy") to 10.9 million tons per year. The amount of waste disposed of cumulatively over the planning period is anticipated to be 190 million tons between 2019 – 2038.

Current regional Type I disposal capacity is 267 million tons. By 2038, 71% of the current disposal capacity will be filled. At the end of the planning period (2038), there is projected to be an estimated 92 million tons of remaining capacity if there are no expansions or new sites permitted (Figure 7-3).

This also does not take into consideration the potential that Type IV landfill capacity will have reached capacity and the waste that would normally go to Type IV landfills may end up being directed to a Type I landfill. It also does not take into consideration other factors including changes in regional economic activity, storm events and the impacts of future source reduction and recycling programs. These impacts will be discussed in future reports prepared as part of the planning process.

Figure 7-4 and Figure 7-5 illustrates the remaining capacity of each of the landfills. If there are no major changes in capacity, and waste disposal quantities continue to increase at projected rates, one landfill will have reached capacity and six landfills, including McCarty Road will have ten years or less of remaining capacity. By the year 2038, five landfills, including McCarty Road and Atascocita will have reached capacity. Four key factors are uncertain at this time that will affect remaining capacity at any specific landfill.

1) Whether any of the landfills are able to expand their current facility
2) If a landfill in the region reaches capacity, where the flow of that waste will go and how will it impact a specific landfill's remaining capacity
3) What factors could impact the waste disposal rate in a way that would reduce annual disposal quantities
4) The region's Type IV landfills have less capacity than the Type I landfills. It is possible that as Type IV options are reduced, some of the waste that currently goes to Type I landfills will ultimately go to Type I Landfills.

Figure 7-3
H-GAC Region - Remaining Capacity

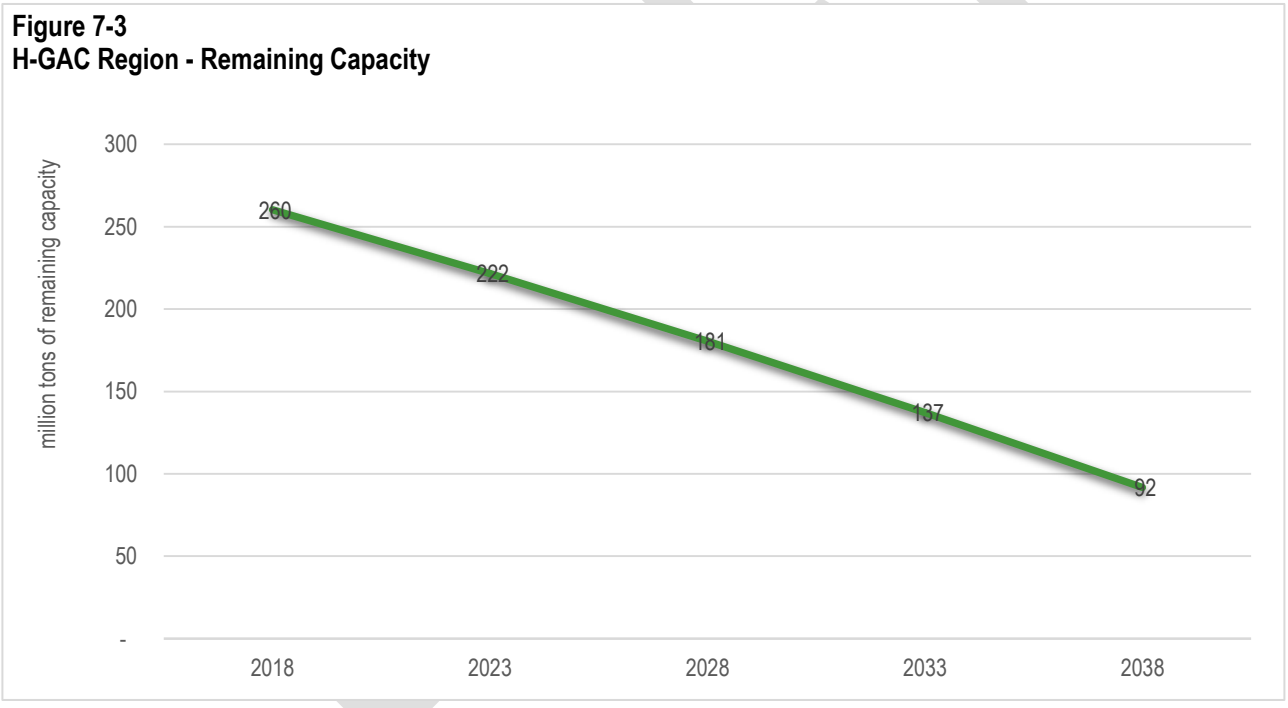


Figure 7-4
Projected Remaining Years for Type I Landfills in 2030

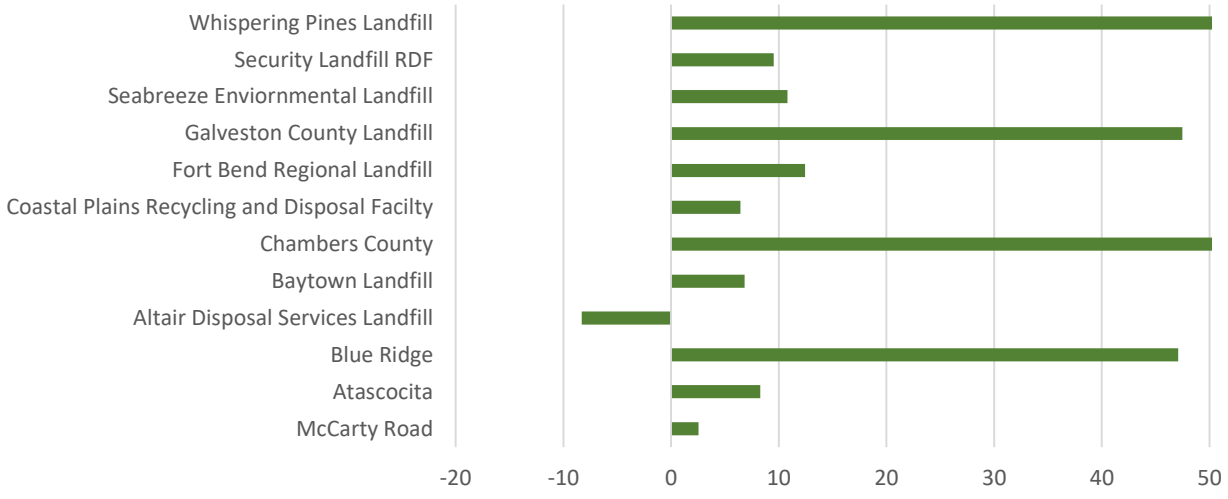
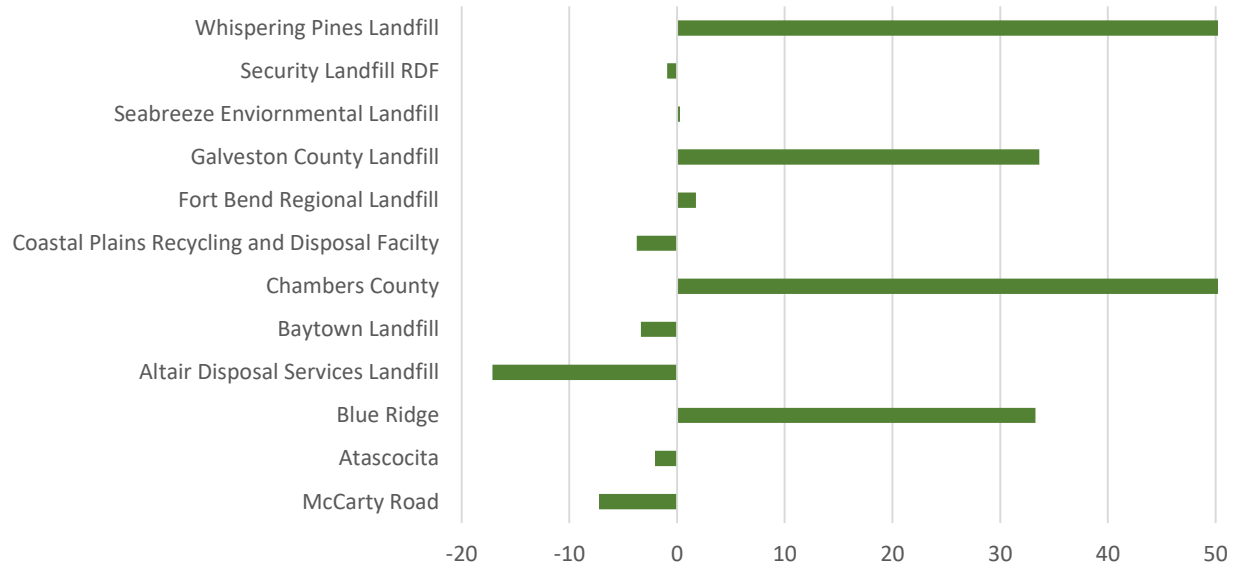


Figure 7-5
Projected Remaining Years for Type I Landfills in 2040



7.2.3 Potential for Expansions

To meet future disposal needs, it is possible that one or more of the region's landfills could be expanded. Landfill expansions can either be horizontal expansions where more land is added to the permitted area, or vertical expansions where the permit boundaries remain the same, but the height of the landfill is increased. To expand a landfill's capacity requires a permit amendment from the TCEQ. The permit amendment process is identical to the process for securing a new permit for a landfill, including requirements for public meetings and the potential for a public hearing. In the H-GAC region, the permitted acreage of landfills ranges from 157 acres to 1149 acres. The permitted net elevation ranges from 103' to 274'.

The ability to expand a landfill depends on a range of issues, including the following.

- Local land use around the landfill
- Transportation network
- Buffer areas
- Site drainage
- Site geometry
- Current liner and leachate design

Currently, there is one Type I permit amendments filed with the TCEQ for a permit expansion.

Seabreeze Landfill Expansion

In January 2019, the Seabreeze Landfill filed a permit amendment to modify their facility to combine areas 3 & 4 into a single disposal unit and to increase the elevation to 222' from its current 148. The permit boundary will remain the same. An additional 38 acres are proposed to be added to the landfill footprint. The permitted footprint of phase 4 will be moved to increase the buffer area. The amendment will add approximately 14.5 million cubic yards of capacity.

7.2.4 Sources of Waste – a Regional System

The landfills in the H-GAC region provide services across county boundaries. Houston's landfill infrastructure is truly a regional system. ***Each of the 12 Type I landfills located in the region reported that they accepted waste from Harris County.***

Landfills located within the City limits includes the McCarty Road Landfill and the Whispering Pines Landfill. The Whispering Pines Landfill only reported accepting 42 tons in 2017. The McCarty Road Landfill, which accepted 1.2 million tons of waste in 2017, reported waste from five counties, including Harris, Walker, Fort Bend, Montgomery and Brazoria. These are both privately owned and operated facilities and individual hauling companies make business decisions regarding which landfill to use based on proximity to the collection point and landfill tipping fees. There are no local restrictions that prevent waste from being imported into these landfills.

7.3 Waste Composition in Type I Landfills

Table 7-3 provides a summary of the types of waste that are accepted at each of the landfills. Municipal solid waste is the primary classification of materials accepted. The other major waste types accepted include: construction / demolition waste (6.9%), sludge (6.6%), Class 2 & 3 NHIW (6.2%), contaminated soil (3.4%) and other materials.

Figure 7 -6
Types of Material Disposed in Type I Landfills

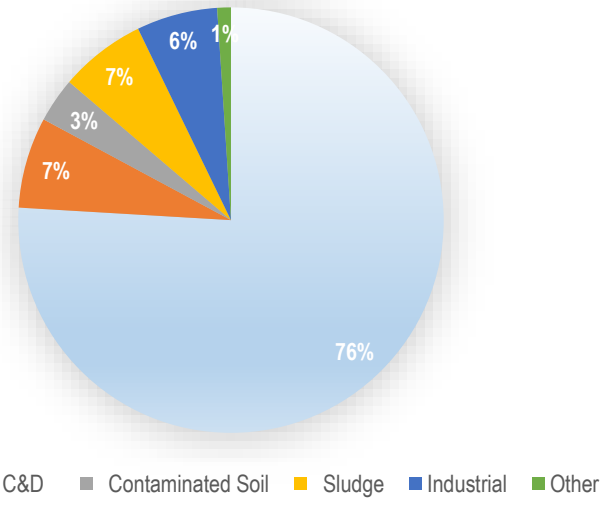


Table 7-3
Composition of Waste Accepted at Type I Landfills

Type of Waste / Year	2010	2017
MSW	77.8%	75.9%
Brush	0.0%	0.2%
Construction & demolition	4.9%	6.9%
Tires	0.0%	0.0%
Contaminated Soil	1.2%	3.4%
Medical Waste	0.0%	0.1%
Dead Animals / Slaughter house	0.0%	0.0%
Regulated asbestos containing materials	0.0%	0.1%
Non regulated asbestos containing materials	1.4%	0.2%
Sludge	8.4%	6.6%
Grease Trap	0.0%	0.0%
Grit Trap	0.2%	0.0%
Non-hazardous industrial wastes	5.5%	6.2%
Incinerator Ash	0.0%	0.0%
Other	0.4%	0.3%
Total	100%	100%

7.4 Type IV Landfills

The H-GAC region has a total of 15 operating Type IV landfills. These landfills are designed to only accept construction / demolition debris and brush. Because they do not accept putrescible waste, the liner and final cover requirements for Type IV landfills are less stringent than the requirements for Type I landfills.

The H-GAC region is unique to Texas in its number of Type IV facilities. Approximately 21% of the total waste stream goes to these facilities compared to the NCTCOG region (Dallas/Fort Worth) where only 7% of the waste stream goes to Type IV facilities. In the NCTCOG region, there are only 3 permitted Type IV facilities.

Table 7-4 lists the Type IV landfills in the H-GAC Region.

The regional capacity of Type IV landfills is 40 million tons and at current rates of disposal at 1.8 million tons per, there are 22 years remaining capacity. Of the 40 million tons of regional capacity, 28 million tons are located within Houston City boundaries, or 70%. Houston Type IV landfills disposed 1.4 million tons in 2017, or 77% of the total amount disposed in regional Type IV landfills. At current rates of disposal, Houston Type IV landfills have an estimated 20 years of remaining capacity.

Figure 7-7
Disposal Facilities Used in H-GAC Region

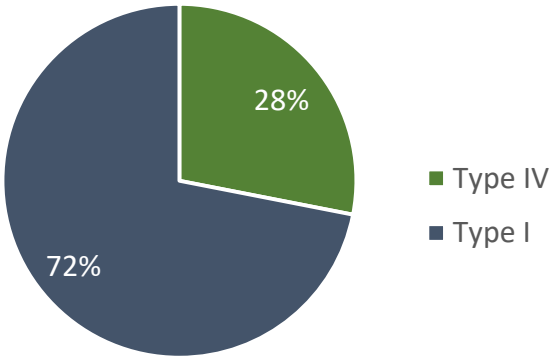


Table 7-4
Type IV Landfill Capacity

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

Table 7-5 presents Type IV landfill disposal quantities for 2010, 2015, 2016 and 2017. As with the case for Type I MSW landfills, the amounts of waste disposed in Type IV landfills has continued to increase from 2010 to present. The 2010 C&D per capita disposal rate was 1.15 pcd; this rate increased to 1.46 pcd in 2018, a 27% increase in pcd disposal. Based on landfill reports to TCEQ, C&D disposal quantities for 2018 increased by approximately 700,000 tons in one year. This is largely due to the impacts of Hurricane Harvey, which occurred in late 2017, but for reporting purposes is shown in 2018. TCEQ reporting periods are Aug-Sept.

Table 7-5
Historic Type IV Disposal Rates

Name	2010	2015	2016	2017	2018
Addicks Fairbanks Landfill	45,536	100,600	129,328	56,929	32,953
Casco Hauling and Excavation Landfill	30,255	64,255	83,589	97,147	105,009
Cougar Landfill	114,201	16	16	16	1,423
Dixie Farm Road Landfill	34,574	42,092	48,961	48,519	123,599
Fairbanks Landfill	4	16	53,813	176,600	349,005
Greenhouse Road Landfill	54,066	107,114	123,931	124,622	171,287
Greenshadows Landfill	91,443	108,350	110,199	101,900	132,147
Hawthorn Park Landfill	109,034	201,177	151,350	16	12
Lone Star Recycling & Disposal	102,449	249,208	323,610	303,486	431,611
North County Landfill	12,304	30	24	20	51,442
Ralston Road Landfill	65,623	119,002	114,814	127,157	135,654
Sprint Fort Bend County Landfill	240,543	333,444	339,836	307,236	336,377
Sprint Montgomery County				8,887	255,269
Tall Pines Disposal Facility	223,881	338,122	316,931	344,369	425,407
WCT Greenbelt	162,006	144,883	135,280	155,381	240,888
Total	1,285,919	1,808,309	1,931,682	1,852,285	2,792,082

7.4.1 Impacts of Growth

Figure 7-8 illustrates remaining Type IV capacity to the year 2038. Regional Type IV landfill capacity is anticipated to reach capacity by approximately 2034. Once these sites reach capacity, waste will have to be disposed of at remaining Type I landfills if no additional Type IV capacity is permitted. It should be noted, as discussed below, that the majority of waste generated from Hurricane Harvey went to Type IV landfills. Future storm events will significantly impact future Type IV disposal capacity.

Figure 7-9 and Figure 7-10 illustrate the number of Type IV landfills that will remain in operation over the planning period if there are no major changes in waste flows. The figure shows that by 2028, 5 of the 14 Type IV landfills will have exceeded capacity. In 2038, only 4 of the 14 will have remaining capacity, unless there is additional capacity permitted prior to these years.

Figure 7-8
Type IV Remaining Capacity (tons)

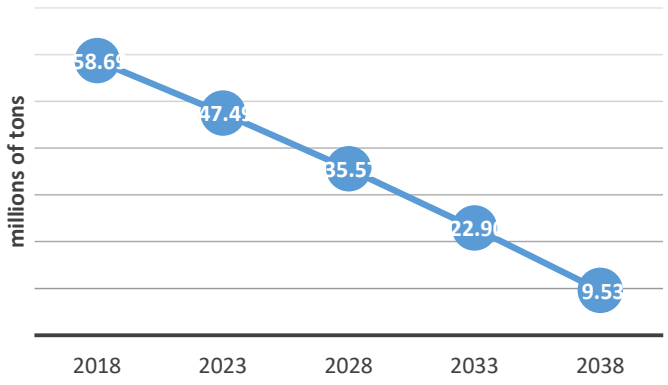


Figure 7-9
Number of Years Remaining Capacity (2030)

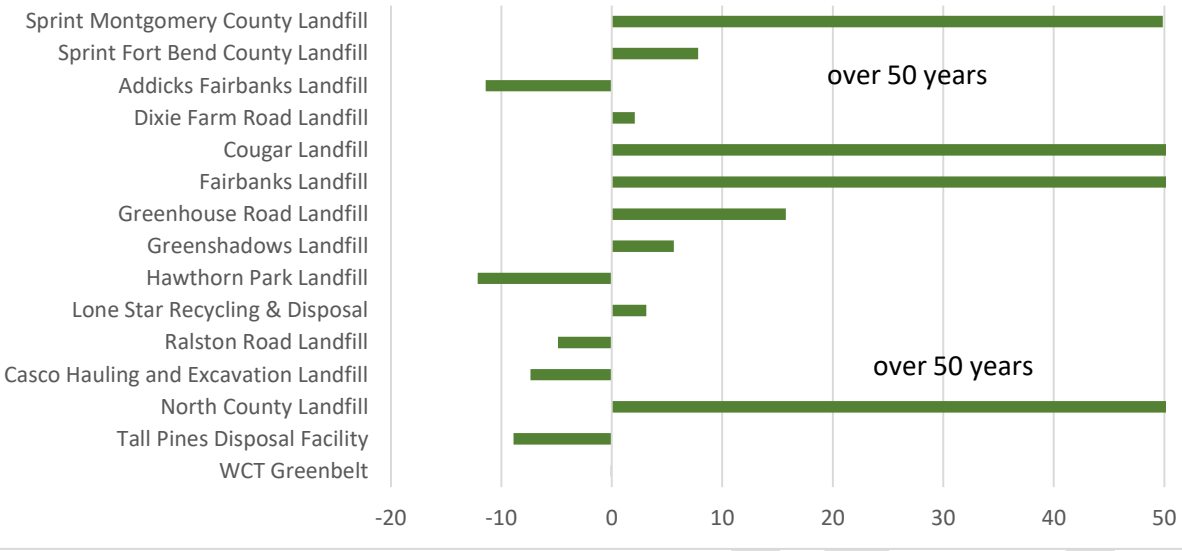
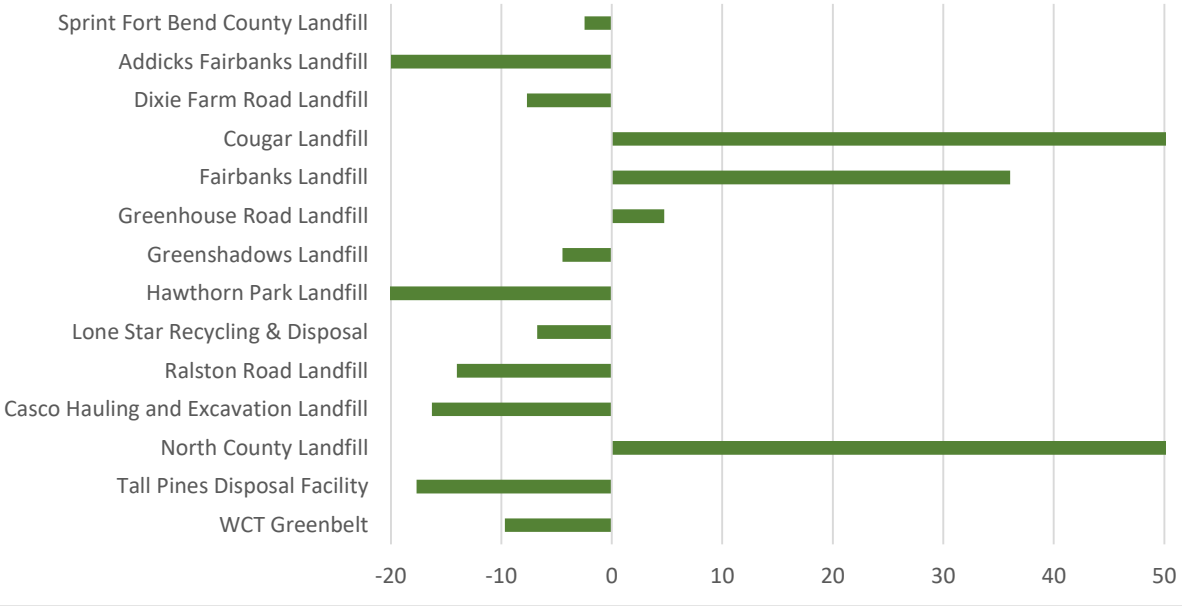


Figure 7-10
Number of Years Remaining Capacity (2040)



Hurricane Harvey Impacts on Landfill Capacity

Hurricane Harvey impacted the Houston area between August 23, 2017 and September 15, 2017. More than 19 trillion gallons of rainwater fell on parts of Texas, causing widespread, catastrophic flooding. Nearly 80,000 homes had at least 18 inches of floodwater, 23,000 of those with more than 5 feet. The Houston area experienced the largest amount of rainwater ever recorded in the continental United States from a single storm (51.88 inches). Twenty-four hospitals were evacuated, 61 communities lost drinking water capability, 23 ports were closed and 781 roads were impassable. Nearly 780,000 Texans evacuated their homes. In the days after the storm, more than 42,000 Texans were housed temporarily in 692 shelters. Local, state and federal first responders rescued 122,331 people and 5,234 pets. Source: FEMA

The waste that was generated from the event was taken either directly to one of the areas regional Type I or Type IV landfills, or to one of the many temporary disposal sites that are located around the region. A review of TCEQ landfill data shows that the hurricane increased disposal quantities by approximately 700,000 tons; most of this impact occurred during the period of September through November. According to TCEQ records, approximately 80% of the increased waste quantities occurred during this time frame. For Type IV landfills, the increase was more widely distributed through the period September through February.

7.4.2 Landfill Expansions

Similar to Type I landfills, Type IV landfills can potentially be expanded either horizontally or vertically. The same issues related to land use, transportation, site geometry, drainage, liner and final cover design apply to Type IV expansions. Also, the same rules related to the permitting process also apply to Type IV expansions.

Greenhouse Landfill Permit Amendment

Currently, the Greenhouse Road Type IV landfill is seeking a permit expansion from the TCEQ. This expansion is designed to add 9 million cubic yards of airspace through both a lateral expansion of 31.85 acres and a vertical expansion of 19.7 feet. The expansion is projected to add approximately 23 years to the facility's life.

Tall Pines Landfill Expansion

The Tall Pines Landfill Expansion permit amendment was originally filed in 2016. The amendment would increase the current permit boundary from 64.5 acres to 192.8 acres. The permit would authorize the disposal area to be 150.7 acres. It also proposes to increase the maximum elevation from 175 feet to 244.5 feet. The amendment would increase capacity from 11.8 million cubic yards to 26.9 million cubic yards.

Landfill Gas Recovery

As waste decomposes, it produces a low to medium Btu gas. Pipeline quality natural gas has a Btu value of approximately 1100 Btu per cubic foot. Landfill gas, primarily methane (50-55%) and carbon dioxide (40%-60%) (Source: LFG Energy Project Development Handbook, EPA). Methane is a potent greenhouse gas which is 28 to 36 times more effective than carbon dioxide at trapping heat in the atmosphere over a 100-year period (Source: ibid). Landfill gas, which is a low-Btu gas, is often recovered and used for either electricity generation or to be upgraded to meet pipeline quality standards. Table 7-6 presents a summary of H-GAC regional landfills that recover gas for either power generation or gas sales. In total, 2671 million cubic feet of gas were distributed off-site and 89.7 million kWh of electricity were generated and sold.

Figure 7-11
Landfill Gas to Energy Options (Source LFG Energy Project Development Handbook)

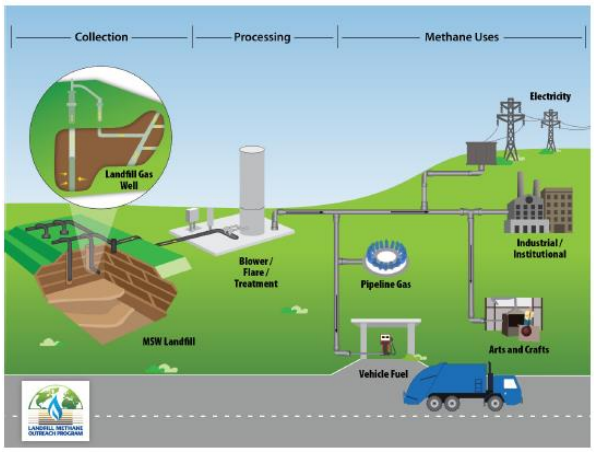


Table 7-6
Energy Recovery from LFG Projects (Source TCEQ MSW Annual Report)

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

7.5 Environmental & Regulatory Issues

7.5.1 Environmental Benefits

Landfill disposal represents the least preferred method of municipal solid waste management; however, it should be recognized that because of the design and operating standards associated with these facilities, they do provide a more responsible alternative to open dumps of the past. Proper management of landfills reduces the environmental impacts to water and air quality and provide a safer disposal method than open dumping.

7.5.2 Environmental Impacts & Mitigation

Environmental Impacts	Mitigation Measures
Land Use Land use compatibility	Site facility in an area that meets TCEQ location restrictions. It should also be noted that 3 counties have their own landfill site selection requirements. Design facility to incorporate appropriate buffer zones. Utilize screening around the site to mitigate visual impacts.
Air Quality Methane generation caused by the decomposition of waste. Potential odors from facilities if materials not properly managed Air emissions from collection trucks and transfer vehicles.	Implement a landfill gas management plan that may include gas collection system and potential conversion to useful energy. Reduce odors through daily cover. Site facilities at locations where access is good. Implement an odor control plan.
Water Quality Storm water pollution Drainage, Floodplains, Wetlands and Waters of the US Groundwater impacts	Design facilities for proper management of storm water. Provide for adequate storm water detention. Sites must be designed to not impact drainage of off-site property owners. Sites cannot be located in a floodplain, wetland or waters of the US. Facility designs must include a liner and cover system that reduces the potential for leachate (water that comes in contact with waste) affecting groundwater. For municipal solid waste facilities, this liner system must also incorporate a leachate collection system that includes a series of pipes and pumps to collect the leachate. The landfill design also incorporates a final cover that is similar to the liner system design. Its purpose is to reduce the potential for water seeping through the landfill once it has closed. Landfills must also perform periodic groundwater monitoring to detect potential groundwater impacts early. Any impacts to groundwater must be mitigated by the landfill operator.
Traffic and Transportation Increased traffic from facility use	Site facilities that have easy access and allow for quick turn-around. Permit application requires demonstration of adequacy of roads and transportation system.
Nuisances Blowing litter Noise Birds	Design facilities so that blowing litter is controlled through operations, screening and fences. Operations plans to include daily litter pick-up of the site. Design of facilities must mitigate noise impacts caused by operating heavy pieces of equipment. Limit the amount of exposed trash in daily operations and implement a bird control plan.
Environmental Justice	Take into consideration the location of facilities so that they don't disproportionately impact EJ communities.

7.5.3 Regulatory Issues

Location Restrictions for Landfills

MSW landfills are regulated federally under Subtitle D of the Resource Conservation and Recovery Act (Subtitle D). The regulations under Subtitle D established guidelines for the location, construction and operation, closure and post-closure care of MSW landfills. These rules have been adopted by the State of Texas and are generally defined in Texas Administrative Code (TAC) 30. 330. Subchapter M defines location restrictions for MSW landfills and these have been summarized here to provide an understanding of factors affecting site selection of new landfills and to extend available disposal capacity.

Easements and Buffer Zones

No solid waste unloading, storage, disposal, or processing operations shall occur within any easement, buffer zone, or right-of-way that crosses the facility. No solid waste disposal shall occur within 25 feet of the center line of any utility line or pipeline easement.

Buffer Zones

For any new Type I landfill, the owner or operator shall establish and maintain a 125-foot buffer zone.

Airport Safety

Must not be located within 10,000 feet of any airport runway end used by turbojet aircraft or within 5,000 feet of any airport runway end used by only piston-type aircraft shall demonstrate that the units are designed and operated so that the municipal solid waste landfill unit does not pose a bird hazard to aircraft.

Floodplains

No solid waste disposal operations shall be permitted in areas that are located in a 100-year floodway.

Endangered or Threatened Species

No facility and the operation of a facility shall not result in the destruction or adverse modification of the critical habitat of endangered or threatened species, or cause or contribute to the taking of any endangered or threatened species.

Wetlands

Municipal solid waste storage or processing facilities shall not be located in wetlands.

Fault Areas

New municipal solid waste landfill units and lateral expansions shall not be located within 200 feet of a fault that has had displacement in Holocene time unless the owner or operator demonstrates to the executive director that an alternative.

Seismic Impact Zones

For the purposes of this section, a seismic impact zone is defined as an area with a 10% or greater probability that the maximum horizontal acceleration in lithified earth material, expressed as a percentage of the earth's gravitational pull, will exceed 0.10g in 250 years.

Unstable Areas

For the purposes of this section, an unstable area is defined to be a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of a landfill's structural components responsible for preventing releases from the landfill; unstable areas can include poor foundation conditions.

In addition to federal and state regulations, local governments have the ability to establish local guidelines for landfill location requirements. In the H-GAC region, the counties of Brazoria, Chambers and Fort Bend have such ordinances. These local ordinances provide specific guidelines regarding where a landfill can and cannot be located within those county's jurisdictions.

The TCEQ location restrictions and local ordinances define locations where landfill locations are restricted. Other criteria that are generally considered in selecting a site include the following.

Surrounding Land Use

Proximity to nearby residential areas, schools, hospitals, cemeteries and historic sites.

Transportation Access

Roadway access is sufficient to manage solid waste vehicle traffic. The transportation routes should not impact sensitive land uses.

Proximity to Waste Generation Centroid

The landfill should be located in proximity to the major sources of waste generation, so as to reduce the time required to haul waste to the landfill. If distances become too great, it may be necessary to construct and operate a transfer station. A transfer station is a facility where waste from collection vehicles is transferred to larger haul trucks, thereby reducing haul costs and traffic impacts.

Large Tracts Owned by Single Entity

The availability of large tracts owned by only a few landowners makes property acquisition much less complex.

Environmental Site Conditions

There are no hazardous waste sites associated with the site.

Favorable Geology

The site must meet the geologic requirements of TCEQ requirements. The site should also be located in a geologic formation that allows for construction of the liner system and will not present major difficulties during construction.

Public Acceptance

The selection of a new landfill site is likely to generate significant public opposition from nearby landowners. This opposition can be tempered with a selection process that is transparent and takes into consideration impacts of surrounding landowners. The use of local citizen advisory committees have been used in the past to provide the transparency required. Design considerations, such as the use of visual screening berms and local site aesthetics can be used to reduce public opposition. The City will have to evaluate each site based on the number of local residences near the permit and anticipated growth patterns to evaluate the level of opposition to the landfill.

Long-term Capacity

Will the property allow for the design of a landfill that meets the City's long-term solid waste management needs. "Long-term" for the purpose of this analysis is 50 years.

Opportunities for other Municipal Operations

The ownership of a large tract of land by the City can open up potential uses for other city needs.

Design & Operating Requirements

The following provides a summary of both design requirements and operating requirements for landfills. The permitting process requires a comprehensive analysis of existing site conditions and description of how the applicant will address key design and operating requirements. In addition to addressing the requirements below, the applicant must demonstrate it meets the location restrictions defined above and that it has the financial resources to close and maintain post-closure care of the site for a minimum of 30 years. The process for securing a permit requires the application be reviewed by TCEQ and then made available to the public for review, comment and possibly a public hearing. The entire permitting process can take between 3 to 5 years to complete.

Design Requirements

- Liner System
- Closure Plan & Financial Assurance

- Leachate Collection System
- Landfill Gas Management System
- Drainage Plan
- 30 Year Post-Closure Care Plan & Financial Assurance
- Access & Site Infrastructure

Site Operating Plan

- Record Keeping & Reporting
- Fire Protection
- Access Control
- Unloading of Waste
- Facility Operating Hours
- Site Sign
- Control of Windblown Solid Waste & Litter
- Easements & Buffer Zones
- Landfill Markers & Benchmarks
- Materials Along the Route to the Site
- Disposal of Large Items
- Odor Management Plan
- Disease Vector Control
- Site Access Roads
- Salvaging & Scavenging
- Endangered Species Protection
- Landfill Gas Control
- Oil, Gas and Water Wells
- Compaction
- Landfill Cover
- Ponded Water
- Waste in Enclosed containers or vehicles accepted at Type IV Landfills
- Disposal of Special Wastes
- Disposal of Industrial Wastes
- Visual Screening of Deposited Waste
- Leachate and Gas Condensate Recirculation

8.0 Other Waste Facilities

8.1 Grease and Grit Trap Waste Facilities

TCEQ requires that grease traps are installed for any facility (including municipal, state, or federal) whose business activity is the source of cooking grease or oil in sewage—such as restaurants, cafeterias, and food-processing plants—and is located in an area that has adopted a plumbing code. Plumbing codes do not allow discharges of grease into the sewers because discharges block the lines. Grit traps are required for permanent car washes and wash bays located in an area that has adopted a plumbing code. Grit cannot be discharged into a sewer because it blocks pipelines and may damage city pumps.

Grease trap waste is material collected in and from a grease interceptor in the sanitary sewer service line of a commercial, institutional, or industrial food service or processing establishment, including the solids resulting from dewatering processes. Grit trap waste Grit trap waste includes waste from interceptors placed in the drains prior to entering the sewer system at maintenance and repair shops, automobile service stations, car washes, laundries, and other similar establishments.

Most grease and grit trap wastes are either disposed of via direct land application if the material is a liquid or by landfilling if it meets landfill waste requirements, i.e. solid enough to pass a paint filter test. Waste water treatment plants are increasingly hesitant to accept these materials as they result in operational difficulties. Land application also causes potential problems for vegetation if grease coats the plants in the fields. Because of this, grease and grit trap wastes are often injected or incorporated into the soil. (Source: *https://www.biocycle.net/2006/08/20/composting-grease-trap-wastes/)*

Only transporters registered with the TCEQ can legally pump and transport grease-trap waste. As reported in the TCEQ's MSW Annual Summary Report, there were five grease and grit trap processing facilities operating in the H-GAC region, all of them located in Houston. These facilities accepted a total of 597,000 tons in 2017.

Table 8-1
H-GAC Regional Grease and Grit Trap Wastes

Facility	County	2017 Tons
Liquid Environmental Solutions of Texas Houston Facility	Harris	282,537
Southwaste Disposal Hurst Facility	Harris	131,931
B R Perrin Plant	Harris	27,909
Big K Environmental Facility	Harris	53,459
Wastewater Residuals Management	Harris	102,086
Total		**597,922**

8.2 Tire facilities

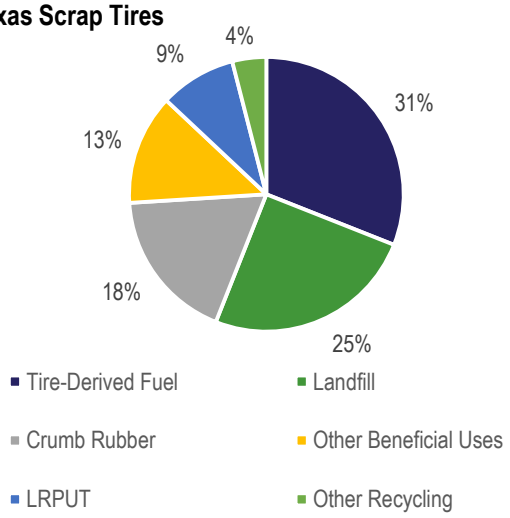
It is estimated that there are over 3.5 million vehicles registered in Harris County alone (Source TxDOT). That is equal to over 15 million tires that will eventually have to be replaced. According to the TCEQ's Annual Scrap Tire Report 2017, over 43.7 million scrap tires were managed state-wide. The main use or disposition avenues in Texas for whole used and scrap tires, include the following broad categories: tire-derived fuel source (TDF), landfill disposal, crumb rubber production, other beneficial use, use in land reclamation projects (Land Reclamation Project – Used Tires), and other recycling. The breakdown of the different types of end-uses and their corresponding number of scrap tire units utilized is presented in Figure 8-1.

At the beginning of May (2014), Genan plans to start up full production at what it has declared the world's largest tire recycling plant. This new plant, which sits on 40 acres of land, is located at 18038 Beaumont Highway in northeast Houston.

Constructed over the last two years with an investment of $140 million, the Houston operation will have the capability to recycle about 10 million tires a year — about a third of all the used tires in Texas — and it will employ 60 workers.

The Houston area is home to some of the largest unauthorized tire disposal sites. These are sites identified by the TCEQ as new, generally small, unauthorized scrap tire piles that are reported to the TCEQ; and legacy, generally large, well-documented scrap tire piles that may have been registered at one time. The TCEQ does have a program to clean-up these sites, but it lacks sufficient funds to adequately clean-up all known tire sites. There are no specific data on the quantities of scrap tires discarded in Houston. According to the City's Solid Waste Management Department, the City spends $1 million annually to collect and dispose of illegally dumped tires.

Figure 8-1
Texas Scrap Tires



In addition to scrap tires being a waste disposal and litter problem, they also present a special health concern as they provide ideal breeding conditions for mosquitos. The rise in mosquito related health issues includes Zika, Encephalitis and West Nile Virus. Scrap tire piles also present a fire hazard if not properly managed.

City of Houston Facilities

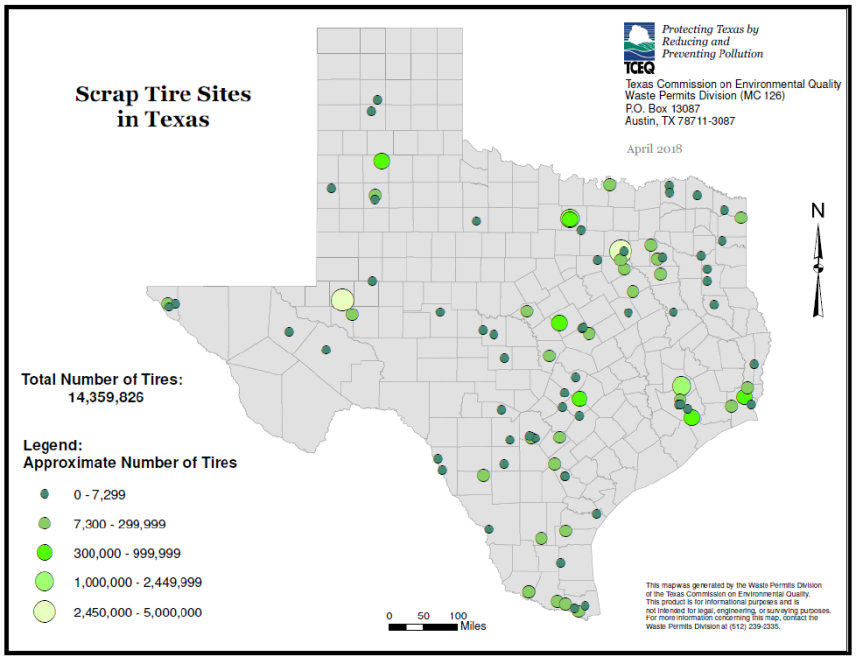
Depositories & Environmental Service Centers

The City of Houston's Depositories and Environmental Service Centers do accept waste tires. Residents are limited to disposing up to 5 tires per month.

Municipal Landfills

The disposal of tires can take place at either a tire recycling facility or at a Type I landfill (for landfill disposal, tires must be split or quartered). In 2017, regional landfills disposed of approximately 1400 tons of tires. The average weight of a scrap passenger vehicle tire is 20 pounds; a scrap truck tire is 100 pounds (Source: Rubber Manufacturers Association). If all the tires disposed in landfills were car tires, this would represent approximately 140,000 tires.

TCEQ Registered Scrap Tire Facilities



Scrap tire facility--A facility that processes, conducts energy recovery, or recycles used or scrap tires or tire pieces.

Scrap tire storage site--A registered facility where more than 500 used or scrap tires (or weight equivalent tire pieces or any combination thereof) on the ground or more than 2,000 used or scrap tires (or weight equivalent tire pieces or any combination thereof) in enclosed and lockable containers. The term does not include a transportation facility or a scrap tire facility that stores on-site no more than a 30 calendar day supply of used or scrap tires or tire pieces.

Table 8-2
Scrap Tire Facilities and Processors

Company	Address	City
Dearth Brothers	3515 Almeda Genoa Road	Houston
Eagle Tire Services	1050 E Crosstimbers Street	Houston
Genan	18038 Beaumont Highway	Houston
Liberty Tire Recycling	1633 E Airtex Drive	Houston
Mt Houston Tire Disposal	5837 Mt Houston Road	Houston
Liberty Tire Recycling	5302 Wade Road	Baytown
EE-TDF Cleveland	1400 S Travis	Cleveland
Earth Energy Tire Recycling Facility	555 Pelican Road	Cleveland
Aarons Tire Repair & Service	108 East Highway 90	Dayton
Cherry Crushed Concrete	606 FM 521	Fresno
Cherry Crushed Concrete	5402 Highway 6	Hitchcock
On Site Tire Disposal	13615 FM 2432	Montgomery
J & J Tire Salvage	8586 Post Oak Point	New Ulm
Latham Tire Transporter	20961 Baldwin Lane	Porter

Table 8-3
Scrap Tire Storage Facilities

Company	Address	City
Genan	18038 Beaumont Highway	Houston
Earth Energy Tire Facility	555 Pelican Road	Cleveland

Tire processor--A registered scrap tire facility where used or scrap tires or tire pieces are collected and shredded or baled for delivery to a scrap tire storage site, or to a facility that recycles, reuses or recovers the energy from the tire pieces. Mobile tire processing facilities shall be considered scrap tire facilities and required to comply with all applicable requirements contained in this subchapter relating to scrap tire facilities.

Regulatory

On October 21, 2015, City Council unanimously approved the Scrap Tire Ordinance due to an immediate need to alleviate the environmental dangers posed by the numerous illegal tire piles within Houston. Reducing and eliminating the illegal dumping of tires will positively affect neighborhoods and city services. The ordinance became effective January 1, 2016.

The Scrap Tire Program was created to establish regulations and procedures for the safe transportation, appropriate storage, and accurate record-keeping and proper disposal of used or scrap tires.

8.3 Medical Wastes

"Medical waste" includes *treated* and *untreated* special waste from health care-related facilities that is comprised of animal waste, bulk blood, bulk human blood, bulk human body fluids, microbiological waste, pathological waste, and sharps from the sources specified in 25 TAC 1.134) , as well as "regulated medical waste" (defined in 49 Code of Federal Regulations, Part 173, 173.134(a)(5)). These wastes do not include municipal solid wastes generated from facilities, such as food wastes or office operations related wastes.

With EPA's tighter Hospital, Medical, and Infectious Waste Incinerators (HMIWI) standards, the number of HMIWIs in the United States has declined since 1997. This has led to an increase in the use of alternative technologies for treating medical waste. The alternative treatments are generally used to render the medical waste non-infectious so that the waste can be disposed of as solid waste in landfills or incinerators.

Potential alternatives to incineration of medical waste include the following:

- Thermal treatment, such as microwave technologies;
- Steam sterilization, such as autoclaving;
- Electropyrolysis; and
- Chemical mechanical systems, among others.

Landfilled Medical Waste

Medical wastes are defined a “special waste” and require notification to TCEQ prior to acceptance by a landfill. A total of 10,276 tons of medical wastes were disposed at 3 landfills in the region. Landfills reporting medical waste disposal included: McCarty Road Landfill; Blue Ridge Landfill; and Galveston County Landfill.

Table 8-4

H-GAC Medical Waste Authorized Facilities

Facility	County	Type of Facility	Tons
Excel Medical Waste Facility	Harris	Autoclave	2,216
Daniels Houston Facility	Harris	Medical Waste Transfer Station	348
Stericycle Montgomery Facility	Montgomery	Autoclave	11,583
Stericycle Fresno Facility	Fort Bend	Medical Waste Transfer Station	3,863
Lone Star SRD Shredding Recycling Disposal Facility	Harris	Autoclave	215
Total			**18,225**
Landfilled Medical Waste			**10,276**

Source: TCEQ MSW Annual Report

Regulatory Issues

Medical waste management includes storage, collection, handling, transportation, and processing. Regulations related to management of medical wastes are found in TCEQ rules and apply to any person or business involved in any aspect of the management and control of medical waste, and any person that by contract, agreement, or otherwise arranges to process, store, or dispose of medical waste, or arranges with a transporter for transport to process, store, or dispose of medical waste.

A person conducting medical waste management activities may need to obtain a TCEQ Registration, claim a Registration by Rule, or submit a TCEQ Notification. Some medical waste management activities are exempt from registration and notification requirements.

8.4 Used Oil

TCEQ defines used oil as "any oil originally refined from crude or synthetic oil, that as a result of use, is contaminated by physical or chemical impurities and cannot be used for its intended purpose."

A used oil collection center (UOCC) is any facility that accepts, stores, and manages used oil collected from generators who bring in shipments less than 55 gallons. Collection centers also may accept used oil from household do-it-yourselfers in quantities less than five gallons. If you operate a UOCC, you must register with the TCEQ within 30 days of operation. A used oil filter collection center (UOFCC) is a facility that accepts, stores, and manages used oil filters collected from do-it-yourselfers. The UOFCCs should remove the free flowing oil from the filters they collect to the greatest extent feasible. For Harris County alone, there are 962 records of used oil facilities.

City of Houston Program

The City allows used motor oil to be placed outside with the green bin/cart on recycling pick-up days. Used oil or used oil filters are collected for recycling at the Westpark Recycling Center. Used oil is also accepted at the Cities Neighborhood depositories/recycling centers and the Environmental Service Centers.

8.5 Battery Recycling

Lead-Acid Batteries

It is unlawful to place a lead acid battery in a landfill in Texas. Texans are required to dispose of a lead-acid battery delivering them to either: a battery retailer, a battery wholesaler, a secondary lead smelter or a collection or recycling facility authorized to accept them. In Houston, the City's environmental service centers accept used lead acid batteries.

Battery retailers and wholesalers must accept used lead acid batteries from the customer, if the used battery is the type and in a quantity equal to the number of new lead-acid batteries sold and the retailer must also post the universal recycling symbol concerning the sale of batteries.

Computer Battery Recycling

A review of TCEQ Recycling and Resource Recovery registered facilities identified six locations for electronics recycling in Houston. These facilities are listed below. This is not an all-inclusive list, as several computer retail locations offer to recycle computer batteries.

Table 8-5
Electronic Recycling Centers

Company	Address
Bass Computers Inc.	10558 Bissonnet Street
Houston Computer Works	12230 Westheimer Road
Houston Computer Recycling	2121 Brittmoore Road
Compucycle	8019 Kempwood Drive
Eco International LLC	3600 Brittmoore Road
Resale Resource	101 Esplanade Boulevard, Suite 400

Source: TCEQ Authorized RR Facilities

The Houston Scrap site is located at 3799 Jensen Drive, just south of Interstate 610 and west of U.S. 69 in Houston. The approximately 20-acre site was previously a rendering facility until approximately 1976, when aluminum and lead-acid batteries recycling began along with various other scrap metal recovery activities. As part of the response action, TCEQ removed 7,500 cubic yards of scrap metal,

used battery casings, used 55-gallon drums, household garbage, and 1,000 discarded truck and car tires. The businesses' operations resulted in soil contamination from lead and other metals, as well as sulfuric acid.

Cleanup is complete. The site is in the **operation and maintenance** phase which requires periodic groundwater sampling to monitor the groundwater for any impacts by the containment cell and maintenance inspections of the integrity of the containment cell and cap and the surrounding fence.

8.6 Ash Management

The WA Parish Power Station, owned by NRG Texas Power and is located in Thompsons, Texas in Fort Bend County. The power station has a 4 coal fired units with a total gross rated capacity of 2667 MW from the coal units. Ash generated from the facility is disposed at NRG's ash landfill located near the power plant. This landfill is permitted as a Class 2 non-hazardous industrial landfills, Industrial and Hazardous Waste Solid Waste Registration 31631. According to an annual inspection report conducted for the power plant, there are an estimated 1.1 million cubic yards of ash disposed of in the landfill. It is also reported that bottom ash is stored at the site for future marketable uses.

Based on annual reports submitted by the area's landfills, a total of 143 tons of ash were disposed of at regional landfills in 2017.

Appendix A

TCEQ Authorized Facilities

The MSW authorization number. Authorization numbers are assigned according to the facility type. MSW facility types are described in rule in 30 TAC §330.5 (in MSW rules, permits, and other formal documents, facility types are identified using roman numerals).

Number Range	Facility Type
1 - 8999	Permitted facility; letter suffix indicates amended permit
	Landfill Facility (Types 1, 1AE, 2, 3, 4, and 4AE; "AE" designates an arid-exempt facility; landfill Types 2 and 3 are historical types that were required to upgrade to Type 1 standards, or to close and install final cover)
	Medical Waste Processing Facility with Autoclave Type 5AC)
	Liquid Waste Processing Facility (Type 5GG)
	Medical Waste Processing Facility (Type 5MW)
	Composting Facility (Type 5RC)
	Transfer Station (Type 5TS)
	Medical Waste Processing Facility with an Incinerator (Type 5WI) (facility may also have autoclave)
9000 - 9999	Landfill Permit by Rule for Demolition Waste from Nuisance or Abandoned Buildings ("Monofill")
40000 - 41999	Registered Transfer Station (Type 5TS) Liquid Transfer Station (Type 5TL) Medical Waste Processing Facility with Autoclave (Type 5AC) Medical Waste Processing Facility (Type 5MW)
	Medical Waste Processing Facility with an Incinerator (Type 5WI) (facility may also have autoclave)
42000 - 42999	Registered Composting Facility (Type 5RC)
43000 - 43999	Registered Liquid Waste Processing Facility (Type 5GG)
47000 - 47999	Notice of Intent to Operate a Composting Facility (Type 5RC)
48000 - 49999	Registered Beneficial Gas Recovery Facility (Type 9GR)
61000 - 61999	Registered Mobile Liquid Waste Processors (Type 5GM)
62000 - 62999	Enclosed Structure Over Closed Landfill, Permitted (CP)
65000 – 65100	Enclosed Structure Over Closed Landfill, Registered (CR)
67000 – 67100	Disturbance of Final Cover (SUBT)
100000 -	Notice of Intent to Operate a Recycling Facility (Type 5RC and 5RR)
110000 -	Notice of Intent to Operate a Low-Volume Transfer Station (Type 5LV)
120000 -	Notice of Intent to Operate a Citizens Collection Station (Type 5CC)
999999	Miscellaneous Communications

1	WHISPERING PINES LANDFILL	1	ACTIVE	HARRIS
2	MCCARTY ROAD LANDFILL	1	ACTIVE	HARRIS
1	HAWTHORNE PARK LANDFILL	4	ACTIVE	HARRIS
2	CASCO HAULING AND EXCAVATION LANDFILL	4	ACTIVE	HARRIS
3	TALL PINES DISPOSAL FACILITY	4	ACTIVE	HARRIS
4	TALL PINES DISPOSAL FACILITY	4	ACTIVE	HARRIS
5	APPLEROCK LANDFILL	4	NOT CONSTRUCTED	HARRIS
6	GREENHOUSE ROAD LANDFILL	4	ACTIVE	HARRIS
7	GREENHOUSE ROAD LANDFILL	4	ACTIVE	HARRIS
8	LONE STAR RECYCLING-DISPOSAL	4	ACTIVE	HARRIS
9	GREENBELT LANDFILL NORTH	4	INACTIVE	HARRIS
10	WCT/GREENBELT LANDFILL	4	ACTIVE	HARRIS
11	ADDICKS FAIRBANKS LANDFILL	4	ACTIVE	HARRIS
12	RALSTON ROAD LANDFILL	4	ACTIVE	HARRIS
13	FAIRBANKS LANDFILL	4	ACTIVE	HARRIS
14	COUGAR LANDFILL	4	ACTIVE	HARRIS
1	LIQUID ENVIRONMENTAL SOLUTIONS OF TEXAS LP PROCESSING FACILITY	5GG	ACTIVE	HARRIS
2	SCHALKER ST GREASE TRAP WASTE PROCESSING FACILITY	5GG	NOT CONSTRUCTED	HARRIS
3	B R PERRIN PLANT	5GG	ACTIVE	HARRIS
4	TAP INC DBA BIG K ENVIRONMENTAL	5GG	ACTIVE	HARRIS
5	SOUTHWASTE HURST FACILITY	5GG	ACTIVE	HARRIS
6	GENESYST INTERNATIONAL LIQUID WASTE PROCESSING FACILITY	5GG	NOT CONSTRUCTED	HARRIS
7	WASTEWATER RESIDUALS MANAGEMENT	5GG	ACTIVE	HARRIS
8	LEY RD RENEWABLE ENERGY FACILITY	5GG	NOT CONSTRUCTED	HARRIS
1	DANIELS SHARPSMART HOUSTON FACILITY	5MWTS	ACTIVE	HARRIS
1	LONE STAR RECYCLING & DISPOSAL FACILITY	5RC	ACTIVE	HARRIS
2	HIS SOILS TECHNOLOGY	5RC	ACTIVE	HARRIS
3	THE GROUND UP HOUSTON	5RC	ACTIVE	HARRIS
4	ROMINE KEVIN D RECYCLING FACILITY	5RC	ACTIVE	HARRIS
1	C & D RECYCLERS OF TEXAS	5RCX	ACTIVE	HARRIS
2	BIOS MULCH FACILITY	5RCX	ACTIVE	HARRIS
3	LIVING EARTH	5RCX	ACTIVE	HARRIS
4	LIVING EARTH	5RCX	ACTIVE	HARRIS
1	AMERICAN REF-FUEL LIQUID WASTE INCINERATION FACILITY	5RE	INACTIVE	HARRIS
1	URBAN WASTE TECHNOLOGIES RECYCLING FACILITY	5RR	INACTIVE	HARRIS

2	CLEARWOOD RECYCLING CENTER	5RR	ACTIVE	HARRIS
3	GULF COAST RECYCLING CLAY RD	5RR	ACTIVE	HARRIS
4	MULCH MATTERS	5RR	ACTIVE	HARRIS
5	POTEETS DIRT YARD	5RR	ACTIVE	HARRIS
6	NOVUS WOOD GROUP LP	5RR	ACTIVE	HARRIS
7	WASTE MANAGEMENT RECYCLE AMERICA LLC	5RR	ACTIVE	HARRIS
8	WOOD AND MULCH SERVICES	5RR	ACTIVE	HARRIS
9	ARBOR CARE INC	5RR	ACTIVE	HARRIS
10	HPP	5RR	ACTIVE	HARRIS
11	JMJ ORGANICS MATERIALS	5RR	ACTIVE	HARRIS
12	JMJ ORGANICS MATERIALS ALDINE	5RR	ACTIVE	HARRIS
13	CHAMPION LANDSCAPE SUPPLIES	5RR	ACTIVE	HARRIS
14	SELINSKY	5RR	ACTIVE	HARRIS
15	NATION WASTE INC	5RR	ACTIVE	HARRIS
16	MELENDY SHINGLE RECYCLING FACILITY	5RR	ACTIVE	HARRIS
17	ECO INTERNATIONAL LLC	5RR	ACTIVE	HARRIS
18	BASS COMPUTERS INC	5RR	ACTIVE	HARRIS
19	CHERRY CRUSHED CONCRETE	5RR	ACTIVE	HARRIS
20	LIVING EARTH TECHNOLOGY	5RR	ACTIVE	HARRIS
21	ACCP INC	5RR	ACTIVE	HARRIS
22	NAVIGATION SHINGLE RECYCLING FACILITY	5RR	ACTIVE	HARRIS
23	ASTRO WASTE INC	5RR	ACTIVE	HARRIS
24	HOUSTON COMPUTER WORKS	5RR	ACTIVE	HARRIS
25	SCC GENOA RED BLUFF RECYCLING YARD	5RR	ACTIVE	HARRIS
26	HOUSTON BRITTMOORE RD FACILITY	5RR	ACTIVE	HARRIS
27	ALPHA DISPOSAL & RECYCLING	5RR	ACTIVE	HARRIS
28	FEDERAL INTERNATIONAL INC	5RR	ACTIVE	HARRIS
29	GREEN NOBEL SOLUTION RECYCLING FACILITY	5RR	ACTIVE	HARRIS
30	HOUSTON COMPUTER RECYCLING	5RR	ACTIVE	HARRIS
31	VR WOOD INC	5RR	INACTIVE	HARRIS
32	U-WSTE RECYCLING SOLUTIONS	5RR	ACTIVE	HARRIS
33	LIVING EARTH	5RR	ACTIVE	HARRIS
34	U-WASTE RECYCLING SOLUTIONS	5RR	ACTIVE	HARRIS
35	EMOTTEC MULTISAT EQUIPMENT LLC	5RR	ACTIVE	HARRIS
36	CHRISMAN YARD	5RR	ACTIVE	HARRIS
37	LOCKWOOD YARD	5RR	ACTIVE	HARRIS
38	TANNER YARD	5RR	ACTIVE	HARRIS
39	WILCREST YARD	5RR	ACTIVE	HARRIS
40	SOUTH MAIN CONCRETE PLANT	5RR	ACTIVE	HARRIS
41	LIBERTY YARD	5RR	ACTIVE	HARRIS
42	EAST ALMEDA FACILITY	5RR	ACTIVE	HARRIS
43	CHERRY STREET YARD	5RR	ACTIVE	HARRIS
44	SOIL STABILIZATION PLANT 1	5RR	ACTIVE	HARRIS
45	TIMBERLINE ENVIRONMENTAL SERVICES	5RR	ACTIVE	HARRIS
46	ARBOR CARE	5RR	ACTIVE	HARRIS
47	CMKR	5RR	ACTIVE	HARRIS
48	HOUSTON WASTE SOLUTIONS RECYCLING FACILITY BREEN DRIVE	5RR	ACTIVE	HARRIS
49	RESALE RESOURCE	5RR	ACTIVE	HARRIS

50	COMPUCYCLE	5RR	ACTIVE	HARRIS
51	COMPUCYCLE	5RR	ACTIVE	HARRIS
1	J COOPER INVESTMENTS LIQUID WASTE TRANSFER STATION	5TL	INACTIVE	CHAMBERS
3	CUT RATE VACUUM SERVICES	5TL	INACTIVE	HARRIS
4	ENVIRO WASTE LIQUID WASTE TRANSFER STATION FACILITY	5TL	INACTIVE	HARRIS
5	GREEN ARROW TRANSFER	5TL	INACTIVE	HARRIS
1	RUFFINO HILLS TRANSFER STATION	5TS	ACTIVE	HARRIS
2	SAM HOUSTON RECYCLING CENTER TRANSFER STATION	5TS	ACTIVE	HARRIS
3	KOENIG STREET TRANSFER STATION	5TS	ACTIVE	HARRIS
4	HARDY ROADTRANSFER STATION	5TS	ACTIVE	HARRIS
5	CITY OF DEER PARK TRANSFER STATION FACILITY	5TS	ACTIVE	HARRIS
6	RALSTON ROAD TRANSFER STATION	5TS	NOT CONSTRUCTED	HARRIS
7	HOUSTON RESOURCE RENEWAL COMPLEX TRANSFER STATION FACILITY	5TS	ACTIVE	HARRIS
8	HOUSTON SOUTHEAST TRANSFER STATION FACILITY	5TS	ACTIVE	HARRIS
9	HOUSTON SOUTHWEST TRANSFER STATION FACILITY	5TS	ACTIVE	HARRIS
10	HOUSTON NORTHWEST TRANSFER STATION FACILITY	5TS	ACTIVE	HARRIS
11	EGBERT TRANSFER STATION	5TS	ACTIVE	HARRIS
12	SPRINT RECYCLING CENTER NORTHEAST	5TS	ACTIVE	HARRIS
13	TANNER ROAD FACILITY	5TS	ACTIVE	HARRIS
14	EXCELL TYPE V-TS MSW TRANSFER STATION	5TS	ACTIVE	HARRIS
15	LONE STAR RECYCLING & DISPOSAL FACILITY	5TS	ACTIVE	HARRIS
16	NEXUS MATERIAL RECOVERY & TRANSFER STATION	5TS	NOT CONSTRUCTED	HARRIS
17	HOLMES ROAD TYPE V TRANSFER STATION	5TS	NOT CONSTRUCTED	HARRIS
18	R & J TRANSFER STATION	5TS	ACTIVE	HARRIS
19	GW TRANSFER STATION	5TS	NOT CONSTRUCTED	HARRIS
20	TALL PINES TRANSFER STATION	5TS	NOT CONSTRUCTED	HARRIS
21	FCC MATERIALS RECOVERY FACILITY HOUSTON	5TS	NOT CONSTRUCTED	HARRIS
1	GETTY SYNTHETIC FUELS GAS RECOVERY	9GR	ACTIVE	HARRIS
2	AMERESCO MCCARTY ENERGY LLC	9GR	ACTIVE	HARRIS
1	OLSHAN LANDFILL	9MR	NOT CONSTRUCTED	HARRIS
1	CYPRESS CREEK GOLF COMPANY	CR	ACTIVE	HARRIS

1	MATIAS ALMEYDA TRAINING CENTER	SUBT	NOT CONSTRUCTED	HARRIS

Site Name	Physical Type	Legal Status	County
SEABREEZE ENVIRONMENTAL LANDFILL	1	ISSUED	BRAZORIA
SEABREEZE ENVIRONMENTAL LANDFILL	1	PENDING	BRAZORIA
CHAMBERS COUNTY LANDFILL	1	ISSUED	CHAMBERS
BAYTOWN LANDFILL FACILITY	1	ISSUED	CHAMBERS
GULF WEST LANDFILL TX LP	1	ISSUED	CHAMBERS
ALTAIR DISPOSAL SERVICES LLC LANDFILL	1	ISSUED	COLORADO
BLUE RIDGE LANDFILL	1	ISSUED	FORT BEND
FORT BEND REGIONAL LANDFILL	1	ISSUED	FORT BEND
GALVESTON COUNTY LANDFILL TX LP	1	ISSUED	GALVESTON
COASTAL PLAINS RECYCLING AND LANDFILL FACILITY	1	ISSUED	GALVESTON
WHISPERING PINES LANDFILL	1	ISSUED	HARRIS
WM ATASCOCITA RECYCLING DISPOSAL FACILITY	1	ISSUED	HARRIS
MCCARTY ROAD LANDFILL	1	ISSUED	HARRIS
SECURITY RECYCLING AND DISPOSAL FACILITY	1	ISSUED	MONTGOMERY
CONROE INDUSTRIAL NON-HAZARDOUS LANDFILL	1	ISSUED	MONTGOMERY
DARRELL DICKEY LANDFILL	1	ISSUED	WALKER
DIXIE FARM ROAD LANDFILL	4	ISSUED	BRAZORIA
FORT BEND COUNTY LANDFILL	4	ISSUED	FORT BEND
NORTH COUNTY LANDFILL	4	ISSUED	GALVESTON
HAWTHORNE PARK LANDFILL	4	ISSUED	HARRIS
CASCO HAULING AND EXCAVATION LANDFILL	4	ISSUED	HARRIS
TALL PINES DISPOSAL FACILITY	4	ISSUED	HARRIS
TALL PINES DISPOSAL FACILITY	4	PENDING	HARRIS
APPLEROCK LANDFILL	4	ISSUED	HARRIS
GREENHOUSE ROAD LANDFILL	4	ISSUED	HARRIS
GREENHOUSE ROAD LANDFILL	4	PENDING	HARRIS
LONE STAR RECYCLING-DISPOSAL	4	ISSUED	HARRIS
GREENBELT LANDFILL NORTH	4	ISSUED	HARRIS
WCT/GREENBELT LANDFILL	4	ISSUED	HARRIS
ADDICKS FAIRBANKS LANDFILL	4	ISSUED	HARRIS
RALSTON ROAD LANDFILL	4	ISSUED	HARRIS
GREENSHADOW LANDFILL	4	ISSUED	HARRIS
FAIRBANKS LANDFILL	4	ISSUED	HARRIS
COUGAR LANDFILL	4	ISSUED	HARRIS
MLS TYPE IV LANDFILL	4	ISSUED	MONTGOMERY
TM DEER PARK SERVICES	5	ISSUED	HARRIS
LONE STAR SRD SHREDDING RECYCLING DISPOSAL	5AC	ISSUED	HARRIS
CONROE MEDICAL WASTE FACILITY	5AC	ISSUED	MONTGOMERY
CITY OF SEALY CITIZEN COLLECTION STATION	5CC	ACKNOWLEDGED	AUSTIN
VILLAGE OF SURFSIDE COLLECTION CENTER	5CC	ACKNOWLEDGED	BRAZORIA
MONT BELVIEU CITIZENS COLLECTIO STATION	5CC	ACKNOWLEDGED	CHAMBERS
ANAHUAC CITIZENS COLLECTION STATION	5CC	ACKNOWLEDGED	CHAMBERS
WALLISVILLE CITIZENS COLLECTION STATION	5CC	ACKNOWLEDGED	CHAMBERS
DOUBLE BAYOU CITIZENS COLLECTION STATION	5CC	ACKNOWLEDGED	CHAMBERS

OAK ISLAND CITIZENS COLLECTION STATION	5CC	ACKNOWLEDGED	CHAMBERS
WINNIE STOWELL CITIZENS COLLECTION STATION	5CC	ACKNOWLEDGED	CHAMBERS
BEACH CITY CITIZENS COLLECTION STATION	5CC	ACKNOWLEDGED	CHAMBERS
SMITH POINT CITIZENS COLLECTION STATION	5CC	ACKNOWLEDGED	CHAMBERS
CITY OF EL CAMPO CITIZENS COLLECTION STATION	5CC	ACKNOWLEDGED	WHARTON
LIQUID ENVIRONMENTAL SOLUTIONS OF TEXAS LP PROCESSING FACILITY	5GG	ISSUED	HARRIS
SCHALKER ST GREASE TRAP WASTE PROCESSING FACILITY	5GG	ISSUED	HARRIS
B R PERRIN PLANT	5GG	ISSUED	HARRIS
TAP INC DBA BIG K ENVIRONMENTAL	5GG	ISSUED	HARRIS
SOUTHWASTE HURST FACILITY	5GG	ISSUED	HARRIS
GENESYST INTERNATIONAL LIQUID WASTE PROCESSING FACILITY	5GG	ISSUED	HARRIS
WASTEWATER RESIDUALS MANAGEMENT	5GG	ISSUED	HARRIS
LEY RD RENEWABLE ENERGY FACILITY	5GG	ISSUED	HARRIS
PENINSULA SANITATION SERVICE INC	5LV	ACKNOWLEDGED	GALVESTON
KICKAPOO TRANSFER	5LV	ACKNOWLEDGED	HARRIS
MURRELL TRANSFER STATION	5LV	ACKNOWLEDGED	HARRIS
DENNISON TRANSFER STATION	5LV	ACKNOWLEDGED	HARRIS
PRIMOS TRASH SERVICE	5LV	ACKNOWLEDGED	MONTGOMERY
JASON THOMPSON	5LV	ACKNOWLEDGED	WALKER
EAGLE SANITATION	5LV	ACKNOWLEDGED	WALKER
FM 1887 RD - BACK DOOR GARBAGE SERVICE	5LV	ACKNOWLEDGED	WALLER
SPRINGER TRANSFER STATION	5LV	ACKNOWLEDGED	WALLER
9127 KATY HOCKLEY RD	5LV	ACKNOWLEDGED	WALLER
YOUR GARBAGE SERVICE	5LV	ACKNOWLEDGED	WALLER
STERICYCLE FRESNO	5MWTS	ISSUED	FORT BEND
DANIELS SHARPSMART HOUSTON FACILITY	5MWTS	ISSUED	HARRIS
COASTAL PLAINS RECYCLING & DISPOSAL FACILITY	5RC	ACKNOWLEDGED	GALVESTON
KIRSCH ENTERPRISES	5RC	ACKNOWLEDGED	HARRIS
LONE STAR RECYCLING & DISPOSAL FACILITY	5RC	ACKNOWLEDGED	HARRIS
HIS SOILS TECHNOLOGY	5RC	ACKNOWLEDGED	HARRIS
THE GROUND UP HOUSTON	5RC	ACKNOWLEDGED	HARRIS
ROMINE KEVIN D RECYCLING FACILITY	5RC	ACKNOWLEDGED	HARRIS
NATURES WAY RESOURCES INC	5RC	ACKNOWLEDGED	MONTGOMERY
NEW EARTH INC	5RC	ISSUED	MONTGOMERY
TRIPLE-S COMPOST FACILITY	5RC	ISSUED	MONTGOMERY
NEW EARTH GRAND PARKWAY COMPOSTING	5RC	ISSUED	WALLER
DON TOL COMPOST FACILITY	5RC	ISSUED	WHARTON
LIVING EARTH	5RCX	ACKNOWLEDGED	BRAZORIA
LISBON WOOD RECYCLE	5RCX	ACKNOWLEDGED	FORT BEND
TEXAS LAWN WORKS	5RCX	ACKNOWLEDGED	FORT BEND
C & D RECYCLERS OF TEXAS	5RCX	ACKNOWLEDGED	HARRIS
BIOS MULCH FACILITY	5RCX	ACKNOWLEDGED	HARRIS
LIVING EARTH	5RCX	ACKNOWLEDGED	HARRIS
LIVING EARTH	5RCX	ACKNOWLEDGED	HARRIS
LIVING EARTH	5RCX	ACKNOWLEDGED	HARRIS
K & T VENTURES INC	5RCX	ACKNOWLEDGED	LIBERTY

DIRT CHEAP MULCH DAYTON	5RCX	ACKNOWLEDGED	LIBERTY
THE LETCO GROUP LLC	5RCX	ACKNOWLEDGED	MONTGOMERY
NEW EARTH GRAND PARKWAY RECYCLING	5RCX	ACKNOWLEDGED	WALLER
TWINWOOD COMPOSTING	5RCX	ACKNOWLEDGED	WALLER
AMERICAN REF-FUEL LIQUID WASTE INCINERATION FACILITY	5RE	ISSUED	HARRIS
BRAZORIA COUNTY RECYCLING CENTER TRANSFER STATION FACILITY	5RR	ISSUED	BRAZORIA
BRAZOS LANDSCAPE SUPPLY	5RR	ACKNOWLEDGED	BRAZORIA
LIVING EARTH	5RR	ACKNOWLEDGED	BRAZORIA
STAR CO LLC	5RR	ACKNOWLEDGED	CHAMBERS
HERITAGE-CRYSTAL CLEAN	5RR	ACKNOWLEDGED	CHAMBERS
HPP MATERIALS	5RR	ACKNOWLEDGED	CHAMBERS
CJM THE SOIL SUPERMARKET	5RR	ACKNOWLEDGED	FORT BEND
LIVING EARTH TECHNOLOGY CO	5RR	ACKNOWLEDGED	FORT BEND
TIMBER SOLUTIONS INC SOUTH YARD	5RR	ACKNOWLEDGED	FORT BEND
MCHARD ROAD CONCRETE CRUSHING	5RR	ACKNOWLEDGED	FORT BEND
THE GROUND UP	5RR	ACKNOWLEDGED	FORT BEND
TEXAS GREEN ELECTRONIC RECYCLING CENTER	5RR	ACKNOWLEDGED	FORT BEND
SUN RECYCLING	5RR	ACKNOWLEDGED	FORT BEND
LIVING EARTH	5RR	ACKNOWLEDGED	FORT BEND
ROSENBERG YARD	5RR	ACKNOWLEDGED	FORT BEND
PUTNAM TREE SERVICE	5RR	ACKNOWLEDGED	GALVESTON
NOVUS WOOD GROUP	5RR	ACKNOWLEDGED	GALVESTON
CJM THE SOIL SUPERMARKET	5RR	ACKNOWLEDGED	GALVESTON
SAN LEON YARD	5RR	ACKNOWLEDGED	GALVESTON
HARBORSIDE YARD	5RR	ACKNOWLEDGED	GALVESTON
EZ WASTE INC	5RR	ISSUED	HARRIS
URBAN WASTE TECHNOLOGIES RECYCLING FACILITY	5RR	ISSUED	HARRIS
CLEARWOOD RECYCLING CENTER	5RR	ACKNOWLEDGED	HARRIS
GULF COAST RECYCLING CLAY RD	5RR	ACKNOWLEDGED	HARRIS
MULCH KING	5RR	ACKNOWLEDGED	HARRIS
MULCH MATTERS	5RR	ACKNOWLEDGED	HARRIS
POTEETS DIRT YARD	5RR	ACKNOWLEDGED	HARRIS
NOVUS WOOD GROUP LP	5RR	ACKNOWLEDGED	HARRIS
WASTE MANAGEMENT RECYCLE AMERICA LLC	5RR	ACKNOWLEDGED	HARRIS
DIRT CHEAP MULCH CO 1	5RR	ACKNOWLEDGED	HARRIS
WOOD AND MULCH SERVICES	5RR	ACKNOWLEDGED	HARRIS
ARBOR CARE INC	5RR	ACKNOWLEDGED	HARRIS
OAKS & MORE INC	5RR	ACKNOWLEDGED	HARRIS
HPP	5RR	ACKNOWLEDGED	HARRIS
JMJ ORGANICS MATERIALS	5RR	ACKNOWLEDGED	HARRIS
JMJ ORGANICS MATERIALS ALDINE	5RR	ACKNOWLEDGED	HARRIS
L.Q. C.S.I	5RR	ACKNOWLEDGED	HARRIS
MEGA SAND	5RR	ACKNOWLEDGED	HARRIS
FM 2100 RECYCLING SITE	5RR	ACKNOWLEDGED	HARRIS
SEBER LANE RECYCLING CENTER	5RR	ACKNOWLEDGED	HARRIS
SUSTAIN TX & RECYCLE CO LLC DBA STAR CO	5RR	ACKNOWLEDGED	HARRIS
CHAMPION LANDSCAPE SUPPLIES	5RR	ACKNOWLEDGED	HARRIS
SELINSKY	5RR	ACKNOWLEDGED	HARRIS
NATION WASTE INC	5RR	ACKNOWLEDGED	HARRIS
HOUSTON SHINGLE RECYCLING FACILITY	5RR	ACKNOWLEDGED	HARRIS

MELENDY SHINGLE RECYCLING FACILITY	5RR	ACKNOWLEDGED	HARRIS
ECO INTERNATIONAL LLC	5RR	ACKNOWLEDGED	HARRIS
BASS COMPUTERS INC	5RR	ACKNOWLEDGED	HARRIS
CHERRY CRUSHED CONCRETE	5RR	ACKNOWLEDGED	HARRIS
LIVING EARTH TECHNOLOGY	5RR	ACKNOWLEDGED	HARRIS
ACCP INC	5RR	ACKNOWLEDGED	HARRIS
NAVIGATION SHINGLE RECYCLING FACILITY	5RR	ACKNOWLEDGED	HARRIS
ASTRO WASTE INC	5RR	ACKNOWLEDGED	HARRIS
HOUSTON COMPUTER WORKS	5RR	ACKNOWLEDGED	HARRIS
BENDER SHINGLE RECYCLING FACILITY	5RR	ACKNOWLEDGED	HARRIS
SCC GENOA RED BLUFF RECYCLING YARD	5RR	ACKNOWLEDGED	HARRIS
HOUSTON BRITTMOORE RD FACILITY	5RR	ACKNOWLEDGED	HARRIS
ALPHA DISPOSAL & RECYCLING	5RR	ACKNOWLEDGED	HARRIS
FEDERAL INTERNATIONAL INC	5RR	ACKNOWLEDGED	HARRIS
GREEN NOBEL SOLUTION RECYCLING FACILITY	5RR	ACKNOWLEDGED	HARRIS
HOUSTON COMPUTER RECYCLING	5RR	ACKNOWLEDGED	HARRIS
HOUSTON ELECTRONIC RECYCLING	5RR	ACKNOWLEDGED	HARRIS
VR WOOD INC	5RR	ACKNOWLEDGED	HARRIS
COMEX ENVIRONMENTAL FACILITY #1 KATY HOCKLEY RD SITE	5RR	ACKNOWLEDGED	HARRIS
U-WSTE RECYCLING SOLUTIONS	5RR	ACKNOWLEDGED	HARRIS
KATY STONE & GRAVEL INC	5RR	ACKNOWLEDGED	HARRIS
LIVING EARTH	5RR	ACKNOWLEDGED	HARRIS
U-WASTE RECYCLING SOLUTIONS	5RR	ACKNOWLEDGED	HARRIS
HOU-SCAPE	5RR	ACKNOWLEDGED	HARRIS
CCP SHINGLE RECYCLING	5RR	ACKNOWLEDGED	HARRIS
EMOTTEC MULTISAT EQUIPMENT LLC	5RR	ACKNOWLEDGED	HARRIS
CHRISMAN YARD	5RR	ACKNOWLEDGED	HARRIS
LOCKWOOD YARD	5RR	ACKNOWLEDGED	HARRIS
TANNER YARD	5RR	ACKNOWLEDGED	HARRIS
WILCREST YARD	5RR	ACKNOWLEDGED	HARRIS
SOUTH MAIN CONCRETE PLANT	5RR	ACKNOWLEDGED	HARRIS
LIBERTY YARD	5RR	ACKNOWLEDGED	HARRIS
CHANNELVIEW YARD	5RR	ACKNOWLEDGED	HARRIS
EAST ALMEDA FACILITY	5RR	ACKNOWLEDGED	HARRIS
CHERRY STREET YARD	5RR	ACKNOWLEDGED	HARRIS
SOIL STABILIZATION PLANT 1	5RR	ACKNOWLEDGED	HARRIS
TIMBERLINE ENVIRONMENTAL SERVICES	5RR	ACKNOWLEDGED	HARRIS
LAND CRAFTERS LTD	5RR	ACKNOWLEDGED	HARRIS
ARBOR CARE	5RR	ACKNOWLEDGED	HARRIS
CMKR	5RR	ACKNOWLEDGED	HARRIS
HOUSTON WASTE SOLUTIONS RECYCLING FACILITY BREEN DRIVE	5RR	ACKNOWLEDGED	HARRIS
RESALE RESOURCE	5RR	ACKNOWLEDGED	HARRIS
COMPUCYCLE	5RR	ACKNOWLEDGED	HARRIS
COMPUCYCLE	5RR	ACKNOWLEDGED	HARRIS
PLUNKETT SAND & BASE	5RR	ACKNOWLEDGED	MONTGOMERY
MILLERS SHAVING INC	5RR	ACKNOWLEDGED	MONTGOMERY
SOUTHEAST TEXAS TREES	5RR	ACKNOWLEDGED	MONTGOMERY
LEWIS-QUINN CONSTRUCTION SERVICES INC	5RR	ACKNOWLEDGED	MONTGOMERY
TEXAS LANDSCAPE PRODUCTS INC	5RR	ACKNOWLEDGED	MONTGOMERY
ORVEL WHEELER	5RR	ACKNOWLEDGED	MONTGOMERY
LIVING EARTH TECHNOLOGY CO	5RR	ACKNOWLEDGED	MONTGOMERY
CGH INC	5RR	ACKNOWLEDGED	MONTGOMERY

SOUTHWEST RECYCLING EQUIPMENT & SERVICES INC	5RR	ACKNOWLEDGED	MONTGOMERY
FARRELL ROAD RECYCLING	5RR	ACKNOWLEDGED	MONTGOMERY
OAKLEY WOOD CHIPS	5RR	ACKNOWLEDGED	MONTGOMERY
WEISINGER MATERIALS INC	5RR	ACKNOWLEDGED	MONTGOMERY
MAGNOLIA WOOD MULCH	5RR	ACKNOWLEDGED	MONTGOMERY
QUALITY MATERIALS	5RR	ACKNOWLEDGED	MONTGOMERY
SAND HILL FOUNDATION	5RR	ACKNOWLEDGED	MONTGOMERY
PRECISION LAND CLEARING	5RR	ACKNOWLEDGED	MONTGOMERY
TOWN AND COUNTRY GARBAGE	5RR	ACKNOWLEDGED	MONTGOMERY
ADF EXCAVATION PIT	5RR	ACKNOWLEDGED	MONTGOMERY
J COOPER INVESTMENTS LIQUID WASTE TRANSFER STATION	5TL	ISSUED	CHAMBERS
BEST SEPTIC TANK CLEANING LIQUID WASTE TRANSFER STATION FACILITY	5TL	ISSUED	FORT BEND
CUT RATE VACUUM SERVICES	5TL	ISSUED	HARRIS
ENVIRO WASTE LIQUID WASTE TRANSFER STATION FACILITY	5TL	ISSUED	HARRIS
GREEN ARROW TRANSFER	5TL	ISSUED	HARRIS
CITY OF SEALY TRANSFER STATION	5TS	ISSUED	AUSTIN
COUNTY WASTE INC	5TS	ISSUED	AUSTIN
PARAGON SOUTHWEST MEDICAL WASTE	5TS	ISSUED	CHAMBERS
CITY OF WEIMAR TRANSFER STATION	5TS	ISSUED	COLORADO
SPRINT FORT BEND COUNTY TRANSFER STATION	5TS	ISSUED	FORT BEND
CITY OF GALVESTON TRANSFER STATION FACILITY	5TS	ISSUED	GALVESTON
RUFFINO HILLS TRANSFER STATION	5TS	ISSUED	HARRIS
SAM HOUSTON RECYCLING CENTER TRANSFER STATION	5TS	ISSUED	HARRIS
KOENIG STREET TRANSFER STATION	5TS	ISSUED	HARRIS
HARDY ROADTRANSFER STATION	5TS	ISSUED	HARRIS
CITY OF DEER PARK TRANSFER STATION FACILITY	5TS	ISSUED	HARRIS
RALSTON ROAD TRANSFER STATION	5TS	ISSUED	HARRIS
HOUSTON RESOURCE RENEWAL COMPLEX TRANSFER STATION FACILITY	5TS	ISSUED	HARRIS
HOUSTON SOUTHEAST TRANSFER STATION FACILITY	5TS	ISSUED	HARRIS
HOUSTON SOUTHWEST TRANSFER STATION FACILITY	5TS	ISSUED	HARRIS
HOUSTON NORTHWEST TRANSFER STATION FACILITY	5TS	ISSUED	HARRIS
EGBERT TRANSFER STATION	5TS	ISSUED	HARRIS
SPRINT RECYCLING CENTER NORTHEAST	5TS	ISSUED	HARRIS
TALL PINES TRANSFER STATION	5TS	ISSUED	HARRIS
TANNER ROAD FACILITY	5TS	ISSUED	HARRIS
EXCELL TYPE V-TS MSW TRANSFER STATION	5TS	ISSUED	HARRIS
LONE STAR RECYCLING & DISPOSAL FACILITY	5TS	ISSUED	HARRIS
NEXUS MATERIAL RECOVERY & TRANSFER STATION	5TS	ISSUED	HARRIS
HOLMES ROAD TYPE V TRANSFER STATION	5TS	ISSUED	HARRIS
R & J TRANSFER STATION	5TS	ISSUED	HARRIS
GW TRANSFER STATION	5TS	ISSUED	HARRIS
TALL PINES TRANSFER STATION	5TS	ISSUED	HARRIS
FCC MATERIALS RECOVERY FACILITY HOUSTON	5TS	ISSUED	HARRIS
K2 WASTE SOLUTIONS	5TS	ISSUED	LIBERTY
MATAGORDA COUNTY TRANSFER STATION	5TS	ISSUED	MATAGORDA
MID AMERICA CONTRACTORS LLC	5TS	ISSUED	MONTGOMERY
CITY OF HUNTSVILLE TRANSFER STATION FACILITY	5TS	ISSUED	WALKER
CITY OF HEMPSTEAD TRANSFER STATION FACILITY	5TS	ISSUED	WALLER

PARAGON SOUTHWEST MEDICAL WASTE	5WI	ISSUED	CHAMBERS
DUNHAM ENVIRONMENTAL SOLID WASTE INCINERATION FACILITY	5WI	ISSUED	COLORADO
UTMB GALVESTON SOLID WASTE INCINERATION FACILITY	5WI	ISSUED	GALVESTON
BLUE RIDGE LANDFILL GAS COMPRESSOR PLANT	9GR	ISSUED	BRAZORIA
SEABREEZE ENVIRONMENTAL LANDFILL	9GR	ISSUED	BRAZORIA
FORT BEND LANDFILL GAS TREATMENT FACILITY	9GR	ISSUED	FORT BEND
BLUE RIDGE LFG TREATMENT FACILITY	9GR	ISSUED	FORT BEND
COASTAL PLAINS LFGTE FACILITY	9GR	ISSUED	GALVESTON
GETTY SYNTHETIC FUELS GAS RECOVERY	9GR	ISSUED	HARRIS
ATASCOCITA LFGTE FACILITY	9GR	ISSUED	HARRIS
AMERESCO MCCARTY ENERGY LLC	9GR	ISSUED	HARRIS
SECURITY LFGTE FACILITY	9GR	ISSUED	MONTGOMERY
OLSHAN LANDFILL	9MR	ISSUED	HARRIS
MARGON PARK RESTROOM FACILITY	CP	ISSUED	BRAZORIA
CYPRESS CREEK GOLF COMPANY	CR	ISSUED	HARRIS
MATIAS ALMEYDA TRAINING CENTER	SUBT	ISSUED	HARRIS