FORT WORTH®

September 2017

2017-2037 Comprehensive Solid Waste Management Plan

RETHINKING WASTE For a Greener Fort Worth

GBB SOLID WASTE MANAGEMENT CONSULTANTS

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City of Fort Worth, TX, Comprehensive Solid Waste Management Plan

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1 Executive Summary

1.1 The City of Fort Worth as Part of a Larger World

Fort Worth, Texas, is one of the largest cities in one of the largest countries on a small planet. Fort Worth's people and its economy have measurable impacts on both the immediate and the larger environment. One of the main ways individuals and businesses impact their environment is by how they manage their municipal solid waste (MSW) or material resources: made up of waste, recyclable materials and residues. Waste that is disposed on land generates liquid and methane gas. Materials that are recycled are remanufactured into new products around the world. Residues that are recycled return beneficially to society.

It is no great revelation that the composition of solid waste—the types of materials we are generating and discarding—has changed significantly since the previous Fort Worth solid waste management plan was created in 1995. What is much more impressive is how much the waste stream has changed since 2008. The following figures show national trends in waste generation and characterization, with data from the U.S. Environmental Protection Agency. Figure 1-1, shows that while total generation of MSW (municipal solid waste) has been increasing—a function of population growth—the per capita waste generation has been decreasing. This is not a result of recycling, as these figures include all waste that is discarded. Rather, it is mainly the aggregated result of light-weighting. This is an industrial practice by which individual items—and particularly, their packaging—are becoming smaller and lighter in an effort to reduce production and transportation costs.

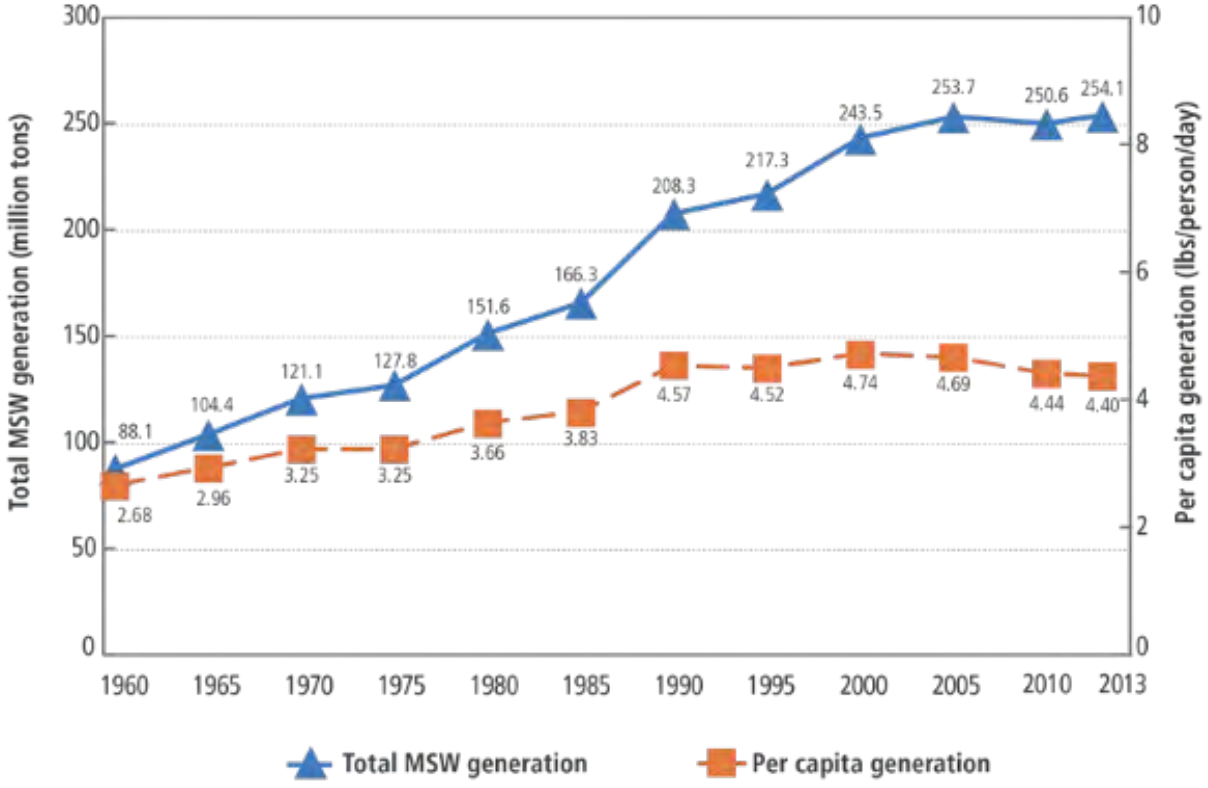


Figure 1-1 Total and Per-capita Waste Generation in the U.S., 1960 – 2013. Source: U.S. EPA

The next chart, Figure 1-2, shows that similar to waste overall, national tons of material recycled continues to increase. The percent recycling line shows that since 2005 the recycling rate has remained relatively flat. This means that while there are more tons entering the economy as commodities and feedstock, Americans have been recycling practically the same proportion of their waste for about ten years.

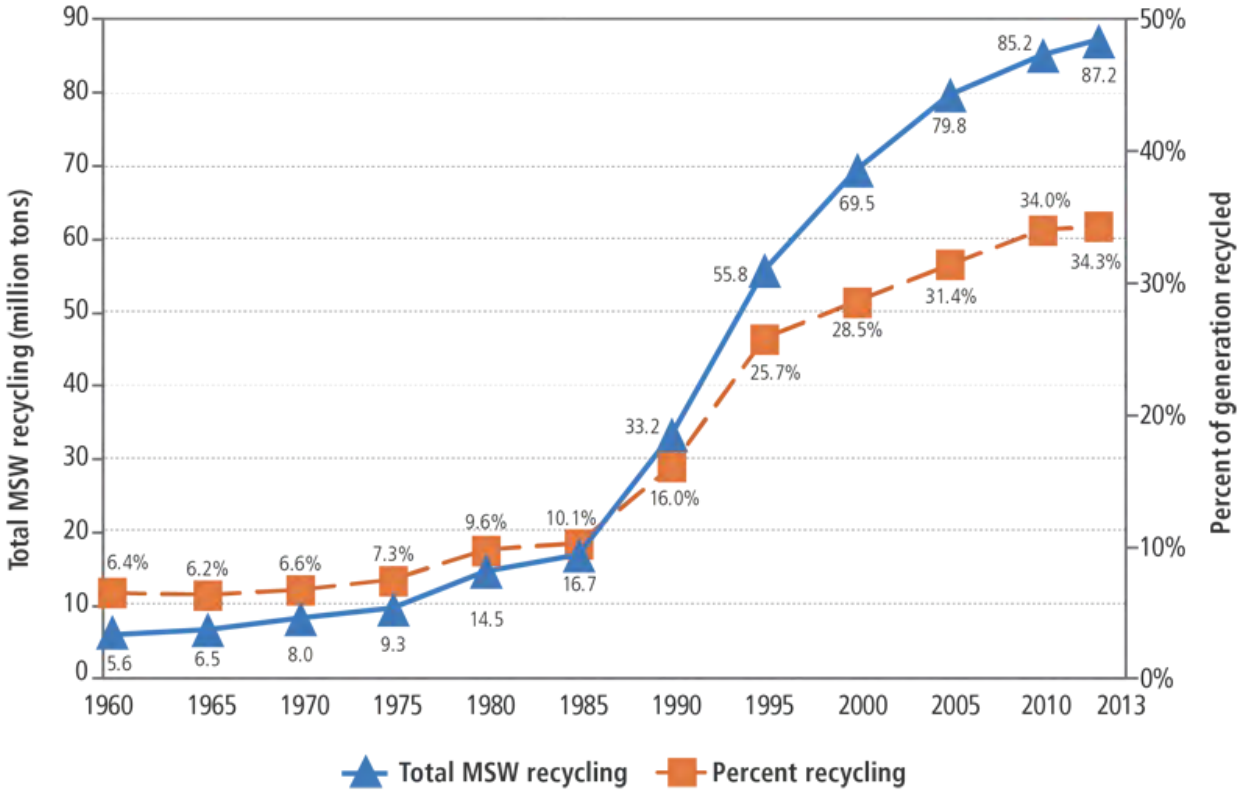


Figure 1-2 Total and Percentage Waste Recycled in the U.S., 1960 – 2013. Source: U.S. EPA

Beyond amounts and proportions, the composition of waste and of recyclables has changed dramatically. In general terms, in the material available for recycling, there is roughly twice as much plastic as in 2008 and half as much paper. This is critically important to understand, because it has been and will continue to fundamentally change the economics of waste recovery. Previously, paper was the revenue-based "bread and butter" of recycling businesses, and the production and recovery of newsprint was relied on to fuel the business. The precipitous decline in newspaper publication has decimated that line of business. Additionally, while valuable, the wide variety of plastics present in the waste stream makes them complicated to process, sort, and market. Furthermore, the recycled plastic markets have been more directly impacted by the drastic industry/market volatility of oil and petroleum resources, driving recycling revenues lower. Figure 1-3 shows the widely recyclable components of MSW; the vertical line indicates the 2008 timeframe.

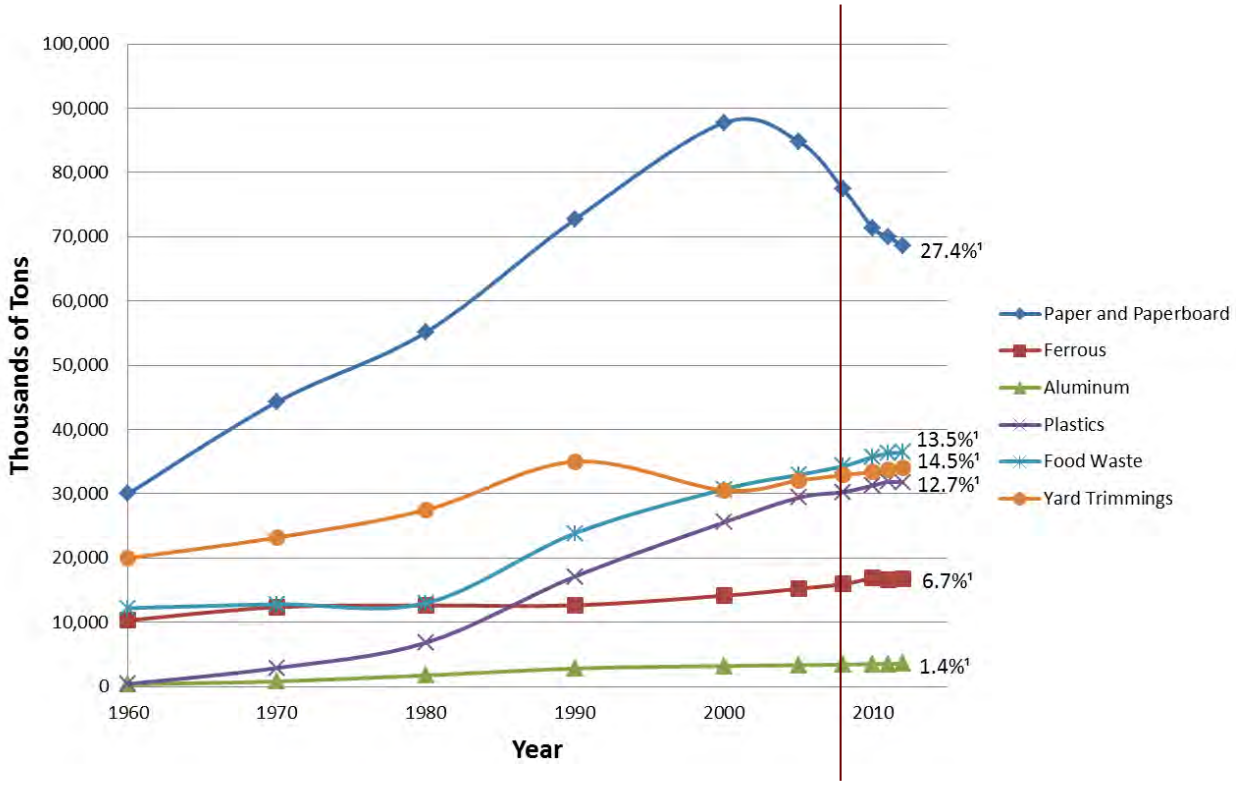


Figure 1-3 Partial Composition of Waste in the U.S., 1960 – 2013; Year 2008 highlighted. Source: U.S. EPA

Economies—and the related population surges—often develop faster than the ability of cities to manage the impacts. The management of solid waste is no exception. It is critical to have a comprehensive integrated approach to be effective and financially sustainable, and this approach needs to be developed in a manner that considers all aspects of the system, including waste reduction, storage, collection, transportation, processing and ultimate disposal.

1.2 Solid Waste Planning in Fort Worth

Beginning in 2014, the City of Fort Worth, Texas (the City) sought to create an updated plan to succeed the Fort Worth Solid Waste Management Plan – 1995-2015. Fort Worth's revised Comprehensive Solid Waste Management Plan (CSWMP) aims to perform several functions:

- Purposeful effort to re-think and re-evaluate the very notion of "waste";
- Comprehensiveness of approach to the management of Fort Worth's MSW, which deals with the city's MSW globally rather than with some of its sectors;
- Deliberate attempt to reflect upon the management of solid waste in Fort Worth from a systemic rather than an atomized way; and,
- Intentional goal of identifying and seizing potential synergies with other City departments and outside agencies.

As with its predecessor, this CSWMP has a 20-year planning horizon and should be reviewed and, if necessary, updated every five years.

Fort Worth Solid Waste Management Plan – 1995-2015

Overall, the City accomplished or fulfilled almost all of the goals set out in the previous plan. The goals could be generally categorized as Maintaining, Innovating, or Aspiring.

Maintaining: These are goals that called for continuing to provide a certain level of service and achieving certain benchmarks of performance.

- The City has maintained the once monthly service level for bulk collection, an above-average amount of access to this type of service. Program metrics indicated growing customer compliance with set-out instructions.
- The City has maintained service levels in the illegal dump cleanup program. 98 percent of incoming work orders are cleared within 3 days, exceeding the goal.
- Keep Fort Worth Beautiful is a premier Keep America Beautiful (KAB) affiliate engaging thousands of people.
- The City has maintained service levels in the dead animal cleanup program. 99 percent of all work orders are cleared within 24 hours.
- Throughout the 1995-2015 planning period, the City achieved a primary goal to maintain adequate disposal capacity, at reasonable rates, to meet long-term solid waste management needs.
- The 1995-2015 Plan stated a goal of providing "Quality service to residents." Surveys indicate that customers are satisfied with the solid waste services offered by the City. They also find the service level to be a good value to the price paid, more so than other utilities / basic services.
- The plan called for a "public information campaign" and public input on current and new programs. The City has executed such a campaign, and used surveys and public meetings to garner feedback from residents and customers.

Innovating: These were new programs or goals set out by the 1995-2015 Plan.

- The 1995-2015 Plan laid out goals and implementation steps for transitioning to collection of MSW in rolling carts. This program was completed and the transition successful.
- The 1995-2015 Plan noted that the City's state-approved Storm Water Pollution Prevention Plan called for the construction and operation of a permanent collection center for household hazardous waste/chemicals. The City has fulfilled this goal, with the development of the Environmental Collection Center (ECC).
- The 1995-2015 Plan established the goal that residents of apartments should have the same access to household hazardous waste collection centers that are available to residents of single family household. This was fulfilled, as these residents are allowed at the ECC and at the mobile events.
- The creation of the Grants of Privilege system was called for in the 1995-2015 Plan, and has since been completed.

Aspiring: These were goals that were not defined quantitatively. They can be evaluated only with regards to whether or not the City took any actions in the vein of the goal, and therefore "fulfilling" the goal does not necessarily indicate programmatic success or completion.

- There were nine recommended actions from the existing 1995-2015 Plan with regards to the industrial, commercial and institutional (ICI) sector. They mostly involved action statements like "encourage," "assist," and "incentivize," and the areas of focus included buying recycled content,

reducing waste, recycling, and composting. For seven of the nine actions (see "Program Evaluation" report), there was at least one effort made in fulfillment of the aspiration.

- The 1995-2015 Plan stated a goal to "assist" ICI organizations with waste management, within the context of customer service. The most direct outcome of this intention is the adoption and implementation of the multi-family recycling ordinance and the related outreach.

2017-2037 Fort Worth CSWMP

Planning Horizon

The following factors and assumptions were identified and considered when projecting the waste management needs for the City during the 2017-2037 planning period:

- The City anticipates considerable population and employment growth and, accordingly, significant growth in the generation of refuse and recyclables in both the residential and ICI sectors;
- The City will continue to provide all the services it currently operates or contracts for, including residential curbside collection of garbage, recyclables, and yard waste, along with outreach activities, drop-off station services, illegal dump clean up and litter abatement, and regulation of haulers;
- The City must improve current recycling rates and reduce recycling contamination at the curb;
- The Southeast Landfill (the SELF) has a projected facility life that is in flux, and the City must consider alternate and new options for disposal sooner rather than later;
- The region's material recovery facilities will continue to operate and be available for the City;
- The City will continue to report on its recycling and disposal tonnages to the North Central Texas Council of Governments and other industry entities, in the interest of data sharing; and,
- The City must investigate, evaluate, and support ways to increase recycling/waste diversion in the ICI sector to assure future landfill capacity.

Planning Areas and Actions

To provide comprehensive solid waste management, the City has used an approach that establishes clear service areas, intended actions, a timeframe for enacting them, and evaluation criteria during the planning stages with periodic updates and reviews. Below is an explanation of how the City strategizes to support and promote best management practices, highlighting some of the program and strategic actions and their components.

Services to Residents

The City is placing renewed and intense focus on improving recycling and waste diversion efforts at the curb. The following initiatives address this priority:

- Continuation of providing high-quality and responsive service on a weekly basis.
- Implementation of renewed efforts to reduce contamination of the source-separated recycling stream.
- Promotion of "right-sizing" collection carts, including migrating more customers to smaller, 64-gallon garbage carts and implementing use of larger, 96-gallon recycling carts.
- Encouragement of at-home or "backyard" composting by residents.
- Enforcing bulk and brush separation for curbside collection

The City does not provide services directly to multi-family residents; however, there are several actions in this CSWMP aimed at indirectly ensuring the residents of apartments and condominiums have as much access to recycling as do residents of single family homes.

Services to Industrial, Commercial, and Institutional Sectors

The City is seeking ways to actively encourage and incentivize recycling in the commercial sector.

- The City will use the Grants of Privilege process, such as the reporting requirements, to spread access to recycling for businesses and gather more information on the current conditions.
- The City is also planning to evaluate collection of food scraps from businesses for the purpose of diverting them to composting or anaerobic digestion.
- The City will seek to use permitting and development processes to divert more construction and demolition (C&D) material to recycling.

Services to the Community

This area of activity includes programs and policies that the City promotes regarding solid waste management in the larger community, both directly and indirectly. The City desires a greater proportion of the recycling rate arising from materials directed into single stream recycling bins (e.g. plastic, metal, glass, and paper) from all sectors, including when residents are away from home or when people are visiting from other communities.

- The City will devise goals and requirements that result in more diversion in public venues, pedestrian areas, and special events, while not burdening businesses unduly.
- The City will continue to provide exemplary service response to illegal dumping cleanups, litter abatement, and dead animal removal, and expand these excellent programs to accomplish more dumping and litter prevention in the first place.
- The City will continue to provide information and drop off services for hard-to-manage and potentially-polluting materials such as electronic waste, household hazardous waste, pharmaceuticals, and fireworks and ammunition. The City will evaluate ways to expand access to programs to encourage participation.
- The City will evaluate ways to support increased sustainable development, including environmental design considerations and C&D waste processing.

Solid Waste Management Facilities

The City is responsible for planning for the management of all solid waste generated in Fort Worth. The material is collected, processed, and disposed by a network of public contracts and private service providers, and therefore reducing the environmental impacts associated with solid waste management is dependent on public/private partnerships. To ensure that proper solid waste management is provided in a way that continually applies best practices for environmental impacts, the CSWMP lays out actions for the following:

- The City will assure that there is adequate disposal capacity available and reserved for materials generated in Fort Worth, either by contract or by creation of a new facility, which provides value for the cost involved.
- The City will evaluate options for ensuring the SELF, or another disposal facility, has capacity for secure disposal of the City's future (2035 – 2060 or beyond) solid waste during the planning period.

- The City will press for additional clean recycling and garbage collection vehicles, and to properly manage other sources of pollution such as landfill gas.
- The City will promote alternative sources of energy and the monitoring and reduction of emissions throughout the solid waste management process.

Solid Waste Services Division Activities

The Solid Waste Services Division (SWSD) is responsible for a variety of activities, contracts, reporting, and information management. The CSWMP provides actions and strategies to empower the SWSD to support the programs in the plan document. These include:

- Providing excellent and responsive customer service.
- Creating and implementing a high-quality outreach and education program that uses contemporary and up-to-date tools and technology to reach people where they are.
- Promoting waste reduction and reuse through messaging and programs, including charitable reuse, swaps, Master Composter programs, and education efforts.
- Promulgating, implementing, and enforcing regulations and ordinances which further the mission of the Division by setting the performance expectations and, when necessary, provide for consequences for noncompliance.

1.3 Public Participation

There are many attributes to an effective solid waste management system - the first is affordability. That doesn't mean the least expensive system, but the one that provides value at a cost that can be paid for by the users of the system. Even if the system is not funded by public dollars, the system will not work if it cannot be afforded by its users. Second, the legal framework for the development of the system needs to be well defined—what permits or approvals are needed, what are the limits for the emissions that are produced by the system—so that businesses and vendors know what is expected of them. Third, social acceptance of the system is critical. A system is made up of people, and they must see their values reflected and be willing to join the effort.

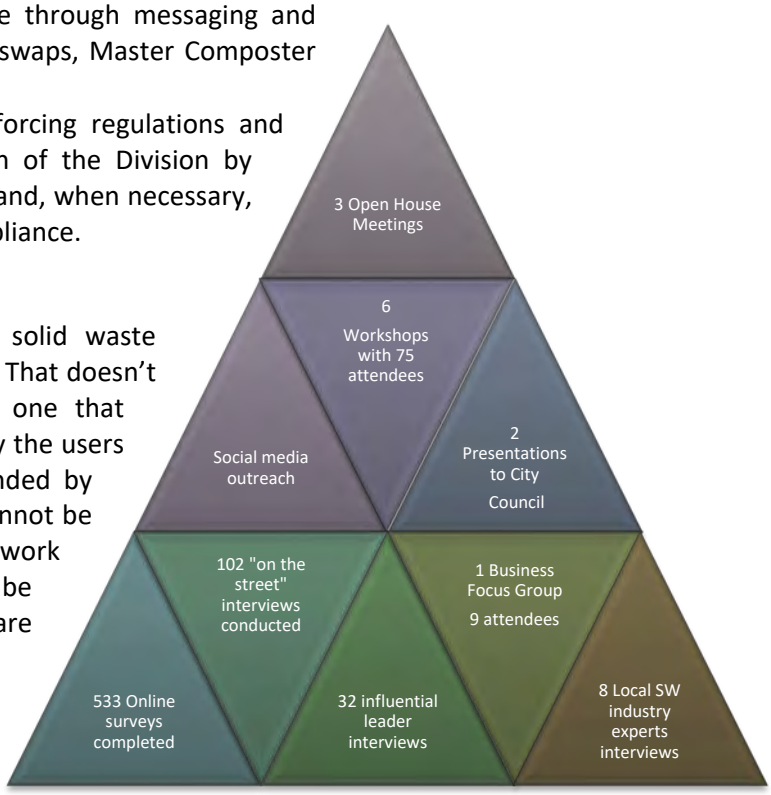


Figure 1-4 Outreach and Public Involvement Techniques from the 2015/16 City of Fort Worth CSWMP Process

From the initialization of the project, the creation of the CSWMP included substantial public input, as detailed in Chapter 2 - Introduction to the Project, Process, and Plan Document and in Appendix C - Outreach Efforts. Public input is critical to a solid waste management planning process because no program can succeed without public engagement. Even the best-designed and funded system cannot function if people do not participate. As shown in Figure 1-4 and in Figure 2-1, the City used several different avenues and technologies to reach out to residents and the community:

- Social media;
- An Online Survey of residents;
- "Man on the Street" Interviews;
- Public open house meetings;
- Business Focus Group;
- Subject specific workshops;
- One-on-One meetings with members of the Solid Waste industry;
- In-depth Interviews with business people, non-profit organizations, institutions, academia, elected officials and influential community leaders; and
- Public hearings

The City worked with the public at large, stakeholders, influential leaders, elected officials, other City staff, and industry consultants to contribute to the plan in thoughtful, meaningful ways. City staff and the consultant team agreed that an appointed advisory committee was not the most beneficial path to seek the community's input due to the nature of the new plan focusing on technical improvements and advances, instead of significant new and complex programs. In the most succinct terms, the public input reflected a City where people are concerned about conserving the environment and aware that their actions have impacts; at the same time, they are sensitive to the need to balance that with the realities of costs and capabilities.

2 Introduction to the Project, Process, and Plan Document

A comprehensive solid waste management plan is the cornerstone of integrated solid waste management, which addresses all aspects of waste from generation to final disposition. As consumer recycling systems mature, the characteristics of waste transforms, and technologies evolve that allow greater amounts and types of waste to be recycled, integrated solid waste management must consider an ever-widening sphere of influence. This is because integrated solid waste management and comprehensive plans do not only address collection, processing, recycling, and disposal. They also address business systems and financing, greenhouse gas emissions, generation and adoption of alternative fuel systems; they intersect with wastewater management and stormwater permits, school bus fleets, and sustainability objectives; and, the comprehensive solid waste management plan addresses what for many individuals in the community is one of their primary and most visible impacts on the environment.

The City of Fort Worth has a tradition of being proactive regarding waste management, going back almost 50 years. Fort Worth is dedicated to providing residents with opportunities to divert, recycle, and reuse. The concept is global in nature, going beyond customer service and the financial bottom line, as demonstrated in this statement:

We cannot keep losing our nation's valuable resources by using them once and burying them in a landfill forever. Fort Worth has to do its part by finding our own solution.

-Former Fort Worth Code Compliance Solid Waste Assistant Director Kim Mote

Increasingly, residents and businesses are thinking about their wastes. Residents reduce the amount of waste generation by bringing their own shopping bags to the store. Residents and businesses know that many materials can be reused or diverted and made into something new. Businesses and residents are interested in landfilling less material, and seek opportunities to recycle as much as possible. The City of Fort Worth is committed to making solid waste management an activity in which residents and businesses are active participants, not something that simply happens to and around them.

These aspirations of building sustainability, protecting the environment, and engaging people do not exist in a vacuum. There is an economic component, in that operations must have funding and also the programs have beneficial short- and long-term financial impacts. Therefore, the solid waste management plan must make provisions for business planning in addition to permitting and programming.

From one community to another, planning periods vary, with many in the 5- and 10-year range. A 20-year plan—the model adopted by Fort Worth—offers both greater strengths and challenges. A plan of this magnitude requires much more sophisticated analysis and financial projections and the foresight to accommodate future developments such as population or technology shifts. At the same time, a 20-year plan empowers the community to utilize long-term contracts for services and facilities—as Fort Worth has done previously—and thereby benefit from operational steadiness and stabilized costs.

Due to the long-term and wide-ranging implications of a comprehensive 20-year plan, substantial public outreach was required. An entire task (see below) was devoted to accomplishing this critical obligation. As a result, direct interaction was held with more than 750 individuals, and many additional people were reached via mass communications, including an updated page on the City web site, http://fortworthtexas.gov/swplan.

One of the foremost interests for the current process of solid waste planning in Fort Worth was to energize the commercial sector to reduce and recycle more waste. Residentially generated solid waste is estimated to account for only one-third of the waste generated in the City, while the commercial sector (which includes the multi-family properties) accounts for the remaining two-thirds. Advancing that goal, the first step was a new regulation issued on January 1, 2014, requiring multi-family properties (which are regulated similarly to businesses and institutions) to provide recycling. Multi-family properties have been since then required to submit recycling plans, with City staff to follow up on the plans with site inspections.

The new multi-family recycling regulation addresses some of the commercial sector recycling, but presently, there is no stated incentive or regulatory requirement for businesses to recycle in Fort Worth, and the City does not provide services to the business sector.[1] There are many businesses that do recycle, and some, like Miller-Coors and Coca-Cola, are leaders in waste management. There is, however, a sizable improvement opportunity that could reduce the volume of landfilled waste by more than a projected 19% from Fort Worth businesses. There are various ways to address this condition, and determining which methods would achieve the greatest diversion potential comprised a considerable part of the analysis conducted during the planning process.

As an intangible outcome of this plan, the City of Fort Worth will continue its position as an innovator not only in Texas but nationally. Diversion or recycling of 40 percent of waste is now commonplace in mature American recycling programs. Single stream collection, rolling carts for recycling, and differential pricing for waste carts otherwise known as “Pay as You Throw” (PAYT) of which Fort Worth was an early adopter, are now the best practice for communities far and wide. With its dedication to innovation and detailed comprehensive planning, Fort Worth can and will set the bar for the best in fiscally responsible and cutting-edge waste reduction, recycling, and disposal programs.

2.1 Competitive Procurement

In 2014, the City of Fort Worth began the work of updating the prevailing Fort Worth Solid Waste Management Plan – 1995-2015 (1995-2015 Plan) and started developing its new 2017-2037 Comprehensive Solid Waste Management Plan (CSWMP). The intentions of the new CSWMP, as presented to the City Council in January 2013, were to:

- Move from residential to global/all waste focus;
- Leverage emerging and sustainable technologies;
- Develop and implement strategies to foster market driven collection and diversion programs;
- Foster collaborative public/private partnerships; and,
- Develop a capital funding plan for new technologies and future infrastructure.

[1] The City does not provide collection services to the business sector other than such small businesses as may request to be added to the City’s residential collection program, utilizing rolling carts for trash.

A Request for Proposals was released in February 2014 to procure consulting services for creation of a CSWMP that would "ensure that the material handling and resource recovery of the solid waste collected in all sectors (residential and industrial, commercial and institutional (ICI)) is done in a logical, manageable, and cost efficient manner that takes into account the City's sustainability needs over the next 20 years."[2] In addition, the CSWMP was envisioned to "serve as a business planning document that identifies financial requirements, short- and long-term financing options, facility requirements, and program requirements for the coming two decades."[3]

In July 2014, Gershman, Brickner & Bratton, Inc. (GBB), was contracted to help the City develop a CSWMP to cover the 2017-2037 period, and to devise and manage a robust public input program throughout the planning process.

2.2 Task Management

This planning project was conducted using a Task Management approach, beginning with a Project Kickoff Meeting followed by the Data Request, with the ensuing work divided into Tasks and Subtasks.

- Project management: A combination of formal and informal communications and contact, regularly scheduled meetings, oversight of the interim work products, and other administrative tasks.
- Data gathering: Research and analysis of existing available planning related data and information which are pertinent to the alternatives development process. Included in the data gathering were socio-economic forecasts, land use projections and the previous 1995-2015 Plan and other relevant documents.
- Program evaluation: A detailed review of current City solid waste programs and initiatives for quality, efficiency, participation, cost performance, and achievement of any existing City goals. The program elements to be evaluated were identified and agreed upon among the Project Team members. Each element was described, assessed given available data, and evaluated through the lens of standing goals and standards, or industry and national best practices.
- Public involvement process: A successful CSWMP hinges on having the buy-in and participation from the community it serves. The public involvement process for this project was designed to ensure an understanding of stakeholder issues, attitudes, and expectations such that the CSWMP would best reflect community values and ideas. Stakeholders involved included residents, business owners, public officials, academia, policy makers and industry representatives. As described in further detail herein, the outreach involved surveys, interviews, workshops, open house meetings, online outreach, and a public hearings.
- Recommendations: Developed collaboratively with the consultant and the City, the recommendations for each of the areas analyzed during program evaluation ultimately became the action items for the CSWMP. The recommendations draw on feedback from the public input from the City, and solid waste industry experience, including best practices.

[2] City of Fort Worth, RFP No. 14-0071
[3] City of Fort Worth, RFP No. 14-0071

- Creation of the CSWMP: The Recommendations came to form the core of the CSWMP. Once they were finalized, "Recommendations" became "Actions," and an implementation plan followed, wrapping up the CWSMP into a final document.

- Disaster Debris Management Plan (DDMP): One of the critical services the City provides to its residents is the management of debris generated during a disaster – be it natural or man-made. The DDMP, which was developed as an integral part of the CSWMP, establishes the protocols for disaster response, identifying the roles and responsibilities of the various City departments and outside agencies involved.

2.3 Public input, Stakeholder Engagement, and Professional Solid Waste Management

As part of the development of Fort Worth's new CSWMP, the City conducted extensive public outreach for the purpose of garnering opinions and insight regarding the interest of the residents of Fort Worth in solid waste and other environmental issues.

As shown in Figure 2-1 (and in Figure 1-4, above), the City used several different avenues and technologies to reach out to residents:

A report on the activities and findings of the public outreach effort was submitted to the City and is attached to this document as Appendix C. Included in that Appendix are the outreach plan for the entire CSWMP process; survey instruments administered to the public; questionnaires prepared for the One-on-One interviews; presentations and materials distributed at Open Houses and Workshops; and, detailed results of responses and feedback, including electronic correspondence.

In general terms, the public outreach process identified that the following topics are of interest or important to residents:

- Nearly all of the residents agreed that "managing waste in the most environmentally responsible manner" is very important or critical to the City's future.

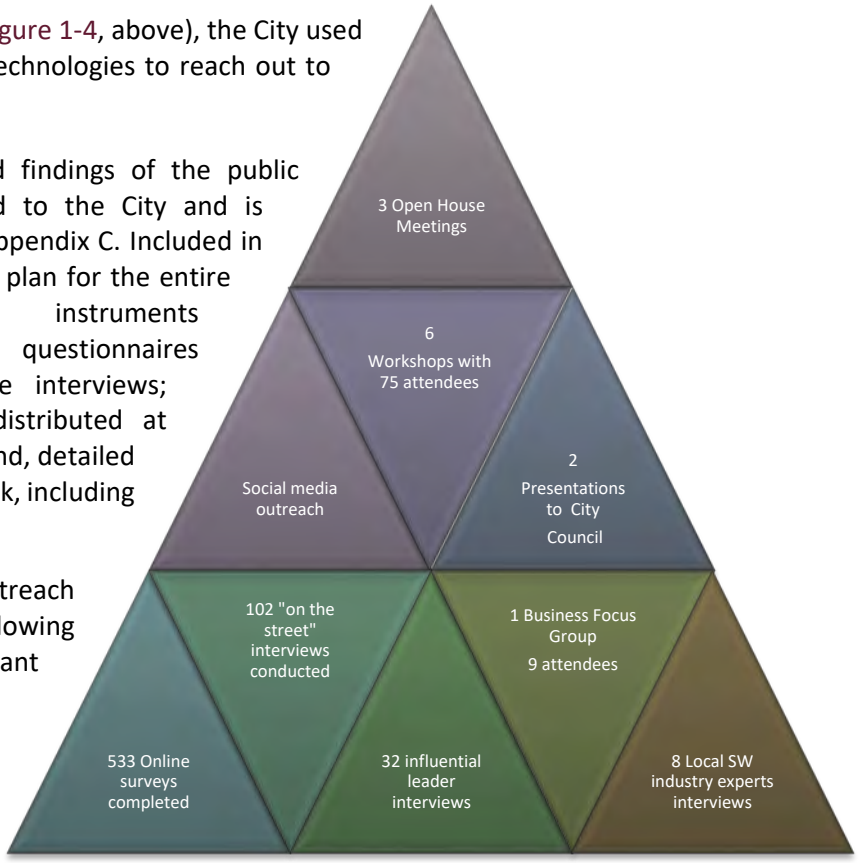


Figure 2-1 Outreach and Public Involvement Techniques from the 2015/16 City of Fort Worth CSWMP Process

- Most of the businesses felt that there is a connection between waste management and the City's economy because it influences quality of life.

- By almost 2-to-1, residents prioritized public space recycling bins and increased recycling efforts at businesses as tools to increase recycling overall. Less than half of the residents prioritized changes to the curbside program that would encourage waste reduction, and lesser priority was given to food waste separation.
- Recycling is viewed by residents as an important environmental issue; however, residents viewed air quality, litter, and water conservation as more pressing (see Figure 2-2, below). In open workshop discussions, residents expressed concern about recycling being a "value" for Fort Worth, and many people stressed the importance of recycling education at all levels, especially for youth. Businesses talked about companies who have adopted "green" as a corporate tenet.
- Businesses said recycling was important, but qualified that many businesses are too busy to care or want an economic incentive to recycle.
- When asked what is the hardest thing about recycling at their locations, businesses lamented that "people don't care," and cited problems with implementing a system such as not having space for containers and having to rely on individuals to carry recycling to their homes due to lack of service. They also noted that turnover means education is a never-ending process, even for people who are engaged. In a later question, several of the businesses noted that recycling always gets "pushed down" below other priorities and demands on their time.
- Businesses indicated that the potentially-recyclable materials they were most likely to generate were cardboard, paper, and batteries.

In the surveys, residents were asked to give open-ended answers to the question, "What are the three most important environmental issues facing Fort Worth?" Their answers were consolidated under summary headings such as "recycling," or "water supply/conservation," and weighted by the respondents' rankings. As shown in Figure 2-2, indicated in colored data labels, the highest priorities were recycling, litter, clean air, and water conservation.

A successful CSWMP hinges on having buy-in and participation from the community it serves, as well as the City's Leadership Team: Mayor, City Council, City Manager, various Department Directors all the way down to individual employees. The outreach activity undertaken in this planning process helped assure that the City heard from a broad and diverse group of stakeholders comprised of residents, business owners, public officials, academia, policy makers and industry representatives. Stakeholder opinions, ideas, attitudes, and engagement provided context and perspective when developing the elements and direction of the CSWMP.

In general, stakeholders identified that the following topics are of interest and/or important to the community:

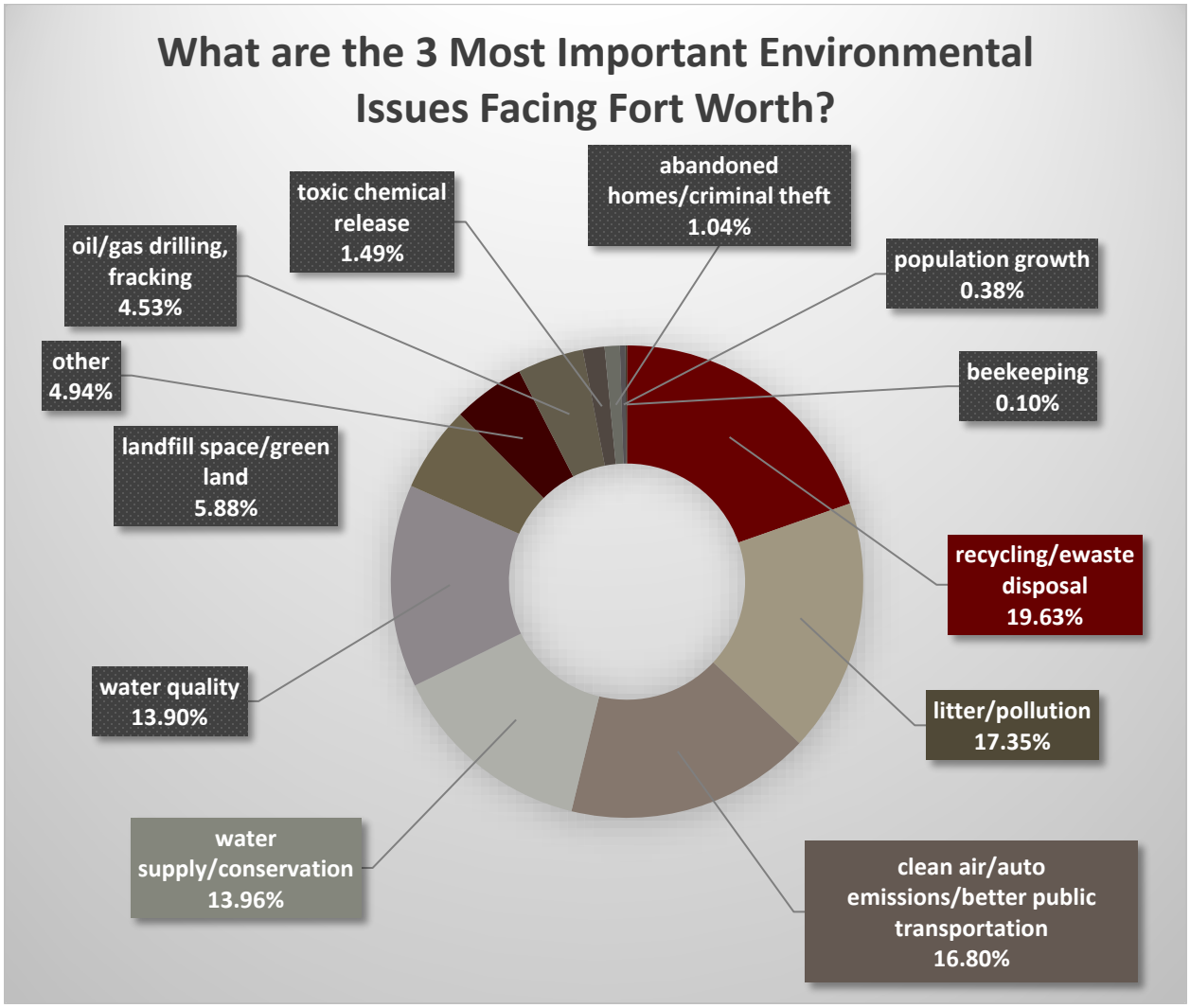


Figure 2-2 Environmental Issues Prioritized by Fort Worth Residents in Surveys, Summer 2014

Regarding the residential sector:

- The City should consider adding used clothing/textiles to curbside (i.e. like SimpleRecycling), partnering with charities; additionally promote the use of the public space "Recycle on the Go" bins.
- The City should change large bulk and brush collection services by separating bulk from large brush so the brush can be routinely recycled (i.e. either mulched or composted).
- Removing glass from single stream curbside recycling cart is acceptable; implement glass drop off location opportunities instead for recovering cleaner materials to market.
- Cart repair requests need to be enhanced: by online requests; by reports from staff and route drivers; in addition to just calling in by residents.
- Carts need instructions added to give clear direction and educational information to households; idea: replace current lids with lids with educational messaging.

Regarding the Institutional/Commercial/Industrial (ICI) sector:

The City should:

- Consider food waste separation and recycling at City and school facilities.
- Consider uses for contaminated wood waste.
- Develop a reward/tax credit incentive for businesses to recycle.
- Develop a recycling ordinance for the ICI developed through the Chamber of Commerce and Real Estate Council; have focus groups through the Chamber and Real Estate Council.
- Promote documented success stories, perhaps give recycling awards.
- The City should consider developing a public-private partnership project for source-separated food waste, working in partnership with other nearby cities, e.g. Arlington and Irving.
- Develop a requirement for food waste separation and collection in the City; having something in place like Massachusetts, Connecticut, and Rhode Island do at state level.[4]
- Consider developing permit requirements with large deposits that are refunded if recycling of C&D materials is confirmed—i.e. City of Plano, TX or the California approach.
- Create incentives for increasing commercial recycling.
- Determine how Miller-Coors got to zero waste at the landfill, identify other businesses in Fort Worth that are at or have achieved similar goals and share their stories.
- Develop commercial recycling education materials and outreach should be bilingual with English and Spanish.
- Give attention to multi-family properties recycling with additional trained staff members.
- Increase Grant of Privilege percentage, perhaps tiered to provide incentive for diversion; have funds go direct into solid waste enterprise fund and not general fund.

Regarding solid waste in general:

The City should:

- Encourage greater diversion of reusable furniture and bulk by increased partnerships with charities, businesses and schools.
- Have stronger education and positive reinforcement to promote better and more recycling.
- Evaluate opportunities for composting including organics/food scraps and biosolids that are currently being land applied.
- Create specifications for the City utilization of recycled concrete in its public works, including trench bedding, to foster new markets for recycled concrete.
- Create alternative channels for pharmaceutical waste management. Most of the waste is flushed down the drain/toilet now causing issues at the Waste Water Treatment Plant (WWTP).
- Develop robust awareness, education and communications needed with results of CSWMP; use automated calling.
- Study the feasibility of converting the SELF into a bioreactor landfill by means of leachate recirculation– similar to the City of Denton landfill.
- Determine if biosolids management by means of composting can be combined with MSW management.

[4] These states are in the process of considering or implementing various degrees of banning food waste from disposal.

2.4 Implementing the CSWMP as a "living document"

The CSWMP is, in many ways, a discussion of how the City has and will impact and affect various components of the solid waste management system, and sets goals for those efforts. The City intends to have positive and lasting effects via the CSWMP, in the following:

- Residential collection;
- ICI sector services;
- Public space recycling and waste diversion;
- Organics diversion;
- Special wastes recycling;
- Reuse and diversion;
- Material and energy recovery;
- Disposal;
- Sustainability efforts;
- Extended producer responsibility; and,
- Public education

City laws and SWSD policies affecting solid waste were evaluated for effectiveness, best practices, and the extent to which they accurately reflect the intentions and programs the City has or intends to implement. Recommendations were developed accordingly, and transformed into action statements with implementation plans.

Solid waste management is undergoing structural changes, regionally and nationally, which impact local solid waste management issues and programs. Yet, all local solid waste decision-making takes place, ultimately, in a unique sociopolitical climate. To ensure the greatest likelihood of new program success, it is crucial to determine the needs and concerns of the many stakeholders involved. This view to the past, the present, and the long-term, produced a CSMWP document that empowers the City to provide the best services and systems to the residents. In this way, by laying the groundwork for ideas that may not be implemented for fifteen or more years, the CSWMP is a "living document" that continues to serve the City's changing needs over time.

2.5 Comprehensive Solid Waste Management Plan Structure and Implementation

All of the program analysis in the CSWMP document, including Program Evaluation and Recommendations, is organized by the following service areas and activities:

An evaluation was conducted on each of the City's programs with the service areas listed above and the results of that evaluation are discussed in Chapter 3 – Evaluation of Program Elements. Accompanying each program were:

Program Description
Brief description of the program element, including services, operations, and dimensions; and, qualitative information about the program performance, participation, etc.

Program Evaluation
Includes identification and description of any existing goals or standards which were applied, such as from the previous 1995-2015 Plan, the City budget document, Texas state goals, or industry standards, and how the program compares.

Chapter 4 – Incorporated Data details the incorporated data that was utilized in the development of the CSWMP. This is information about Fort Worth that influences solid waste generation and management. It includes demographics like population, economic factors such as employment and land use, and less tangible factors such as history, culture, and geography.

Chapter 5 – Present and Future Resources describes the solid waste management facilities available to the City now and over the course of the CSWMP planning horizon. This includes briefly addressing available facility capacity for disposal and for processing of recyclables and organic material. It also talks about possibilities for future system developments. More in-depth discussion of the facilities is included in the Program Evaluation in Chapter 3 and in the Recommendations in Chapter 6.

Chapter 6 – Identification and Evaluation of Recommendations provides the recommendations for the CSWMP. As in the Program Evaluation content, each service area was populated by the City's programs. Accompanying each program are:

Recommendations
Recommended course of action, including any new goals or standards associated with the recommendations and how the new goals should be evaluated.

Impacts Analysis
Each recommended course of action was analyzed with regards to its impacts on policy or regulations; potential landfill diversion; economics; and other possible factors such as jobs creation or greenhouse gas emissions.

Implementation Schedule
Each recommendation was identified for implementation in the Short-term (1-5 years), Mid-term (6-10 years) or Long-term (10-20 years).

In Chapter 7 – Strategic Planning, there is a discussion of the importance of strategic planning and several of the CSWMP actions are featured. The role of planning in the City of Fort Worth government is presented, and the lasting positive impacts that best practice planning can effect.

The recommendations from Chapter 6 have been transformed into actions, and implementation plans for each adopted recommendation are laid out in Chapter 8 – CSWMP Implementation. As in other chapters, the actions are organized by program and by service area. The information is presented in tables as follows:

Program Name			
Actions	Resources needed	Responsible Party	Implementation Timeframe
Brief description of the action; more detail can be found in Appendix C	Funding, staffing, facilities, etc. Will be in general terms.	Party or parties responsible for implementing the action. Subject to change.	Short-, Mid-, or Long-term

Finally, Chapter 9 - Performance Assessment and Plan Updating establishes the criteria for and frequency of the recommended plan evaluation and updating. Intentionally designed as a self-correcting, dynamic plan, the CSWMP sets internally the methods for its renewal.

3 Evaluation of Program Elements

Each program element in the solid waste management program was identified as being part of one of five operational categories. The categories are primarily identified as three service sectors (services to Residents; services to Industrial, Commercial and Institutional (ICI) sectors; and services to the Community), along with solid waste facilities and internal agency operations. Data for the purposes of evaluation came directly from City sources, and most goals or standards came from the 1995-2015 Plan or other City sources. Any external standards are based on the United States Environmental Protection Agency (EPA), established industry sources, and from common knowledge of exemplary programs.

The analysis was provided in a detailed report to the City, which involves an evaluation of current City solid waste programs and initiatives for quality, efficiency, participation, cost performance, and achievement of any existing City goals. The program elements to be evaluated were identified and agreed upon among the Project Team members. Each element was assessed given available data, and evaluated through the lens either of standing goals and standards or industry and national best practices.

The report is provided in its entirety as Appendix D – Program Evaluation Report.

4 Incorporated Data

This section presents information pertaining to Fort Worth, such as population, housing concentrations, geographic conditions, economic growth and development, markets for the reuse and recycling of materials, and transportation conditions. This content excerpts several information and data points from the City's 2016 Draft Comprehensive Plan, and uses such data to project waste generation. Other sources of data for projections include the U.S. Census Bureau; the North Central Texas Council of Governments (NCTCOG); a waste characterization study conducted for the City by GBB in 2014; and, the U.S. Environmental Protection Agency (U.S. EPA). All are referenced and cited accordingly.

4.1 City History[5]

The area in and around Fort Worth was inhabited by Native Americans long before the first settlers established a fort near present-day Birdville in 1840. Fort Worth's slogan of "Where the West Begins" dates back to this time, when a boundary treaty was negotiated with the native people to remain west of a particular map line. The town that became Fort Worth arose from civilian activities when the actual fort was vacated in 1853. Fort Worth was incorporated in 1873 with a population of 500.

Fort Worth's economic growth was fueled by its location on the Chisholm Trail, a major route for driving cattle from the grazing lands to the markets and railheads in Kansas City. In 1876, the railroad reached Fort Worth, transforming it from a waypoint on the cattle drives to the trail's end. The first stock show was held in 1886, and well over a century later, the historic stockyards and surrounding business area remain as a prominent feature in the City.

The City continued to grow and develop. From 1890 to 1900, the population increased by more than 20,000 people, from about 6,600 to more than 26,600. Building on the stockyards, the meat packing industry came to town, and by the 1910 census, the population increased by nearly another 50,000, to over 76,300.

In the years between World War I and World War II, Fort Worth continued to grow rapidly, benefitting greatly from the oil boom. Investments were made in infrastructure such as hospitals, water supplies, highways, and cultural resources. World War II brought aeronautics to Fort Worth, and over 3,000 B-24 Liberator bombers were built in the city during the war.

From 1940 to 1960, Fort Worth grew at an astronomical rate of roughly 100,000 people between each census-taking. Changes in the downtown core and the decentralization of the livestock marketing industry made it clear that Fort Worth needed to plan aggressively for its future. City leaders and businesses continued to seek long-term economic drivers for the area during the 1960s and 1970s, with fixtures such as the opening of the Dallas/Fort Worth (DFW) Airport, the Tarrant County Convention Center (now known as the Fort Worth Convention Center), the Amon Carter Museum, and the Kimbell Art Museum.[6] In the 1970s, a second oil boom in North Texas again benefitted Fort Worth.[7]

[5] Unless otherwise noted, historical information in this section was sourced from information compiled at http://fortworthtexas.gov/about/history/,

[6] Texas State Historical Association, https://tshaonline.org/handbook/online/articles/hdf01 and https://tshaonline.org/handbook/online/articles/dif04, retrieved March 30, 2016.

[7] https://en.wikipedia.org/wiki/Fort_Worth,_Texas#Late_20th_and_early_21st_centuries

Technological developments in 2007 began opening up the possibility of tapping the Barnett Shale beneath Fort Worth for natural gas production.[8]

The City of Fort Worth now encompasses 353 square miles and is part of the 13-county Dallas/Fort Worth Metroplex, which covers 9,286 square miles and has more than 7 million residents. This is the fastest-growing metro area in the U.S., the largest in the South, and the largest landlocked metropolitan area in the country.[9]

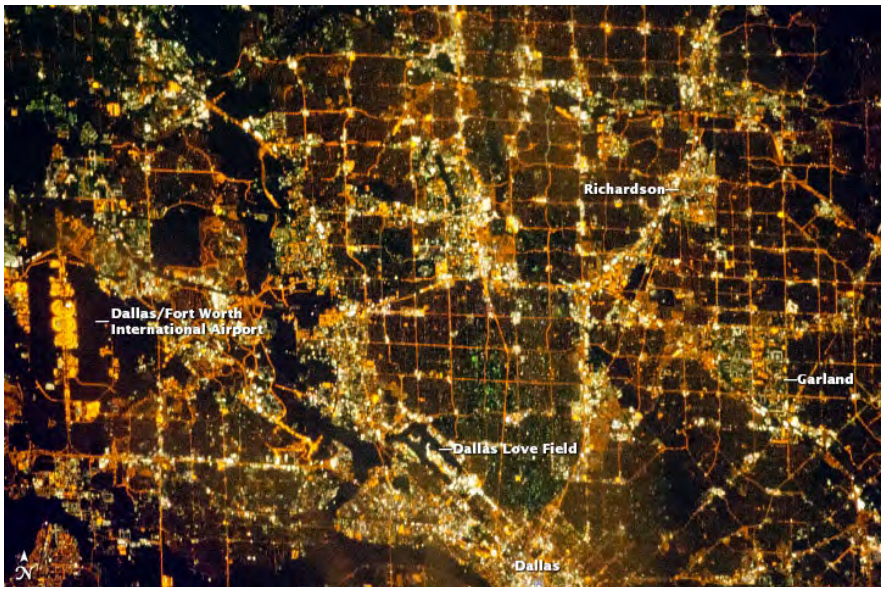


Figure 4-1 Nighttime view of DFW Metroplex from space, by NASA Astronaut, provided to the public domain courtesy of NASA

4.2 City Description

Fort Worth is served directly by DFW International Airport, and also by Dallas Love Field, plus several private/commercial aviation airports and airfields like Meacham and Spinks. Amtrak train service connects Fort Worth to Oklahoma City, with limited stops in between. Also, Amtrak's *Texas Eagle*, which traverses the Midwest from Chicago to San Antonio, passes through Fort Worth daily; three times per week, the *Texas Eagle* connects directly to the *Sunset Limited*, which connects New Orleans and Los Angeles. There are four Federal highways through Fort Worth (I-20, I-30, I-35W, and I-820), two U.S. highways (Route 287 and Route 377), and a large network of Texas state highways and local roadways. Public buses serve the City, along with a commuter railway connecting downtown Fort Worth to downtown Dallas.[10]

The City has long used annexation to grow with infill, and increase planned for five-year periods on a rolling basis.[11] This system allows for planned and more-orderly expansion of critical services. The map in Figure 4-2 is from the draft City's 2016 Comprehensive Plan shows developed land in Fort Worth and the immediately surrounding areas, known as "extraterritorial jurisdiction." Abbreviated "ETJ," this is "the unincorporated area that is contiguous to the corporate boundaries of the municipality."

[8] https://en.wikipedia.org/wiki/Fort_Worth,_Texas#Late_20th_and_early_21st_centuries
[9] https://en.wikipedia.org/wiki/Dallas%E2%80%93Fort_Worth_metroplex
[10] https://en.wikipedia.org/wiki/Fort_Worth,_Texas
[11] http://fortworthtexas.gov/annexation/

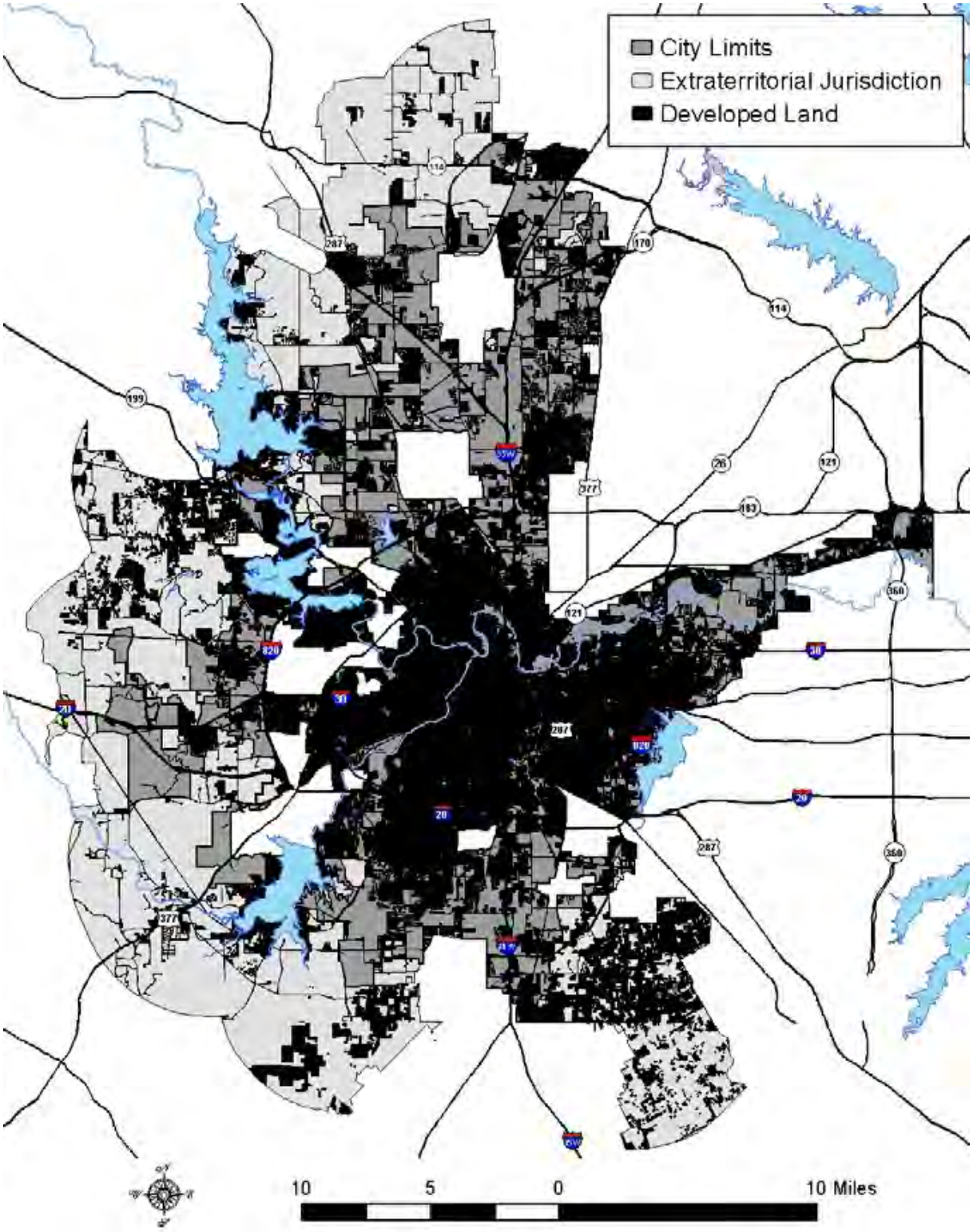


Figure 4-2 Developed Land in Fort Worth and its Extraterritorial Jurisdiction, 2005
Source: 2016 Draft Comprehensive Plan

The ETJ around Fort Worth extends for 5 miles beyond its boundaries,[12] and the City has authority over development within the ETJ.[13] In Figure 4-2, above, the darkest color indicates developed land; the medium color is land within the City limits not yet developed (approximately 27 percent of the area), and the lightest color is the ETJ. Future job growth in Fort Worth will likely be linked to this undeveloped or underutilized land and the mostly vacant areas in the ETJ. The details of the acres of each type of use are shown in Table 4-1. The map in Figure 4-3 (next page) shows the planned land use for the next 20 years. This shows how the land uses extend into the ETJ.

Table 4-1 2010 Land Use (Acres); Source; NCTCOG

2010 Land Use	Acres
Single Family	43,469
Multi-family	3,960
Other Residential	2,634
Commercial and Industrial	24,096
Institutional/Semi-Public	7,375
Infrastructure	42,249
Dedicated Areas (Parks, Flood Plain)	20,225
Water	6,147
Under Construction	824
Vacant	70,661 (31.9%)
Total Acres	221,638

[12] Unless such area abuts to another municipality.

[13] http://fortworthtexas.gov/uploadedFiles/Planning_and_Development/Planning_and_Design/Annexations/annexation-faq.pdf

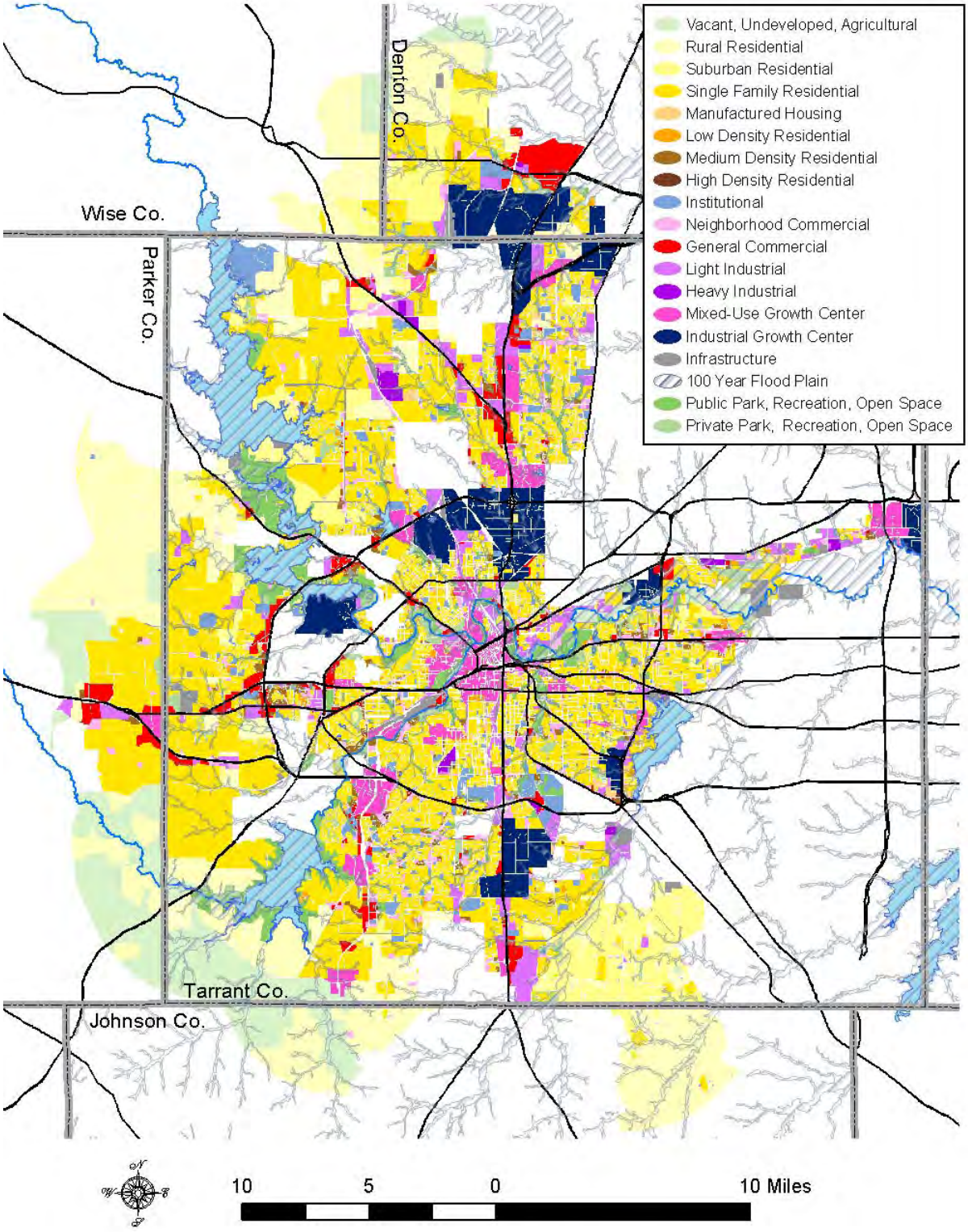


Figure 4-3 Future Land Use in Fort Worth
Source: 2016 Draft Comprehensive Plan

4.3 Economic Growth and Development

One of the greatest factors in determining solid waste generation is employment. Fort Worth is in a long-term economic growth phase, and the daytime population of 880,002 people means that for each actual resident, there are 1.18 jobs in the City.[14] The jobs growth has been spread across the City, as shown in Figure 4-4. According to the North Central Texas Council of Governments' employment forecast, employment in the City of Fort Worth will continue to rise by 2.5 percent, reaching approximately 900,000 jobs within the city limits in 2040.

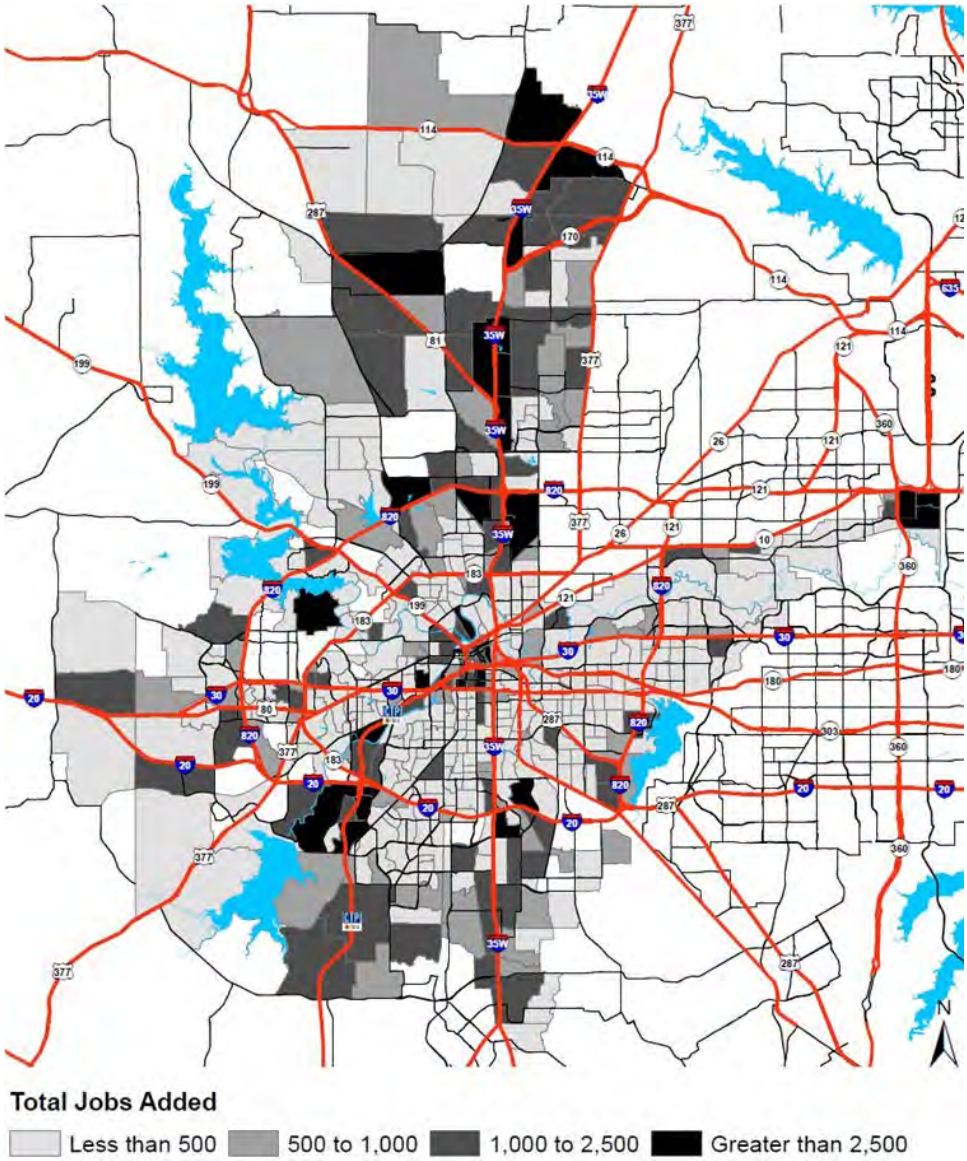


Figure 4-4 Employment Change in Fort Worth 2015-2040;
Source: Draft 2016 Comprehensive Plan and NCTCOG

[14] NCTCOG, 2014

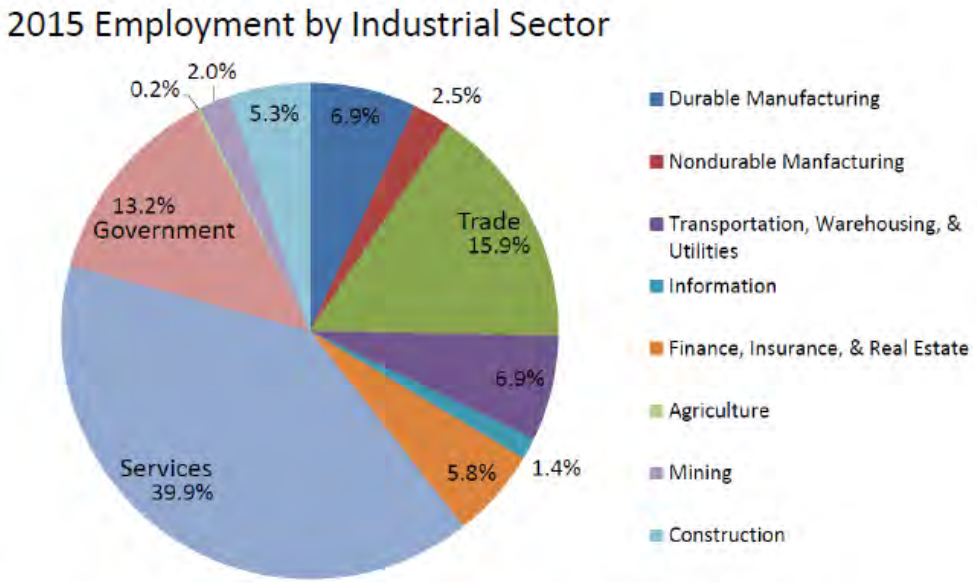
As shown in Table 4-2, employment is spread across a variety of employer types, including businesses, government agencies, and non-profit organizations, with no sector constituting more than a quarter of the employment.

Table 4-2 Employees on nonfarm payrolls by industry supersector, Fort Worth-Arlington, TX Metropolitan Division, not seasonally adjusted, March 2016. Source: U.S. Census Bureau[15]

Total nonfarm employment	1,001,400
Mining, logging, and construction	69,100
Manufacturing	94,100
Trade, transportation, and utilities	244,200
Information	11,500
Financial activities	56,400
Professional and business services	113,000
Education and health services	129,200
Leisure and hospitality	112,500
Other services	36,200
Government	135,200

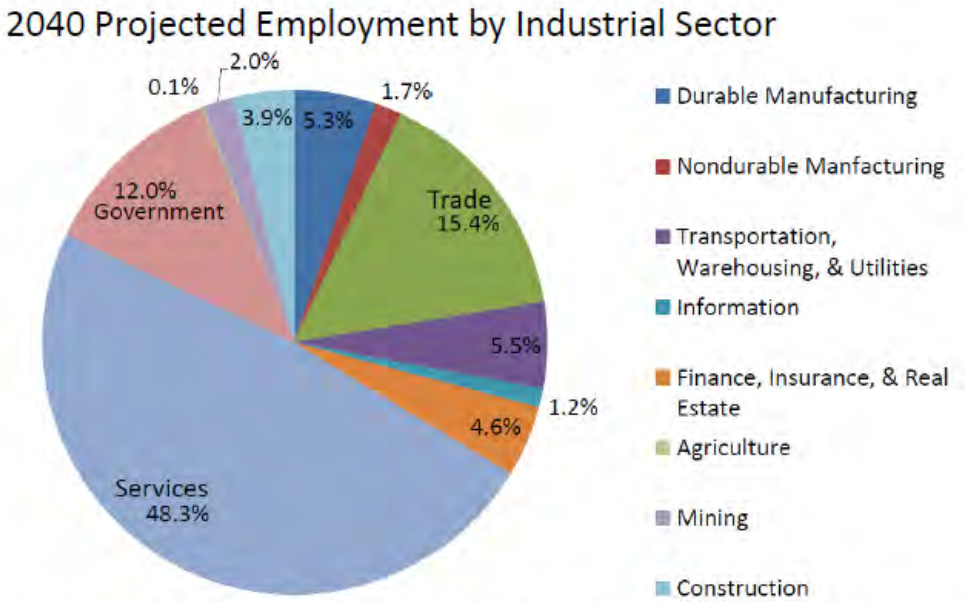
Employment in Fort Worth is diverse and projected to grow an average of 2. 3 percent annually from 2015 through 2020, an increase of 160,061 jobs. Projecting that trend out to 2040 produces an increase of 1,048,903 total jobs from 2015 to 2040.[16] Job diversity can also be tracked by looking at the employment by North American Industry Classification System, also known as the NAICS code. This is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. Approximately 64 percent of wage and salary workers are currently in the services, government, and trade industries. Over the long-term forecast horizon, those three sectors will account for almost 70 percent of employment in the Fort Worth-Arlington Metro Division, as shown in Figure 4-5 and Figure 4-6.

[15] http://www.bls.gov/regions/southwest/news-release/areaemployment_dallasfortworth.htm
[16] 2016 Draft Comprehensive Plan



Services and Trade were the largest employment sectors in the Fort Worth-Arlington MD in 2015. (*Source: Perryman Group Inc., 2015, Fort Worth-Arlington Metro Division*)

Figure 4-5 Employment by Industrial Sector; 2015,
Source: 2016 Draft Comprehensive Plan



Services and Trade are forecast to remain the largest employment sectors in the Fort Worth-Arlington MD in 2040. (*Source: Perryman Group Inc., 2015, Fort Worth -Arlington Metro Division*)

Figure 4-6 Employment by Industrial Sector; 2040 Projected,
Source: 2016 Draft Comprehensive Plan

As shown in Figure 4-7, median family income for the Fort Worth-Arlington HUD Metro FMR Area increased from $60,100 to $70,500 between 2001 and 2015, an average annual increase of 1.4% over the 15-year period.

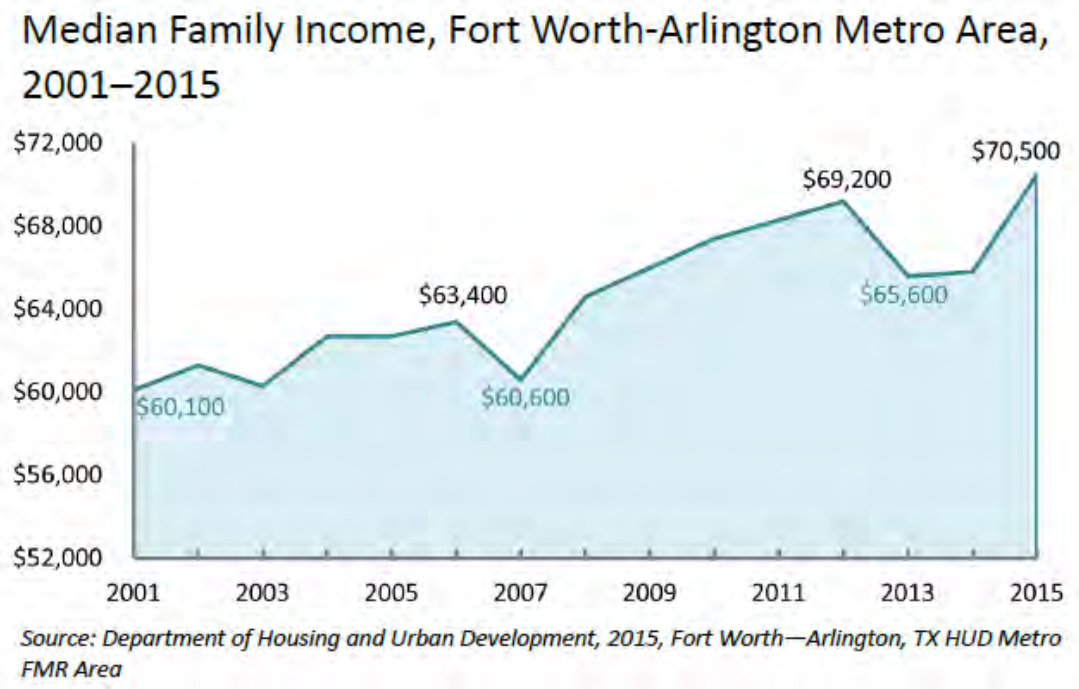


Figure 4-7 Growth of Median Family Income, 2001-2015; Source: 2016 Draft Comprehensive Plan

4.4 Demographics

As described previously, the population of Fort Worth has been in a "boom" cycle of growth, and barring unforeseen circumstances, that growth is not expected to abate. This is due in part to the fact that Fort Worth has room to annex and expand into its Extraterritorial Jurisdiction (ETJ), whereas some other municipalities in the region cannot grow any further in area. Forecasts released by the NCTCOG project that the City's population will reach approximately 1.38 million by 2040 and is expected to exceed one million between 2025 and 2030.[17]

[17] Sources: U.S. Census Bureau, 1950-2014; North Central Texas Council of Governments, 2015; Planning and Development Department, 2015.

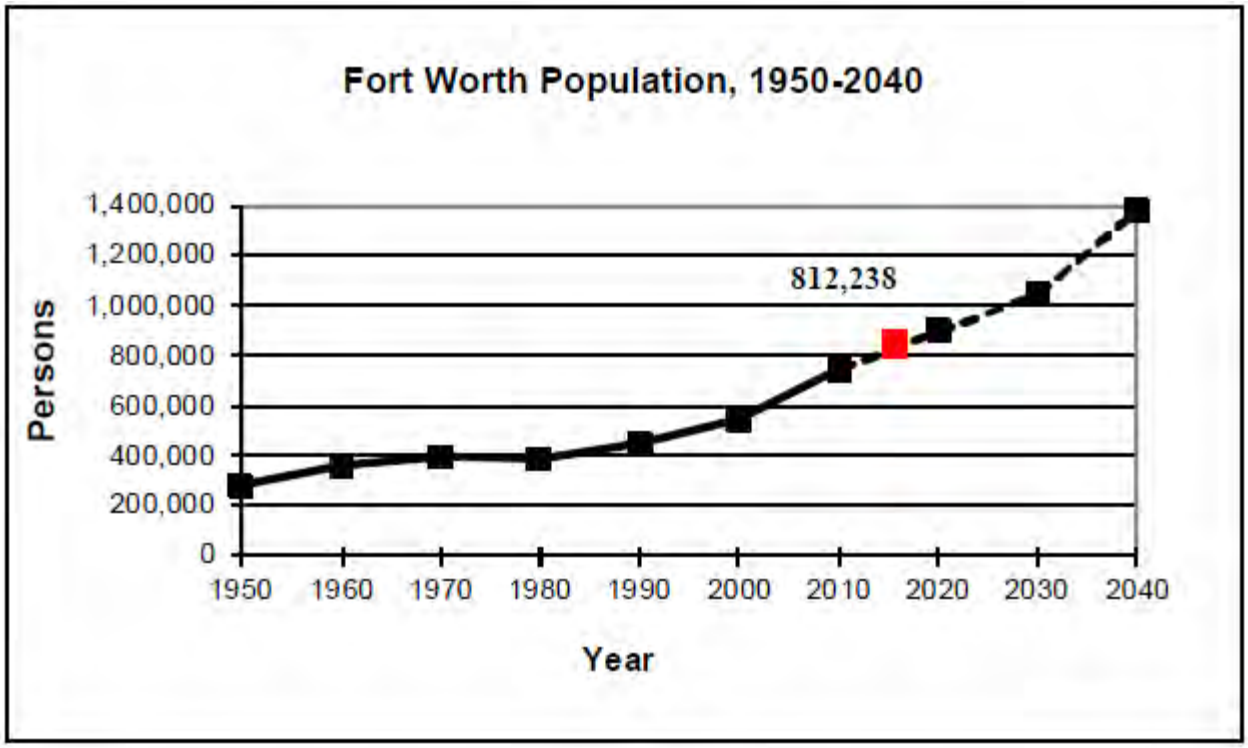


Figure 4-8 Historic and Projected Population of Fort Worth; Source: 2016 Draft Comprehensive Plan

Population data is an important part of estimating future waste generation, as current data can be used to help predict future activity.

4.5 Waste Generation and Composition

To create the following waste generation projections, the following assumptions and data were used:

- Population forecasts from NCTCOG;
- 2015 residential pounds per capita waste generation figures, calculated by the City of Fort Worth based on its collection customers;
- Composition data from the waste characterization conducted by GBB;
- Employment forecasts from NCTCOG;
- Employment by North American Industry Classification System (NAICS) code, based on current data from NCTCOG; and,
- Waste generation rates by NAICS code, based on industry-standard figures produced by CalRecycle.

This method yielded a residential generation projection (including multi-family residents) and a commercial generation projection (including businesses and institutions). Combined, they represent the waste generation for the City. Additionally, future composition of the waste stream was estimated using the following:

- The projected tonnages from the above generation modeling;
- A waste characterization study conducted in Fort Worth in 2014; and,
- A composition model developed by Gershman, Brickner & Bratton, Inc.

The figures and tables below show the project waste generation and composition for the planning period of this plan. As a comprehensive plan for an integrated solid waste management system, this plan and the City are responsible for ensuring this material is properly collected, transported, sorted, diverted, recovered, and disposed in a way that protects air, soil, water, and people.

Figure 4-9 shows projected residential generation. It is based on a historic average tons per year (TPY) per capita (i.e., per person) rate of 0.391 tons, derived from actual reporting in the years 2010 through 2015, projected across the extrapolated population figures generated by the NCTCOG, the City of Fort Worth, and the U.S. Census Bureau. The projection shows that residential generation will increase by less than 80,000 TPY by the end of the planning period.

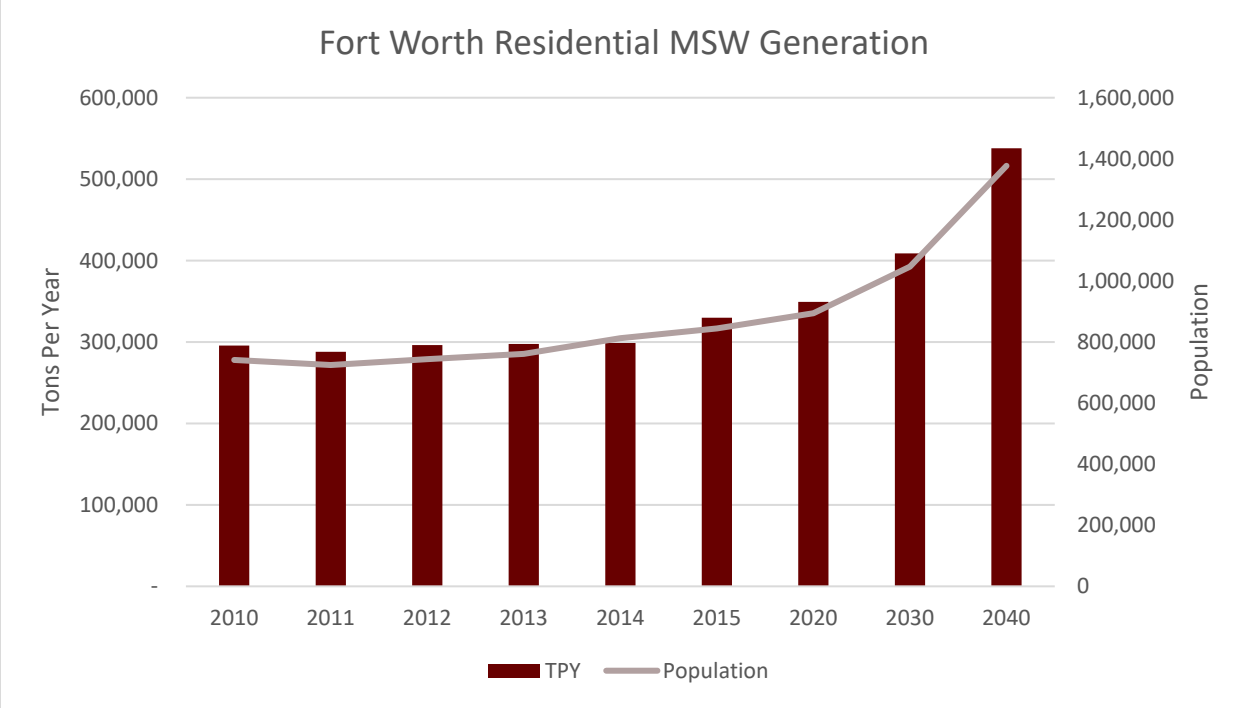


Figure 4-9 Projected Fort Worth Residential MSW Generation

Figure 4-10 shows projected employment growth and the commercial waste generation associated with it. The jobs figures are from the City's 2016 Draft Comprehensive Plan. The waste generation rates are based on which industrial sectors the jobs inhabit, with annual per-employee generation information sourced from the former California Integrated Waste Management Board.[18] The figure shows how waste generation growth mirrors economic growth.

[18] The waste generation figures compiled by the former CIWMB (now CalRecycle) and found at http://www.calrecycle.ca.gov/WasteChar/WasteGenRates/ are the best available substitute when local actual data is unavailable.

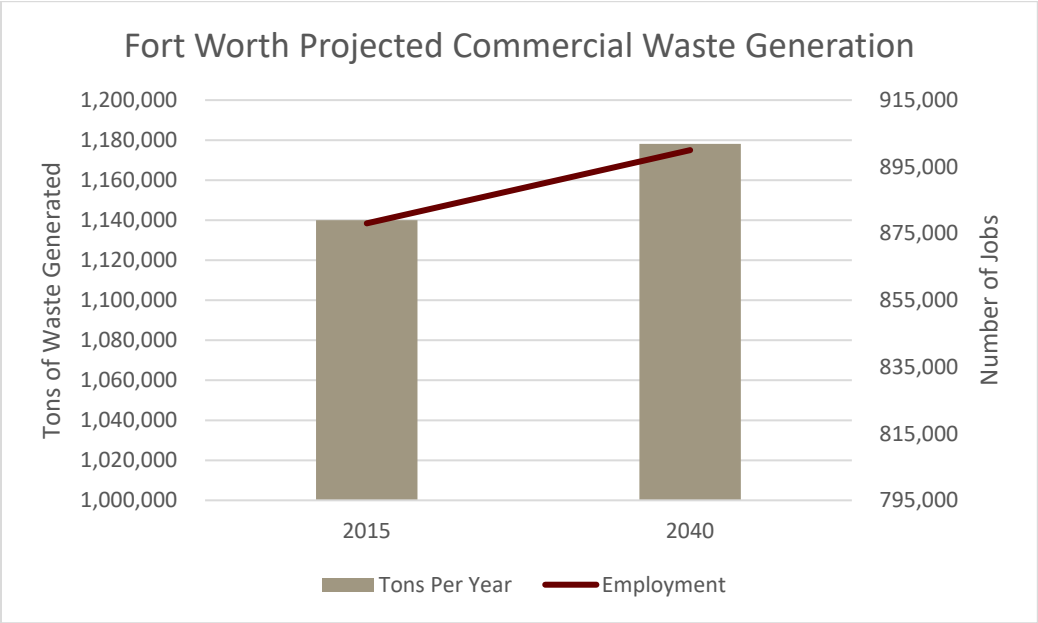


Figure 4-10 Projected Fort Worth Commercial Waste Generation

As shown in Figure 4-11 and Figure 4-12, in both the U.S. and in Fort Worth, a considerable portion of the waste sent for disposal could have been recycled. Besides paper, metals, glass, and plastic, there are compostable organic materials like yard trimmings and food scraps. In the Fort Worth data, the "other" category includes more recyclable materials, such as electronics and construction debris.

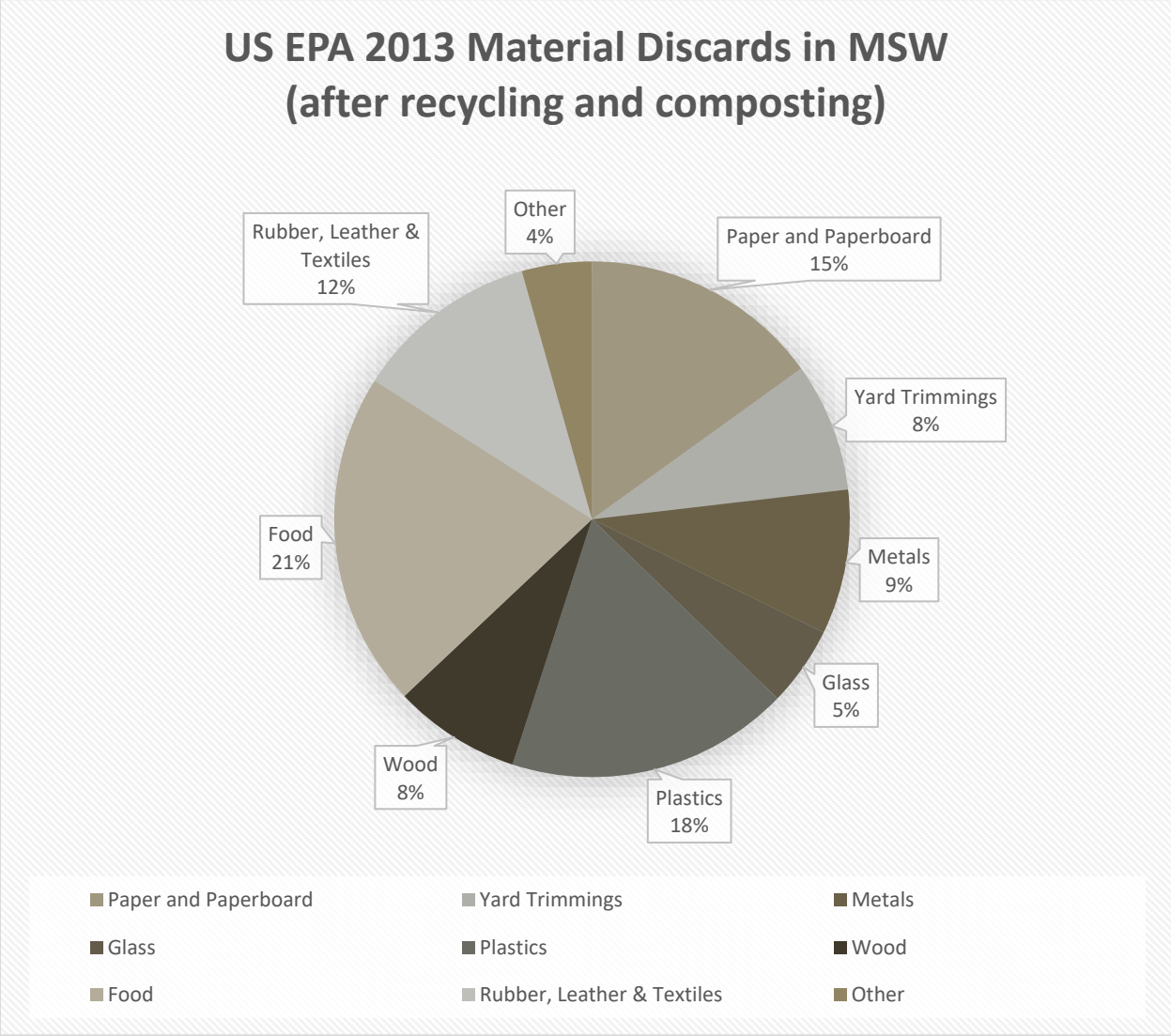


Figure 4-11 US EPA Material Discards in MSW (After Recycling and Composting) – *Advancing Sustainable Materials Management: Facts and Figures 2013*

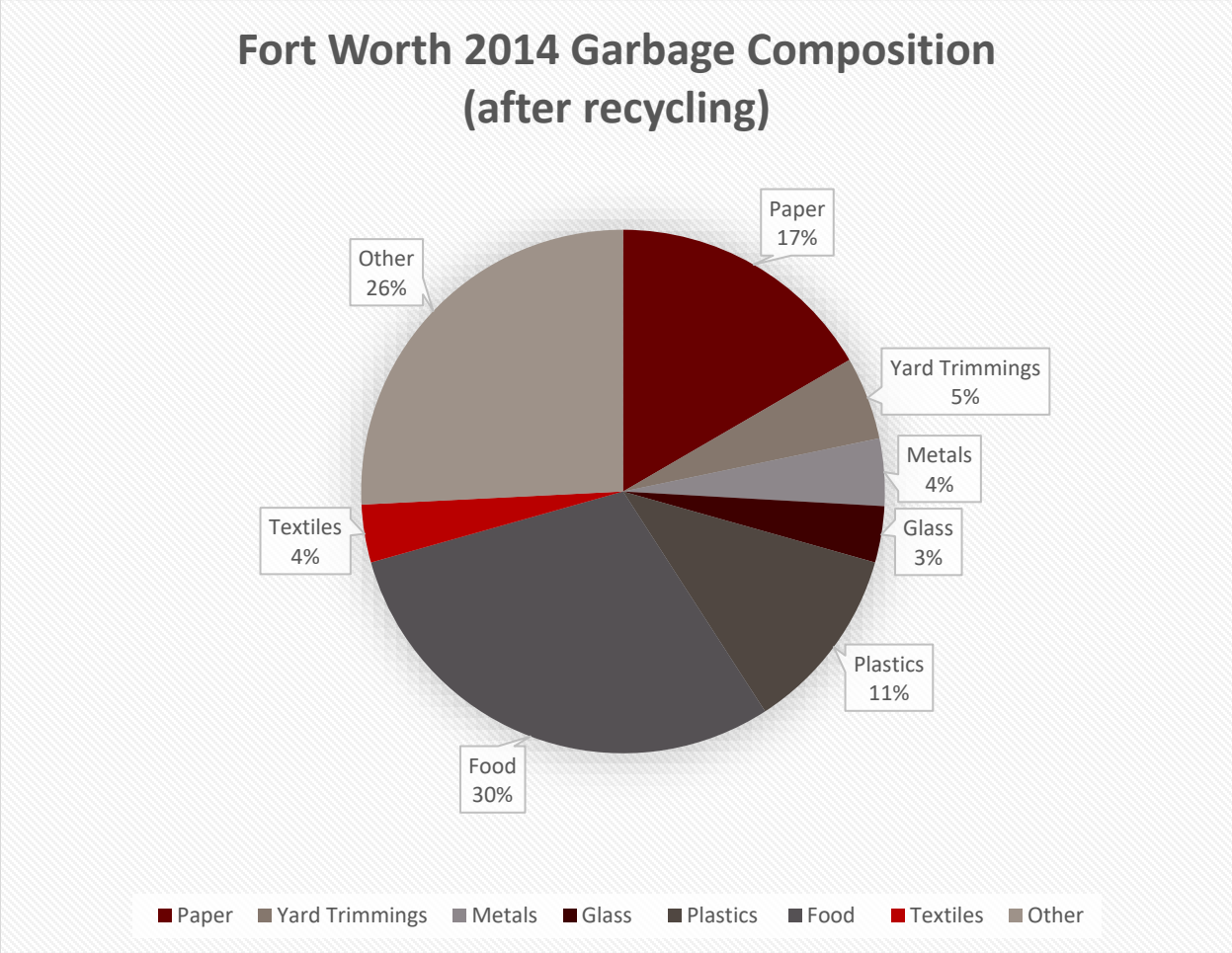


Figure 4-12 Fort Worth Garbage Composition (After Recycling) – 2014 Waste Characterization Study

5 Present and Future Resources

On the basis of the projected population growth and the characteristics of the local waste-shed, the City has the following resources available now and expects to continue to have them in the future. For greater detail about the present facilities and the operational possibilities mentioned in this chapter, please see Chapter 3 – Evaluation of Program Elements, and Chapter 6 – Program Recommendations.

5.1 Southeast Landfill (SELF)

The City owns the SELF, which is located at 6288 Salt Rd, Fort Worth, TX 76140. The SELF is owned by the City and operated by Republic Services, Inc. under a contract expiring on December 31, 2033. The projected life of the SELF has fluctuated considerably recently, even within the project period during which this CSWMP was being developed. At the start of the planning process, the SELF had an estimated 43 years remaining capacity – see Table 5-1 below. Due to continued increases in commercial waste volumes, this capacity is now estimated as significantly less. In the latest report to TCEQ, the City reported 22 years remaining capacity. However, tonnages accepted continue to increase. Based on the most recent aerial survey, the SELF consumed 1.08 million cubic yards of airspace since the last annual survey. The survey also reported 24 million cubic yards of remaining airspace. At this rate of disposal, with no increases in capacity, the SELF has approximately 20 years remaining capacity. For more detail about the current status of the SELF, see Appendix D – Program Evaluation Report. For more detail about the recommended actions regarding it, see Appendix E – Recommendations Report.

As the North Central Texas region continues to grow, the amounts of waste disposed at the SELF could continue to increase, resulting in a further reduction of the projected life of the SELF. The time to secure additional capacity ranges from 3-5 years to contract with an existing regional facility, to 5 to 15 years to develop alternative disposal methods. Such alternatives include developing the City's next landfill, building a dual-stream transfer station at the SELF for trans-loading solid waste and recyclables by tractor trailer or railroad, or entering into a public-private landfill development. Other options include expanding the SELF; enhancing recycling, waste reduction, and composting efforts; and, initiating efforts to identify a future landfill. Each of these options has risks and opportunities. Regardless of the option selected, the City must begin making policy decisions now regarding how to manage waste in the mid-to-long term.

5.2 Regional Landfills

Construction and demolition (C&D) waste generated in Fort Worth is disposed at either one of the several Type I landfills (MSW landfills), or the Type IV C&D landfills. There is one permitted Type IV Landfill in the area that is owned and operated by Waste Connections/IESI. This C&D landfill is located on Dick Price Road. It currently accepts approximately 359,000 tons per year and has 10 years of remaining permitted capacity.

Table 5-1 shows other landfills, open and closed, in the Fort Worth region.

Table 5-1 Regional Landfills around Fort Worth

Landfill	Owner	Operator	Location	Disposal Tons	Remaining Capacity (years)	Remaining capacity (tons)	Disposal Rate $/ton	Compaction Rate
City of Fort Worth	City of Fort Worth	Republic	Fort Worth	529,737	43	22,746,326	22.09	1,744
121 Regional Disposal Facility	North Texas Municipal Water District	North Texas Municipal Water District	Melissa	816,478	81	65,839,653	$ 31.00	1,079
City of Arlington	City of Arlington	Republic	Arlington	806,545	48	38,711,044	$ 26.00	1,454
DFW Recycling and Disposal Facility	WMI of Texas	WMI of Texas	Lewisville	1,261,273	9	10,767,554	$ 21.00	1,780
Camelot Landfill	City of Farmers Branch		Lewisville	286,617	23	6,239,523	$ 29.62	1,969
Charles M Hinton Jr. Regoinal Landfill	City of Garland	City of Garland	Rowlett	389,835	48	20,351,895	$ 26.71	1,200
City of Denton Landfill	City of Denton	City of Denton	Denton	191,250	28	5,424,704	$ 43.50	1,002
Ellis County Landfill	Pine Hill Farms Landfill TX LP	Pine Hill Farms Landfill TX LP	Ennis	57,966	519	30,061,526	$ 29.40	1,496
City of Grand Prairie Landfill	City of Grand Prairie	City of Grand Prairie	Grand Prairie	167,971	41	6,329,584	$ 32.00	1,030
IESI Fort Worth C & D Landfill*	IESI	IESI	Fort Worth	356,826	10	3,044,959	$ 23.60	1,560
IESI Weatherford Landfill	IESI	IESI	Weatherford	200,856	7	1,483,999	$ 30.00	1,300
Hunter Ferrell Landfill	City of Irving	City of Irving	Irving	162,787	67	10,591,972	$ 40.00	1,480
Itasca Landfill	Itasca Landfill Tx LP	Itasca Landfill Tx LP	Itasca	178,213	208	44,638,073	$ 28.63	1,821
Lewisville Landfill	Lewisville Landfill Tx LP	Lewisville Landfill Tx LP	Lewsiville	187,906	94	17,710,514	$ 18.41	2,230
Republic Maloy Landfill	Republic Waste Services of Tx LTD	Republic Waste Services of Tx LTD	Campbell	97,800	27	5	$ 30.71	1,234
City of Dallas Mccommas Bluff Landfill	City of Dallas	City of Dallas	Dallas	1,872,789	45	65,176,330	$ 21.50	1,415
CSC Disposal and Landfill	Republic Waste Services of Tx LTD	Republic Waste Services of Tx LTD	Avalon	659	534	36,584,539	$ 52.78	2,362
Waste Management Skyline Landfill	WMI of Texas	WMI of Texas	Ferris	1,207,060	18	21,173,156	$ 18.50	1,440
City of Stephenville Landfill	City of Stephenville	City of Stephenville	Stephenville	7,407	53	394,134	$ 50.00	850
IESI Turkey Creek Landfill	IESI	IESI	Alvarado	480,789	15	7,365,831	$ 32.00	1,460
Total				*9,260,764*		*414,635,321*		
Average				*463,038*	*96*	*20,731,766*	*30*	*1,495*

5.3 MSW Recycling Systems

There are ten private recycling companies serving Fort Worth,[19] not including any diversion or recycling activities that occur at the landfills, nor any reuse activity of for-profit businesses and non-profit organizations like thrift shops or charities. This includes two full-service material recovery facilities (MRFs) operated by two different national firms. There are also three recycling transfer stations.

Unlike a landfill, the capacity of a recycling processing facility is not consumed over time, and with modifications and updates can expand to meet the needs of the customers, so long as the firms can continue business operations. The recycling and recovery capacity in Fort Worth is currently adequate; however, with growth in population and increased participation in recycling, additional MRF capacity would be needed. The viability of the recycling system and facilities can be better preserved and utilized by source separating recyclables properly and reducing contamination, a condition which can both cause undue stress on machinery and negatively impact business operations.

5.4 Construction and Demolition Recycling and Disposal Systems

The primary destination for commercially produced construction and demolition (C&D) material—i.e., that arising from demolition of old structures and construction of new structures—is the Waste

[19] For details, see Appendix D - Program Evaluation Report.

Connections/IESI Landfill. This facility is nearing capacity; however, an application for expansion is pending.

The complicating factor in calculating C&D capacity is that while C&D is typically disposed in "Type IV" C&D landfills, on which there are less restrictive regulations than for MSW, C&D can actually be disposed in "Type I" MSW landfills. This means that, technically, the disposal capacity available for C&D in a region is the available "Type IV" C&D landfill space plus all available "Type I" MSW landfill space. Disposal of C&D in MSW landfills is not ideal, however, as it consumes the much more heavily regulated and expensive space in those facilities with material that does not require it. Therefore, advancing the development of a C&D MRF facility to recover some of the highly-recyclable materials in C&D paired with preservation (or creation) of C&D disposal capacity is preferable. The permit amendment at the Waste Connections/IESI Landfill may address the former, but more capacity and effort for C&D recycling would also benefit the system.

5.5 Compost and Organics Management Systems

There are six mulching and composting operations serving Fort Worth.[20] Like recycling facilities, they are not consumed over time and can be adjusted to meet demand, within certain limitations. At present, they are sufficient for current waste streams and have available capacity for more properly prepared material. Initialization of significant food waste diversion efforts could likely drive the need for additional available capacity, sites or capable facilities, as composting of food waste requires more operational care and infrastructure than management of landscaping waste and other similar material.

5.6 Emerging Technologies

In the U.S., there are viable technologies available to the City besides recycling and landfilling, as shown in Table 5-2 below. In particular, anaerobic digestion and waste-to-energy are commercially viable, both of which can pair beneficially with mixed waste processing (MWP).

Table 5-2 U.S. Waste Management Technologies and Risk
Source: GBB, 2015

Technology	Risks/Liability	Risk Summary
Mass Burn Combustion	Proven commercial technology	Low
Refuse Derived Fuel (RDF) Combustion	Proven technology; limited U.S. commercial experience	Moderate to Low
Anaerobic Digestion	Proven technology; limited U.S. commercial experience	Moderate to Low
Composting	Proven commercial technology	Low
Food & Yard Waste Composting	Previous large failures; limited large-scale plants in operation; product quality issues	Moderate to High
Pyrolysis and Gasification	Previous failures at scale; no operating experience with large -scale operations in the U.S.; full-scale demonstrations nearing operation	High
Automated Material Processing	Proven commercial technology	Low

[20] For more detail, see the Program Evaluation Report.

Not included in Table 5-2 is Mixed Waste Processing (MWP). This technology remains somewhat confusing and controversial for the public, but when combined with a source-separation program and MRF processing thereof, MWP can add considerable results to diversion efforts. Hybrid systems like Mechanical Biological Treatment (MBT), which is not uncommon in Europe, can marry legacy systems and new technologies to optimize waste diversion. For example, a MWP facility can sort organics from a properly prepared waste stream and send that material to anaerobic digestion (AD), while also capturing certain high-value recyclables. With a fast-growing population and great opportunity to increase diversion, the possibilities for Fort Worth to adopt new technology are vast. More information about mixed waste processing is available online at the following web addresses:

https://plastics.americanchemistry.com/Education-Resources/Publications/The-Evolution-of-Mixed-Waste-Processing-Facilities.pdf

https://plastics.americanchemistry.com/Education-Resources/Publications/The-Evolution-of-Mixed-Waste-Processing-Facilities-Technology-and-Equipment-Guide.pdf.

6 Identification and Evaluation of Recommendations

During the CSWMP process, having reviewed all the programs as described in Chapter 3 – Evaluation of Program Elements, and reported in Appendix D – Program Evaluation Report, combined with all the public, community and industry outreach input, more than 120 recommendations (i.e. action items) were developed. The majority of the recommendations drew on feedback from the public, influential leader interviews, input from the City Management and staff, and our local solid waste industry professionals, including industrial best management practices.

Having reviewed the existing facilities owned or operated by the City of Fort Worth and those available from private industry, recommendations were developed regarding solid waste processing facilities, including transfer stations, landfills and all their attendant operations, material recovery facilities and other recycling facilities, mulching and composting, energy-from-waste facilities, conversion technologies, and the needed capacity for the planning horizon and focus especially on options for disposal other than landfill. For collection and drop-off services, recommendations were prepared that ensure all residents and businesses have access to recycling and properly manage as much of their waste as possible. Recommendations were also provided for how the solid waste program can help build resource-based economies to expand not only recycling but value extraction and re-manufacturing, commercialization of compost and mulch operations, support of emerging alternative fuel networks, and promotion of reuse, repair, and reclamation enterprises. There were also recommendations prepared with regards to strategic actions to best implement the CSWMP, as further discussed in Chapter 7.

The report of the recommendations is provided in its entirety as Appendix E – Recommendations Report.

7 Strategic Planning

7.1 Comprehensive Planning

7.1.1 Leadership from the City

In 2016, Fort Worth was in the process of adopting a new Comprehensive Plan for the City. According to the Planning and Development Department:

> *The Comprehensive Plan is the City of Fort Worth's official guide for making decisions about growth and development. The Plan is a summary of the goals, objectives, policies, strategies, programs, and projects that will enable the City to achieve its mission of focusing on the future, working together to build strong neighborhoods, develop a sound economy, and provide a safe community.*[21]

The legal basis for having a comprehensive plan is established by Texas Local Government Code. If a city adopts such a plan, it must abide by it. Therefore, both the provisions of the comprehensive plan and the data cited within it are researched and projected with great consideration. This further makes the Comprehensive Plan the optimal source of information regarding population, housing, employment, and land use for solid waste planning purposes.

The new 2016 Comprehensive Plan will incorporate the 2017-2037 CSWMP as appropriate within Appendix I or in a more appropriate area.

7.1.2 Influences on Solid Waste Planning

The Comprehensive Plan is "a summary of the recommended policies, strategies, programs, and projects that will enable the City to achieve its mission of focusing on the future and working together to build strong neighborhoods, develop a sound economy, and provide a safe community."[22] Creation of and adherence to a comprehensive plan for solid waste management serves a similar function for that undertaking—i.e., it is a guide for making decisions about source separation, collection, processing, resource recovery, and disposal. It will also advise on adjunct activities like illegal dump cleanups, litter abatement, household hazardous waste collection, and outreach and education.

The demographic and employment projections created by the Comprehensive Plan are used to calculate waste generation rates, which help estimate future solid waste capacity needs. Planned and projected population growth, including numbers of households and geographic distribution, is used to evaluate collection operations and the placement of service sites ranging from recycling drop off stations to waste disposal facilities.

Other influences on solid waste planning include mandates for performance, both regulatory and aspirational. They come from state law, local ordinance, other governing documents (like a Comprehensive Plan, a Sustainability Plan, a Climate Change Action Plan, or other ratified program), or agency policy. Examples include goals for recycling, diversion, or disposal rates. Service levels are another example: number of "misses" at the curb; time to answer and resolve an incoming call or work order;

[21] http://fortworthtexas.gov/comprehensiveplan/, retrieved March 29, 2016.
[22] 2016 Fort Worth Comprehensive Plan, "Summary," http://fortworthtexas.gov/planninganddevelopment/plans/compplan/2016/00-introduction.pdf

provision of technical assistance; field inspections and site visits; and, number of people reached by education efforts. To make these goals meaningful, they are incorporated into the plan document, along with actions to implement them and ways to evaluate their progress.

7.1.3 Impacts of Solid Waste Planning

A comprehensive solid waste management plan addresses all aspects of waste, from point of discard to the point at which it no longer exists as it was discarded—i.e., it has been buried in a landfill, it has been converted into energy, or it has been transformed into something else such as a commodity or compost. In fact, solid waste plans cover even more than that, as they include waste reduction and reuse prior to discard and provide for proper management of landfill gas and closed landfills long after disposal.

The CSWMP both empowers and requires the City to provide the integrated solid waste management system it has laid out for itself, and when decisions need to be made, it provides guidance. It provides the precedence for actions that impact other organizations and businesses. It shows that the City considers its actions carefully and thoughtfully rather than capriciously and without thought of the future.

7.2 Strategic Planning for City of Fort Worth Solid Waste Management

With regard to the City's solid waste program activities, the CSWMP provides for the following:

The CSWMP empowers SWSD to achieve their mission of providing comprehensive and integrated solid waste management in Fort Worth.

Organization and Agency

The City of Fort Worth bears the responsibility for most solid waste services, as opposed to those borne by the private sector. The City provides many solid waste services, including curbside collection to single family homes as well as managing contracts for the disposal of garbage and the processing of recyclables; drop off stations and HHW collection; regulation of private haulers; outreach and education; illegal dump cleanups, litter abatement, environmental enforcement and customer service. The way the agency is organized influences its ability to respond to the actions set for it by the CSWMP. For example, the 2017-2037 CSWMP calls for greatly increased technical assistance in the field, particularly in the Industrial, Commercial and Institutional (ICI) sector. This expanded set of duties requires expert staffing working in a section of the agency dedicated to those efforts.

Customer Experience and Engagement

Overall, the solid waste program ensures that the citizens of Fort Worth have access to the best possible solid waste management system. "The best possible" means proper, safe, legal, and long-lasting disposal capacity; the opportunity to divert and recycle as much material as they can or want to; up-to-date, accurate, and accessible information; adoption of industry best practices whenever feasible; and, value for the funds expended in all of these activities.

Funding and Financial Strategies

All of the actions described in this CSWMP for implementation serve the goal of protecting soil, air, water, and people. The actions accomplish this by furthering waste reduction, recycling, proper disposal, and redirection of potentially polluting materials like household hazardous waste or illegally dumped waste. However lofty or critical, all of these actions have costs associated with them. While not as detailed as a budget document or financial model, the CSWMP necessarily describes how actions will be "paid for." The Plan indicates if an action is paid for by user fees or taxes; if the Plan can be part of already ongoing activity or will require a new initiative or position; and, what the possible positive economic benefits will be, such as revenue or job creation.

The Solid Waste Enterprise Fund (Fund) was established to set up fiscally responsible programs and management of the City's solid waste related activities. The City, with assistance from GBB, has developed a 5 Year Capital Improvement Plan (CIP) to insure all necessary future funding needs will be covered by the program fees, Fund balance and "pay as you go" funding stream. Since the City has enjoyed stable residential rates since 2006 along with the increased solid waste volume and required future disposal capacity capital; proposed future residential rate increases would be phased in over a pre-determined time period and in two (2) separate increments, following an established and approved rate schedule and timetable. The last proposed 5 Year CIP is provided in its entirety as Appendix F – City's Proposed 2016 5 Year Solid Waste CIP Report.

Responding to Change, Providing for the Future

Much has changed in the City of Fort Worth since the previous 1995-2015 Plan was approved, and much will continue to change during the planning horizon of this CSWMP. Although every effort was made to forecast, project, provide, and plan for the future, certain unforeseen changes will arise requiring response. For this reason, solid waste management plans are generally revisited and updated on 5- or 10-year cycles. The City of Fort Worth intends to revisit this plan document five years from its adoption. Accordingly, in Chapter 8 – CSWMP Implementation, the actions that comprise this CSWMP are identified as being part of the immediate and short-term "5-year Action Plan" or the longer view towards the mid- and long-term. The former are items that the City will begin to work on shortly after adoption. They inherently also include the "continue to" actions, such as "continue to provide once-weekly collection of garbage, trash, and recycling," the success of which also needs continual evaluation.

7.3 Strategic Planning Actions in the Fort Worth CSWMP

The items listed in Figure 7-1 below are a subset of the actions in this CSWMP organized by a description of how they fulfill the City's intention to employ careful and comprehensive planning in the fulfillment of agency mission. These are not specific programs, and some of them aren't line items in a budget; they are, however, the fundamental strategies behind many of the program actions, and therefore critical to the Plan's successful implementation.

Setting goals
- A 40 percent recycling rate (short-term)
- A 50 percent diversion rate (long-term)
- A 10 percent reduction in disposal rate (long-term)

Modification of the Grants of Privilege
- Require recycling service for ICI customers
- Obtain better and more meaningful reporting
- Reward grantees who best implement recycling
- Possibly generate revenue dedicated to SWSD

Provision of technical assistance in the field
- Create one or more new divisions and positions
- Support businesses and multi-family properties
- Get first-hand field knowledge of what is actually happening
- Lay the groundwork for enforcement or program adjustment

Market intervention
- For example, franchising collection or opening the MRF to haulers
- Landfill bans (e.g., cardboard or yard waste)
- If the same parameters are used for decades and fail to produce the desired results, more substantive action may be needed

Modification of regulations
- Modifying permitting process to increase the diversion and/or recovery of building materials
- Create a sustainable building standard and permitting process

Policy and advocacy
- Support Extended Producer Responsibility for materials like electronics and paint
- Support the Texas Product Stewardship Council and other product stewardship interest groups
- Develop a solid waste division brand and adopt modern communication tools
- Build synergy with the Blue Zones Initiative

Partnerships
- Pursue development of an eco-industrial park
- Work with Universities and Colleges to establish centers of excellence

Figure 7-1 Strategic Actions in the Comprehensive Solid Waste Management Plan

From the onset of the planning process it was a goal of the CSWMP to identify and seize potential synergies with other City departments and outside agencies that benefit all and promote the common good. Advancing those potential intra and inter-agency collaborations would bring to fruition the full benefits of the CSWMP to the City.

Strategic initiatives such as the development of a Universal Recycling Ordinance; a Green-Purchasing Ordinance; an Eco-Industrial Park (capable of absorbing locally the locally generated recycling feedstock, stabilizing the commodity market, while creating new jobs and new revenue streams); of partnerships with Universities and Colleges (as potential innovators); etc. transcend the reach of the Code Compliance Department, Solid Waste Services Division and require a full buy-in from the City for their implementation. Leadership from the City Council and City Management, and community support is crucial in carrying out these multi-party initiatives that may move Fort Worth forward in a more sustainable manner.

8 CSWMP Implementation

This section explains how the actions in the CSWMP will be realized, and includes how new goals or standards will be evaluated. It will also indicate if the actions will be implemented in the short-term (1-5 years), mid-term (6-10 years) or long-term (10-20 years). The information is presented in a table format; for more detail, refer back to the Recommendations (Appendix E) for that Program Element (Appendix D).

8.1 5-Year Action Plan

The following action items are for implementation starting in the short-term (within the first 5 years of the planning horizon). Many of them continue into the mid-term (5 to 10 years into the planning horizon) and the long-term (10 years or more into the planning horizon). Each of the action items supports one or more of the City's initial aims and goals to be accomplished in the initial 5-Year Action Plan, and

I. Preservation of Southeast Landfill
II. Incorporate Commercial & Industrial Waste Strategies
III. Engage and Promote Environmental Stewardship
IV. Grow Top-Shelf Residential Services
V. Roadmap for Future Policy Considerations

Furthermore, the action items generally fall into one of four categories of action *type*, and are grouped accordingly in the tables below:

- Maintaining: the actions that will continue current programs into the new planning period, with the same or better level of service for residents;
- Evaluating: actions that call for studying, either formally or continually, new programs, policies, or activities related to solid waste;
- Changing: these are actions that will change one or more programs or policies at the City, possibly involving other agencies; and,
- Beginning: the actions that involve new staffing or programming which will directly benefit residents of Fort Worth and improve service provision and/or performance.

The information in the tables also includes estimated, projected, or approximate costs associated with the action; the service sector involved; and, possible impacts on waste diversion. With the exception of the "Maintaining" actions, the year by which the action should initialize is also included.

8.1.1 Evaluating: Studies and Feasibility[23]

"Evaluating" Actions	Goal Fulfillment	Service Area	Projected One-time Cost	Cost Per Household	Waste Diversion Impact	Year to Start by
Consider removing glass from single stream collection	IV	Services to Residents	$45,000.00	$0.21	Unclear; glass is a significant portion of recyclables by weight, and some of it will be lost to disposal. At the same time, the quality of the remaining recyclables will be improved.	2018
Evaluate bulk reuse opportunities	IV	Services to Residents	$20,000.00	$0.09	This program may not represent significant tons of formal reuse or recycling; however, it should have a residual effect of waste reduction before items even get to the curb.	2017
Evaluate implementing a separate curbside collection program in partnership with one or more contractors to divert and reuse items such as textiles, clothing, shoes, pots/pans, kitchenware, furniture, toys, and small appliances	IV	Services to Residents	$20,000.00	$0.09		2018

[23] All changes displayed in red font were included following the August 2, 2016 Draft Review and September 15, 2016 third Open House public meeting.

"Evaluating" Actions	Goal Fulfillment	Service Area	Projected One-time Cost	Cost Per Household	Waste Diversion Impact	Year to Start by
Review and Modify Recyclebank partnership	I	Services to Residents	$15,000.00	$0.07	The simple act of modifying the Recyclebank partnership is unlikely to have any impact on diversion; however, it will allow SWSD to re-direct advertising expenditures to more meaningful technical support, which should increase diversion.	2018
Conduct a Landfill Gas-to-Energy Feasibility Study	VI	Solid Waste Management Facilities	$70,000.00	$0.33	Not applicable	2017
As the City's population increases, evaluated opening an additional one or two drop-off stations	IV	Solid Waste Management Facilities	$90,000.00	$0.42	Proper, convenient facilities to which one can deliver recyclables will encourage participation and reinforce recycling as a City value	2018
Evaluate Low-volume Commercial Transfer Station	II	Solid Waste Management Facilities	$50,000.00	$0.23	Not applicable, unless such facility also accepted, processed, or transferred recyclables	2017
Evaluate Small Commercial Cart-based Recycling Service	II	Services to Industrial, Commercial, and Institutions	Included in current operations	$0	This program may not represent significant tons of formal reduction or recycling; however, it should have an accumulative effect within the commercial sector.	2017
Evaluate the potential of converting its City-owned solid waste vehicles to CNG after the infrastructure has been put in place as part of the conversion of the WM fleet	III	Solid Waste Management Facilities	$20,000.00	$0.09	Not applicable	2018

"Evaluating" Actions	Goal Fulfillment	Service Area	Projected One-time Cost	Cost Per Household	Waste Diversion Impact	Year to Start by
Evaluate the use of TERP (Texas Emission Reduction Program) and other funds for the conversion of the City owned solid waste vehicles to CNG	III	Solid Waste Management Facilities	$15,000.00	$0.07	Not applicable	2018
Evaluate implementing an economic incentive for backyard composting	III	Solid Waste Services Division	$10,000.00	$0.05	People who compost at home waste less food, at-home composting reinforces other waste reduction and recycling behaviors.	2018
Evaluate the feasibility of increased tipping fees at SELF or complete C&D ban as a way to minimize tonnages from being disposed at the SELF, in particular C&D material	I	Solid Waste Management Facility	$20,000	$0.10	It is estimated by TCEQ that in 2013, 17.5 percent by weight of all material landfilled in Texas was C&D waste.	2018
Develop a Residential Organic-based Recycling Pilot Program	III	Services to Residents	$70,000	$0.33	If Fort Worth diverted an additional quarter of its MSW by weight, the recycling rate in FY14-15 would have been 37.4 percent.	2018
Evaluate Residential Organic-based Recycling Pilot Program and consider a subscription-based expansion	III	Services to Residents	$150,000	$0.70		2019

"Evaluating" Actions	Goal Fulfillment	Service Area	Projected One-time Cost	Cost Per Household	Waste Diversion Impact	Year to Start by
Initiate a siting study to identify suitable city-owned property for a new, privately-operated composting facility for yard waste, food residuals, and possible biosolids from the Village Creek Wastewater Treatment Facility	I	Services to Industrial, Commercial, and Institutions	$80,000.00	$0.37	Diversion could be significant; the 2014 Waste Composition study in Fort Worth showed that more than half of discarded garbage was food, yard trimmings, and paper, a good proportion of which could be diverted for processing.	2020
Conduct a procurement process to contract for operation of a composting facility	I	Services to Industrial, Commercial, and Institutions	$ 150,000.00	$0.70	The potential recovery of bagged grass clippings, alone, is tens of thousands of tons.	2020
Evaluate banning yard waste from disposal in the SELF	I	Solid Waste Services Division	$50,000.00	$0.23		2020
Evaluate Photovoltaic Solar Farm on Future Closed SELF	VI	Solid Waste Management Facilities	$ 150,000.00	$0.70	Not applicable	2021

8.1.2 Changing: Revising or Adjusting Programs[24]

"Changing" Actions	Goal Fulfillment	Service Area	Projected Costs	Cost Per Household	Waste Diversion Impact	Year to Start by
Encourage residential use of right-sized garbage carts	I	Services to Residents	Beyond staffing, a per-cart cost to swap	Making the change to larger recycling carts at the start of a new contract could minimize any cost increase per household.	Increasing participation from 70 percent to 90 percent of households would represent almost 14,000 additional tons and nearly 4 percentage points on the recycling rate.	2017
Reduce recyclables contamination	I	Services to Residents	Expenditures beyond staffing will vary	Industry standard is $3.00 per household, per year, for education efforts to effect change in behavior.	If 14,000 additional tons of recyclables had been collected in FY15 through improved participation, the avoided disposal costs to the City would have been approximately $243,000.	2017
Improve recycling participation	I	Services to Residents	Expenditures beyond staffing will vary		Small changes make a difference. If each household recycled, on average, 5% more material by weight, it would be an additional 3,415 tons per year, or about 1 percentage point on the recycling rate. If each household recycled, on average, 1 pound more per week, it would be an additional 54,889 tons per year, or about 1.67 percentage points on the recycling rate.	2017
Develop targeted education and outreach	III	Services to Residents	Expenditures beyond staffing will vary			2017

[24] All changes displayed in red font were included following the August 2, 2016 Draft Review and September 15, 2016 third Open House public meeting.

"Changing" Actions	Goal Fulfillment	Service Area	Projected Costs	Cost Per Household	Waste Diversion Impact	Year to Start by
Include "reuse" in waste reduction messaging, including in instructional materials for curbside set-out of reusable items, in general outreach materials, and in other available outlets such as newsletters, City TV programming, etc.	III	Solid Waste Services Division	Expenditures beyond staffing will vary	Industry standard is $3.00 per household, per year, for education efforts to effect change in behavior.	Not significant; however, reuse and waste reduction are part of a larger behavior change.	2017
Set new recycling goals	I	Services to Residents	Included in current operations	$0	If the recycling rate had been 40% in FY14-15, an additional 63,633.64 tons of material would have been diverted from disposal.	2017
Increase the residential recycling rate to 30% or higher by 2021	I	Services to Residents	Included in current operations	$0		2017
Adopt goal to recycle 40% of all waste (by weight) generated in the City, including residential, commercial and ICI by 2023	I	Services to Industrial, Commercial, and Institutions	Included in current operations	$0		2017
Enforce no large brush or yard waste in bulk collection	I	Services to Residents	Expenditures beyond staffing will vary; can be added to current Blue Crew efforts	$0	The City estimates as much as 30,000 tons of material per year is brush improperly set out as bulk	2017
Segregate brush from bulk collection	I	Services to Residents	Expenditures beyond staffing will vary	Estimate additional information efforts at $1 per household	The City estimates as much as 30,000 tons of material per year is brush improperly set out as bulk	2017

"Changing" Actions	Goal Fulfillment	Service Area	Projected Costs	Cost Per Household	Waste Diversion Impact	Year to Start by
Make as a condition of the Grants of Privilege that commercial haulers report on all recycling activities	II	Services to Industrial, Commercial, and Institutions	Expenditures beyond staffing will vary; Estimate that all Grants of Privilege rewriting could be $75,000 contract for services	$0 - $0.35	Impacts on waste diversion of these changes will be indirect: better reporting should lead to better implementation of recycling in the ICI sector; better implementation of recycling programs should lead to more and better recycling at ICI locations.	2017
Make as a condition of the Grants of Privilege that commercial haulers report tonnages on all recycling activities	II	Services to Industrial, Commercial, and Institutions		$0 - $0.35		2017
Expand Master Composter Program and At-home composting	III	Services to Residents	Expenditures beyond staffing will vary; subsidized equipment could cost $10 - $50 per piece	unclear how many households might participate	Minimal	2018
Promote the availability of C&D waste processors in the area such as concrete crushers, scrap metal dealers, shingle and asphalt re-processors, and glass processors	I	Services to Industrial, Commercial, and Institutions	Included in current operations	Part of outreach expenditures	Unclear	2017
Promote to residents that they have frequent and free collection for many commonly-dumped items such as appliances, tires, and furniture	IV	Services to the Community	Expenditures beyond staffing will vary	Part of outreach expenditures	Unclear	2017

"Changing" Actions	Goal Fulfillment	Service Area	Projected Costs	Cost Per Household	Waste Diversion Impact	Year to Start by
Educate residents that computer and televisions can be recycled pursuant to the State programs	III	Services to the Community	Expenditures beyond staffing will vary	Part of outreach expenditures	Unclear, as many Americans have been hoarding electronics when uncertain what to do. The larger problem with electronics is the polluting potential.	2017
Direct residents to electronics recycling options such as the Electronic Manufacturers Recycling Management Company at www.mrmrecycling.com, www.TexasRecyclesComputers.org, and www.TexasRecyclesTVs.org.	III	Services to the Community	Expenditures beyond staffing will vary	Part of outreach expenditures		2017
Educate residents in the proper management of sharps and general medical waste	III	Services to the Community	Expenditures beyond staffing will vary	Part of outreach expenditures	not applicable	2017
Work with Republic Services to extend the life of the SELF through operational/contract changes that will increase in-place densities or expand the site	I	Solid Waste Management Facilities	Included in current operations	$0	not applicable	2017
Establish a reserve fund from the SELF rental payments or the enterprise fund as a whole to pay for future disposal capacity	I	Solid Waste Management Facilities	Expenditures beyond staffing will vary	$0	not applicable	2017

"Changing" Actions	Goal Fulfillment	Service Area	Projected Costs	Cost Per Household	Waste Diversion Impact	Year to Start by
Create a Comprehensive Outreach Plan	III	Solid Waste Services Division	Expenditures beyond staffing will vary; consulting could be $90,000	$0 - $0.42	If the recycling rate had been 40% in FY14-15, an additional 63,633.64 tons of material would have been diverted from disposal. Increasing participation from 70 percent to 90 percent of households would represent almost 14,000 additional tons and nearly 4 percentage points on the recycling rate.	2017
Identify and establish priority programs and projects	III	Solid Waste Services Division				2017
Coordinate with Office of Performance, Budget and Communication and Public Engagement outreach campaign to promote future solid waste rate increase plan.	III	Solid Waste Services Division				2017
Develop a solid waste division brand	III	Solid Waste Services Division				2017
Combine outreach efforts and team members into one coordinated Solid Waste unit	III	Solid Waste Services Division				2017
Consumer Choice – Plastic Bag Campaign	III	Solid Waste Services Division				2017
Set a more aggressive, tiered goal for addressing Dead Animal Cleanup work orders	IV	Solid Waste Services Division	Included in current operations	$0	not applicable	2018
Implement program for accepting reusable items for donation at the drop-off stations	IV	Solid Waste Services Division	Included in current operations	$0	unclear	2017

"Changing" Actions	Goal Fulfillment	Service Area	Projected Costs	Cost Per Household	Waste Diversion Impact	Year to Start by
Pursue the development of a Scrap Tire Ordinance	V	Solid Waste Services Division	Included in current operations	$0	The larger problem of improperly disposed tires is not simply their tons, but their potential for pollution and the spread of diseases by constituting potential breeding grounds for mosquitos.	2018
Expand efforts towards City's Comprehensive Litter Program	V	Services to the Community	Included in current operations	$0	Reduce the cost of litter and illegal dumping collections, improving the community and local water sources.	2017
Working with business sector to curb improperly managed on premise trash: Overflowing dumpsters, proper screening, onsite trash cans	II	Services to the Community	Included in current operations	$0	Reduce the cost of litter collections, improving the community and local water sources.	2017
Working with Chamber, Business Associations about implementing litter and trash best practices as litter prevention activities.	II	Services to the Community	Included in current operations	$0		2017
Implement a pharmaceutical drug take-back or disposal program for Fort Worth residents prior to an EPR-based program	III	Services to the Community	Included in current operations	$0	Reduces the volume of discarded pharmaceuticals into the SELF, accidental overdoses and abuse within the general community.	2017
Establish a 5 Year Residential Recycling Processing Agreement	IV	Services to Residents	Included in current operations	$0	To synchronize the time period for both the residential collection services and recycling processing agreements.	2017

"Changing" Actions	Goal Fulfillment	Service Area	Projected Costs	Cost Per Household	Waste Diversion Impact	Year to Start by
Transition to Larger Recycling Carts	I	Services to Residents	Beyond staffing, a per-cart cost to swap	Making the change to larger recycling carts at the start of a new contract could minimize any cost increase per household.	Increasing participation from 70 percent to 90 percent of households would represent almost 14,000 additional tons and nearly 4 percentage points on the recycling rate.	2018
Evaluate Waste Minimization Program (bag-based PAYT)	IV	Services to Residents	Included in current operations; Evaluation should be $0, as the proposing firm can provide evaluation; outside consulting service to provide opinion could be $20,000	$0 - $0.94	The vendor in question claims to reduce waste tonnages by 44%, on average.	2018
Establish a Fee-based partnership with Tarrant County to grant the residents of unincorporated Tarrant County access to Fort Worth's Drop Off Stations for Recycling	V	Services to the community	Included in current operations	$0	Increase recycling efforts for residents living outside but working at businesses inside Fort Worth.	2018

"Changing" Actions	Goal Fulfillment	Service Area	Projected Costs	Cost Per Household	Waste Diversion Impact	Year to Start by
Expand Grants of Privilege to recycling-only Haulers, to create a registration or Grant of Privilege for haulers that collect only recyclables	V	Services to Industrial, Commercial, and Institutions	Expenditures beyond staffing will vary; Estimate that all Grants of Privilege rewriting could be $75,000 contract for services	$0 - $0.35	Impacts on waste diversion of these changes will be indirect: better reporting should lead to better implementation of recycling in the ICI sector; better implementation of recycling programs should lead to more and better recycling at ICI locations.	2018
Make as a condition of the Grants of Privilege that private haulers must offer recycling to all commercial establishments	II	Services to Industrial, Commercial, and Institutions	Expenditures beyond staffing will vary; Estimate that all Grants of Privilege rewriting could be $75,000 contract for services	$0 - $0.35	Impacts on waste diversion of these changes will be indirect: better reporting should lead to better implementation of recycling in the ICI sector; better implementation of recycling programs should lead to more and better recycling at ICI locations.	2018
Make as a condition of the Grants of Privilege that commercial haulers provide a Diversion Plan to identify the diversion (recyclables, construction and demolition debris, and/or organics) services that will be provided to commercial establishments and multi-family properties	II	Services to Industrial, Commercial, and Institutions	Expenditures beyond staffing will vary; Estimate that all Grants of Privilege rewriting could be $75,000 contract for services	$0 - $0.35	Impacts on waste diversion of these changes will be indirect: better reporting should lead to better implementation of recycling in the ICI sector; better implementation of recycling programs should lead to more and better recycling at ICI locations.	2018
Modify the current Grant of Privilege fee charged to commercial haulers from 5 percent to a tiered system based on the overall level of recycling achieved by commercial hauler	V	Services to Industrial, Commercial, and Institutions	Expenditures beyond staffing will vary; Estimate that all Grants of Privilege rewriting could be $75,000 contract for services	$0 - $0.35	Impacts on waste diversion of these changes will be indirect: better reporting should lead to better implementation of recycling in the ICI sector; better implementation of recycling programs should lead to more and better recycling at ICI locations.	2018

"Changing" Actions	Goal Fulfillment	Service Area	Projected Costs	Cost Per Household	Waste Diversion Impact	Year to Start by
Establish access to the City contracted MRF by private haulers	II	Services to Residents	Expenditures beyond staffing will vary; consulting fees to re-procure the contract could be $60,000	$0 - $0.28	Unclear	2018
Include in public education messages encouraging the smarter shopping of food and consumer goods	III	Solid Waste Services Division	Expenditures beyond staffing will vary	Part of outreach expenditures	If each household reduced its weekly food waste generation by just 3 pounds from FY14-15 levels, a 5% reduction in waste would be realized.	2018
Update the multi-family recycling regulation to ensure that apartment residents are provided a similar level of recycling service as single family residents, and to narrow the exemption loophole and thereby include more residents	V	Solid Waste Services Division	Included in current operations	$0	Each single family home recycles about 12 lbs. per week; multi-family could do similarly, given proper resources.	2018
Expand City's In-house Recycling Programs in advance of pursuing the development of a Universal Recycling Ordinance (URO)	V	Solid Waste Services Division	Included in current operations	$0	Austin, TX, expects its URO to help the City achieve 90% diversion by 2040.	2018
Pursue the development of a Green Purchasing Ordinance	V	Solid Waste Services Division	Included in current operations	$0	Green Purchasing is also about waste reduction and fostering the demand for more recyclable materials.	2019

"Changing" Actions	Goal Fulfillment	Service Area	Projected Costs	Cost Per Household	Waste Diversion Impact	Year to Start by
Develop or adopt a sustainable building standard and permitting process in coordination with Planning and Development	V	Services to Industrial, Commercial, and Institutions	Expenditures beyond staffing will vary; consulting fees to write a standard might be $75,000	$0 - $0.35	Unclear	2019
Work with the Planning and Development Department to establish a program within the permitting process that encourages, incentivizes or fosters a means to increase the diversion and/or recovery of building construction and demolition materials	V	Services to Industrial, Commercial, and Institutions	Expenditures beyond staffing will vary; consulting fees to create a program could be $85,000	$0 - $0.40	18 percent of all material landfilled in TX is C&D, or about 0.2 tons per capita per year.	2019
Waste Swap with the City of Arlington's Landfill	V	Solid Waste Management Facilities	Expenditures beyond staffing will vary	$0	not applicable	2019
Amend the Zoning Ordinance to require recycling receptacles for use by occupants at one or more zoning category	V	Solid Waste Services Division	Included in current operations	$0	If the recycling rate had been 30% in FY14-15, an additional 30,648.78 tons of material would have been diverted from disposal. Proper access to systems is necessary for that goal to be realized.	2019
Require new or amended site plans for commercial properties to demonstrate suitable container storage, screening and service access to garbage and recycling management areas	II	Services to Industrial, Commercial, and Institutions	Expenditures beyond staffing will vary; consulting to work on revising site plan review systems could be $75,000.	$0 - $0.35	Unclear	2020

"Changing" Actions	Goal Fulfillment	Service Area	Projected Costs	Cost Per Household	Waste Diversion Impact	Year to Start by
Set a goal of reducing per-household waste generation by 10 percent over the course of the planning period	I	Solid Waste Services Division	Included in current operations	$0	If each household reduced its weekly waste generation by just 6 pounds from FY14-15 levels, the 10% reduction goal would be met.	2020
Adopt goal to increase Fort Worth's Total Diversion Rate (including residential, commercial and ICI) to 50% by 2030 and 60% or more by 2037	I	Services to Residential, Industrial, Commercial, and Institutions	Included in current operations	$0	Will assist the community in reaching next level of landfill preservation and increased waste diversion.	2020
Amend the Zoning Ordinance to mandate sight or walking distances to recycling receptacles in public areas.	V	Solid Waste Services Division	Included in current operations	$0	Adequate provision of and access to recycling receptacles is necessary for higher public areas diversion rates.	2020
Amend the Zoning Ordinance to specify in the streetscaping burden on developers that compliant trash receptacles must be accompanied by recycling receptacles	V	Solid Waste Services Division	Included in current operations			2020

8.1.3 Beginning: New Operations[25]

"Beginning" Actions	Goal Fulfillment	Service Area	Waste Diversion Impact
All of the actions in this table depend on the creation of a commercial recycling section within the Planning Section or Solid Waste Administration to conduct field work, technical support, planning, and reporting. This action would address all of the CSWMP goals and serve all sectors. It should be started as soon as possible, ideally in FY18. **The projected staffing cost is $75,900 per position per year, including benefits, or $0.353 per household, per year.** **Other operational costs may include a dedicated vehicle, proper personal protection equipment, training, supplies, materials to distribute, and workspace.** **The total cost for one position and the operations, the first year, might be $150,000, or $0.70 per year ($0.06 per month).** **See impacts and service areas of individual duties assigned to this section, below.**			
"Beginning" Actions	**Goal Fulfillment**	**Service Area**	**Waste Diversion Impact**
Once multi-family plans are submitted, work with the properties to make sure the plans get implemented, providing technical assistance and correcting problems	II	Services to Residents	There are about 68,250 households in buildings with 5 or more units. If each of those households recycled at the same level as the City's curbside customers, it would represent an additional 22,082 tons per year.
Require new or amended site plans for multi-family properties to demonstrate adequate storage of and access to garbage and recycling management areas	II	Services to Residents	
Establish a Technical Assistance Program to assist commercial haulers with waste reduction, reuse and recycling guidance	II	Services to Residents	The tons available from the ICI sector for recycling could be a hundred thousand tons or more.
Continue to seek other ways to work with both commercial waste haulers and the ICI customers to explore best practices to divert materials and properly manage waste services to prevent problems like blowing litter	II	Services to Industrial, Commercial, and Institutions	

[25] All changes displayed in red font were included following the August 2, 2016 Draft Review and September 15, 2016 third Open House public meeting.

"Beginning" Actions	Goal Fulfillment	Service Area	Waste Diversion Impact
Implement recycling collection services to the interested small business customers.	II	Services to Industrial, Commercial, and Institutions	The tons available from the ICI sector for recycling could be a hundred thousand tons or more.
Develop Database of Food Residuals Generators	II	Services to Industrial, Commercial, and Institutions	It is estimated that food waste could amount to about 14 percent of the ICI waste stream.
Expansion of "Recycle on the Go" Program, including development of a database of service providers	III	Services to the Community	If each resident of Fort Worth recycled 3 bottles or cans on-the-go each week, it would be 124.8 million bottles each year.
Require new site plans and site plan amendments to show that all public use garbage cans at commercial buildings will be paired with a recycling bin	II	Services to the Community	
Require Special Events (temporary gatherings of 500 or more attendees) to provide recycling (which could include organics composting) services	V	Services to the Community	Properly prepared, event waste can be mostly recyclable and/or compostable: single serving beverages, food waste, cardboard, napkins and other paper products.
Conduct outreach to large-scale events held at venues such as Texas Motors Speedway and Panther Island to encourage implementation of effective recycling at those events, and reporting actual results following events	II	Services to the Community	

"Beginning" Actions	Goal Fulfillment	Service Area	Waste Diversion Impact
Work with TCEQ and local businesses and non-profits to identify a cost effective way to collect and recycle computers, televisions and other electronics at the City's three drop-off stations	IV	Services to the Community	Small businesses and nonprofits face expensive management requirements from the Federal Government, unless they can find and use an appropriate recycling program.
Work with the recycling industry in and around Fort Worth to promote their activities and encourage private businesses especially to recycle materials through this industry	II	Solid Waste Management Facilities	All diversion programs rely on there being a market for materials.
Utilize a commercial recycling section within the Planning Section or Solid Waste Administration to support a team for the duties associated with developing an ECO Industrial Park (EIP) and the centers of excellence.	II	Solid Waste Management Facilities	
Build synergy with the Blue Zones Initiatives	III	Solid Waste Services Division	Unclear, but definitely a priority for Fort Worth.
Establish Focus Groups with key stakeholders and advocacy groups seeking advancement of the CSWMP by means of specific Action Items and biennial updates on the implementation of the CSWMP and financially sound ideas to achieve higher diversion rates.	I	Solid Waste Services Division and Services to the Community	Instrumental in the advance of future waste diversion through key focus group involvement of action item evaluation and development.
Implement a City sponsored annual environmentally focused grant program to foster a "green entrepreneurial-based economy"	V	Service to Green Initiatives and Businesses	Will be determined based on individual grant programs.

"Beginning" Actions	Goal Fulfillment	Service Area	Waste Diversion Impact
Develop Annual CSWMP Accomplishment Report, Biennial Implementation updates and 5-Year "Living" Plan Updates	V	Service to the Community	Overall assistance in building community participation and waste diversion behaviors.

8.1.4 Maintaining: Continuing Programs and Actions[26]

"Maintaining" Actions	Goal Fulfillment	Service Area	Cost or Resource Needed	Waste Diversion Impact
Continue and improve garbage and recycling collection service	IV	Services to Residents	Included in current operations	The curbside system currently available in Fort Worth consists of many best practices; however, residents with similar services in other communities achieve higher recycling rates. Greater diversion is possible if more people recycle correctly.
Continue and improve bulk collection	IV	Services to Residents	Included in current operations	
Continue implementation of the multi-family recycling ordinance, including collection options and expanded recycling plans	II	Services to Residents	This activity would likely be assigned to a commercial recycling section; see "Beginning" actions.	The City has made great progress in engaging apartment and condo complexes, which is an achievement on which it can build to give multi-family residents greater recycling access.
Don't Bag It	I	Services to Residents	Included in current operations	If successfully adopted, the "Don't Bag It" philosophy would make many tons of yard waste available for recycling.
Support Food Residual Generators	II	Services to Industrial, Commercial, and Institutions	Included in current operations	With a mature recycling program in place, the next opportunity for major metros like Fort Worth to increase diversion lies in organics. It is mathematically critical to divert more organics in order to reach higher-level diversion rates.
Further the discussions with the Fort Worth Water Department regarding the feasibility of co-composting biosolids from the Village Creek Wastewater Treatment Facility	V	Services to Industrial, Commercial, and Institutions	Included in current operations	
Implementation of Keep America Beautiful (KAB) Best Practices	III	Services to the Community	Included in current operations	Keep Fort Worth Beautiful is a flagship program of Keep America Beautiful.

[26] All changes displayed in red font were included following the August 2, 2016 Draft Review and September 15, 2016 third Open House public meeting.

"Maintaining" Actions	Goal Fulfillment	Service Area	Cost or Resource Needed	Waste Diversion Impact
Maintain and expand participation in Keep America Beautiful efforts, including the Cowtown Cleanup; adoption of KAB's recycling messages to connect recycling with not-littering; and, adoption of a litter plan	III	Services to the Community	Included in current operations	The City can take advantage of Keep America Beautiful's public area recycling programs to improve on-the-go access locally.
Maintain the high level of service and responsiveness to illegal dump clean-ups	III	Services to the Community	Included in current operations	While there is little chance of illegally dumped materials being recycled, there is some possibility that properly managed materials might get recycled.
Continue operation of the drop-off stations for residential use, to discourage them from dumping items or bags of trash	IV	Services to the Community	Included in current operations	
Continue the current dead animal program	IV	Services to the Community	Included in current operations	This program has no impact on waste diversion; however, it is part of the comprehensive services provided by the City.
Continue to adopt an objective of completing 100 percent processing of dead animal work orders within 48 hours of receipt	IV	Services to the Community	Included in current operations	
Continue to support EPR/circular economy as a waste management technique for electronics and certain other items	III	Services to the Community	Included in current operations	Product stewardship has great potential for diverting materials from landfill disposal to proper management, especially electronics.
Continue supporting the efforts of the Texas Product Stewardship Council	III	Services to the Community	Included in current operations	
Continue to direct residents with fireworks or ammunition to contact the Fire Department to schedule a drop-off or arrange a pick-up of unwanted ammunition, ammunition loading supplies, fireworks, and other explosives	IV	Services to the Community	Included in current operations	These programs do not represent significant diversion of tons from landfill disposal; however, they do divert potentially dangerous or polluting materials to proper management.

"Maintaining" Actions	Goal Fulfillment	Service Area	Cost or Resource Needed	Waste Diversion Impact
Maintain the household hazardous waste (HHW) services at the Environmental Collection Center (ECC), the Mobile Collection Units (MCUs), Drop off Stations and the interlocal agreements associated with this program.	IV	Services to the Community	Included in current operations	
Implement a pharmaceutical drug take-back or disposal program for Fort Worth residents prior to an EPR-based program	IV	Services to the Community	$10,000 plus $4.58 per mail-back envelope, which covers processing	
Secure long-term disposal capacity for 2035-2060	I	Solid Waste Management Facilities	Included in current operations	Not applicable
Continuously monitor the SELF's capacity	I	Solid Waste Management Facilities	Included in current operations	
Continuously monitor regional landfill capacities and remaining life cycles (i.e. Waste Connection C&D site)	I	Solid Waste Management Facilities	Included in current operations	Not applicable
Continue to educate waste and construction haulers that C&D materials should go to Type IV Landfill sites (i.e. Waste Connection) instead of Southeast or Type I Landfill sites	I	Solid Waste Management Facilities	Included in current operations	Diverting non-putrescible waste materials will lengthen the life of the SELF.
Continue to have operational performance goals regarding misses, incoming customer calls, and response times	IV	Solid Waste Services Division	Included in current operations	Meaningful performance criteria and customer service review will ensure that SWSD provides services customers want and need, and that they can reach them appropriately.
Continuously evaluate SWSD performance and opportunities for internal improvement, as outlined in the Recommendations	IV	Solid Waste Services Division	Some included in current operations; other costs may vary	

"Maintaining" Actions	Goal Fulfillment	Service Area	Cost or Resource Needed	Waste Diversion Impact
Continue to conduct satisfaction surveys of its customers to gather opinion data regarding services	IV	Solid Waste Services Division	Included in current operations	
Continue the dialogue with non-profit organizations involved in reuse or resale of materials to identify their needs and desired support by the City, if any.	I	Solid Waste Services Division	Expenditures beyond staffing will vary	These programs do not represent significant diversion of tons from landfill disposal; however, they reinforce the concepts of reuse and waste reduction, and should have a residual effect of waste reduction before items even get to the curb.

8.2 Mid- and Long-term Actions and Implementation

The following actions are for implementation in the mid-term (5 to 10 years into the planning horizon) and the long-term (10 years or more into the planning horizon).

8.2.1 Services to Residents[27]

Incentive Programs			
Actions	**Resources needed**	**Responsible Party**	**Implementation Timeframe**
Consider Other Incentive Programs to increase participation and reduce recycling contamination	Expenditures beyond staffing will vary	SW Planners, Contract Services	Mid- to Long-term

[27] All changes displayed in red font were included following the August 2, 2016 Draft Review and September 15, 2016 third Open House public meeting.

Multi-family properties			
Actions	**Resources needed**	**Responsible Party**	**Implementation Timeframe**
If source separation of recyclables at multi-family properties remains insufficient, initiate evaluation of alternate routes to success, such as Alternate Collection Strategies	Expenditures beyond staffing will vary	SW Planners	Long-Term

Yard and Food Waste Collection			
Actions	**Resources needed**	**Responsible Party**	**Implementation Timeframe**
Evaluate Residential Food Waste Collection expansion and participation discount programs.	Expenditures beyond staffing will vary	SW Planners, Blue Crews	Mid- to Long-term
Evaluate Banning Yard Waste from Disposal in SELF	Expenditures beyond staffing will vary	SW Planners	Mid- to Long-term

8.2.2 Services to the Community[28]

Litter Abatement and Illegal Dump Clean-ups			
Actions	**Resources needed**	**Responsible Party**	**Implementation Timeframe**
Strive to pair garbage cans along pedestrian paths—sometimes referred to as "litter bins"—with recycle receptacles	Expenditures beyond staffing will vary	Public Education Program Coordinator, SW Planners	Mid-Term

[28] All changes displayed in red font were included following the August 2, 2016 Draft Review and September 15, 2016 third Open House public meeting.

Initialize an outreach campaign specifically aimed at cigarette litter and the impacts it has on water quality	Expenditures beyond staffing will vary	Public Education Program Coordinator, SW Planners	Mid-Term
Consider what low- or no-cost options the City could offer to businesses to dispose of their materials properly, and also what technologies or techniques could be used to "catch" people using popular dump sites	Expenditures beyond staffing will vary	Field Operations, Customer Care Division	Mid- to Long-term

HHW and pharmaceuticals			
Actions	**Resources needed**	**Responsible Party**	**Implementation Timeframe**
Pursue more equitable options to provide easy to use and understand disposal of medications	Expenditures beyond staffing will vary	Field Operations	Mid-Term
Pursue participation in product stewardship interest groups, such as the Texas Product Stewardship Council, and promotion of EPR as an alternative to government-provided collection programs for potentially polluting materials	Included in current operations	SW Planners	Mid-Term
Pursue opportunities for EPR of paint in Fort Worth or Texas as a whole.	Included in current operations	SW Planners	Mid-Term

8.2.3 Solid Waste Management Facilities[29]

Alternative Energy & Emission Standards			
Actions	**Resources needed**	**Responsible Party**	**Implementation Timeframe**

[29] All changes displayed in red font were included following the August 2, 2016 Draft Review and September 15, 2016 third Open House public meeting.

Waste-to-Energy Technologies	Expenditures beyond staffing will vary	SW Planners	Mid- to Long-Term
Evaluate real estate reclamation through closed landfill mining	Expenditures beyond staffing will vary	SW Planners	Mid- to Long-Term

Private sector facilities			
Actions	**Resources needed**	**Responsible Party**	**Implementation Timeframe**
Pursue a long-term strategy for developing an eco-industrial park for the purpose of building up local markets for recovered feedstocks, diverting materials from disposal, and creating sustainable "green" jobs.	A commercial recycling section may need to be formed within the Planning Section or Solid Waste Administration to support this effort	TBD	Long-Term
Develop partnerships with Universities and Colleges as potential innovators to establish one or more centers of learning or excellence.	A commercial recycling section may need to be formed within the Planning Section or Solid Waste Administration to support this effort	TBD	Mid-Term

8.2.4 Solid Waste Services Division Activities[30]

Organizational Structure			
Actions	**Resources needed**	**Responsible Party**	**Implementation Timeframe**
Continuously evaluate SWSD performance and opportunities for internal improvement, as outlined in the Recommendations	Some included in current operations; other costs may vary	Solid Waste Services Division	Mid- to Long-term

Source Reduction			
Actions	**Resources needed**	**Responsible Party**	**Implementation Timeframe**
Evaluate adopting goal to increase Fort Worth's Total Diversion Rate (including residential, commercial and ICI) to 80% by 2045	Expenditures will include consulting service fees, staffing resources and additional expenditures beyond staffing based on final determination	Solid Waste Services Division	Mid- to Long-term
Evaluate banning yard waste from disposal in the SELF	Expenditures beyond staffing will vary	SW Planners	Long-Term

[30] All changes displayed in red font were included following the August 2, 2016 Draft Review and September 15, 2016 third Open House public meeting.

Ordinances, Rules, and Regulations			
Actions	**Resources needed**	**Responsible Party**	**Implementation Timeframe**
Closely evaluate banning disposal of yard waste in the SELF	Expenditures beyond staffing will vary	SW Planners	Mid- to Long-term
Consider the positive and negative potential impacts on diversion of other disposal bans, such as cardboard	Expenditures beyond staffing will vary	SW Planners	Mid- to Long-term

9 Performance Assessment and Plan Updating

Change in the solid waste management arena is constant and inevitable. As described herein, there are many factors that can impact solid waste management. The CSWMP has two roles in the face of these changes: to clearly define the priorities and needs of the solid waste management system, and to measure the impact of the changes when the Plan is updated. The CSWMP lays out a timeline for actions and also the methods for evaluating the efforts. The Plan outlines measurable goals for the City to determine when the objectives of the Plan have been completed. The timeline is an important tool for monitoring objectives, and, in particular, new objectives when the Plan is reevaluated and updated. The best practice is to evaluate or update a 20-year plan every 5 or 10 years. Figure 9-1 shows some reasons for this interim update schedule.

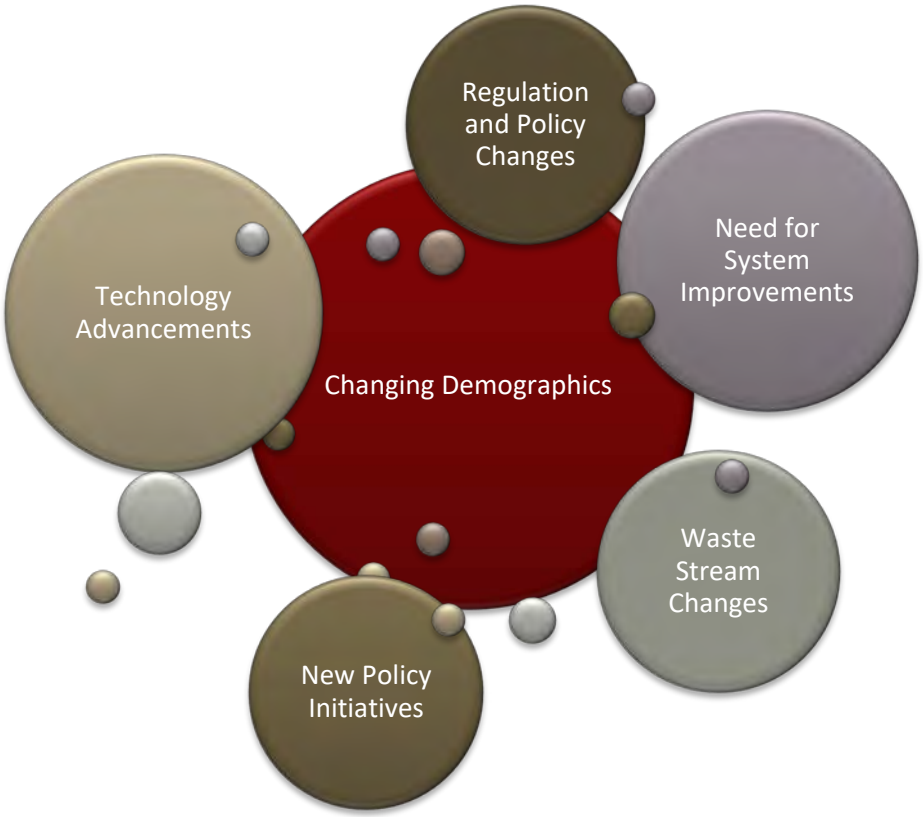


Figure 9-1 Reasons to Update a CSWMP during the Planning Period

The CSWMP is a discussion of how the City has and will impact and affect various components of the solid waste management system, and sets goals for those efforts. The City of Fort Worth intends to have positive and lasting effects via the CSWMP, including all aspects of residential collection, ICI sector services, public space recycling and waste diversion, organics, special wastes, reuse and diversion, material and energy recovery, disposal, sustainability efforts, extended producer responsibility, and public education. Therefore, when the CSWMP is updated, each of these programs must be evaluated with a goal of fulfilling the plan's objectives compared to national best practices. City ordinances and agency policies affecting solid waste also need to be evaluated for effectiveness, best practices, and the extent to which they accurately reflect the intentions and programs the City chooses to implement. As with the previous 1995-2015 Plan, this CSWMP includes with each recommended action the criteria for evaluating its success in both the short- and long term.

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September 2017

2017-2037 Comprehensive Solid Waste Management Plan
Appendix A – Glossary of Terms

RETHINKING WASTE For a Greener Fort Worth

Submitted to:

Robert Smouse
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Submitted by:

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GERSHMAN, BRICKNER & BRATTON, INC.

City of Fort Worth, TX, Comprehensive Solid Waste Management Plan

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Client Reference No: C17045

Appendix A – Glossary of Terms

1995-2015 Plan	The 1995-2015 Fort Worth Solid Waste Management Plan
2016 Draft Comprehensive Plan	The City of Fort Worth's draft 2016 Comprehensive Plan
AD	Anaerobic Digestion or Assistant Director
AP	Authorized Positions
ARR	Austin Resource Recovery
BTU	British Thermal Unit
C&D	Construction and Demolition debris
CCD	Code Compliance Department
CIP	Capital Improvement Plan
City	The City of Fort Worth, Texas
City TV	Fort Worth Television, sponsored by the City of Fort Worth
CIWMB	Former California Integrated Waste Management Board (now CalRecycle)
CLOMR	Conditional Letter of Map Revision (FEMA)
CNG	Compressed Natural Gas
CSWMP	Comprehensive Solid Waste Management Plan
DDMP	Disaster Debris Management Plan
DFW	Dallas/Fort Worth region
ECC	Environmental Collection Center
EIP	Eco-Industrial Park
ELR	Enhanced Leachate Recirculation
EPA	U.S. Environmental Protection Agency
EPR	Extended Producer Responsibility
ETJ	Extraterritorial Jurisdiction, the legal ability of a government to exercise authority beyond its normal boundaries
EWS	City of Garland's Environmental Waste Services
FEMA	Federal Emergency Management Agency
Fund	The City of Fort Worth's Solid Waste Enterprise Fund
FWISD	Fort Worth Independent School District
GBB	Gershman, Brickner & Bratton, Inc.
GHG	Greenhouse Gas
Grant of Privilege	A permitting system by the City of Fort Worth regarding commercial waste and recycling hauling operations
HHW	Household Hazardous Waste
HUD	U.S. Department of Housing and Urban Development
ICI	Industrial, Commercial and Institutional Sector
IDC	Illegal Dumping Cleanup
IESI	A holding corporation which, through its subsidiaries, provides waste collection and recycling services (currently operating as a subsidiary of Waste Connection, Inc.)
IT	Information Technology
KAB	Keep America Beautiful
KFWB	Keep Fort Worth Beautiful
LEED	Leadership in Energy and Environmental Design

LETCO	Living Earth Technologies
LFG	Landfill Gas
LFGTE	Landfill Gas to Energy
Master Composter	A composting training program sponsored by the City of Fort Worth
MBT	Mechanical Biological Treatment
MCU	Mobile Collection Unit
MRF	Material Recovery Facility
MSW	Municipal Solid Waste
MWP	Mixed Waste Processing
NAICS Code	North American Industry Classification System
NASA	National Aeronautics and Space Administration
NCTCOG	The North Central Texas Council of Governments
NOx	Nitrogen Oxides
PAYT	Pay as You Throw
PID	Public Improvement District
Project Team	Members of the consulting team lead by Gershman, Brickner & Bratton, Inc.
PUC	Texas Public Utility Commission
PV	Photovoltaic
RDF	Refuse Derived Fuel
REC	Renewable Energy Credit
Republic Services	Republic Services, LLC
RRC	NCTCOG's Regional Review Committee
RTD	Ready to Drink
SELF	The City of Fort Worth's Southeast Landfill
STAR	State of Texas Alliance for Recycling
SWSD	The City of Fort Worth, Code Compliance Department, Solid Waste Division
TCEQ	Texas Commission on Environmental Quality
TEMD	Texas Emergency Management Division
TERP	Texas Emission Reduction Program
TPD	Tons per Day
TPW	City of Fort Worth Transportation and Public Works Department
TPY	Tons per Year
TxSWANA	Texas Solid Waste Association of North America
Type I Landfill	Landfill permitted to accept municipal solid waste
Type IV Landfill	Landfill permitted to accept construction and demolition debris
ULSD	Ultra-Low Sulfur Diesel
URO	Universal Recycling Ordinance
U.S. EPA	U.S. Environmental Protection Agency
VOCs	Volatile organic compounds
Waste Connections	Waste Connections, Inc.
WM/WMI	Waste Management, Inc.
WWTP	Waste Water Treatment Plant
Zero Waste	Concept to divert the majority of waste from disposal

September 2017

2017-2037 Comprehensive Solid Waste Management Plan
Appendix B – Index of Topics

RETHINKING WASTE For a Greener Fort Worth

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America Recycles Day ***See OUTREACH & EDUCATION***

Anaerobic Digestion ***See ENERGY***

Antifreeze ***See HAZARDOUS & SPECIAL WASTES***

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September 2017

2017-2037 Comprehensive Solid Waste Management Plan
Appendix C – Public Involvement and Outreach

RETHINKING WASTE For a Greener Fort Worth

Submitted to:

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City of Fort Worth, TX, Comprehensive Solid Waste Management Plan

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Client Reference No: C17045

City of Fort Worth
2017 - 2037 Comprehensive Solid Waste Management Plan
Public Involvement Plan

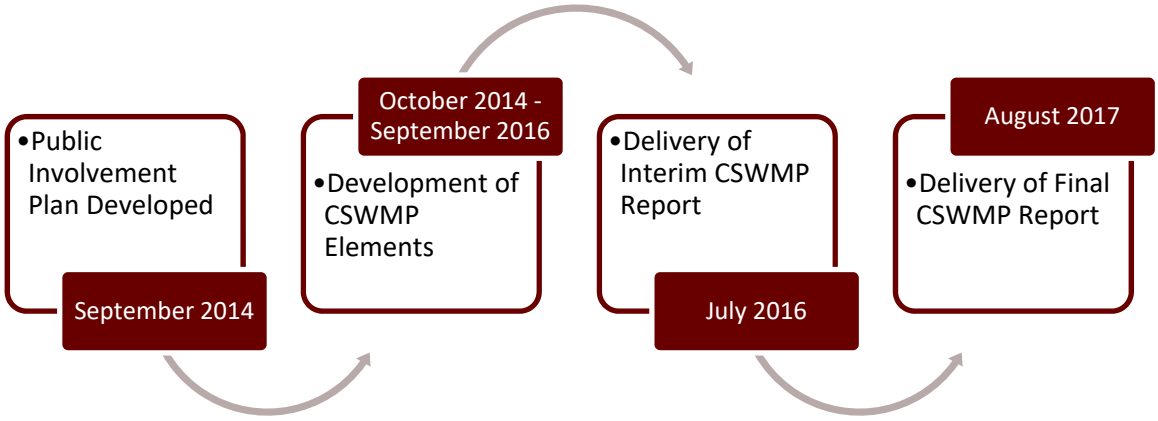
GOAL

A process for enabling effective and meaningful public involvement to ensure an understanding among a broad swath of stakeholders, their issues, attitudes, and expectations, so that the SWMP accurately reflected and incorporated community values and ideas.

CITY'S CORE BELIEFS/KEY MESSAGES

Landfilling our nation's valuable resources after use is not a sustainable method of solid waste management. Fort Worth must continue to implement new and innovative programs to increase landfill diversion and resource recovery.

SCHEDULE



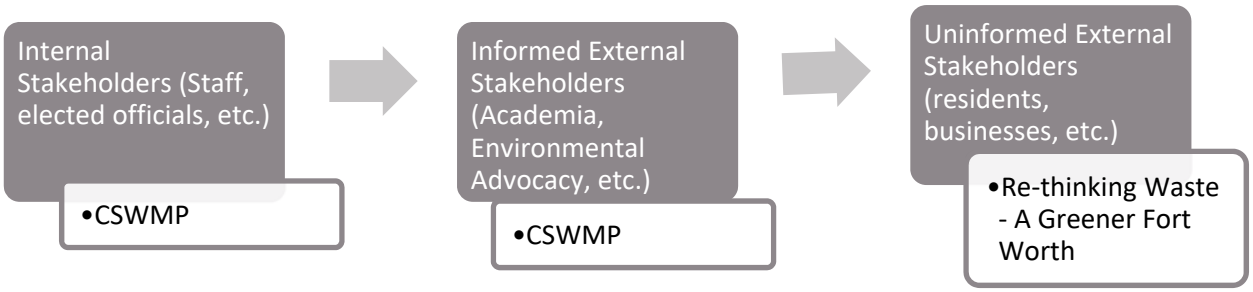
KEY AUDIENCES/CRITICAL STAKEHOLDERS

There were a number of diverse groups of audiences, or stakeholders, that we engaged with throughout this process. Each group had different interests, concerns and ideas when it came to the long-term, sustainable management of solid waste and the costs (both economic and noneconomic) associated with it. Below is the list of

the groups of stakeholders engaged throughout the process:

- The City's Elected Officials and Decision Makers
- City Staff, as owners and ambassadors of the Plan
- Local Media, to ensure they had the facts they needed to help the City tell the story
- Private waste, recycling companies and haulers
- Large Commercial Customers
    - Lockheed Martin, Bell Helicopter
- Commercial Property Managers
    - Tarrant Count Apartment Association, apartment management associations, shopping center managers
- Small businesses that generate reusable commodities
- Chambers of Commerce (economic development perspective and businesses)
- Residents
    - Single-Family and Townhome Residents
    - Apartment and Condominium Residents
- Other Governmental Entities
    - FWISD, NCTCOG, surrounding small communities (inter-local agreements with Environmental Collection Center)
- Environmental Advocacy Groups
- Members of academia, local university

NAME/IDENTITY FOR PROJECT
Formal name: 2017-2037 Comprehensive Solid Waste Management Plan
Project Name: Re-thinking Waste – A Greener Fort Worth



PLAN STRATEGIC ELEMENTS
Fort Worth's Public Involvement Plan for its CSWMP followed Industry Best Practice and included Planning, Research and Development.

Planning
The team began by planning an approach to the project research and the plan development. During the Research phase, Fort Worth evaluated the current knowledge, attitudes, questions and concerns among key audiences about solid waste management for the City. The research methods and audiences were identified initially in the RFP and then expanded upon during the outreach planning phase. Over the course of the project, the strong foundation of the plan enabled the team to be responsive to changing conditions and conduct meaningful research and productive communication with stakeholders and the public.

Research

Research conducted during the fall of 2014 and start of winter 2015 elicited quality information from each of the diverse groups of stakeholders. The information obtained through this effort informed and shaped the elements in the CSWMP. The research strategies were as follows:

RESEARCH METHOD	AUDIENCE	RESULT
90-Minute Workshops	• Large ICI generators • Organics generators and processors • C&D generators and processors • Naval Air Station Joint Reserve Training Base Fort Worth • Other Institutions: FWISD; NCTCOG; Academia (as large generators) • Environmental Advocacy Groups (TCE; Sierra Club; Fort Worth Interfaith Power & Light; etc.)	Six workshops planned and conducted; Provided a facilitated discussion environment, among homogenous groups, that enabled deep exploration into concerns and issues early on.
Email Survey (Constant Contact)	Residents	More than 500 people responded to the survey; Provided a way to obtain some less anecdotal, more quantitative feedback among a *select and not random* group of
Intercept "On the Street" Interviews	General Public	Over 100 interviews completed; Provided a way to obtain less anecdotal, more quantitative feedback among a *random* group
Influential Leaders Interviews (ILIs)	• Elected Officials • Heads of City's Departments • Members of the Solid Waste Industry • Business Representatives • Academia • Non-profit Organizations • Chambers of Commerce	Initially 12 ILIs planned, 32 conducted; Provided a way to obtain less anecdotal, more quantitative, feedback from key decision makers in a format that was less likely to influence their comments and opinions.

RESEARCH METHOD	AUDIENCE	RESULT
Facebook Polling	General Public	Over the course of the project, resources were reassigned from this effort in order to capitalize on the opportunity to conduct more ILIs and expand upon the Open House activity (see below).

Development

Throughout this phase, conducted from August 2014 –September 2016, the point of our efforts was to share intermediary information and continue to obtain feedback from the general population, our external audiences. A mix of strategies and tactics were planned and completed to reach Fort Worth's diverse stakeholders as follows:

ACTIVITY	AUDIENCE TARGET	RESULT	TIMING
Open House	General Public	3 Open Houses conducted; 1 to Introduce and kickoff the project and 2 to inform the Fort Worth Community on the development of the plan	August 2014 – September 2016
Fort Worth Website	General Public	Continually updated; Served as "Home base" for all information about the project, fact sheets, glossary of terms, shareable information.	• Review and Initial Updates, October 2014 • Continued updates through September 2016
Fort Worth Facebook Posts and Advertising	General Public	Continually updated; Ensured the conversation stayed "top of mind"; to monitor conversation and address myths/rumors quickly.	Throughout the development process
Fact Sheet (s)	General Public	Continually updated; Explained the need for the project, impacts of status quo; explained technologies	Throughout the development process
Media Relations (sending releases/pitching local media)	Media and General Public	Continually updated; Ensured the conversation stayed "top of mind" and ensured the public was well informed of their opportunity to engage	Throughout the development process

ACTIVITY	AUDIENCE TARGET	RESULT	TIMING
Advertising	General Public	Continually updated; Ensured the conversation stayed "top of mind" and ensured the public was well informed of their opportunity to engage	Throughout the development process, as budget permitted.
Workshop Series	• Large ICI generators • Organics generators and processors • C&D generators and processors • Naval Air Station Joint Reserve Training Base Fort Worth • Other Institutions: FWISD; NCTCOG; Academia (as large generators) • Environmental Advocacy Groups (TCE; Sierra Club; Fort Worth Interfaith Power & Light; etc.)	6 total, each approximately 90 minutes in length; Shared information known/learned to date on technologies proposed and to ask for additional feedback, concerns and ideas for inclusion in the CSWMP.	During 2015-2016
PowerPoint Presentation	Business, advocacy and other groups, as requested	Shared latest information, explained proposed technologies and obtained latest ideas, input.	September 2015

OUTREACH PLAN TOOLS

The following are the research and outreach tools used to implement the Outreach Plan:

- Email alias swplan@fortworthtexas.gov
- Online Survey Results: Questions and Responses
- Intercept "On the Street" Interview Results: Questions and Responses
- Guidance documents (scripts) for focus groups
- Guidance documents (scripts) for influential leader interviews (ILIs)
- Fact Sheets
- Internet Updates
- Feedback form
- Open House Presentations
- Pre-Council Presentation

Mail to swplan@fortworthtexas.gov

The City of Fort Worth created an email alias, swplan@fortworthtexas.gov, to collect input from residents and other stakeholders. The following is an encapsulation of 173 incoming messages.

Topics of interest, comment, and concern

- Access to services or facilities: Increased access to City solid waste facilities for those who are not currently allowed to use them, such as residents of unincorporated areas or independent landlords who manage rental housing.
- Business recycling: Requirement for businesses to recycle
  - Frustration at not having access to recycling in the workplace
  - Sentiment that if residents are required to recycle and can be penalize for not doing so, the same should go for businesses
- C&D: Requirement for this material to be recycled.
  - Concern about the problem of debris at residential curb
  - Importance of diversion of this material for the overall waste management system
- Commercial composting: Importance of food waste composting
  - Requirement for large generators to compost
  - Endorsement for the City to take action to support development of a facility.
- Disposal options: Ideas about facilities and technologies
  - WTE: Interest in pursuing resource recovery
  - Concern about expansion of the current landfill
- Food composting (residential): Support for collection of food waste at the residential curb for the purpose of composting
- Hard-to-recycle items: Interest and ideas for programs or partnerships that divert particular items from disposal, such as textiles or furniture
- Illegal dumping: Concern about access to proper management of bulky items resulting in illegal dumping
- Materials that can be recycled at the residential curb
  - Confusion about the recyclability of particular items in the curbside program
  - Interest in adding additional materials to the recycling programs
- Outreach and education: Interest and ideas for ways to engage and educate residents and businesses
- "Not enough": Sentiment, often overlapping with other topics, that the CSWMP is not aggressive enough in its goals or intentions
- Plastic bags: Importance of reducing them in the environment
  - Support for regulation to ban or limit single-use plastic bags
  - Concern about their impact on the environment
- Positive responses to the CSWMP, the planning process, and the public outreach processes
- Service at the curb: General complaints, concerns, and ideas for ways service could be improved
- Zero Waste: Endorsement for the concept of Zero Waste
  - Advocacy for high recycling rate goals and a more aggressive timeline for achieving them
  - Social action by stakeholder groups: Of the 173 incoming emails, 145 contained the same text or a

slight variation thereof. The message was concerning:

- Interest in more aggressive recycling goals than in the draft CSWMP, including pursuit of a Universal Recycling Ordinance (URO), citing Austin, TX, as an example
- Endorsement of the concept of Zero Waste
- Expansion of recycling in public places and in businesses / workplaces
- Support for collection of food waste at the residential curb and from businesses for the purpose of composting
- Disapproval of CSWMP elements regarding expansion of the current landfill or pursuit of resource recovery that involves incineration

Online Survey Results March 9, 2015

This survey was administered online using the SurveyMonkey service. It was promoted to "friends" of the City of Fort Worth and other individuals who had signed up their email addresses to receive information from the City.

Questions and Responses

1. **In your opinion, what are the most important environmental issues facing Fort Worth? (Respondents were asked to rank their #1, #2, and #3 priorities)**

   - The issue most often identified as a #1 priority was "clean air/reducing auto emissions" (19.5% ranked it as their #1 priority)

     The issues next most frequently ranked #1 were Litter followed by water conservation

   - The issue most often identified as a #2 priority was Recycling (25% ranked it as a #2 priority)

     The issues next most frequently ranked #2 were Litter followed by water quality

   - The issue most often identified as a #2 priority was also Recycling (25% ranked it as a #3 priority)

     The issues next most frequently ranked #3 were Litter and clean air/emissions

   There were 511 total responses to this question

2. **On average, each household in Fort Worth generates about a ton and a half of garbage and recycling each year that the City collects and manages. How important is it to our City's future to manage this material in the most environmentally responsible manner? (Scale of 1 to 5 with 5 being critical and 1 being not at all important)**

   1. Not Important – 6%
   2. A little Important – 2%
   3. Important – 3%
   4. Very Important – 18%
   5. Critical –71%

3. **If you were in charge of the City's recycling program which of the following ideas do you think should be done to increase recycling? Please select your top 3 –**

   1. Place more recycling bins in public areas like parks – 66%
   2. Promote more recycling at businesses – 76%

3. Encourage more recycling by making the larger garbage carts more expensive to use – 21%
4. Collecting and composting food waste – 35%
5. Continue monthly bulk collection but alternate each month between big junk and large brush collections. Large brush can then be mulched and kept from landfill disposal – 35%
6. Add more material to what can be collected at the curb –53%

4. If the City decided to offer residential curbside collection of food waste in a separate container so that food scraps do not end up in the landfill, would you be willing to participate?

Yes – 62% No – 38%

5. There several emerging trends in solid waste management currently. These include –

1. Waste-to-Energy – Is an operation where materials not collected as recycling are incinerated as a fuel to generate electricity at a specially designed facility. Energy generated is sold back into the power grid. 96% Favorable
2. Zero Waste – Is a concept where organizations and municipalities commit to finding ways to divert the majority of waste from disposal in a landfill. It includes expanding traditional collection methods and maximizing recycling, diversion of organics such as yard and food waste for composting, and finding uses for the remaining materials preventing disposal. 92% Favorable
3. One Cart collection - Where all garbage and recycling is placed in one cart at households, collected by the city then taken to a mixed waste processing facility where as much material is pulled out as possible for recycling, composting or handled through other processes to minimize disposal in a landfill. 96% Favorable

6. The ideas we've talked about (such as construction of a waste-to-energy facility, construction of a recycling facility that can sort all-in-one trash and recycling, or even adopting the concept of Zero Waste) might result in an increase to garbage collection fees charged to City residents. The current price ranges from $12.50 to $22.75 per cart per month.

How much of an increase do you think you could tolerate if it meant one or more of the ideas above could be implemented for a real, measurable improvement to our environment?

1. Less than one dollar – 21% 2.

$1-5 – 58%

3. $6-10 – 21%

7. What are your top 3 sources for local news, including apps/websites? List top 3 in order.

1. Fort Worth Star Telegram (18%)

   Local TV and Local Radio were 2nd and 3rd

2. Fort Worth Star Telegram (26%) (named Star-Telegram or "local paper")

   Local TV rated 2nd; and News Website/Facebook tied for 3rd

3. Local TV (12%)

   Local talk radio and "Other*" were 2nd and 3rd

A total of 533 answered this question. “Other” included City emails, water bill, city newsletters, brochure mailings, etc.

Intercept Interview Results March 9, 2015

This survey was administered to people at a busy shopping center who were screened only to verify that they were Fort Worth residents.

Questions and Responses

1. **In your opinion, what are the most important *environmental* issues facing Fort Worth?**
   1. Litter/pollution (36%)
      Trash/hauling/recycling management and Air pollution were 2nd and 3rd
   2. Litter/pollution (17%)
      Trash/hauling/recycling management was 2nd
   3. Trash/hauling/recycling management (7%)

There were 88 respondents to this question

2. **On average, each household in Fort Worth generates about a ton and a half of garbage and recycling each year that the City collects and manages. How important is it to our City's future to manage this material in the most environmentally responsible manner? (Scale of 1 to 5 with 5 being critical and 1 being not at all important)**

   1 Not Important – 1%
   2 A little Important – 1%
   3 Important – 5%
   4 Very Important – 24%
   5 Critical – 71%

3. **If you were in charge of the City's recycling program which of the following ideas do you think should be done to increase recycling? Please select your top 3 –**
   a. Place more recycling bins in public areas like parks – 82%
   b. Promote more recycling at businesses – 72%
   c. Continue monthly bulk collection but alternate each month between big junk and large brush collections. Large brush can then be mulched and kept from landfill disposal – 45%
   d. Add more material to what can be collected at the curb – 32%
      Is there something that you have in mind? *No one said anything.*
   e. Encourage more recycling by making the larger garbage carts more expensive to use – 29%
   f. Collecting and composting food waste – 26%

4. **If the City decided to offer residential curbside collection of food waste in a separate container so that food scraps do not end up in the landfill, would you be willing to participate?**

Yes – 66% No – 34%

If no: Why not?

- There's no market for it
- Attracts animals
- Odors
- Too expensive
- I don't have time/too much trouble
- I don't have room

If yes: What if there were a cost involved? 60% (40 out of 67) said okay

5. **There several emerging trends in solid waste management currently. These include –**

   a. **Waste-to-Energy** – Is an operation where materials not collected as recycling are incinerated as a fuel to generate electricity at a specially designed facility. Energy generated is sold back into the power grid. 38% Favorable

   b. **Zero Waste** – Is a concept where organizations and municipalities commit to finding ways to divert the majority of waste from disposal in a landfill. It includes expanding traditional collection methods and maximizing recycling, diversion of organics such as yard and food waste for composting, and finding uses for the remaining materials preventing disposal. 8% Favorable

   c. **One Cart collection** - Where all garbage and recycling is placed in one cart at households, collected by the city then taken to a mixed waste processing facility where as much material is pulled out as possible for recycling, composting or handled through other processes to minimize disposal in a landfill. 18% Favorable

How do you feel about Fort Worth look into these for its solid waste management?

- 41 responded favorably to this idea in the general sense – and this may overlap a preference for one of the items above.
- 1 responded generally unfavorable to these ideas, citing expense.

6. **The ideas we've talked about (such as construction of a waste-to-energy facility, construction of a recycling facility that can sort all-in-one trash and recycling, or even adopting the concept of Zero Waste) might result in an increase to garbage collection fees charged to City residents. The current price ranges from $12.50 to**
   $22.75 per cart per month.

   How much of an increase do you think you could tolerate if it meant one or more of the ideas above could be implemented for a real, measurable improvement to our environment?

   a. Less than one dollar –
   20% b. $1-5 – 64%
   c. $6-10 – 12%
   d. How much would be reasonable? 5% indicated no increase would be tolerable.

7. **What are your top 3 sources for local news, including apps/websites? List top 3 in order.**
   1. Internet (general) (21%)
2. *TV and Fox 4, specifically, were 2nd and 3rd* Internet (general) (13%)

Radio was 2nd

3. Fort Worth Star Telegram (11%)

Among Specific Internet Responses

- Facebook – 11
- Twitter – 8
- Social media (general) – 5
- Google – 2
- School website – 1
- Fort Worth City website – 1
- The Salon – 1
- Reddit – 1
- Reuters – 1
- Tumblr – 1
- Yahoo – 1

Among Specific TV Responses

- Fox 4 – 27
- NBC – 20
- CNN – 19
- CBS Channel 11 and 21 – 9
- ABC Channel 8 (WFAA) – 6

BUSINESS (Focus Groups)

Restaurants and Commercial Tenants

Time Frame: 90 minutes
Group Size: 9-10
Three groups: Commercial Tenants, Restaurants, Commercial Property Managers

Introduction:
Good Evening (Afternoon). My name is Cynthia White with Open Channels Group. I have been asked to assist the City in the development of a comprehensive solid waste plan, so that Fort Worth can plan a sustainable future and do better things with waste than dump it in a landfill.

Businesses in Fort Worth have a huge stake in the City's success, as they generate two thirds of its waste. So we have invited you here today (tonight) to help us understand better what you know as a group, what you don't know (so we can message appropriately) and how you feel about some of the possible ways Fort Worth can do better things with its waste.

With me is (introduce your note taker) who will be recording this session (just audio) and also taking notes so we can compile a report for the City, which will inform the decisions they make on this journey.

A few ground rules here tonight (today) are:

- Please wait until I recognize you to speak, so we can be sure everyone is heard.
- When it's your turn, please speak clearly and project so everyone can hear.
- It's important there are no side conversations. We want to capture all your thoughts and ideas and it's hard to do when there are more than one conversations happening.

Just so you are aware we are conducting three groups like this. Yours is the Commercial Tenants Group. We are also going to meet with a Restaurant Group and Commercial Property Owners. We tried to group you by similar challenges.

Are there any questions before we begin?

Section 1: 30 minutes GENERAL KNOWLEDGE

So, first I am going to ask you about general knowledge about City solid waste and recycling.

- What, if anything, do you know about recycling requirements and goals in Fort Worth?
- Do you recycle at your business? Why or why not?
- What are the top 2 or 3 items you generate that can be recycled?
- Are you recycling these items?
- Who oversees recycling and trash collection at your business? Are employees involved? How so?
- If it's not you who oversees, how often is recycling/trash info communicated to you and by whom?
- How effective is that communication?

Section 2: 30 minutes ATTITUDES

This next section is about your attitudes and feelings about recycling and trash.

- Is managing proper disposal of your trash important to you? Why or why not?
- Is recycling important? Why or why not?
- How do you feel about composting, separating food out of your trash for separate disposal?
- Is recycling at your business easy for employees? Why or Why not?
- What's the hardest thing about recycling at your business?
- Do you think there is (or how is there) a connection between waste management and the City's economy?
- Is there a connection between how you manage waste at your workplace/property and your (a) bottom line (b) reputation (c) employee/tenant satisfaction/morale? Explain.
- Would a one-bin system, collecting all trash and recyclables in one container to be separated and processed later at a facility that can do it for you, be a good idea? Why or why not?
- What should cost more, recycling (because it costs more to process, though a revenue is generated back) or trash disposal (because it harms the environment)?

- What would help your business/workplace/property recycle more? A tool or assistance from the City? Signage? Financial carrot or stick?

Section 3: 30 minutes Behaviors with respect to recycling and waste disposal

- Are you able to reuse anything before throwing away? What?
- How do you handle electronics you no longer want or need?
- What do you do with bulky items like furniture or appliances?
- What's the best way the City can interact and engage you and business like yours in the kinds of behaviors that benefit the environment?
- What's the best way for the City to communicate with you?
- Is the person who handles your invoices the same as the person who makes decisions about trash and recycling? If not, do they talk often?

Are there any comments you would like to make about business recycling or trash management that we haven't already covered?

BUSINESS (Focus Groups) Commercial Property Owners

Time Frame: 90 minutes
Group Size: 9-10
Three groups: Commercial Tenants, Restaurants, Commercial Property Managers

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Are there any questions before we begin?

Section 1: 30 minutes GENERAL KNOWLEDGE

So, first I am going to ask you about general knowledge about City solid waste and recycling.

- What, if anything, do you know about recycling requirements and goals in Fort Worth?
- Do you offer recycling to your tenants? Why or why not?
- What are the top 2 or 3 items you believe your tenants generate that can be recycled?
- Are these materials being collected for recycling?
- Who oversees recycling and trash collection for your tenants? Are your own employees involved? How so?
- If it's not you who oversees, how often is recycling/trash collection info communicated to you and by whom?
- How effective is that communication?

Section 2: 30 minutes ATTITUDES

This next section is about your attitudes and feelings about recycling and trash.

- Is managing proper disposal of your trash at your properties important to you? Why or why not?
- Is recycling important? Why or why not?
- How do you feel about composting, which is the separating out of food from trash for beneficial use elsewhere?
- Do you foresee any issues with composting?
- Is offering recycling collection at your properties easy? Why or Why not?
- What's the hardest thing about offering recycling at your business?
- Do you think there is (or how is there) a connection between waste management and the City's economy?
- Is there a connection between how you manage waste at your properties and your (a) bottom line (b) reputation (c) employee/tenant satisfaction/morale? Explain.
- Would a one-bin system, collecting all trash and recyclables in one container to be separated and processed later at a facility that can do it for you, be a good idea? Why or why not?

- What should cost more, recycling (because it costs more to process – though you get revenue from the material) or trash disposal (because it harms the environment)?
- What do you think would help your tenants recycle more? A tool or assistance from the City? Signage? Financial carrot or stick?
- What kind of role would you be willing to play in making that happen?

Section 3: 30 minutes Behaviors with respect to recycling and waste disposal

- Is there anything you collect from tenants for reuse rather than haul away for trash or recycling?
- How do you/haulers handle electronics left behind?
- What do you do with bulky items like furniture or appliances that are left behind?
- What's the best way the City can interact and engage you and business like yours in the kinds of behaviors that benefit the environment?
- What's the best way for the City to communicate with you?
- Is the person who handles your invoices/mail from City the same as the person who makes decisions about trash and recycling? If not, do they talk often?

Are there any comments you would like to make about business recycling or trash management that we haven't already covered?

CITY OF FORT WORTH
INFLUENTIAL LEADER
INTERVIEW QUESTIONS

As you know, Fort Worth is growing and this poses a considerable challenge when it comes to managing the city's solid waste. We are developing a new 20-year comprehensive solid waste management plan to ensure that the material handling and resource recovery is done in a manageable, and cost efficient manner. The City is therefore engaging residents, businesses, institutions, and some of its influential leaders to share their insight into how we can best meet these challenges, and this interview is part of that process. So, let's begin.

1. The City currently controls one third of the total MSW – its residential component – and influences somewhat the management of the other two thirds – the so called ICI waste. It is the intent of the Comprehensive Solid Waste Management Plan for the City to participate more directly in the management of the ICI, for instance, through ordinances. What are your thoughts?

2. The City's landfill has a projected life of 24-46 years, depending on projected volumes of municipal solid waste and compaction rates. One of the most logical next steps to meaningfully decrease what's disposed in the landfill, and consequently extend its life, would be to capture the organic waste (mainly food) for composting (which some municipalities nationwide are successfully doing). What are your thoughts and concerns on the City collecting residential food waste for composting?

3. What are your thoughts/concerns on encouraging or requiring businesses to collect and recycle their organic waste (food waste and landscape waste)?

4. What are your thoughts/concerns on composting all (or part of) the Wastewater Treatment Plant's biosolids, similar to the methods used by the City of Denton?

5. Presently, City residents can place up to 10 cubic yards of bulk waste at the curb for collection each month. But, often bulk items are placed in the same pile with large brush, rendering the brush contaminated for mulching/composting and resulting in all of the material being landfilled. What are your thoughts on requiring separation of residential bulk from brush? Depending on how it is done, such a separation may either decrease or increase the level of service to residents; no matter what, it will increase the volume of material diverted (perhaps by 8-10%) from the landfill. What are your thoughts?

6. There are several emerging trends in the solid waste management currently.

Some of these are –

a. Waste-to-Energy – where materials not collected as recycling are incinerated as a fuel to generate electricity at a specially designed facility. Energy generated is sold back into the power grid.

b. Zero Waste – where organizations and municipalities commit to diverting the vast majority or all of waste from disposal in a landfill. It requires expanding traditional collection methods and maximizing recycling, diversion of organics such as yard and food waste for composting, and finding uses for the remaining materials preventing disposal. The City of Austin is currently working on the implementation of this concept.

c. One Cart collection – where all residential garbage and recycling is placed in one cart at households, collected by the city and then taken to a mixed waste processing facility where as much material is pulled out as possible for recycling, composting or handled through other processes to minimize disposal in a landfill. This is a concept currently under study by the City of Houston.

What are your thoughts about the City pursuing some of the emerging recovery technologies just discussed, which will be costlier to the City, but may prove to be beneficial to Fort Worth in the future? With the goal of increased landfill diversion and capacity of future disposal needs, how open would you/council be to fee structure changes? For instance Fort Worth has a $5 differential between our three garbage cart sizes, but Austin has more than a $20 difference from smallest garbage cart to largest.

7. Managed or franchised collection systems may result in lower overall costs to consumers. In addition, recycling rates are typically higher in organized systems. How do you view the possible franchising of Fort Worth's current open commercial hauler market?

8. What are your thoughts on the development of a public-private eco-business park in Fort Worth capable of absorbing the extra recycled material generated locally, possibly creating new recycling markets, while generating new revenue streams and creating local jobs?

9. Is there any other idea, concern or question related to solid waste management you want to express that we haven't already discussed?

RE-THINKING WASTE
A GREENER FORT WORTH

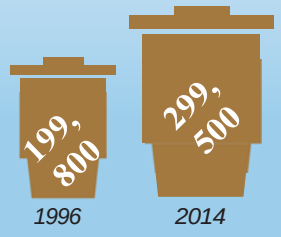
CREATING SUSTAINABLE PRACTICES FOR A HEALTHY ENVIRONMENT

Fort Worth is a vibrant community where residents participate in a number of green initiatives. The latest initiative, 'Re-thinking Waste – A Greener Fort Worth,' is one of the largest green initiatives yet.

- We are developing a comprehensive solid waste management plan that will guide the city 20 years into the future.
- We hope to captures the best and most appropriate innovations and technology for our waste management.
- Please join us in an interactive community-wide effort to and make a greener Fort Worth.

Then and Now

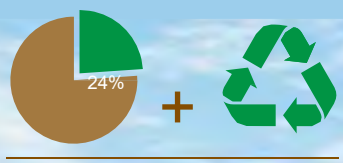
A good plan considers the past and the present to determine a greener future.



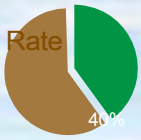
Total Residential Waste Collected Annually in Tons

Our business and industry generates two-thirds of our waste.

Current Diversion Rate



Goal Diversion Rate



We need to reach beyond 40% as we plan for the next 20 years.

Increase Diversions

The City of Fort Worth is committed to responsible management of all solid waste. One of our goals is to increase the amount of solid waste that we keep out of the landfill. We've made progress, but more can be done. Help us plan a future that considers growth, innovation and technology so we can reach our goal.

Your Voice is Important

Responsible management of solid waste by all of us will help protect quality of life and create a healthy environment all residents can enjoy now and into the future. We want to know what you think. Call email, or connect with us online using the information below.

For more information:

RETHINKING WASTE For a Greener Fort Worth

The City of Fort Worth is undertaking one of the largest green initiatives yet with the development of a comprehensive solid waste management plan.

Watch an update from Solid Waste Services Assistant Director Kim Mote.

Public Outreach

The city has conducted public outreach to collect information about Fort Worth residents interest in solid waste and other environmental issues.

View the summary

The plan will serve as a blueprint for how waste is handled and managed in Cowtown for the next 20 years. The previous plan – created in 1995 – addressed a number of issues, including ensuring adequate landfill space. This time around, the cityis looking to involve all residents of Fort Worth to answer tougher questions:

- What is waste, and what part of waste is a resource?
- Which resources can we recapture for value, and what's the best way to do that?
- What behaviors are Fort Worth residents and businesses willing to adopt to make a greener city?

Watch this page and City News for opportunities to give your input on the plan.

Just the facts

Fort Worth is growing

- It's grown by 50 percent over the last 20 years.
- Residential waste only comprises about one third of all of the waste generated within the city.
- Industrial, commercial and institutional waste comprises the remaining two-thirds.

Making progress

*The city's goal is to divert **40 percent** of residential waste away from the landfill through recycling and other programs.*

- Prior to 2003, the city diverted **7 percent** of waste.
- In 2013, the city diverted **24 percent**. See what kinds of waste are making their way to the landfill.

Goals

- Evaluate and address all waste produced within the City not just the residential waste.
- Consider emerging technologies and sustainable practices in managing our solid waste as both practices and technologies have changed significantly since 1995.
- Determine if the city has the best available technology in place.
- Move beyond traditional waste management programs and find the best material management solutions for the city's future.

Updates

- Comprehensive Solid Waste Management Plan on track for City Council presentation this summer (May 20, 2016)

Stay in the loop on the city's Comprehensive Solid Waste Plan and learn how to give your feedback.

Subscribe

Presentations

- Update on Comprehensive Solid Waste Plan (Feb. 5, 2015)
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Resources

- Re-thinking Waste Fact Sheet

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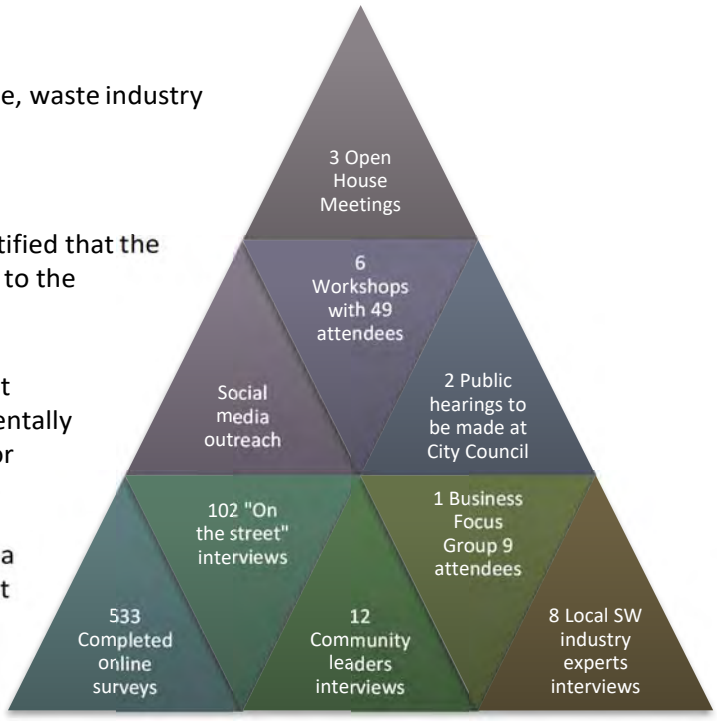
City of Fort Worth Comprehensive Solid Waste Management Plan
Public Outreach Summary
October 2015

As part of the update to the City's Comprehensive Solid Waste Management Plan (CSWMP) process, the City has conducted extensive public outreach for the purpose of garnering opinions and insight regarding the interest of residents of Fort Worth in solid waste and other environmental issues.

The City has used several different avenues and technologies to reach out to residents:

- News articles, advertisements, and social media;
- Online Survey of residents;
- On the Street interviews;
- Public open house meetings;
- Business Focus Groups;
- Subject specific workshops; and,
- In-Depth Interviews with business people, waste industry experts, and community leaders.



Priorities and Values

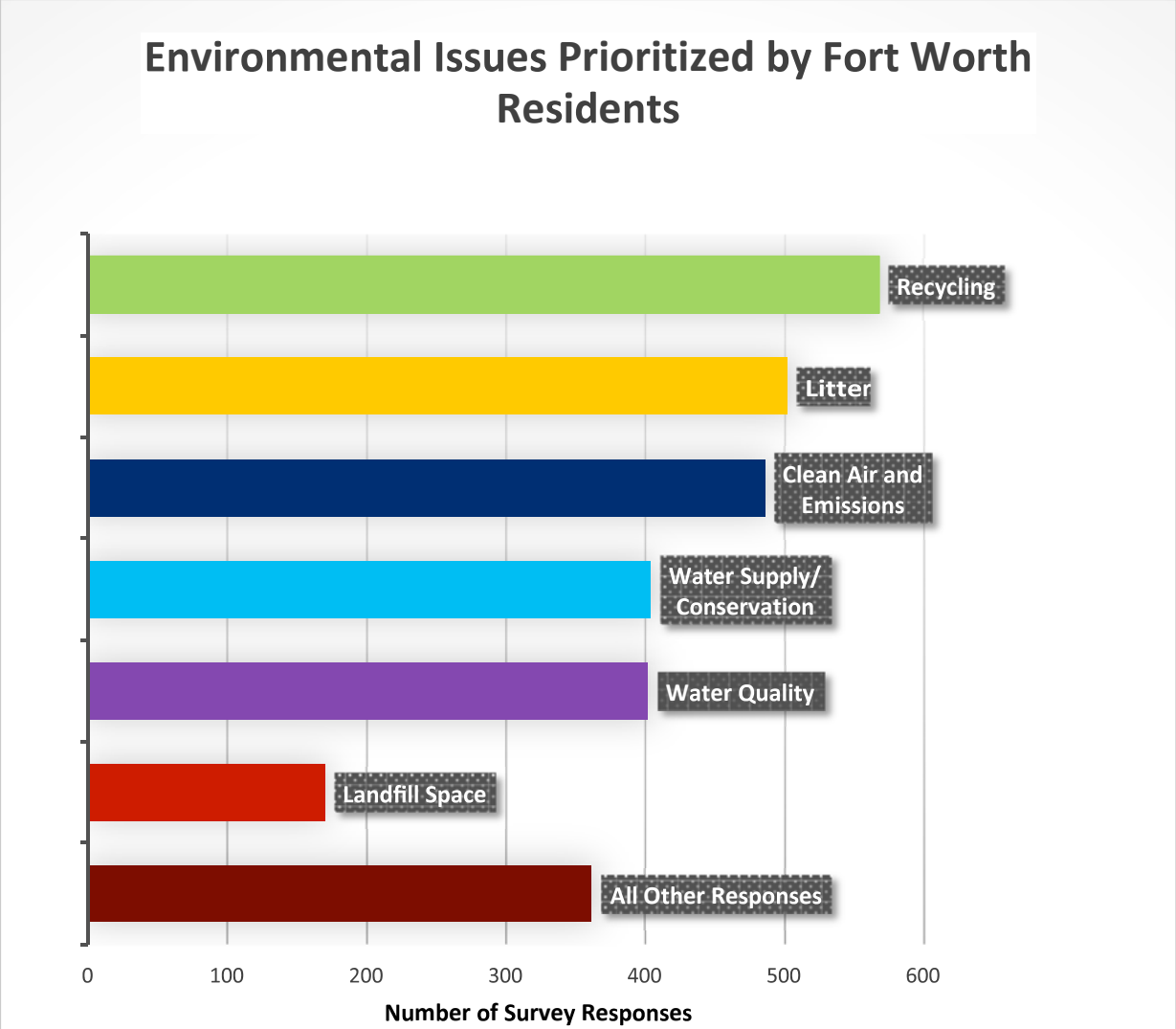
In general, the public outreach process identified that the following topics are of interest or important to the residents of Fort Worth:

- Nearly all residents surveyed agreed that "managing waste in the most environmentally responsible manner" is very important or critical to the City's future.

- Most of the businesses felt that there is a connection between waste management and the City's economy because it influences quality of life.

- By almost 2-to-1, residents prioritized public space recycling bins and increased recycling efforts at businesses as tools to increase recycling overall. Half or less of residents prioritized changes to the curbside program that would encourage waste reduction, and lesser priority was given to food waste separation and further manipulating collection prices to discourage disposal.

- Recycling was the most-frequently prioritized environmental issue by the survey respondents. They also viewed litter, air quality, and water as pressing issues (see figure below). In open workshop discussions, residents expressed concern about recycling being a "value" for Fort Worth, and businesses talked about companies who have adopted "green" as a corporate tenet. Many people stressed the importance of recycling education at all age levels, especially the youth.



- Businesses said recycling was important, but qualified that many businesses are too busy to care or want an economic incentive to recycle.

- When asked what is the hardest thing about recycling at their locations, businesses lamented that "people don't care," and cited problems with implementing a system such as not having space for containers and having to rely on individuals to carry recycling to their homes due to lack of service. They also noted that turnover means education is a never-ending process, even for people who are engaged. In a later question, several of the businesses noted that recycling always gets "pushed down" below other priorities and demands on their time.

- Businesses indicated that the potentially-recyclable materials they were most likely to generate were batteries, cardboard, and paper.

- Although food waste collection and composting was prioritized by less than a third of the residents surveyed, more than two-thirds indicated that "yes," they would be interested in participating in such a program. Some of the reasons for responding "no" included fears regarding animals, odors, and costs. Smell and effort were also concerns expressed by business interviewees, although many of them agreed that food waste is a huge part of the commercial waste stream that really needs to be diverted.

Attitudes and Interest

- Residents were provided descriptions about three advanced solid waste management techniques: zero waste, waste-to-energy, and mixed waste processing. Online surveys were exceptionally high in favorability toward the techniques, while the face-to-face interviews were less enthusiastic. Some residents at the workshops also wanted to discuss what they had heard about 1-bin systems from other cities. 1-bin is a collection system whereby recyclables and trash would be separated at a sorting facility rather than at the point of generation. Some thought it was interesting, others thought it would make people "disconnected" from waste.

- Most residents were willing to pay a small additional price per month if an advanced solid waste technique made a "real" difference. The most common acceptable price was $1 to $5, and the next most-common acceptable price was less than $1.

- In interviews, business people were asked about recycling at commercial locations. Their responses indicate that there is a notable lack of knowledge about what is required of businesses, with many respondents saying that they know "not much" or "nothing" about such regulations.

- The businesses were specifically asked about a 1-bin or no-sort system. Some liked the idea, saying it "sounds easy;" however, just as many disparaged the idea, saying that such an effort "sounds expensive," and did not like the idea of paying even more for such as service than the current source-separation method.

- Most of the businesses and property managers interviewed felt that having a recycling program in place adds prestige to a facility or company, which is positive for the firm. Several

noted that younger people expect to be able to recycle at work and express dismay when they cannot.

- Businesses and property managers said that a cost incentive would definitely help them implement recycling systems, even if such implementation took time and effort. Some residents felt this way, too.

RETHINKING WASTE For a Greener Fort Worth

On March 1, 2012, staff of the city's Solid Waste Division chose a random residential garbage truck and performed an audit of its contents. The purpose of the audit was to identify how much material that could have been recycled was actually tossed into the garbage rather than the blue recycling cart.

Remember: everything thrown into the brown cart heads directly to the landfill to be buried forever; items tossed into the blue recycling carts will be re-purposed and re-enter our market place.

The Results

Nearly 30 percent of the debris on the truck was recyclable in Fort Worth's recycling program. Here's the breakdown of what was found in the truck:

- Compostables: 27%
- Mixed Paper: 12%
- Yard Waste: 11%
- Glass: 8%
- Bath & Diapers: 7%
- Garbage: 7%
- Mixed Plastic: 6%
- Textiles: 5%

- Remodel Waste: 5%
- Electronics: 4%
- Plastic Bags: 3%
- Aluminum: 2%
- Ferrous Metals: 2%
- Hangers: 1%

- Cartons: <1%

Fort Worth currently diverts 24 percent of residential waste from the landfill through recycling and yard waste collections.

If Fort Worth residents put all of their recycling in the blue cart to be recycled instead of wasting it as garbage, we could divert more than 40 percent away from landfill disposal.

It all adds up

An estimate of the value of residential recycling materials that was landfilled in 2011 is $12,744,816.03. These recycling materials were landfilled because many residents choose to use their garbage cart instead of their blue recycling cart.

Updates

- Comprehensive Solid Waste Management Plan on track for City Council presentation this summer (May 20, 2016)

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RETHINKING WASTE For a Greener Fort Worth

With two-thirds of the city's new 2015-2035 Comprehensive Solid Waste Management Plan (CSWMP) complete, a City Council presentation for the draft plan is scheduled for Aug. 2.

Work on the plan –- one of the largest green initiatives undertaken in Fort Worth – began in August 2014. With the planning nearing its public debut, here's a recap of what's happened since November 2015 update and a preview of what's next.

Public Meetings

Since the last update, eight one-on-one meetings with local solid waste industry members were conducted, and 32 interviews with influential city leaders took place – 20 more than originally planned. The meetings included city management and City Council; all chambers of commerce; local businesses; educational and professional organizations.

Disaster Debris Management Plan

During the last six months, the city has also prepared a Disaster Debris Management Plan (DDMP) – an integral part of the CSWMP.

One of the critical services the city provides to its residents is the management of debris generated during a disaster – be it natural or man-made. The DDMP establishes the protocols to be observed in responding to a disaster, identifying the roles and responsibilities of the various city departments and outside agencies. The city is currently wrapping up enhancements to the DDMP, which were funded by a grant from the Department of Homeland Security.

Next Steps

Following the City Council presentation, both the draft CSWMP and final DDMP will be made available to all residents of Fort Worth for public review. The third and final public open house is scheduled to take place in September, providing the public and local businesses with an overview of the key recommendations of the plan and an opportunity to give direct feedback.

The comments and input received during creation of the plan is being compiled, reviewed and will be considered for inclusion in the Comprehensive Solid Waste Management Plan in its final version.

The Comprehensive Solid Waste Management Plan is currently scheduled for completion in late October or early November 2016.

Updates

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Comprehensive Solid Waste Management Plan on track for City Council presentation this...

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RETHINKING WASTE For a Greener Fort Worth

The city is currently half way into the development of its new 2015-2035 Comprehensive Solid Waste Management Plan (CSWMP).

Since the initial development working meeting in August 2014, the City has accomplished the following:

- Created a webpage and email address to receive public comments and feedback on the CSWMP
- Held a public open house meeting on Nov. 20, 2014, attended by more than 50 residents and other interested parties.
- Conducted 102 face-to-face resident interviews and an online survey with 533 responses. The preliminary tallied results of those interviews and survey are currently posted on the city's webpage.
- Held a business focus group with nine participants from local businesses.
- Developed an operational draft Disaster Debris Management Plan (an integral part of its Comprehensive Solid Waste Management Plan). The draft plan was reviewed by other city departments (Transportation & Public Works, Park & Recreation and the Emergency Management Office) and is to be finalized soon. Additional services are planned to expand and broaden the content developed. The additional services to the Disaster Debris Management Plan are to be completed before June of 2016.
- Held six workshops with:
  1. Environmental Advocacy groups
  2. Institutions (Independent School Districts, Universities, NCTCOG, Amon Carter Museum, etc.)
  3. Industrial/Commercial/Institutional large waste generators
  4. Members of the commercial mulching/composting industry
  5. Construction & Demolition generators and processors
  6. Academia – as researchers and innovators.
- Made a presentation on the development of the Comprehensive Solid Waste Management Plan to the Chamber of Commerce Environmental Committee.

- Held a second open house meeting on Sept. 1, 2015, attended by 37 residents and interested parties.

The comments and inputs the city continues to receive from individuals, businesses, institutions, and industry are being compiled, reviewed and will be considered for inclusion in the Comprehensive Solid Waste Management Plan as it is developed.

Public engagement sessions remaining include: interviews with at a minimum 12 influential city leaders; eight one-on-one meetings with local members of the solid waste industry; and two public hearings/presentations during future City Council meetings – the first of which is planned immediately prior to a preliminary draft preparation, and the second one before the completion of the CSWMP. A third and final public open house meeting is tentatively scheduled for mid-January 2016 after a first complete draft of the CSWMP is prepared.

The Comprehensive Solid Waste Management Plan is scheduled for completion by mid-2016.

Updates

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Solid Waste Plan Feedback

Stay in the loop as the City of Fort Worth develops its Comprehensive Solid Waste Plan. Sign up for updates! Comments also may be emailed to swplan@fortworthtexas.gov or submitted by phone at 817-392-1234.

Name

First | Last

Email

Address

Street Address

Address Line 2

City | State / Province / Region

Postal / Zip Code | Country: United States

Check All That Apply

- ☐ I would like to receive updates on Comprehensive Solid Waste Plan development.
- ☐ I would like to receive weekly updates from the City of Fort Worth.
- ☐ I would like to give some initial thoughts on Fort Worth's solid waste program.

Submit

Re-Thinking Waste: A Greener Fort Worth

An Update on the Development of the City's Comprehensive Solid Waste Management Plan

Agenda

- Introduce Team
- Overview of Solid Waste Management Planning
- Current Program Highlights and Challenges
- Future Possibilities
- CSWMP Development Plan
- Public Involvement Opportunities
- Questions and Answers

Purpose of a Comprehensive Solid Waste Management Plan

- Provides a blueprint for how our waste should be managed for the next 20 years.
- Previous plan (1995), focused on landfill space but also recommended a Pay-as-You-Throw system, the use of carts and encouraged diversion.
- The current study seeks to address the following:
  - Should "waste" continue to be viewed as something to be discarded?
  - What is waste versus what is a resource or opportunity?
  - Which resources can we capture efficiently and economically?
- Input is needed from residents and businesses in plan development to help staff understand:
  - What is important to our residents and businesses?
  - What are we willing to do together to make us a greener city?

Methods Do Change (Thank Goodness)

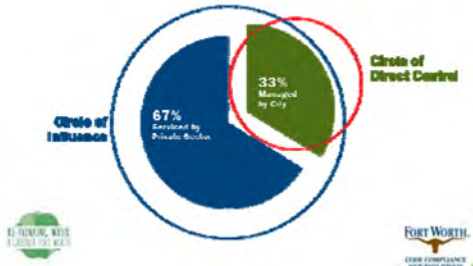
Requirement of our Comprehensive Solid Waste Management Plan

- Move from residential to global/all waste focus
- Understand and capitalize on emerging and sustainable technologies that fit our city
- Develop and implement strategies to foster market driven collection and diversion programs
- Foster collaborative public/private partnerships
- Develop capital funding plan for new technologies and future infrastructure

How Waste is Currently Collected

- Once a week collections
  - Garbage (Pay As You Throw)
    - 3 sizes of carts - 32, 64 & 96 gallon
  - Recycling Single stream by 64/96 gallon cart
    - Not mandatory
  - Yard Waste
    - Bundled, Yard Bags, Optional Yard Cart & Loose Brush
- Monthly bulk waste collection
  - Set schedule based on geographic area
- Commercial/industrial is an open market

Distribution of Collection



How Waste is Currently Managed

- Material collected as Garbage is disposed of in landfills –
  - Residential Garbage – 234,584 Tons
  - Commercial - ???? Estimated to be about 2X as much as residential
- Material collected as Recycling is processed to return to the marketplace
  - Residential Recycling – 37,066 Tons diverted from disposal
  - Commercial [illegible] to be about the same as residential

How Waste is Currently Managed

- Material collected as Yard Waste is mulched for commercial use
  - Residential Yard Waste – 27,171 Tons diverted from disposal
  - Commercial - ?????
- Material collected as Bulk mostly disposed with some limited diversion
  - Residential Bulk – 33,235 tons
  - Commercial – N/A

Success Measures

- Diversion from landfill disposal – 21.5% - 23%
- 2010 Landfill expansion provides the City nearly 40 additional years
- Recycling (Blue Cart) Participation Rate – Over 65%
- Sanitation Rate Stability – No rate increase since 2006
- Service and Service Attempts each week – Nearly 675,000
- Missed Pickup – Both garbage and recycling about .0007%

Success Measures

- Over 74% of Budget is outsourced
- Reduction in Illegal Dumping – 12,610 tons in FY 2004; 2,752 tons in FY 2014
- Three existing Drop off Stations; Construction of fourth out for bid
  - Use of Drop off Stations – 199,403 individual visits in FY 2014
- Multi-Family (Apartment) recycling – 82.6% in compliance with new ordinance
  - 92 complexes either seeking a waiver or working on implementing program
- Business Smart Program

Exploration of Current Challenges

- Landfill audits = Nearly $13 million loss with disposal of recyclables
- Increase residential diversion and reduce contamination
  - How to increase awareness and ownership
- Increase opportunities/requirements for multi-family recycling
- Greater encouragement of business sector to reexamine their waste
  - Two-thirds of waste generated in the city is from business sector
  - Business can often reduce expenses with proper recycling

Future Possibilities

- Currently in Process -
  - Recycle Processing Facility Request for Proposals
  - Compressed Natural Gas powered trucks
    - Waste Management/Knight Waste fleet
    - Public/private refueling locations
  - Landfill Gas Utilization

Future Possibilities

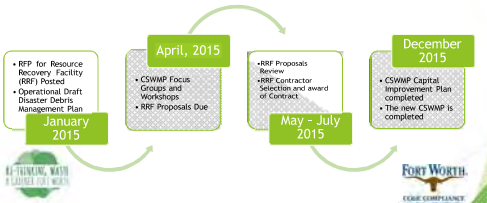
- Increase waste diversion from disposal
  - Landfill audit results = Nearly $13 million loss
  - Request for Proposals on material recovery facility
    - Is a Mixed Waste Processing or "Dirty MRF" an Option?
      - Recover additional recyclables
      - Compost putrescibles
      - Refuse derived fuels or bio fuels
  - Construction & Demolition Debris diversion
  - Bulk Waste collections
    - Change method of collection to capture more material
  - Yard Waste diversion
    - Increase diversion
    - Large scale composting
    - Collection of putrescibles / "Yuck" Factor

Future Possibilities

- Implement greater cost differential in cart sizes
- Encourage re-use through donations
- Increase Pedestrian and Special Event recycling
- Encourage Green Purchasing in City departments and Business community
- Research and Development Opportunities
  - UTA/TCU Partnerships
  - Encourage innovation and future technologies
- Eco-Business Park
  - To develop further Resource Recovery opportunities

Overview of the New CSWMP and Resource Recovery Facility Next Steps

Public Involvement



Public Involvement Opportunities

- Open Houses, like today's
- Social media
- Electronic Survey
- Focus Groups
- Workshops
- Interviews
- Email: swplan@fortworthtexas.com

Questions, Answers & Discussion

Re-Thinking Waste: A Greener Fort Worth

An Update on the Development of the City's Comprehensive Solid Waste Management Plan

Agenda

- Introduce Team
- Overview of Solid Waste Management Planning
- Current Program
- Future Possibilities & Waste in the News
- Public Involvement Feedback
- CSWMP Development Plan
- Questions and Answers

Purpose of a Comprehensive Solid Waste Management Plan

- Provides a blueprint for how our waste should be managed for the next 20 years.
- Previous plan (1995), focused on landfill space but also recommended a Pay-as-You-Throw system, the use of carts and encouraged diversion.
- The current study seeks to address the following:
  - Should "waste" continue to be viewed as something to be discarded?
  - What is waste versus what is a resource or opportunity?
  - Which resources can we capture efficiently and economically?
- Input is needed from residents and businesses in plan development to help staff understand:
  - What is important to our residents and businesses?
  - What are we willing to do together to make us a greener city?

Methods Do Change (Thank Goodness)

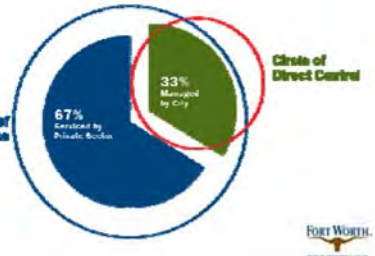
Requirement of our Comprehensive Solid Waste Management Plan

- Move from residential to global/all waste focus
- Understand and capitalize on emerging and sustainable technologies that fit our city
- Develop and implement strategies to foster market driven collection and diversion programs
- Foster collaborative public/private partnerships
- Develop capital funding plan for new technologies and future infrastructure

How Waste is Currently Collected

- Once a week collections
  - Garbage (Pay As You Throw)
    - 3 sizes of carts - 32, 64 & 96 gallon
  - Recycling Single stream by 64/96 gallon cart
    - Not mandatory
  - Yard Waste
    - Bundled, Yard Bags, Optional Yard Cart & Loose Brush
- Monthly bulk waste collection
  - Set schedule based on geographic area
- Commercial/industrial is an open market

Distribution of Collection



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  - UTA/TCU Partnerships
  - Encourage innovation and future technologies

Future Possibilities

- Increase waste diversion from disposal and recover additional recyclables
  - Construction & Demolition Debris diversion
  - Increase diversion of yard waste, possibly with large scale composting
  - Perhaps a Mixed Waste Processing or "Dirty MRF"
    - Compost putrescibles and create refuse-derived fuels or biofuels
  - Implement greater cost differential in cart sizes
  - Encourage re-use through donations
  - Increase Pedestrian and Special Event recycling
  - Eco-Business Park to develop further Resource Recovery opportunities

Industry Influences

Things you might have heard or read about

1-bin systems and mixed waste processing

- 1-bin is a system where generators do not source-separate recyclables from garbage, and put everything together in one large bin.
- The switch must be accompanied by implementation of a mixed-waste processing facility which can sort through the material and divert different types of waste to their best use
  - Metals, plastic, organics, possibly other materials, and garbage to be disposed are sorted using various technologies and manual labor
  - Optimally there is some recovery of energy, either through digestion or combustion
  - Yard waste like brush and bulky items may still be collected separately
  - This system is sometimes called a "dirty MRF," particularly by detractors.

Yes, this is what Houston has been considering

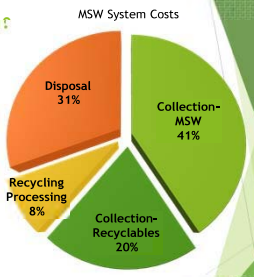
- Houston had a 19% recycling rate
- One estimate was that 55% diversion was possible in the first year
  - Even if that was HALF right, they would see a 8.5% increase

The industry is divided on the issue

RIP Slide from: Michael Timpane Presentation at the NERC Conference in Wilmington, DE on April 8, 2015

Why would one do 1-bin?

- To reduce collection costs dramatically, which are the largest portion of solid waste management expenses
- To increase recycling in areas where participation and tonnages are especially low



What can possibly be recovered in mixed waste processing?

Large Rigid Plastics	PET (#1) Containers	Mixed Paper	Ferrous Metals	Organic Rich Materials for AD
Large Film Plastics	HDPE (#2) Containers	Large Cardboard	Bulky Scrap Metals	Special feedstock for combustion or gasification systems
Film Plastic	Mixed Plastic (#3 - #7) Containers	Wood	Aluminum Beverage Containers (non-ferrous)	Residue for disposal

Factors Affecting 1-bin System Costs & Success

Population and Demographics	Laws and Regulations	Markets	Politics
Sites	Financing	Hidden Costs	Waste Supply Contracts
	Public Education and Enforcement		

More recycling stories in the "mainstream" media

The Washington Post

American recycling is stalling, and the Big blue bin is one reason why

June 21, 2015

THE WALL STREET JOURNAL.

Unprofitable Recycling Weighs On Waste Management

April 29, 2015

EPA Reports Flat Recycling; "The Evolving Ton"

EPA reports flat overall recycling rate

Media covers it with "the evolving ton"

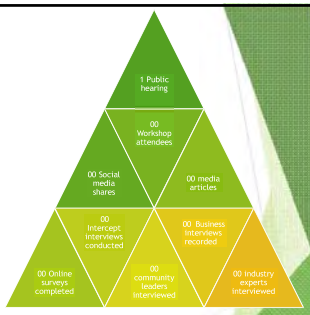
The Evolving Ton: US MSW Composition

Material	1994	2009	Difference
Paper	32.9%	16.1%	-51.1%
Plastic	11.8%	17.2%	45.8%
Metals	6.3%	8.5%	34.9%
Glass	6.4%	5.5%	-14.1%
Organics	31.5%	37.6%	19.4%

Source: USEPA, Municipal Solid Waste Generation, Recycling, and

Fort Worthians and their feedback

During this process, the City has administered a Survey Monkey online survey, conducted intercept interviews "on the street," held workshops like this one, and has conducted in-depth interviews with business people, waste industry experts, and community leaders.



Fort Worthians and their feedback

Online Surveys

Most pressing environmental issues
- Most frequent #1 Air quality
- Most frequent #2 recycling
- Most frequent #3 recycling

Most frequently prioritized ideas to increase recycling
- 76% Promote to businesses
- 66% more bins in public areas
- 35% Alternate bulk and brush collection
- 35% Collect & compost food waste

Would you participate in curbside food waste collection?
- 62% Yes
  38% No

Fort Worthians and their feedback

Intercept Interviews

Most pressing environmental issues
- Most frequent #1 Air Quality
- Most frequent #2 Recycling
- Most frequent #3 Recycling

Most frequently prioritized ideas to increase recycling
- 82% More bins in public areas
- 72% Promote to businesses
- 45% Alternate bulky and brush collection

Would you participate in curbside food waste collection?
- 66% Yes
- 34% No

Fort Worthians and their feedback

Business Interviews

What do you know about business recycling requirements in Fort Worth?
- Not much
- Not sure
- Nothing

What's the hardest thing about offering recycling at businesses?
- People don't care
- No space for the containers
- Relying on people to volunteer or carry it home

Do you think a 1-bin system is a good idea?
- Yes, it sounds easy
- No, it sounds expensive

Overview of the New CSWMP and Resource Recovery Facility Next Steps

Public Involvement

- RRF Proposals Review
- RRF Contractor Selection and award of Contract

- Workshop
- VIP Interviews
- Creation of recommendations

- CSWMP Capital Improvement Plan completed
- The new CSWMP is completed

Questions, Answers & Discussion

Fort Worth Code Compliance

Draft 2016-2036 Comprehensive Solid Waste Management Plan (CSWMP)

FORT WORTH

September 15, 2016
Brandon Bennett, Director of Code Compliance
Robert Smouse, Assistant Director of Solid Waste Services

Fort Worth Code Compliance

Introduction

- Brandon Bennett – Director of Code Compliance
- Robert Smouse – Assistant Director - Solid Waste
- Val Familo, Contract Compliance Superintendent
- German Vazquez – Field Operations Superintendent
- Joao Pimentel – Senior Planner
- Debbie Branch – Planning & Keep Fort Worth Beautiful
- Cheryl Libby – Planning Administration Coordinator
- John Carlton – Consultant, Gershman, Brickner & Bratton

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Housekeeping - Announcement

- Thank you - Blue-crew helping with our Zero Waste Event
- Please silence your phone and step outside if needing to answer a phone call
- Please hold your questions/comments until the end of the presentation
- Calendar of events*:
  - Litter Stomp Sept. 17th
  - Landfill Lunch & Learn – Oct. 27th

* Master Composter Program/Classes: Keep Fort Worth Beautiful website & Facebook

Fort Worth Code Compliance

Purpose

- Update Stakeholders & Public on the progress and development of the current Draft Solid Waste Plan
- Review key aspects evaluated and balanced approach to current Draft Solid Waste Plan
- Outline additional steps to incorporate public input
- Outline process for development of final plan

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Why Plan?

Planning is essential for ensuring that current and future solid waste collection, resource recovery, and disposal needs are met in an efficient and effective manner:

- Promoting, engaging and creating programs that increase recycling & diversion to reduce the amount of waste generated, collected, transported, processed and landfilled
- Reducing long-term reliance on landfilling and extending the life of the Fort Worth Landfill (residential, commercial and industrial)
- Building sustainable services (both environmentally & financially based)
- Being prepared for and complement economic growth and livability
- Fostering Public and Private Partnerships

RETHINKING WASTE

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Solid Waste Planning - History

- History:
  The Fort Worth Solid Waste Management Plan - 1995-2015 focused on landfill space, residential collections, recommended a Pay-as-You-Throw system and the use of carts, and encouraged residential focused diversion
- Current:
  Collecting input from residents, industry, non-profits, experts, City Departments (TPW, Water, Planning and Development, Economic Development, Property Management) and other government agencies in plan development
- Future:
  The updated plan provides a blueprint for how our waste should be managed for the next 20 years and plan for the disposal options related to 2035-2060.

1

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Plan Activities and Public Input Initiatives

- Late 2014
  - Project Kickoff
  - Initial research and start of program education
  - Residential Waste Characterization
- 2015
  - Workshops and other public input
  - Evaluate Current Programs and Services
  - Met with Major Industries
- 2016
  - Influential Leader Interviews
  - Met with Colleges & Universities
  - Development of draft CSWMP for additional input
  - Additional public input (where we are now)
  - Review Draft CSWMP and public input with City Leadership
  - Presentation of a proposed CSWMP to City Council (Early 2017)

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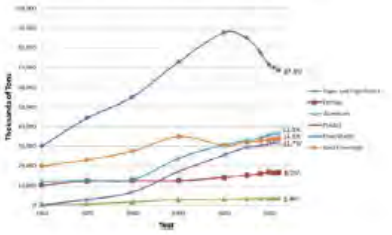
Recycling Composition Trends



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Fort Worth Southeast Landfill

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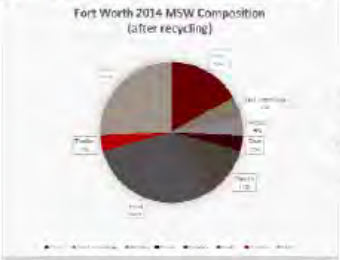
What is going to the Landfill?



35% of Waste in Garbage Carts is Recyclable in our Program

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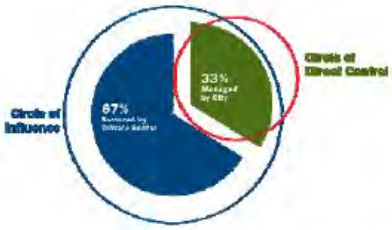
Distribution of City's Total Waste Stream



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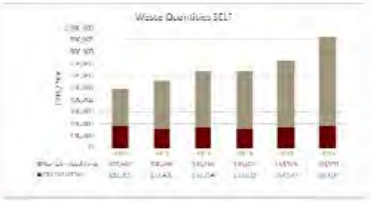
Landfilling by Type of Waste



- Up to 55% of Non City Tons could be diverted from landfill through greater commercial recycling efforts
- City Tons represent all tonnages collected and disposed of based on residential solid waste programs only

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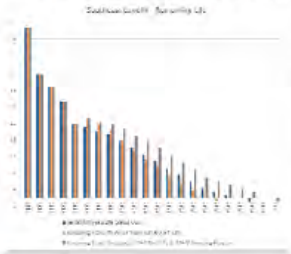
Commercial Sector Importance



Projected Landfill Life
Status Quo of 2015:
1st Qtr. 2037

Conservative Growth:
2nd Qtr. 2035

Conservative Growth & Commercial Recycling Program:
1st Qtr. 2041

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Guiding Principles for Developing Plan

- Evaluating and providing for adequate system capacity
- Collaborative public/private partnerships
- Moving from residential to global/all waste focus
- Strategies that foster market driven collection and diversion programs
- Understanding and capitalizing on emerging and sustainable technologies that fit Fort Worth:
  - Financially, Culturally & Progressively

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Fort Worth's Balanced Approach

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A Global World: Impacts on Fort Worth

- Energy Markets (demand and pricing)
- China's "Green Fence"
- 1-bin is a system where generators do not source-separate recyclables from garbage, and put everything together in one large bin (attempted at various levels in Houston, Indianapolis and Alabama)
- Problems with Blue Bin (Washington Post, June 21, 2015)
- Unprofitable Recycling Efforts (Wall Street Journal, April 29, 2015)
- Flat Recycling Tonnages
- "The Evolving Ton"
- Glass Recycling Efforts

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Community Outreach Activities

- Social Media & Web outreach
- 1 Business Focus Group
- 2 Presentations to City Council
- 3 Open Houses
- 6 Workshops with 75+ attendees
- 8 Local Solid Waste Industry Expert Interviews
- 32 Influential Leader Interviews
- 102 "On the Street" random Interviews
- 533 Completed Online Surveys

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Outreach Outcomes – Online Surveys

Most pressing environmental issues:
Most common first priority was Air Quality
Most common second and third priorities were recycling

Most frequently prioritized ideas to increase recycling:
76% Promote to businesses
66% More bins in public areas
53 % Add more to what can be collected at the curb
35% Collect & compost food waste
35% Alternate bulk and brush collection

Would you participate in curbside food waste collection?
62% Yes 38% No

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Outreach Outcomes – "On the Street" Interviews

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45% Alternate bulky and brush collection
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Would you participate in curbside food waste collection?
66% Yes 34% No

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Outreach Outcomes – Business Interviews - Identified Challenges

What do you know about business recycling requirements in Fort Worth?
- Not much
- Not sure
- Nothing

What's the hardest thing about offering recycling at businesses?
- People don't care
- No space for the containers
- Relying on people to volunteer or carry it home

Do you think a 1-bin system is a good idea?
Yes Why? Most popular reason: It sounds easy
No Why not? Most popular reason: It sounds expensive

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Outreach Outcomes – Influential Leader Interviews

Regarding residential services:
- Suggest comprehensive communication with customers
- Make recycling easier with incentives and awareness of what can be recycled
- Support more types of recyclables collected at the curb

Regarding Industrial, Commercial & Institutional sector:
- Recognition of the opportunity to divert organics and food waste
- Involvement of stakeholders in any regulations, rewards, rules
- Endorsement of market-based programs to increase diversion

In General:
- The City should demonstrate leadership with internal recycling program
- The City could use market influence or incentives to increase diversion and reuse
- Emphasis on partnerships, charitable efforts, etc.
- Importance of education and engagement for program success

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Six Major Goals – Improve Residential Services and Programs

- Encourage residential use of right-sized garbage carts
- Implement program for accepting reusable items for donation at the drop-off stations
- Maintain the high level of service and responsiveness to illegal dump clean-ups
- Continue the household hazardous waste (HHW) services at the Environmental Collection Center (ECC), the Mobile Collection Units (MCUs), Drop off Stations and the interlocal agreements
- Continuously evaluate SWSD performance goals, conduct satisfaction surveys and identify opportunities for internal improvement, as outlined in the Recommendations section
- Additional Drop-off Station (West side) and evaluate special low volume commercial based site

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Six Major Goals – Increase Community Outreach for program understanding & compliance

- Develop targeted education and outreach within a Comprehensive Plan (+11 supportive action items)
- Include "minimization" and "reuse" in waste reduction messaging
- Expand Master Composter Program and at-home composting
- Educate residents in the proper management of all materials: trash, recycling, reusable, electronic, pharmaceutical drugs, sharps and medical waste
- Include in public education messages encouraging smarter shopping for food, consumer goods and Consumer Choice Bag campaign
- Educate residents that computer and televisions can be recycled pursuant to the State programs & locations
- Connect with and support partnerships – Blue Zones, 10 on Tuesday/Reverse Litter and Keep America Beautiful

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Six Major Goals – Increase City's Annual Recycling Goal

- Confirm Fort Worth's Goal & Timeline – 30%, 40%, 50% or higher…?
- Reduce recyclables contamination & Improve recycling participation
- Enforce no large brush or yard waste in bulk collection
- Segregate Brush from Bulk Collection
- Establish a 5 year (or longer) Residential Recycling Processing Agreement
- Transition to Larger Recycling Carts
- Evaluate Residential Food Waste Collection

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Six Major Goals – Confirm City's Disposal Capacity Plan (2035 to 2060)

- Maximize materials reduction, recycling, reuse and diversion (+4 additional action items)
- Evaluate Waste Minimization Program (bag-based PAYT)
- Set a goal of reducing per-household waste generation by 10 percent over the course of the planning period
- Work with Republic Services (as contractor) and other solid waste/recycling businesses to extend the life of our landfill
- Secure long-term disposal capacity for 2035-2060

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Six Major Goals – Advance Commercial Technical Assistance & Diversion Programs

- Creation of a Commercial Technical Assistance Section within the SW-Planning Section
- Modifications & Improvements to the Grants of Privilege Program
- Promote the availability of C&D waste processors in the area such as concrete crushers, scrap metal dealers, shingle and asphalt re-processors, and glass processors
- Working with Chamber, Business Associations about advancing recycling and implementing best practices as litter prevention activities
- Work with the Planning and Development Department to foster increased commercial recycling and recovery of construction and demolition materials (+3 additional action items)

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Six Major Goals – How the City will set future Policy & Ordinance Direction

- Just how Green should Fort Worth be?
- Pursue the development of a Universal Recycling Ordinance (City needs to lead with internal example)
- Pursue the development of a Scrap Tire Ordinance
- Expand efforts towards City's Comprehensive Litter Program
- Pursue the development of a Green Purchasing Ordinance

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Proposed Schedule and Actions

- Compile all public comments received tonight, prior and through the close of business Friday, Sept. 16th
- Review and comment by City Plan Commission (September/October)
- Confirm & Clarify Action Items identified and included in CSWMP
- Adjustments to 5 Year Action Plan and remaining Mid-term and Long-term action items based on public comments and/or stakeholder input (October)
- Review with City Manager and Leadership Team (October/November)
- Final review and editing process (October/November)
- Presentation to Council for adopting Final Plan (early 2017)

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Overall Input Received to Date

- Healthy number of comments received through the requested process (SWPlan), City Manager, Mayor and City Council members
- Comments ranged from good to not-enough & in-between (improvements or specific requests)
  - Increased Recycling rates (residential & commercial)
  - Increased Education, Improved Services & Drop-off Stations
  - Zero Waste advancement/direction
  - Single Use Plastic Bags Ban/Ordinance
  - Food Recycling – residential & commercial
  - Adopting Ordinance, Regulations or Mandates

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Opening the Floor for Comments

- Comment Cards for individuals who prefer not to speak at the microphone or if time runs short
- Organized fashion to line up at each of the station microphone and please
  - please limit your comments to three minutes at a time
  - state your full name and address or organization
  - state your comment, question or suggestion

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RETHINKING WASTE For a Greener Fort Worth

www.fortworthtexas.gov/swplan

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Draft Residential Service Fee Structure – Right Size Your Cart

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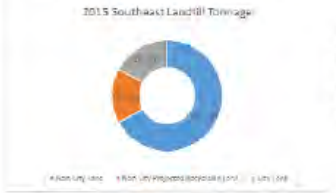
Commercial Technical Assistance Program



Of the 80% Non-City Tonnage (733,944 tons) in 2015, an estimated 24% (175,183 tons) could be recycled through advanced Commercial Technical Assistance Program

Additional commercial recycling tonnages would be included with Construction & Demolition efforts and increased Commercial-based Organic/Composting programs within Fort Worth.

Fort Worth Code Compliance

Six Major Goals – Draft Framework

Improve Residential Services and Programs

- Improve participation; improve diversion; reduce contamination; future "Pay as You Throw" (PAYT) rate enhancements

Increase Community Outreach to improve understanding and compliance with programs and future enhancements

- Improve engaging the community to recycle more through creation of technical assistance program; work with targeted areas to solve specific problems in those areas; implement related components of City's Comprehensive Litter Plan

Increase City's Annual Recycling Goal

- Current recycling rate is 21%; need to preserve Southeast Landfill capacity life

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Six Major Goals – Draft Framework

Confirm City's Disposal Capacity Plan (2035 to 2060)

- Recent evaluation and projections show that the Southeast Landfill could reach capacity earlier under certain worst case scenarios; conservative remaining life of 20 to 25 years; funding option for future capacity needs

Advance Commercial Technical Assistance & Diversion Programs

- Technical support in the field is the strongest non-enforcement tool to support this advancement

Set City's future Policy & Ordinance Direction

- Enhancing existing; adopting new ones for potentially-polluting items like Scrap Tires; perhaps similar to Universal Recycling Ordinance concept

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Can we meet future landfill needs?

Year	Annual Tons Accepted	Annual Airspace Used (cubic yards)	Total Remaining Airspace (cubic yards)	Estimated Years of Remaining Capacity
2011	557,474	540,000	27,475,700	50.88
2012	643,519	731,000	26,935,700	36.85
2013	642,640	785,500	26,204,700	33.36
2014	722,555	880,200	25,419,200	28.88
2015	920,981	1,103,900	24,539,000	22.23

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Update on the Development of the City's 2016-2036 Comprehensive Solid Waste Management Plan (CSWMP)

FORT WORTH

August 2, 2016
Brandon Bennett, Director of Code Compliance
Robert Smouse, Assistant Director of Solid Waste Services

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Purpose

- Interim update on the progress of the Solid Waste Plan
- Outline additional steps for public input
- Outline process for development of final plan

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Why Plan?

Planning is essential for ensuring that current and future solid waste diversion, collection and disposal needs are met in an efficient and effective manner:

- Promoting, engaging and creating programs that increase recycling & diversion to reduce the amount of waste generated, collected, transported, processed and landfilled
- Reducing long-term reliance on landfilling and extending the life of the Fort Worth Landfill (residential, commercial and industrial)
- Building sustainable services (both environmental & financial based)
- Being prepared for and compliment economic growth and livability
- Fostering Public and Private Partnerships

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Solid Waste Planning - History

- History:
  The 1995-2015 CSWMP focused on landfill space, residential collections, recommended a Pay-as-You-Throw system and the use of carts, and encouraged diversion
- Current:
  Collecting input from residents, industry, non-profits, experts, City Departments (TPW, Water, Planning and Development, Economic Development, Property Management) and other government agencies in plan development
- Future:
  The updated plan provides a blueprint for how our waste should be managed for the next 20 years

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Plan Activities and Public Input Initiatives

- Late 2014
  - Project Kickoff
  - Initial research and start of program education
  - Residential Waste Characterization
- 2015
  - Workshops and other public input
  - Evaluate Current Programs and Services
  - Met with Major Industries
- 2016
  - Influential Leader Interviews
  - Met with Colleges & Universities
  - Development of draft CSWMP for additional input
  - Additional public input (where we are now)
  - Recommendation of a Draft CSWMP (Early 2017)

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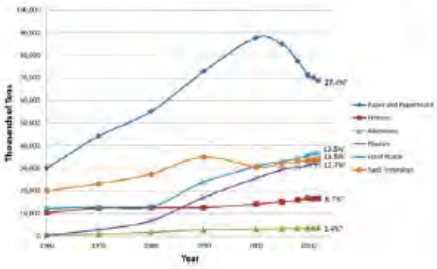
Recycling Composition Trends



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Fort Worth Southeast Landfill

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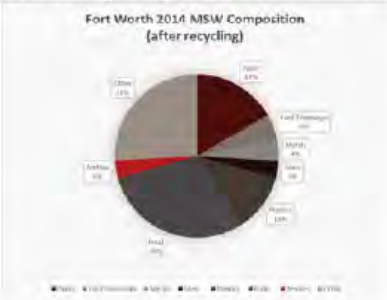
What is going to the Landfill?



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Landfilling by Type of Waste

- Up to 55% of Non City Tons could be diverted from landfill
- City Tons represent all tonnages collected and disposed of based on residential solid waste programs only

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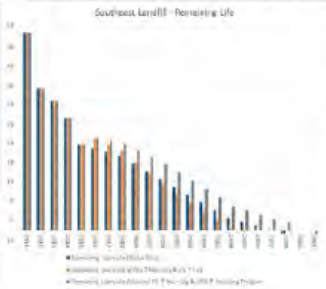
Commercial Sector Importance



Projected Landfill Life
Status Quo of 2015:
1st Qtr. 2037

Conservative Growth:
2nd Qtr. 2035

Conservative Growth & Commercial Recycling Program:
1st Qtr. 2041

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Guiding Principles for Developing Plan

- Evaluating and providing for adequate system capacity
- Collaborative public/private partnerships
- Moving from residential to global/all waste focus
- Strategies that foster market driven collection and diversion programs
- Understanding and capitalizing on emerging and sustainable technologies that fit Fort Worth

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A Global World: Impacts on Fort Worth

- Energy Markets (demand and pricing)
- China's "Green Fence"
- 1-bin is a system where generators do not source-separate recyclables from garbage, and put everything together in one large bin (like in Houston)
- Problems with Blue Bin (Washington Post, June 21, 2015)
- Unprofitable Recycling Efforts (Wall Street Journal, April 29, 2015)
- Flat Recycling Tonnages
- "The Evolving Ton"

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Community Outreach Activities

- Social Media & Web outreach
- 1 Business Focus Group
- 2 Presentations to City Council
- 3 Open House Meetings
- 6 Workshops with 75+ attendees
- 8 Local Solid Waste Industry Expert Interviews
- 32 Influential Leader Interviews
- 102 "On the Street" random Interviews
- 533 Completed Online Surveys

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Outreach Outcomes – Online Surveys

Most pressing environmental issues:
Most common first priority was Air Quality
Most common second and third priorities were recycling

Most frequently prioritized ideas to increase recycling:
76% Promote to businesses
66% More bins in public areas
53 % Add more to what can be collected at the curb
35% Collect & compost food waste
35% Alternate bulk and brush collection

Would you participate in curbside food waste collection?
62% Yes 38% No

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Outreach Outcomes – "On the Street" Interviews

Most pressing environmental issues:
Most common first priority was Air Quality
Most common second and third priorities were Recycling

Most frequently prioritized ideas to increase recycling:
82% More bins in public areas
72% Promote to businesses
45% Alternate bulky and brush collection
32% Add more to what can be collected at the curb

Would you participate in curbside food waste collection?
66% Yes 34% No

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Outreach Outcomes – Business Interviews

What do you know about business recycling requirements in Fort Worth?
- Not much
- Not sure
- Nothing

What's the hardest thing about offering recycling at businesses?
- People don't care
- No space for the containers
- Relying on people to volunteer or carry it home

Do you think a 1-bin system is a good idea?
Yes Why? Most popular reason: It sounds easy
No Why not? Most popular reason: It sounds expensive

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Outreach Outcomes – Influential Leader Interviews

Regarding residential services:
- Support more types of recyclables collected at the curb
- Suggest comprehensive communication with customers
- Make recycling easier with incentives and awareness of what can be recycled

Regarding Industrial, Commercial & Institutional sector:
- Recognition of the opportunity to divert organics and food waste
- Promotion of engaging the stakeholders in any regulations, rewards, rules
- Endorsement of market-based programs to increase diversion

In General:
- The City should demonstrate leadership with internal recycling program
- The City could use market influence, such as building rules, to increase diversion and reuse
- Emphasis on partnerships, charitable efforts, etc.
- Importance of education and engagement for program success

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Six Major Goals – Draft Framework

Improve Residential Services and Programs
- Improve participation; improve diversion; reduce contamination; future "Pay as You Throw" (PAYT) rate enhancements

Increase Community Outreach to improve understanding and compliance with programs and future enhancements
- Improve engaging the community to recycle more through creation of **technical assistance program**; work with targeted areas to solve specific problems in those areas; implement related components of City's Comprehensive Litter Plan

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- Current recycling rate is 21%; need to preserve Southeast Landfill capacity life

3

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Six Major Goals – Draft Framework

Confirm City's Disposal Capacity Plan (2035 to 2060)

- Recent evaluation and projections show that the Southeast Landfill could reach capacity earlier under certain worst case scenarios; conservative remaining life of 20 to 25 years; funding option for future capacity needs

Advance Commercial Technical Assistance & Diversion Programs

- Technical support in the field is the strongest non-enforcement tool to support this advancement

Set City's future Policy & Ordinance Direction

- Enhancing existing; adopting new ones for potentially-polluting items like Scrap Tires, perhaps similar to Universal Recycling Ordinance concept

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Planned Program Enhancements

- Update the Zoning of the Drop Off Stations - allowing for the collection of residential Household chemicals, paints, automotive & pool products (Household Hazardous Waste as classified by TCEQ) and resalable donation items
- Pilot program with 1,000 Pharmaceutical Mail-back Envelopes and expanded efforts with NCTCOG, DEA Takeback Events, UNT and future Walgreen collection kiosks
- Rate adjustments at landfill to accept small loads of commercial waste at the Southeast Landfill

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Proposed Schedule and Actions

- Post online Draft Executive Summary, Implementation & Plan
- Additional Outreach to neighborhood associations
- Additional collaboration with Chambers/outreach to business and industry
- Additional outreach to universities and other institutions
- Broad Public Outreach with Web & Social Media Presence seeking input
- Additional Open House will be held on September 15th or 16th
- Review and comment by City Plan Commission
- Final review and editing process
- Presentation to Council for Final Plan adoption in early 2017

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www.fortworthtexas.gov/swplan

4

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September 2017

2017-2037 Comprehensive Solid Waste Management Plan
Appendix D - Evaluation of Current Programs

RETHINKING WASTE For a Greener Fort Worth

GBB SOLID WASTE MANAGEMENT CONSULTANTS

AZ&B

OCG|PR OPEN CHANNELS GROUP

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City of Fort Worth, TX, Comprehensive Solid Waste Management Plan

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Introduction

This report involves an evaluation of current City of Fort Worth (the City) solid waste programs and initiatives for quality, efficiency, participation, cost performance, and achievement of any existing City goals. The program elements to be evaluated were identified and agreed upon among the Project Team members. Each element was assessed given available data, and evaluated through the lens either of standing goals and standards or industry and national best practices.

Evaluation of Program Elements

Each program element was identified as being part of one of five operational categories. The categories are primarily identified as three service sectors (services to Residents; services to Industrial, Commercial and Institutional (ICI) sectors; and services to the Community), along with solid waste facilities and internal agency operations. Data for the purposes of evaluation came directly from City sources, and most goals or standards came from the prevailing solid waste management plan or other City sources. Any external standards are based on the United States Environmental Protection Agency (EPA), established industry sources, and from common knowledge of exemplary programs.

1 Services to Residents

1.1 Curbside Collection of Garbage and Recycling

Program Description

Fort Worth single family residents[1] receive collection of garbage and recycling once weekly from the City. Collection occurs Monday through Friday, and service is performed by a contracted collector. In return, the collector pays fees to the City based on its annual receipts. In 2015, there were 212,601 customers, and there are 217,422 residential garbage carts in distribution.

The City offers a Pay-As-You-Throw (PAYT) volume-based residential garbage container sizing system to encourage recycling and discourage waste generation. Three residential garbage container sizes are offered: 32 gallons, 64 gallons and 96 gallons. The City, as of September 2015, charges a variable rate for each container size: $12.50 per month for 32 gallons, $17.50 per month for 64 gallons, and $22.75 per month for 96 gallons.

As of April 2015, just over 60 percent of the garbage containers are 64 gallons in size, a little under 20 percent are 96 gallons in size, and a little under 20 percent are 32 gallons in size. All garbage and recycling carts are owned by the City. Customer service calls, emails, and issues received through the City solid waste app come in to the City's Call Center and are entered into the customer relations management

[1] Includes homes with one, two (duplex), or three (triplex) units and townhouses with individual water meters.

system (CRMS). The collections contractor also has access to that system. Missed collections are collected within 24 hours. Drivers can report improper set outs or nothing-out (addresses with no carts set out).

In Fiscal Year (FY) 14-15, 233,674.87 tons of waste were collected from these customers. The average weekly set out (garbage and recycling) per household was 41.3 pounds: 32.7 pounds of garbage and 8.66 pounds of recycling. On an annual basis, each customer sets out approximately 2,149.5 pounds of garbage and recycling per household, per year. That same year, 31,879.4 tons of bulk waste and 28,973.5 tons of yard waste were collected from the residential collections contractor. With 212,601 households on the customer list, that is an average of 299.9 pounds of bulk waste per household and 272.6 pounds of yard waste per household, per year.

Participation in garbage collection is presumed to be 100 percent for serviced residential units, and per field observations by the City, the recycling set-out rate is 65 to 70 percent. The current diversion rate is around 21 percent, and recent analysis shows more recyclable metal and plastic is going to landfill than to recycling. The FY14-15 budget (actual) for curbside collection is $33,667,554.37, or approximately $154.85 per household per year. This includes garbage, recycling, yard waste, and bulk collection.

Current Goals and Standards

The Texas state recycling goal is 40 percent; the national recycling rate average from U.S. EPA is 34.5 percent, and recent Columbia University research puts the national recycling rate average at around 29 percent. A January 2015 report called the Texas Recycling Data Initiative showed a tons-over-tons statewide municipal solid waste (MSW) recycling rate of 18.9 percent.

The current "Fort Worth Solid Waste Management Plan 1995-2015" (1995-2015 Plan) called for utilizing automated collection technology to reduce garbage collection from twice weekly to once weekly, and to collect recyclables once weekly and yard waste once weekly on a seasonal basis. It was anticipated that the outcomes of this change would include meeting the goals of reducing worker injuries and providing "cost-effective" service. The 1995-2015 Plan also called for implementing a PAYT fee structure as part of this change.

Regarding yard waste, the 1995-2015 Plan had a short-term goal of the provision of once weekly collection of yard waste; however, over the long-term, the 1995-2015 Plan's goal was to reduce yard waste collection by encouraging residents to refrain from bagging yard waste and/or to manage it on their own property.

In addition to the goals in the 1995-2015 Plan, the FY14-15 City budget document set the following objectives for the curbside collection program:

- To provide once a week curbside garbage collection with less than one missed collection per 1,000 households.
- To provide once a week curbside recycling collection with less than 1 missed collection per 1,000 households.
- To increase the diversion rate of residential wastes from landfill disposal from 23 percent to 30 percent by FY14-15.
- To reduce curbside recycling contamination from 20 percent to 10 percent by FY14-15.

Program Evaluation

The 1995-2015 Plan goals and budget document objectives to provide once-weekly garbage service and recycling service have been fulfilled. Yard waste collection also continues once weekly. The continued residential participation in the yard waste program indicates that "Don't Bag It" programs have not been successful in reducing the amount of yard waste set out at the curb to an extent that service can be reduced or eliminated.

Regarding misses of garbage and recycling at the curb, the City and its contractor have been consistently exceeding the objective of less than 1 miss per 1,000 households. Table 1-1 shows the miss rates for the past three years.

Table 1-1 Curbside Miss Rate per Thousand Customers

	Curbside Garbage Misses	Curbside Recycling Misses
FY2012-13	.45	.23
FY2013-14	.74	.42
FY2014-15	.53	.27

The 1995-2015 Plan goal to implement automated collection was completed, as was implementation of a PAYT billing program. The outcomes of the PAYT system are subject to analysis, as the high rate of contamination in the recyclables delivered to the MRF may be due in part to residents having chosen garbage carts that are too small for their needs or habits, resulting in "overflow" garbage being deposited in recycling carts. The FY14-15 budget document objective to reduce curbside recycling contamination from 20 percent to 10 percent by FY14-15 was not achieved; the contamination rate was 24.16 percent for FY14-15.[2]

The objective to increase the diversion rate to 30 percent by FY14-15 was also the objective in the FY13-14 budget document. This objective was not achieved for FY13-14, when the diversion rate was 21.24 percent, nor was it achieved in FY14-15, when the diversion rate was 20.71 percent. Regardless, a 30 percent diversion rate with yard waste diversion included is too low for a program as comprehensive and well-established as the one in Fort Worth. It is below not only the Texas state goal but also published figures for the national average, and achievable figures for a community with this level of access to recycling.

[2] The 2012-13 contamination rate was 20.56 percent, and the 2013-14 contamination rate was 20.64 percent

Figure 1-1 shows the characterization of the average Fort Worth curbside set-out. In recent years, not including yard waste,[3] Fort Worth residents have source separated from the garbage 20 to 23 percent of their waste. A waste audit of garbage and recycling conducted in March 2014 found that the randomly selected residences source separated a bit more than the average household, at 28 percent. However, nearly that much recycling by weight—i.e., what *could* have been recycled—remained in the trash and was lost to landfill. This comparison shows that even *without* yard waste recycling, Fort Worth should ultimately be able to recycle much more than the 30 percent goal rate.

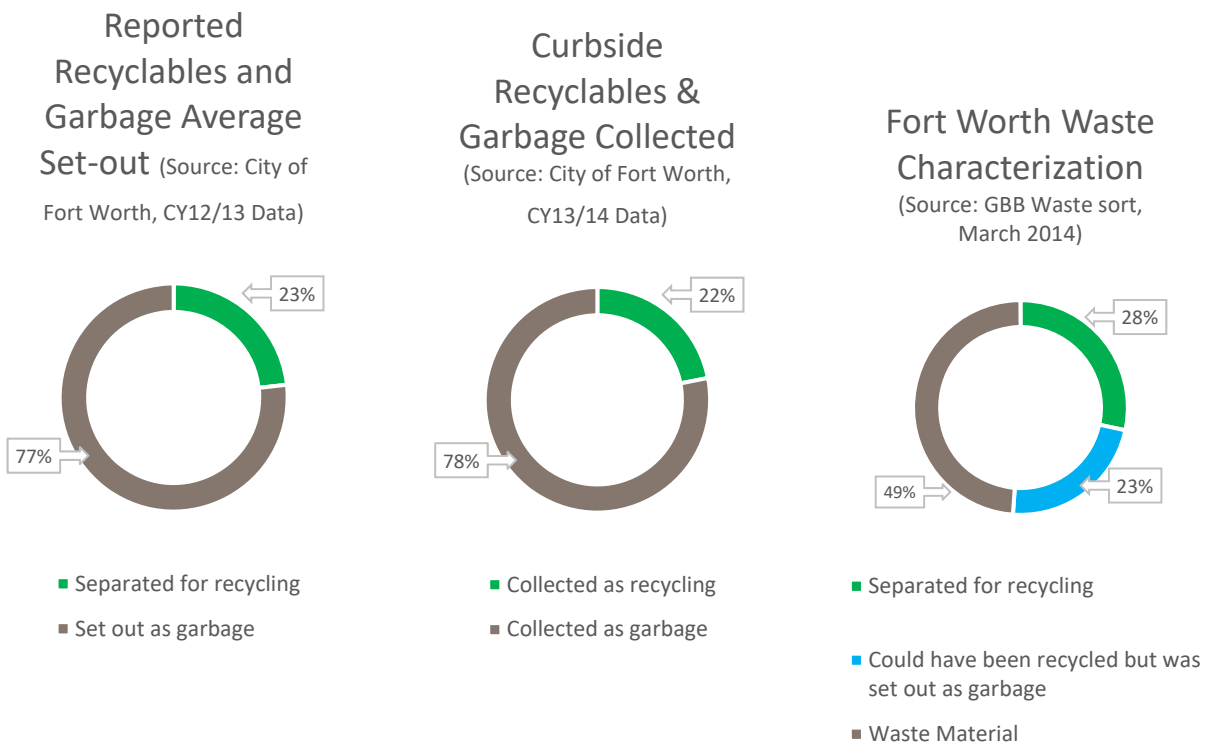


Figure 1-1 Average Curbside Set-out Compared to Actual Waste Stream Characterization

1.2 Bulky Item Collection

Program Description

Collection of bulk material is provided once monthly during a designated week. This service is for items that are too large, heavy, or otherwise unable to fit in a garbage cart. Bulk collection is not for excessive amounts of garbage, and bagged waste is not accepted. Other items not accepted in the bulk collection program include electronics, appliances containing coolant or gasoline, hazardous materials such as chemicals or poisons, automotive parts (including batteries and tires), glass, and rock, soil, concrete, or tile. Volume is limited to 10 cubic yards per collection.

Crews collect bulk set-outs throughout the designated week. Residents may set out their bulk items as early as 6 p.m. the Friday before the collection week, but no later than 7 am on Monday of the collection

[3] Yard waste was excluded for the purposes of this comparison because curbside yard waste set-outs were not counted in the waste characterization conducted in October 2014.

week, and crews have until 5 p.m. on the Saturday at the end of the collection week to pick up the material. During the life of the current 1995-2015 Plan, out-of-budget costs, or overages, for this program have reduced due to residents conforming to the set-out instructions.

In a 2012 Customer Service survey, 70.4 percent of respondents indicated that they use the bulk program. In the same survey, 87.3 percent of respondents said they were "somewhat" or "very" satisfied with the bulk collection program.

Current Goals and Standards

The primary existing goal for this program from the current 1995-2015 Plan was to maintain the service level of once-monthly collection, with ambitions to "encourage" apartments, businesses, and institutions to recycle bulk items when possible. The intention for that effort was to reduce the amount of reusable items going straight to landfill.

Program Evaluation

The City has maintained the once monthly service level for bulk collection, and the reduction in out-of-budget expenditures reflects growing customer compliance with set-out instructions. Based on industry experience with bulk item collection programs, once monthly bulk collection at no additional cost is an above-average amount of access to this type of service. The lengthy time period provided to set out material (Friday night to Monday morning) also makes participation simple. There is no comprehensive data to indicate that residents mind that bulky items may be on the curb for up to a week, and it is not unreasonable to suppose that some residents have learned that they have until even later in the week than Monday to set out their items, expanding the set-out window even further. This exceptional level of "easy" access to a "free" program to dispose of bulk items provides no incentive for residents to seek other options to rid themselves of bulk items or material that could be diverted from disposal, such as selling, donating, or recycling. Therefore, while the program has met its goal of providing a certain level of service, it does not serve the larger goal of reducing waste sent to landfill.

In addition to not incentivizing waste reduction, this style of bulk collection is relatively expensive. City staff estimates that approximately 33 percent of the monthly per household charge by the contractor for waste collection is attributable to bulk waste collection (this also includes enhanced yard waste collection), but bulk materials account for only 12.3 percent of the tons collected. Proportionally, these charges are second only to garbage collection, which accounts for approximately 41 percent of the charge but over 60 percent of the tons collected. Figure 1-2 shows how disproportionately expensive bulk waste collection is.

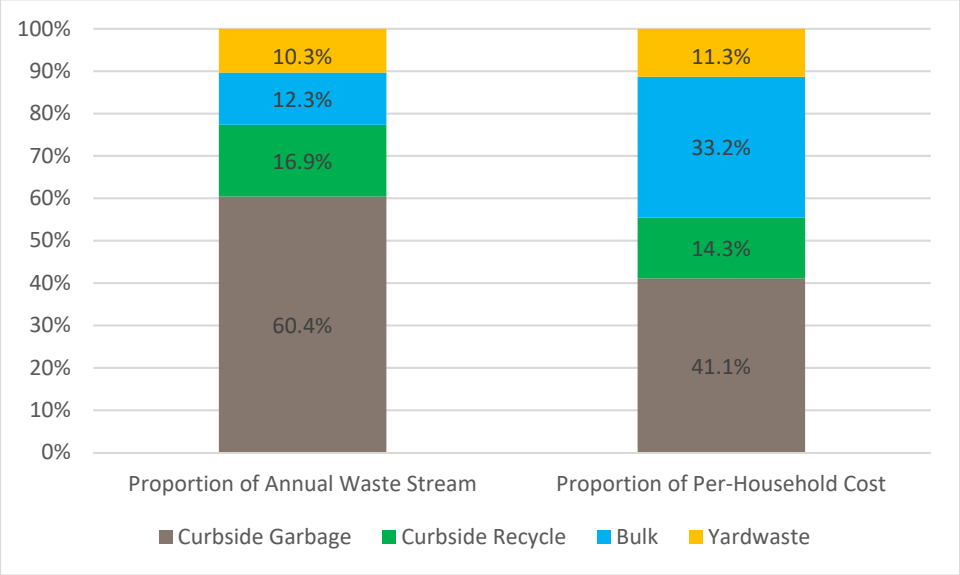


Figure 1-2 Collection Services as Proportion of Annual Waste Stream and Proportion of Per-Household Rate Charged by Contractor
(Source: City of Fort Worth Data)

Furthermore, a survey by the City in 2011 of the materials set out and collected as "bulk" found that up to 70 percent is organic materials, such as yard trimmings and brush. Effectively, this means many tons of organic material are being collected expensively and then disposed instead of recovered.

1.3 Incentive Programs

Program Description

Incentive programs are initiatives to provide a motivation—usually financial—to residents to reduce waste generation, to recycle, or to recycle more. In 2012, Fort Worth began a Recyclebank program. The program is provided through the partnership between Recyclebank and Waste Management, Inc. (WMI). Recyclebank lets participants earn points by recycling, and those points can be "cashed in" for benefits such as vouchers or coupons good at local or national vendors.

During the first month of the program (April 2012), Recyclebank reported to the City[4] that 21,168 of the 195,928 customers who were eligible for the program had registered to participate, representing a 10.8 percent subscription rate. Of those subscribed customers, 10,403 (or, 49.1 percent) actively participated in earning Recyclebank rewards, earning nearly 7 million points for recycling. In subsequent years,[5] active participation has declined significantly. Subscription has increased to 16.7 percent; however, only about 10 percent of those subscribers are actively reporting, representing just 1.3 percent of all eligible customers. A customer service survey in 2012 indicated that many users were frustrated with the process of using Recyclebank, or were confused by how to participate.

[4] "Recycling Reporting," from Waste Management, Fort Worth, TX, April 2012.
[5] "Recyclebank Recycling Education & Engagement Program Results," reports from Waste Management, Fort Worth, TX, dated February 2015 and September 2015.

Table 1-2 Fort Worth Recyclebank Subscription and Reporting Figures

	April 2012 (Program Start)	April 2014 (24 months from start)	February 2015 (34 months from start)	September 2015 (41 months from start)
Number of subscribers	21,168	30,633	31,551	34,710
Subscription Rate	10.8%	14.9%	15.3%	16.7%
Subscribers Reporting/ Participating	10,403	3,812	3,667	3,523
Program Reporting/ Participation Rate	49.1%	12.5%	11.6%	10.1%
CITYWIDE Reporting/ Participation Rate	5.3%	1.85%	1.8%	1.3%

Current Goals and Standards

The existing 1995-2015 Plan recommended establishing "positive incentives" for businesses to recycle, but did not place the same priority for residential programs. The residential curbside goals are focused on service provision. There are no national standards for incentive programs, and their adoption is uneven.

Program Evaluation

While the introduction of the Recyclebank program in Fort Worth was promoted via channels such as City News;[6] the web site currently provides a minimal description of the program and then refers readers to the Recyclebank web site. Recyclebank's operational model does normally include their providing the outreach and education materials regarding the program. Budgetary information provided shows a $50,000 expenditure for "Recyclebank / Recycle Right postcards," which figure included both Recyclebank and general recycling outreach efforts. Approximate annual expenditures by the City for Recyclebank outreach were $20,000 in 2012 and $10,000 each year in 2013 and 2014.[7] Furthermore, the City paid about $930,000 annually in per-household fees for participating in Recyclebank.[8] Recyclebank was required by contract to expend $150,000 in the program for marketing purposes from April 1, 2014 through March 31, 2015, and $150,000 April 1, 2015, through March 2016.

Recyclebank has been in place in Fort Worth for nearly three and a half years. The recycling rate for 2012 would likely not have been heavily influenced by the program, and in subsequent years, there has been no impact—in fact, the City's diversion rate has decreased each year during the program and is now more than three percentage points lower than the reporting year in which the program began. The number of subscribers has increased, but the decline in active participation in Recyclebank by those subscribers is noticeable.

Additionally, one of the purported benefits of Recyclebank is promotion of local businesses via the rewards that participants can select and redeem. From March 2014 to February 2015, about 2 percent of members ordered rewards from Recyclebank. These were disproportionately identified as "local"

[6] http://fortworthtexas.gov/citynews/default.aspx?id=96026

[7] Email correspondence with Diane Covey, Public Information Officer with the City's Code Compliance Department, March 12, 2015.

[8] FY2017 Code Enforcement Program Improvement Package documents

rewards,[9] although the reporting does not identify if the rewards are for truly local businesses or rewards that are limited to being spent at Fort Worth locations. That trend began to change, however. In the 12-month period from October 2014 to September 2015, a similar representation of members ordered rewards from Recyclebank (just under 2 percent, on average). The ratio of local to national rewards changed significantly, however, and overall more than 82 percent of rewards ordered were national.[10]

1.4 Yard and Food Waste Collection

Program Description

The City offers yard waste collection services from single family residences in several different forms through Waste Management, Inc., its collection contractor. Any yard waste including grass clippings in Kraft paper bags may be placed at the curb for weekly collection. Residents are responsible for purchasing Kraft paper bags at retail outlets.

Tied bundles of yard waste up to 4 ft. long and 40 lbs. in weight may be placed at the curb, along with stacks of brush and limbs up to 8 ft. long and 4 in. in diameter (piles with limbs larger than these dimensions are considered bulk) if bundles are no larger than 10 cubic yards. Yard waste is collected weekly at no additional charge to households. Residents have the option of paying one-time $75.00 to purchase a green, 96-gallon cart for any yard waste. Yard waste that does not meet these criteria may be collected at additional cost to the resident. To avoid additional fees, residents may take their yard waste to one of three drop-off stations where yard waste is accepted free of charge.

City contractors deliver yard waste to the Southeast Landfill (SELF) where it is ground into mulch by Living Earth Technologies (LETCO) under subcontract to the SELF operator, Republic Services. Republic Services/LETCO is required to accept the material unless it contains “Unacceptable Waste” or loads with an “unreasonable amount of prohibited items”; however, the amount of contamination constituting an “unreasonable amount” is not defined in the Landfill Operating Contract Amendment 3 which addresses processing of yard waste. Republic/LETCO processed just under 29,000 tons of yard waste into mulch in FY14-15 according to the City’s Annual Report. The contamination rate, calculated using the amount of yard waste disposed by the mulching operation, was 6.85 percent by weight.

The City does not provide separate collection of food waste for recycling. Residences have no option for removing food residuals from their solid waste except to compost it in their back-yard composting, or by using under-sink disposers. Back-yard composting is a beneficial form of diverting both yard waste and food waste from disposal. Using an under-sink disposer is also a form of diversion from landfill because municipal wastewater bio-solids are typically land applied for beneficial agricultural use. The City currently incentivizes diversion of both food residuals and yard waste by providing a PAYT program, which allows residents to pay less for smaller solid waste carts without paying more for separate yard waste collection. The City has a back-yard composting education program. For instance, a fifteen-hour Master Composter course is offered twice-per-year at the Botanical Gardens and Master Composters are available five Saturdays a year to offer composting help to residents at the Compost Outpost (a self-guided compost demonstration area) at the Botanic Garden and thus help residents to divert organic waste from landfilling

[9] Local to National rewards ranged from almost 3-to-1 to more than 5-to-1 from March 2014 to February 2015.
[10] Local to National rewards ranged from 1-to-2 to 1-to-18.8 from October 2014 to September 2015.

Current Goals and Standards

Statewide, 15.8 percent of all reported material recycled from residential sources was made up of yard trimmings, brush and green waste in 2013 (Texas Recycling Data Initiative Biennial Report, 2014). However, this benchmark is believed to be low because of the very large number of small composters and mulch producers operating in the State, many of which were not accounted for in the statewide study.[11]

Program Evaluation

Although the reported yard waste and food waste diversion rates compare very favorably to the reported statewide rates, the reported statewide rates are believed to be lower than actual rates. Opportunities to increase diversion rates for these materials lie in increasing local opportunities for composting and mulching driven by market forces for economically favorable tipping fees and high-quality compost, soil blends, and mulches. Opportunities to increase diversion of food waste lie in providing processing capacity, including composting and other techniques, for food and yard waste generated by the residential sector. The March 2014 waste characterization study conducted for the City showed that 34.9 percent of the material set out as garbage, exclusive of recycling and yard waste, was food or food-contaminated paper, indicating that perhaps a third of current "garbage" could be diverted to composting, digestion, in-sink disposers, or other techniques.

1.5 Multi-family properties

Program Description

At present, the main service provided to multi-family residents by the City regarding recycling is information and outreach. The City does not provide any direct services. The City's information and outreach provides guidance to individuals seeking to start or support recycling, including how to seek collection service from the private sector, and where drop-off services are available.

In 2014, an ordinance passed in 2011 went into effect which requires all multi-family housing complexes to have recycling programs and to submit documentation of their programs to the City. To bring about compliance, the City provided technical assistance, a checklist, and other resources such as a direct email address, AptRecycling@fortworthtexas.gov.

Current Goals and Standards

The existing 1995-2015 Plan provided programmatic goals for apartment recycling:

- Requiring apartments to provide recycling to residents;
- Providing City support of and enforcement for apartment complexes to recycle;
- Encouraging apartments to divert yard waste from disposal;
- Encouraging residents to recycle; and,
- Assisting in the formation of recycling cooperatives among complexes.

The 1995-2015 Plan also included this statement regarding recycling access for apartment residents:

> *It is the Committee's general opinion that, to the extent possible, residents of apartments should receive services comparable to services provided to residents of single family households.*

[11] 2014 Texas Recycling Data Initiative Biennial Report, page 23.

This sentiment reflects a forward-thinking idea that with the advent of single stream recycling, there is no operational reason that apartment residents cannot recycle the same common materials as those living in single family homes.

Program Evaluation

As of January 2015, 545 multi-family housing complexes have complied with the program: 440 have a recycling plan in place and 105 have requested a waiver opting out of implementing recycling. While the compliance is remarkable, the ordinance has no service capacity requirements nor does it specify which products must be recycled. Therefore, while the objectives related to this endeavor have been met, the achievement of providing a similar level of service for apartment and single family residents is lacking. Continued implementation of this ordinance will be essential for ongoing service provision to apartment residents.

The nonspecific goal to "encourage" residents to recycle is met by existing outreach programs, including the offer by the City to speak at community and civic groups. Efforts to encourage complexes regarding diversion of yard waste and the active support of recycling cooperatives appears not to have been accomplished.

2 Services to Industrial, Commercial, and Institutional Sectors

2.1 C&D

Program Description

Construction activities result in the generation of construction and demolition ("C&D") waste, which is generally managed differently than other MSW. The TCEQ defines C&D waste as waste resulting from construction or demolition projects; includes all materials that are directly or indirectly the by-products of construction work or that result from demolition of buildings and other structures, including, but not limited to paper, cartons, gypsum board, wood, excelsior, rubber, and plastics.[12] C&D wastes can be disposed of in landfills dedicated to C&D disposal, referred to as Type IV Landfills. These facilities do not have to have as extensive a liner or final cover system since the wastes that can be accepted at these facilities must be inert.

C&D debris often contains bulky, heavy materials that include:

- Concrete, wood, and asphalt (from roads and roofing shingles);
- Gypsum (the main component of drywall);
- Metals, bricks, glass, and plastics; and,
- Salvaged building components, such as doors, windows, and plumbing fixtures

C&D is the second largest waste type disposed in Texas. The TCEQ reports that 18 percent by weight of all material landfilled in Texas is C&D material, or about 0.2 tons per capita per year.[13] Using U.S. Census data, this rate equates to 173,920 tons per year of C&D waste generated in Fort Worth.

Current Goals and Standards

To provide for proper disposal of C&D waste, it is the City's goal to provide sufficient disposal capacity for all wastes generated by both residential and commercial sectors. Currently this is achieved through a combination of disposal capacity from both the public and private sectors.

Program Evaluation

C&D waste from new construction, major residential renovation and demolition projects make up much larger quantities than C&D material that is likely to be collected through the City's curbside bulk collection program. This material is typically collected by private contract with haulers who may haul to Waste Connections C&D landfill, the Southeast Landfill (SELF) or elsewhere.

The SELF accepts C&D wastes. However, C&D waste, unlike residential curbside garbage collection, is not directed to the SELF. In FY14-15, the SELF received 50,188 tons of C&D waste. This represented approximately 7.9 percent of the total waste disposed of at the SELF that year.

The Waste Connections C&D landfill (formerly identified as Progressive/IESI) is located in Tarrant County. This facility accepted a total of 356,826 tons in 2014. C&D waste accepted at this facility is generated by both the City's residential and ICI sectors, as well as from outside of Fort Worth and brought in by private haulers. The remaining capacity of this landfill is 20 years at current rates of disposal.[14]

[12] 30 TAC 330

[13] *Municipal Solid Waste in Texas: A Year in Review – FY 2014 Data Summary and Analysis*, TCEQ

[14] *Municipal Solid Waste in Texas: A Year in Review – FY 2014 Data Summary and Analysis*, TCEQ

2.2 Commercial Collection

Program Description

At present, the main service provided to businesses—i.e., the commercial sector—by the City is information and outreach. The City does not provide any direct services, except for approximately 1,000 small business customers that are serviced by 96-gallon carts by the City's residential collections contractor. Information provides guidance to individuals seeking to start or support recycling, including how to seek collection service from the private sector, and where drop-off services are available. The existing 1995-2015 Plan notes this condition, and that it should continue.

> *Their participation will have to be secured through largely voluntary measures, as the City currently exercises limited control in how waste is collected and disposed. It is the Committee's belief that this level of business sector flexibility should continue.*

The commercial program also includes regulation of solid waste haulers.

Current Goals and Standards

The existing 1995-2015 Plan listed nine recommended actions for the commercial program, enumerated below, which are primarily aspirational in nature. The action statements were mostly "encourage," "assist," and "incentivize," and the areas of focus included buying recycled content, reducing waste, recycling, and composting. The existing 1995-2015 Plan recommends that the City provide information to businesses on the importance of recycling and waste reduction, and on how to access markets for recyclable materials. The 1995-2015 Plan further recommends turning to organizations such as the Sierra Club and the Chamber of Commerce for assistance with these educational efforts.

The 1995-2015 Plan calls for the institution of the Grants of Privilege system, requiring haulers to have a license or permit and to pay fees, and to provide tonnage data to the City.

Program Evaluation

The City estimates that the proportion of waste from Fort Worth generated by the ICI sector is at least two-thirds of the total, as estimated in the current 1995-2015 Plan, but it may be as much as three-quarters. Accordingly, the importance of influencing this sector to reduce waste and recycle has increased in prominence. Below are the nine recommended actions from the existing 1995-2015 Plan and status on their implementation.

1. Encourage businesses to recycle
    - The City has started "Green Breakfasts" with tours of companies incorporating sustainable business practices. The City also hosts Business Smart workshops for area businesses on incorporating sustainable business practices including recycling and waste reduction best practices. As part of the rollout of the multi-family complex recycling program, the City held four workshops specifically for apartment managers on best practices.
2. Assist schools to establish in-house recycling programs
    - The City obtained grant funds for Fort Worth schools to receive recycling bins, and 3,000 bins were placed in 2015. Keep Fort Worth Beautiful encourages the formation of school "Green Teams" and hopes to recognize them for their efforts. Only schools forming a

green team comprised of a student, a custodial staff person, an administrator, a teacher and a parent receive recycling bins.

- The City's Community Engagement Office (formerly Neighborhood Education Office) does outreach in schools and neighborhoods educating students and citizens on how to recycle properly at home. In the period from January 1, 2014 through January 31, 2015 the former Neighborhood Education office achieved the following:
  - 104 elementary schools were visited for outreach
  - 4,851 students were reached with the recycling presentations
  - 5,035 Fort Worth citizens were reached with the recycling presentations
  - 65,491 pieces of recycling collaterals were distributed

3. Establish positive incentives for recycling programs.
   - No programs.
4. Adopt business design standards that encourage use of recycled products
   - Business Smart program – to share best management practices with local businesses.
5. Encourage procurement of goods made from recycled/able materials
   - The City's Sustainability Plan does encourage green purchasing.
6. Evaluate use of waste water treatment sludge for composting
   - The Solid Waste Services Division had three meetings with the Water Department on this topic and current discussions are ongoing and show promise.
7. Encourage composting organic materials by private sector
   - Not accomplished yet.
8. Encourage lawn care companies to "don't bag it"
   - Fort Worth has an active Master Composter program, which a few lawn care companies have attended.
9. Require data collection and reporting and franchise fees of haulers
   - This action has been accomplished. The Grants of Privilege program collected $2.4 million in FY 14-15.

2.3 Food Waste Collection

Program Description

Collection of food waste in the non-residential sector is typically through self-haul by the generator or through contracts with hauling companies. In general, the primary impediments to food waste recycling are a lack of appropriate processing facilities within an economic haul distance, and lack of adequate route density to make collection and hauling more efficient and more economical. Food waste is typically heavy, which may also reduce haul efficiency.

Current Goals and Standards

There are no current goals or standards associated with food and yard waste from Industrial, Commercial, and Institutional (ICI) sources.

Program Evaluation

Opportunities to increase diversion of food waste lie in providing processing capacity, including composting and other techniques, for food generated by the ICI sectors.

3 Services to the Community

3.1 Away-from-Home Recycling Services

Program Description

The Solid Waste Services Division and Downtown Fort Worth, Inc. have implemented the "Recycle on the Go" program. This program provides 78 dual-use (recycling/garbage) cans throughout the downtown area: 66 purchased by the City and 12 purchased by the Downtown Public Improvement District (PID). There are also 10 "Big-Belly" automated recycling units. The recycling side of the dual-use cans provides an opportunity for recycling of paper, plastic, metal and glass. The collected materials are consolidated into a 3-cubic yard container, which is emptied once weekly. During winter months, it is estimated to be only two-thirds full when emptied.

This program was partly funded by a grant from Texas Commission on Environmental Quality. The Downtown PID spends about $1 million annually on "trash removal," which accounts for around 45 percent of its budget expenses. The Stockyards PID spends approximately $10,775, or 16 percent of its budget, on waste removal annually. Waste removal expenditures for the Trinity Bluffs PID have varied markedly over the past five fiscal years, accounting for 26 to 39 percent of operating expenditures. In addition to expenditures by the PIDs, the City pays Waste Management $58,000 per year to empty 194 street garbage cans.

Current Goals and Standards

There were not any goals or aspirations for away-from-home recycling in the current 1995-2015 Plan. Through the Recycle on the Go program, the City hoped to reduce the amount of waste disposed by 10 percent, or approximately 10,000 pounds annually.

The most widely cited best practices for public space recycling, backed by research and public input, are found in a 2011 report[15] by Eureka Recycling and a 2013 report by Keep America Beautiful (KAB).[16]

Eureka Recycling is a zero waste nonprofit organization in St. Paul, MN, and operates several programs to further its mission, including a curbside recycling program. Eureka Recycling offered the following best practices for creating a program of public space recycling:

- Clearly define the budget and scope of the program and identify phases of implementation;
- Consider prioritizing visible and popular public spaces first;
- Build strong partnerships with stakeholders, including the community;
- Design the program around both diversion potential and ensuring that the materials really get recycled; and,
- Develop systems to track and measure diversion, and communicate results.

Keep America Beautiful is the foremost organization dedicated to the care of public spaces, the host organization of the Great American Cleanup and America Recycles Day, manifested locally in Fort Worth as the Cowtown Cleanup in the spring and America Recycles Day in the fall each year.

Keep America Beautiful conducted a survey of communities who have public space recycling and in 2013 published ten best practices for such programs, based on the experience of the survey respondents:

[15] "Development of Best Practices in Public Space Recycling," Eureka Recycling, 2011. http://www.eurekarecycling.org/imageupload/file/Eureka-Public_Space_Recycling-final_web.pdf

[16] Planning for Success: Ten Tips for Designing Public Space Recycling Programs," Keep America Beautiful, 2013. http://americarecyclesday.org/wp-content/uploads/2013/07/Public-Space-Recycling-Guide1.pdf.

Best Practices for Public Space Recycling - Keep America Beautiful, 2013
•Recycling must be simple and convenient, removing the two primary barriers of lack of convenience and confusion over what to do; •Know the waste stream before selecting containers, in order to properly identify what users will actually be generating; •Place recycling bins directly next to trash bins, as isolated recycling bins will become trash cans no matter what the label says; •Use restrictive lids, as small openings reduce contamination and force people to slow down and read; •Use clear, simple labels and language with easy-to-recognize images and avoid cluttering signage with too much detail; •Choose the right bin for the setting and the materials, and one that is distinct from the trash cans—blue is the most common color used for recycling; •Be consistent, and pick a uniform bin style, color scheme, and message, coordinating with nearby residential programs and other venues or facilities; •Keep bins clean and well-maintained, and emptied adequately—dirty, damaged, and overflowing bins turn people off; •Conduct educational outreach, including special signage and recycling ambassadors to interact with users; and, •Be prepared to evaluate and improve—when asked "have you made any changes to your system to address contamination or other issues?" 69 percent of the survey respondents said "no."

Program Evaluation

The Recycle on the Go program had a goal of diverting 10,000 pounds of material per year. The following approximate estimates were made to evaluate the achievement of this goal.

The Downtown Fort Worth PID states that the 3-CY recycling container is emptied weekly, but that in the winter months it is only two-thirds full. Assuming that December, January, and February are the "winter months," there are 13 winter weeks and 39 "regular" weeks each year.

(2 CY/week * 13 winter weeks/year) + (3 CY/week * 39 regular weeks/year) = 143 CY per year

Recyclemania, a national collegiate recycling competition operated by Keep America Beautiful, provides several volume-to-weight conversion factors,[17] one of which is most relevant to the PID recycling containers: 200 pounds per CY for commingled containers (glass, metal, and plastic bottles and cans).[18]

143 CY of recyclables/year * 200 pounds/CY = 28,600 pounds per year

This would presume that the material placed in the recycling containers was all recyclable, which would be erroneous. However, even if the material in the recycling bins was 65 percent contaminated (residue), there would still be 10,000 pounds of recyclables to be sorted out at the MRF, and the goal of the Recycle on the Go program would be achieved. Therefore, it is likely that the 10,000 pound goal is met; however,

[17] http://www.recyclemaniacs.org/sites/default/files/documents/Volume-weight-conversions.pdf

[18] The Downtown Fort Worth recycling bins are designated for bottle and can recycling, and these are the materials most likely recycled by people on the go.

better information is required. The provision of weight tickets for the 3CY recycling container, for example, could provide such information. In addition, the dual-stream recycling containers are still outnumbered almost 2.5 to 1 by trash-only containers, meaning tens of thousands of additional pounds that could be recycled are being lost to landfill disposal each year in the Downtown PID.

Several public parks in Fort Worth have recycling containers installed for the use of visitors. Prominent among them is the Fort Worth Botanic Garden. There are more than 290 facilities operated by the Parks and Recreation Department, including 179 neighborhood parks, 20 community centers, 5 golf courses, 3 aquatics centers, 2 athletic centers, and 1 fishing lake. Every park has at least two recycling bins on site for visitors to use. An estimated 40 percent of the garbage cans in the parks have accompanying recycling bins.[19]

3.2 Special Event Collection

Program Description

Fort Worth has many public events and parades throughout the year. Attendance ranges from 2,500 at Prairie Fest to over 1 million for the Fort Worth Stock Show. The Texas Motor Speedway, with a capacity of over 181,000 people, is host to three NASCAR Series, an Indy Car Series, and various other races, events, and concerts. NASCAR has worked with partners such as Coca-Cola and Miller Coors to provide recycling at some of its events.[20] There are potentially millions of glass, plastic, and metal beverage containers generated at these facilities which could be diverted from landfill each year.

Waste collection service at special events is provided by one of several private haulers, and the presence of recycling containers also varies. Some of the events, like the Stock Show and NASCAR, have reported on the amount of recyclables they have collected, but others have not. Essentially, recycling at public events is at the discretion of the event organizers and the waste hauler servicing the events. For example, Ordinance No. 19255-08-2010 regarding Outdoor Events states that "Recycling at Events is strongly encouraged, but is not mandatory."[21] There is no mention of recycling in the permit guidelines for Neighborhood Events and Parades, although permit holders are responsible for "collection and disposal of all trash."[22]

Organizations and individuals can borrow recycling bins from the Parks and Recreation Department using an online form, located at http://fortworthtexas.gov/parks/eventrecycling/. The bins are free to borrow and easy to use, and are of the type shown in Figure 3-1. Borrowers may have as many bins as they need, and can bring the material they collect to the North District Service Center on Brennan Ave., along with returning the bins there. There is a $55 charge for any bins damaged or not returned. In the first three quarters of FY16, eleven organizations borrowed a combined total of 126 recycling bins.

Figure 3-1 Example of Recycling Bin Available to Borrow from the Parks Department

[19] Estimate provided by Parks and Recreation Department District Superintendent, July 1, 2016.
[20] http://green.nascar.com/partners
[21] Sec. 20-422. Additional Permits Required.
[22] http://fortworthtexas.gov/uploadedFiles/Public_Events/Outdoor_Events/NeighborhoodEvents.pdf?update=110720

Current Goals and Standards

There were no goals or aspirations for away-from-home recycling in the current 1995-2015 Plan. The FY14-15 budget document stated a goal to divert from landfill disposal 90,000 pounds of recyclables at special events in 2015. The goal for 2014 was 20,000 pounds.

Best practices for supporting event recycling programs include connecting provision of recycling to the event permit; supporting the recycling efforts with messaging, containers, service, or programmatic support; and, promoting recycling as a service that City Residents should expect when they are enjoying local events.

Best practices for implementing temporary event recycling operations are to some degree similar to those for permanent public space recycling, and include many of the same elements. This knowledge and information could be provided by the City to the event operators in the form of programmatic support:

- Messaging about recycling at both the point of purchase (such as food vendors) and at the point of discard (i.e., waste management containers or areas), and along the way;
- Prohibiting vendors from selling containers or packaging that will contaminate the recycling stream or confuse attendees;
- Pairing recycling receptacles with all waste receptacles;
- Utilizing recycling receptacles that are easy for attendees to recognize and use; and,
- Ensuring that on-site sanitation staff properly segregate recycling from garbage all the way from the receptacles to the collection points, and that the recyclable materials are properly routed from the event site to a MRF.

Program Evaluation

City staff provided data estimating that 90,432 pounds of recyclables were collected at various events in 2014, and that the 2014 objective was met. For the period October 2014 to September 2015, special event recycling was estimated at 95,502 pounds, and the 2015 objective was met.

3.3 Litter Abatement and Illegal Dump Clean-ups

Program Description

The City operates a significant program to clean up litter and illegal dumps. Sites in need of clean up are identified by Code Compliance officers, citizen calls, or the litter abatement crews themselves in the course of their work. A work order is created, and all orders are collected within five days, at which point a supervisor closes the order. Work is done during a regular daytime schedule, unless there is an emergency situation or a special event.

In FY14-15, the program collected 4,927 tons of material, up from 2,971 tons in FY12-13. The budget for FY14-15 for this activity was $1,340,846.57, or $272.14 per ton. The majority of these costs are for labor, equipment, and fuel to collect the materials, as disposal is generally only $15 to $18 per ton.

In addition to cleaning up, the City strongly supports Keep Fort Worth Beautiful (KFWB), an affiliate of Keep America Beautiful. A City staff person serves as the coordinator of KFWB.

Current Goals and Standards

The FY14-15 budget document stated an objective to collect 90 percent of all work orders within 5 days of receipt.

The current 1995-2015 Plan placed a high priority on continuing the City programs of litter abatement and illegal dump prevention and clean-up. It states that all services related to such should be maintained, and recommends two strategies to cut down on illegal dumping in the first place: making access to proper disposal more convenient, and increasing enforcement and prosecution efforts towards those who dump illegally.

The aim of Keep America Beautiful and its affiliates is to bring people together to make public spaces into beautiful places. In the past, efforts focused primarily on beautification and litter clean-ups; however, its mission has evolved in recent years to engage individuals to take responsibility for their community's environment. This mission adjustment included acquisition by KAB of the America Recycles Day intellectual property, and promotion of the criticality of recycling systems to environmental quality and quality public space.

Program Evaluation

The illegal dump cleanup program's goals were to maintain service levels, which it has done. All programs remain intact, with full-time and wide-ranging activity to clean up illegal dumps and litter. As of April 2015, 98 percent of incoming work orders are cleared within 3 days, exceeding the goal.

The cost per ton to collect this material is many times greater than operational costs to collect waste properly from homes and businesses, and is heavily driven by the transportation and vehicle costs. In FY14-15, costs associated with vehicles and fuel (not including any purchase of new vehicles) was more than $238,000, or about 15 percent, of the operational budget. Like many programs, the single largest cost center was staffing salary, wages, and benefits. For FY14-15, this was over $850,000, or more than 51 percent, of the program budget.

Keep Fort Worth Beautiful is a premier KAB affiliate. The keystone event, the Great American Cowtown Cleanup, engages over 5,000 residents of Fort Worth annually. The chapter has been distinguished many times for its excellence, including Gold Star status from Keep Texas Beautiful, President's Circle by KAB, Community Achievement Awards from the Texas Governor, and other recognitions.

3.4 Dead Animal Management

Program Description

As part of the City of Fort Worth Code Compliance Department, the Solid Waste Services Division is responsible for removal of properly prepared dead animals from residences. Article IV of Chapter 6 of the City Code governs this collection. The Division collects smaller animals from City streets or from private property that have been placed at the curb. Residents can call in for a pick-up, and people can also call in dead animals on public or business property. The carcasses are handled as a special waste at the landfill per Texas law.

The City provides this service, in part, because ordinances require that animals can only be buried at a pet cemetery or licensed landfill. Unlike in some other communities, they cannot be buried on a person's property. For larger animals, such as livestock, residents are directed to contact a rendering company to dispose of large animals.

Tonnage collected was steady FY03-04 through FY07-08; however, as shown in Figure 3-2, the tonnage has dropped by approximately 40 percent from FY07-08 to FY12-13. Tonnage always fluctuates due to natural animal population changes and dependent on how many large animals are collected; however, this precipitous drop is primarily attributable to a program change. Previously, animals were collected, (for a fee) from veterinary locations, but customers have not been calling for service.

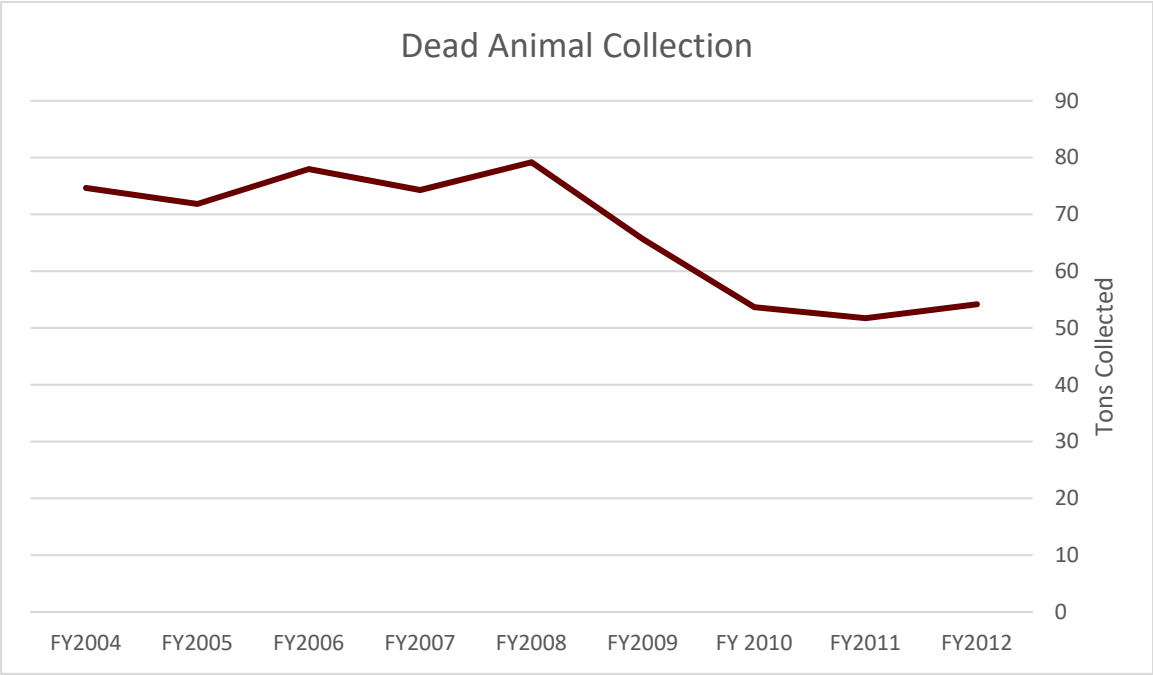


Figure 3-2 Tons Collected, Dead Animal Cleanup

The budgetary expenditures for the dead animal removal operation—shown for the past three years below—are primarily for salary and wages, and benefits. The next largest line item is vehicle fuel, followed by safety equipment. Table 3-1 shows recent expenditures and budget figures for this activity. The annual expenditures remain relatively stable while tons collected have decreased. The cause for this per-ton

increase in costs is not readily apparent but is likely affected by many uncontrollable factors such as fuel costs, climate, public interest in the matter, and animal population patterns.

Table 3-1 Recent Budget Figures for Dead Animal Clean-up

FY 2012-13 Unaudited Actual	FY 2013-14 Adopted	FY 2014-15 Actual
$206,219	$216,386	$232,637

City ordinances do provide for collection of fines for improperly handling animal carcasses, up to $2,000, and for collection of a fee for collection of animals from business property; however, such monies would be deposited into the General Fund and would not directly benefit the animal collection program. This program operates as a necessary public service.

Current Goals and Standards

The FY14-15 budget document states an objective for 100 percent of incoming dead animal work orders to be completed within 48 hours of receipt.

The other primary standards of evaluating this program lie in the current 1995-2015 Plan, which called for the City to continue removal of dead animals from the public right-of-way, identifying the effort as "necessary," and noting that the Committee that evaluated the priority of this program ranked it as of the highest importance.

Program Evaluation

As of April 2015, 99.3 percent of all work orders are cleared within 24 hours; a report for FY14-15 shows that 94 percent are cleared in that time frame. These both exceed the stated goal. A 2011 media report also cites a City source as saying work orders are usually completed within 24 hours.[23] Considering that the primary objective of this program is to exist and be responsive, and in the absence of any customer service evaluation, it can be said to currently fulfill its charge satisfactorily.

3.5 C&D Processing

Program Description

C&D waste associated with structures may be processed separately from other recyclables in a specialized materials recovery facility (MRF) designed for this purpose. A C&D MRF may be a stand-alone processing facility, or may be as simple as a controlled salvage/diversion operation at a landfill. Alternatively, C&D waste may be separated at the construction or demolition site into components that are marketable. This activity typically takes the form of placing several roll-off or similar containers at the job site, each dedicated to a certain type of marketable waste material, then marketing to various brokers, mills or end users. Recycling pavement materials such as asphalt and concrete is possibly the most common form of C&D recycling. This is typically initiated on a project-by-project basis based on market conditions for new and reclaimed paving materials. Asphalt is typically reprocessed into new paving material. Concrete and rock rubble are typically crushed and graded to meet specifications for use in roadway construction, bank stabilization, or other uses. Metals are highly marketable when properly segregated to meet market specifications. Asphalt shingles may be reprocessed into recycled asphalt shingles or into paving materials

[23] "Advice on what to do when a dog or cat dies suddenly," posted May 27, 2011 on the "Mom2MomDFW" blog, part of the Fort Worth Star-Telegram network. http://www.star-telegram.com/living/family/moms/article3827833.html

for use in pavement repairs. Glass from C&D activities may be recycled but markets are quite demanding. Markets for color-separated glass for use in terrazzo-like flooring and counter tops are emerging.

The City of Fort Worth does not own or operate a C&D MRF and there are no C&D MRFs in the area immediately in and around Fort Worth. However, numerous processors of materials that might be recovered from C&D activities are located in the area. These include scrap metal dealers, concrete crushers, shingle re-processors, asphalt re-processors, among others. These facilities are entirely market driven. It is difficult to determine the market capacity of these private operations.

Current Goals and Standards

Cities across Texas, including Austin, Dallas, Denton, El Paso, Flower Mound, Houston, McKinney and Plano have adopted some form of sustainable building/development standard, which incentivizes construction and demolition industries to avoid landfilling C&D waste. Often, these standards encourage waste reduction, reuse, and recycling of all wastes associated with the built environment. Examples include Leadership in Energy and Environmental Design (LEED) certification through the US Green Building Council, Envision certification of public works projects through the Institute for Sustainable Infrastructure, or custom-designed programs developed to meet specific local objectives. These programs not only reduce landfilling of C&D wastes, but they also indirectly support the development infrastructure such as independent processors of this waste stream.

Program Evaluation

The City of Fort Worth has no program designed specifically to require diversion of C&D wastes from landfills, thus supporting markets for new C&D waste processors. The City's Sustainability Plan finalized in 2010 does recommend promoting LEED certification of new buildings. However, there is no mandated certification addressing waste reduction or landfill diversion of C&D waste in place at this time. Such activities are voluntary for private and public development in the City.

3.6 E-Waste/Specialty/Hard-to-Handle Waste

Program Description

Specialty and hard-to-handle waste falls into several categories:

1. Electronic Waste (E-Waste)
2. Medical Waste (not Pharmaceutical)
3. Fireworks and Ammunition

E-Waste

To dispose of E-Waste, citizens are encouraged to:

- Visit the TCEQ website for recycling options offered by computer and television manufacturers. All computer and television manufacturers are required to offer recycling options for the equipment they produce.
- Conduct an Internet search for companies that are accepting and in some cases offering rebates for electronic items such as MP3 players, wireless phones, electronic camcorders etc. Some stores—such as Best Buy and Costco—sometimes offer trade-in programs for computers, monitors, digital cameras, camcorders, game systems and other gadgets. The City lists several websites that offer information on how to dispose of specialty E-Waste items, including the Texas

Recycles Computers Program (www.texasrecyclescomputers.com) and the Texas Recycles TVs Program (www.texasrecyclestvs.com).
- Take unwanted electronics to one of the City of Fort Worth's drop-off stations for recycling.

The drop-off stations will accept computer equipment, many other electronic items and up to two televisions per Fort Worth household every six months. These items will then be recycled or repurposed with an appropriate vendor.

Medical Waste

To dispose of medical waste, citizens are encouraged to:

- Sharps (needles, syringes, lancets)
  - Before throwing away sharps in a garbage receptacle, place them in a sharps disposal container or hard plastic/metal with a tightly-secured lid (detergent bottles with screw-on lids or a coffee can). When possible, break off syringe needles to prevent reuse.
- General Medical Waste
  - Place IV bags, plastic tubing and similar medical equipment in plastic garbage bags and throw them away in garbage receptacle. These items are not recyclable, whether they have been used or not.

Fireworks and Ammunition

Fireworks are illegal in the City of Fort Worth. By ordinance (Section 3301.1.3) the possession, manufacture, storage, sale, handling and use of fireworks are prohibited. Wildfires, structure fires and personal injury are common results of illegal fireworks use. City of Fort Worth residents are directed to follow these recommendations:

- Contact the Fire Department at 817-392-6850 or FWFire@fortworthtexas.gov to schedule a drop off or arrange a pick-up of unwanted ammunition, ammunition loading supplies, and other explosives.
- Do not put fireworks or ammunition in garbage or recycling bins.
- Do not take fireworks or ammunition to the Environmental Collection Center or a Fort Worth Solid Waste Drop-off Station for disposal.

Current Goals and Standards

The FY14-15 budget document states no objective for e-waste, medical waste, or fireworks and ammunition management. The current 1995-2015 Plan also does not contain goals or standards for the management of these materials.

The North Central Texas Council of Governments (NCTCOG) noted in its SEE Less Trash Plan that emphasis in the region during the 1995-2011 period had been to increase the development of permanent collection facilities along with the use of mobile collection units in the more populated areas of the region. The City of Fort Worth followed this trend, and has developed both the permanent Environmental Collection Center (ECC) and the mobile collection units.

Program Evaluation

As greater quantities of special wastes are being diverted from landfills and water system, the special waste diversion program meets a baseline measure of success. However, as the City has no specifically established goals for expanding these programs, there is no current official benchmark against which to

compare, other than the constant expansion of the program and additional tons of materials diverted (and number of events held) every year. Now that these programs are established, and agreements are in place to extend access to special waste disposal and recycling services to residents in other communities in Tarrant County, a goal should be established for expansion of the program, whether by expansion of education (number of households reached per year with pertinent information) or tons diverted (by model or measure).

3.7 HHW and pharmaceuticals

Program Description

The City of Fort Worth, with TCEQ grant and City funding, has a permanent household hazardous waste (HHW) collection facility on three acres east of downtown near the intersection of I-30 and East Loop 820. It is open Thursdays and Fridays from 11 a.m.-7 p.m. and Saturdays: 9 a.m.-3 p.m. The phone number is 817-392-1234, and it is closed January 1, July 4, Thanksgiving Day and the day after, and December 25. This facility, known as the Environmental Collection Center (ECC), collects HHW from residents throughout Tarrant County and beyond through contracts with over 50 local jurisdictions. The facility also offers products for reuse, through a "give-and-take" area called the "Help Yourself Shelf." Fort Worth also works with two other groups of cities in Tarrant County to implement three HHW Mobile Collection Units (MCUs) that can be loaned out to participating cities throughout the year to be used as one-day drop-off centers throughout the ECC service area.

The ECC is for residential waste disposal and recycling only. Commercial, business or industrial waste cannot be accepted under Texas regulations. Residents of apartments and condos are also not allowed. The inter-local agreements allow participating communities to use the ECC, schedule events where a MCU is present, and have HHW collected at mobile collection events disposed of under the City's contract for disposal. In order to participate in the City's program, communities' signatory to the inter-local agreement must commit to also providing certain resources and funds toward collection of HHW and other waste materials during collection events.

Residents of the following municipal entities can access the ECC: 23 can do so without purchasing disposal vouchers, and residents of the other 29 (*denoted in the list below) are required to first purchase vouchers from their municipalities. Proof of residence (current water bill or valid driver's license) or presentation of a voucher is required to use the ECC.

Arlington
Azle
Bedford*
Benbrook
Burleson
Cedar Hill
Cleburne
Colleyville
Crowley*
Dalworthington Gardens*
Decatur*
Euless
Forest Hill*
Fort Worth
Glenn Heights*
Godley
Grand Prairie
Grapevine
Haltom City
Haslet*
Hood County*
Hurst
Johnson County*
Joshua*
Keller
Kennedale*
Lake Worth*
Lakeside*
Mansfield
Midlothian*
North Richland Hills*
Oak Leaf*
Pantego*
Parker County*
Richland Hills
River Oaks Roanoke*
Saginaw
Sherman
Southlake
Stephenville*
Tarrant Regional Water District (TRWD)

Trophy Club
Unincorporated Tarrant County*
Upper Trinity Regional Water District*
Watauga*
Waxahachie*
Weatherford*
Westlake*
Westover Hills*
Westworth Village*
White Settlement*

Of the citizens with access, approximately 6 to 7 percent of residents are presently using the Environmental Collection Center.

When residents come to the facility, they are instructed to bring products in original, clearly labeled containers, not in garbage bags. If any materials are leaking, residents need to place them in a second container of a like material (glass for corrosives, metal for flammables). All residents are instructed to place materials in the trunk of their car or bed of a truck, and to remain in the vehicle while the staff at the facility unloads material. There is an area of the facility that is accessible to residents, and it houses the Help-Yourself Shelf (See Figure 3-3), where chemicals, cleaners, and paint in like new condition are offered free of charge.

Figure 3-3 Images of HHW Services –Help Yourself Shelf

In an effort to publicize the availability of this collection facility, the City uses characters called "Captain Crud and the Cruddies" as part of a public awareness campaign highlighting the collection capabilities at the permanent center, and with the mobile collection units known as Crud Cruisers (see Figure 3-4).

Figure 3-4 Images of HHW Services –The Crud Cruiser

Participating cities can schedule one mobile collection event to be operated by Fort Worth personnel each year, or can conduct their own events using their own MCUs. The City has a Reserve MCU, which is a specially designed and equipped thirty-six (36) foot gooseneck box-trailer and one (1) ton pickup owned by Fort Worth. Any participating city may request the loan of Fort Worth's Reserve MCU free of charge for use in a HHW collection event. Fort Worth's MCUs are designed to hold the HHW of approximately 50 to 75 households. HHW from all mobile collection events is brought to the ECC, and is managed by the City of Fort Worth under contracts for disposal and recycling of HHW.

The ECC and mobile events allow residents to dispose or recycle many items, as shown in Figure 3-5.

Items Accepted	Items Not Accepted
•Automotive fluids •Batteries •Cleaners & chemicals •Cooking oil •Lawn/garden/pool chemicals •Light bulbs •Paint & painting Supplies	•Ammunition & Explosives •Appliances & electronics •Building materials •Bulk trash & yard waste •Butane/propane cylinders •Medicines & Medical waste •Tires •Asbestos/PCBs/radioactive

Figure 3-5 Items Accepted and Not Accepted at the Environmental Collection Center

The City also suggests several options other than flushing (which is not recommended) for the disposal of expired, unused and unwanted over-the-counter and prescription (controlled and non-controlled) pharmaceuticals, as shown in Figure 3-6. These options are in order of preference.

Periodic Take-Back Events	Citizens can drop off unused and expired prescription drugs and over-the-counter medications at one of the take-back events sponsored by the Department of Justice.	Locations vary
Pharmacy Drug Take Back Programs	Certain pharmacies offer a mail-in system through which residents can safely dispose of unwanted medications.	Locations vary University of North Texas offers a drop-off
Trash	Only if citizens are unable to participate in any of the above mentioned programs, they may follow these steps to dispose of medication in the household trash.	Mix medicines (do not crush tablets or open capsules) with an unpalatable substance such as coffee grounds, cat litter or cottage cheese. Place the mixture in a sealed container or plastic bag. Throw the container in the appropriate trash bin.

Figure 3-6 Recommended Actions for Fort Worth Regarding Pharmaceuticals

Current Goals and Standards

Fort Worth's current 1995-2015 Plan noted that the City's state approved Storm Water Pollution Prevention Plan called for the construction and operation of a permanent collection center. The 1995-2015 Plan also established the goal that residents of apartments should have the same access to household hazardous waste collection centers that are available to residents of single family household.

The Plan noted that apartment owners should encourage residents to use available facilities for HHW, as opposed to using disposal containers provided at the complexes.

The City is not required by its current 1995-2015 Plan to achieve a specific rate of resident participation.

Program Evaluation

The City has fulfilled the goal of creating a permanent collection center with the development of the ECC. However, the City has only partially fulfilled the goal of providing equal access for apartment residents because while they can utilize the mobile collection events, they are not allowed to use the ECC because it is paid for out of the residential collection fees, which they do not pay.

30 TAC §332.61 (c) states "any person who intends to conduct a collection event or intends to operate a permanent collection center shall comply with the requirements of Chapter 335, Subchapter N relating to Household Materials Which Could Be Classified as Hazardous Waste." 30 TAC §335.62(a) addresses the need of the applicant to demonstrate reasonable access to HHW collection using either of two options. In Option 1, the applicant demonstrates access to the collection of HHW based upon population. Figure 3-7 shows a breakdown of services required based on population.

Figure 3-7 HHW Collection Requirements based on Service Area Population[24]

Permanent Facility access hours must be outside of regular business hours. "Business Hours" means 8:00 a.m. to 5:00 p.m., Monday through Friday. Mobile collection events must be held with a minimum six-hour continuous period of access outside of regular business hours.

The City's population puts it into the 500,000 – 1,000,000 category, though with the 17 participating communities, the population of the region exceeds 1,000,000. The ECC is open for over 1,100 hours per year (over 500 of which are outside of Business Hours), and holds over 60 mobile collection events per year, so exceeds the 30 TAC requirements for service. However, the mobile collection events are two-hours long, short of the 30 TAC six-hour requirement.

[24] 30 TAC §332.62(a)(1)

4 Solid Waste Management Facilities

4.1 Alternative Energy & Emission Standards

Program Description

The efficient use of energy is key to keeping solid waste management costs reasonable, as well as meeting the City's sustainable goals for energy conservation. The collection, processing and disposal of MSW requires fuel to power collection vehicles and landfill compactors and to power processing equipment. In addition to using energy efficiently, there are opportunities in solid waste management to both utilize alternative energy resources and to use waste to generate energy in a variety of forms. Some of these options include using compressed natural gas ("CNG") in collection fleets, capturing gas generated from landfills to produce electricity or pipeline quality natural gas, or combust or gasify MSW to generate electricity or steam.

The operation of the solid waste equipment also generates air emissions. The control of these emissions is especially important in the Fort Worth region, as the City is currently in a non-attainment area for ozone air pollution. Specifically, Tarrant County is in moderate non-attainment for the 8 hour, 0.075 ppm standard. Ground-level ozone is not emitted directly into the air, but is created by chemical reactions between nitrogen oxides (NOx) and volatile organic compounds (VOCs) in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, chemical solvents are some of the major sources of NOx and VOCs.

In addition to operating equipment, landfills generate emissions of methane gas as waste decomposes. The SELF is designed to capture these emissions. There is the potential to utilize this gas for energy generation, either as a replacement for natural gas or to be used for electric generation.

Collection

The City controls residential solid waste collection through contracts with Waste Management Inc. Currently, the City provides weekly collection of garbage, recyclables, yard waste and brush as well as monthly collection of large brush and bulk waste. The City also has an illegal dumping collection program. The City owns and operates the vehicles for the illegal dumping program. Republic Services Inc. ("Republic") is responsible for the transport of both recyclables and waste from the City's three drop-off stations. A fourth drop-off station is anticipated to be in operation in late 2016. Republic also provides collection of recyclables and garbage from City facilities at large.

On any given day, the City and its contractors will operate over 100 vehicles to collect waste, recyclables, yard waste and brush, bulk waste, illegal dumping collections and transport of materials from drop-off centers. These vehicles consume diesel fuel or compressed natural gas and generate emissions. Table 4-1 lists the number of routes for each service provided.

Table 4-1 Fort Worth Collection Program

Service	Households	Routes/Day
Garbage	207,691	38
Recyclables	207,691	30
Yard Waste	207,691	17
Bulk Waste	207,691	14
Total	207,691	99

Landfill Operations

The operation of the City's Southeast Landfill (SELF) is managed through a contract with Republic. Republic has the responsibility to maintain equipment necessary to manage waste and address all of the operational requirements as defined in the landfill's permit. Each of the pieces of equipment list below are operating at the SELF consume fuel and generate emissions.

- Two articulated dump trucks
- One excavator
- One motor grader
- Four garbage compactors
- Six track Dozers

The SELF has a gas collection system that collects the gas through a series of pipes that direct the gas to a flare and the gas is burned. Burning the landfill gas significantly reduces the amount of methane released to the atmosphere.

Another air emission associated with landfill operations is dust in the form of particulate matter. This is caused from heavy equipment operations. The landfill permit does include a dust control plan to reduce dust emissions. This is accomplished by paving high traffic roadways and using water on certain surfaces to reduce dust generation and other measures.

Current Goals and Standards

The City's 2015 Comprehensive Plan promotes the use of renewable energy resources (page 187) and emission reductions (page 175 and throughout Chapter 18, "Environmental Quality). A driving force in the need to reduce emissions is the fact that the Dallas/Fort Worth (DFW) region is currently in a non-attainment area for ozone as described above.

The City, in its Sustainability Plan is committed to reducing the generation of greenhouse gases.

The latest request for proposals issued by the Solid Waste Services Division stated goals of increasing resource recovery and extending the life of the landfill. The approved technology must be demonstrated to be cost-effective.

Program Evaluation

Alternative Energy

CNG

CNG as a transportation fuel is considered an alternative energy technology. Natural gas has traditionally been used for residential heating and commercial/industrial uses, however, it has increasingly been used to fuel vehicles, especially in fleet situations. Natural gas can be either compressed or liquefied to be used as a transportation fuel.

In an amendment to its 2013 contract with WMI, the City required WMI to convert its collection fleet, and those of its subcontractors to CNG. This conversion is to be completed by June 9, 2017. It should be noted

that the City's contract includes an escalation clause that takes into account both labor and diesel fuel price increases or decreases.

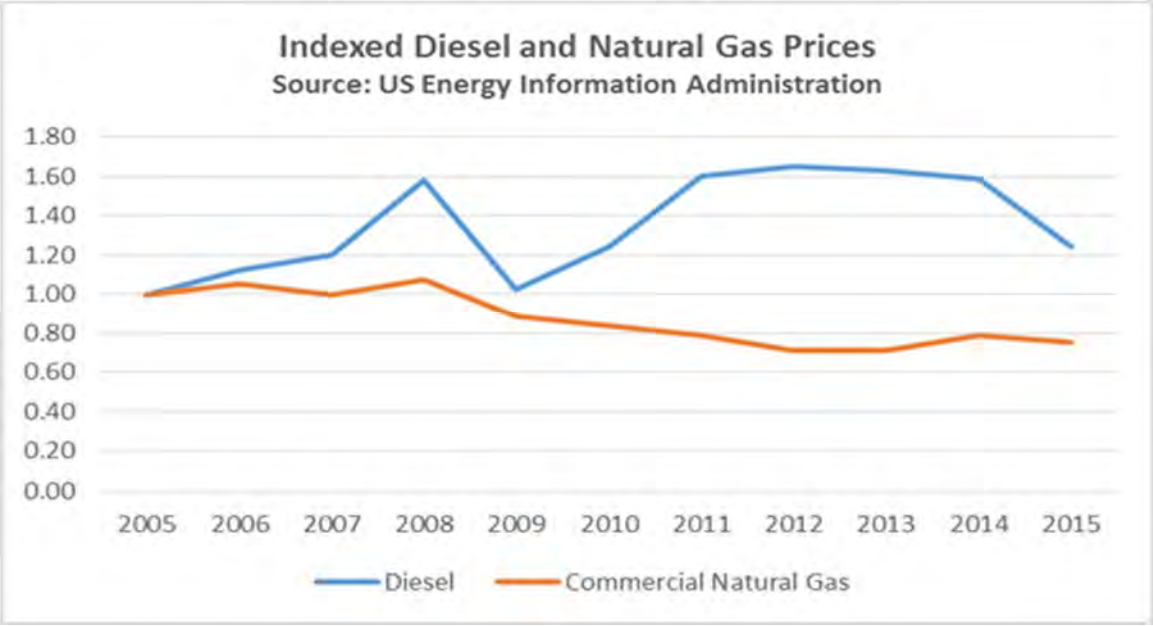


Figure 4-1 Diesel and Natural Gas Pricing

The conversion to CNG from diesel fuel has been occurring across the country as a means to reduce energy costs and vehicle emissions. There are capital costs involved in this transition and CNG vehicles cost more than conventional diesel collection vehicles, however energy savings are proving to generate pay-backs in 3 to 8 years. Figure 4-14-1 above illustrates that natural gas prices have steadily declined since 2005. While oil prices have fallen significantly in the past two years, energy cost savings can still be realized. In addition, the fact that the Tarrant County area is in non-attainment for ozone, the use of CNG vehicles is important to reduce emissions.

In a US Department of Energy Report – Case Study – Compressed Natural Gas Refuse Fleet (February 2014), the report concluded the following.

The fleets in this study chose CNG to save money on fuel (around 50 percent, on average), and to satisfy corporate or municipal environmental initiatives.

- Fleets in this study saved approximately $0.90 per mile in fuel costs by using CNG.
- The incremental cost of the CNG vehicles and fueling infrastructure can be recouped in 3–8 years.
- Driver feedback has been very positive: drivers appreciate the quieter operation of the trucks and noted the good acceleration performance.
- CNG trucks in this case study traveled around 14,500 miles per year on average and achieved fuel economy of 2.1 miles per diesel gallon equivalent.

Waste-to-Energy and Emerging Technologies

Technologies to convert waste-to-energy include the following:

- Converting landfill gas to energy by either converting the low-BTU gas to a high BTU gas
- Converting landfill gas to electricity by using it to power a generator

- Combusting MSW in a mass-burn incinerator with energy recovery
- Converting waste to refuse-derived fuel that can be used in a similar manner as coal
- Converting waste to gases or liquids through higher tech processes like gasification or pyrolysis

According to a recent Energy Information Agency Report there are 87 operating waste-to-energy facilities operating in the US, with a total generating capacity of 2500 megawatts. The majority of these facilities utilize either mass-burn or refuse derived fuel technologies. In general, these technologies are significantly capital intensive and have high operating costs. Total capital and operating costs for resource recovery facilities for energy recovery require a tipping fee ranging between $75 and $100 per ton (including energy revenues), versus landfills located in the NCTCOG region where tipping fees range between approximately $17 to $40 per ton (Fort Worth's contracted tipping fee is $17.37 per ton in CY15). None of the technologies to convert waste-to-energy listed above are being utilized at this time by the City.

More advanced alternative energy technologies involve the generation of either steam, electricity or combustion gases include: gasification, and pyrolysis. These technologies could generate more efficiently and generate fewer emissions. However, they are relatively untested technologies on a large-scale basis. Because of the high cost of construction, selection of these options should be done carefully and with a careful risk analysis as part of the overall process.

The EPA's Landfill and LFG Energy Project database, which tracks the development of U.S. LFG energy projects and landfills with project development potential, indicates that 636 LFG energy projects are currently operating in 48 states and 1 U.S. territory. Roughly three-quarters of these projects generate electricity, while one-quarter are direct-use projects where the LFG is used for its thermal capacity.

Bioreactor design or enhanced leachate recirculation (ELR) are landfill management approaches that are designed to accelerate the gas generation rate, thereby improving the economics of the operation. These processes are unlike traditional landfills, which operate in a manner to keep as much liquids out of the filled area. Bioreactors and ELR operations are designed to introduce liquids into the fill area as a means of accelerating decomposition of the waste, thereby accelerating the generation of landfill gas. This approach has the additional benefit of increasing the capacity of the landfill. Pilot demonstrations of this approach are taking place locally in Dallas and Denton, Texas.

However, the City is negotiating with Republic to develop a joint system to utilize landfill gas. The proposed system would convert the low-Btu gas to a high-Btu gas that meets commercial pipeline standards.

Solar Energy

The Old Hemphill Drop Off station is 100% powered by photovoltaic panel array on site. The soon to be built Drop Off station number 4 will also be solar powered.

The City's collection contract with WMI also stipulated that WMI agree to provide the City with a total of 125 solar powered garbage compactors. These were to be delivered at a rate of 25 compactors per year beginning on April 1, 2013. The City has the responsibility to maintain, repair or replace compactors once they are delivered to the City.

Emissions

Collection

As mentioned, the City, through its contract with WMI is converting the collection fleet from diesel fuel to CNG. The conversion of the collection fleet is anticipated to reduce greenhouse gases emissions from the collection trucks between 21-26 percent.[25]

Landfill

The City's SELF is in compliance with air emissions regulations. These regulations include the following.

- Standard air permit for MSW Landfill Facilities and Transfer Stations
- Landfill Gas Management Plan of the SELF Permit
- Dust Control Management per the Site Operating Plan of the SELF Permit

4.2 Disposal Capacity

Program Description

Providing for adequate waste disposal that is operationally safe, environmentally sound, and cost-efficient is a core function of an integrated solid waste management system and of the CSWMP.

Residential and commercial waste that cannot be recycled through either a MRF or a mulching/composting operation is disposed of at SELF. Commercial waste that is generated by the private sector is hauled to one of several regional landfills including SELF. SELF is owned by the City and operated by Republic Services, Inc., under a contract that expires December 31, 2033. The SELF permit was amended in 2010 to add additional capacity. The Landfill is located at 6288 Salt Road, Fort Worth. Figure 4-2 shows a recent aerial view of the site.

[25] *Clean Cities Niche Market Overview: Refuse Haulers*, U.S. Department of Energy, September 2011

Figure 4-2 Aerial View of SELF, January 2016

SELF is permitted to the City by the TCEQ. The permit requires that the City directly, or through its contractor, construct, operate, close and maintain post-closure care in accordance with both state and Federal MSW guidelines. Although some of the areas of the landfill's footprint are pre-RCRA Subtitle D, all new disposal cells of SELF are constructed with a composite liner that is designed to reduce the potential of groundwater contamination. SELF also has an overliner system for the vertical expansion areas that will lay on top of pre-Subtitle D disposal areas. A leachate collection system is incorporated into the design as a means of capturing water that filters through the waste. The landfill design also includes a gas collection system; however, the City is not yet collecting gas for commercial energy use. The City is in discussions with Republic to determine the feasibility of a landfill gas to energy project. Operations at the Landfill are designed to reduce potential nuisances, to protect the quality of water resources and to provide for safe operations. The permit defines the requirements for closing the Landfill once it has reached capacity, as well as post-closure care requirements for 30 years following closure.

Included in the agreement with Republic is a requirement for Republic to provide brush-mulching services. Source-separated brush material is delivered to the site by the curbside collection and drop off stations transportations trucks and processed into mulch. The contract expires December 31, 2018, with one 5-year extension option. In FY14-15, the City reports that 26,889.46 tons of brush were mulched at the SELF. That same year, SELF reported to TCEQ that 33,132.86 tons of "yard waste or brush" were diverted by the facility.

Figure 4-3 shows all the types of material that were accepted at the landfill in 2015, and that total intake was 637,034 tons.

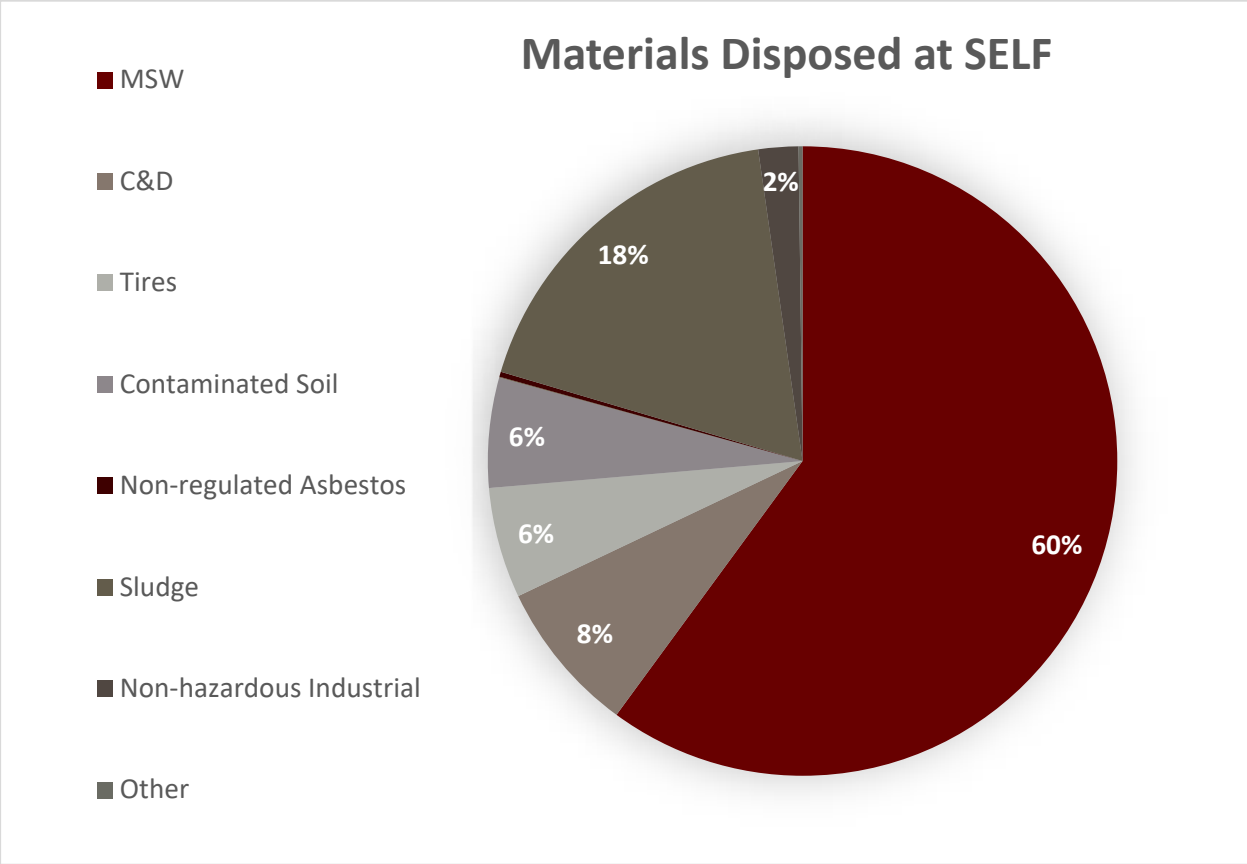


Figure 4-3 2015 Southeast Landfill Disposal, by material
Source: ***Municipal Solid Waste in Texas: A Year in Review – FY 2015 Data Summary and Analysis***

The City's contract with Republic also provides for a minimum annual rental payment from Republic to the City. In FY13-14, this payment was $3,174,967; in FY14-15, it was $3,087,474.[26] This could increase depending on the quantities of waste accepted at the Landfill. There are no limitations on the amount of waste Republic is allowed to dispose at the landfill, as long as they maintain efficient service to the City. Construction and demolition (C&D) waste generated in Fort Worth is disposed at either one of the several Type I landfills (MSW landfills), or the Type IV C&D landfills. There is one permitted Type IV Landfill in the area and it is owned and operated by Waste Connections. This C&D landfill is located on Dick Price Road. It currently accepts approximately 359,000 tons per year and has 20 years of remaining permitted capacity.

Table 4-2 summarizes the active landfills that are located within the region. Figure 4-4 shows the facilities on a map.

[26] FY13-14 figure is unaudited actual, FY14-15 figure is Budgeted

Table 4-2 Active Landfills in North Central Texas Region, 2014 – Source: TCEQ

Landfill	Owner	Operator	Location	Disposal Tons	Remaining Capacity (years)	Remaining capacity (tons)	County	Permt #
City of Fort Worth	**City of Fort Worth**	**Republic**	**Fort Worth**	**637,034**	**30**	**18,892,730**	Tarrant	**218C**
City of Arlington	City of Arlington	Republic	Arlington	971,614	46	44,606,653	Tarrant	358B
IESI Fort Worth C & D Landfill*	IESI	IESI	Fort Worth	380,511	6	2,235,258	Tarrant	1983C
Charles M Hinton Jr. Regional Landfill	City of Garland City	City of Garland	Rowlett	448,734	47	19,764,560	Dallas	1895A
of Dallas Mccommas Bluff Landfill	City of Dallas	City of Dallas	Dallas	1,707,182	44	74,201,362	Dallas	62
City of Grand Prairie Landfill	City of Grand Prairie	City of Grand Prairie	Grand Prairie	180,988	40	7,221,802	Dallas	996C
Waste Management Skyline Landfill	WMI of Texas	WMI of Texas	Ferris	1,161,354	30	20,894,285	Dallas	42D
Hunter Ferrell Landfill	City of Irving	City of Irving	Irving	162,236	65	10,475,464	Dallas	1394B
IESI Weatherford Landfill	IESI	IESI	Weatherford	192,385	5	1,046,562	Parker	47A
City of Stephenville Landfill	City of Stephenville	City of Stephenville	Stephenville	16,368	65	489,636	Stephenville	664
DFW Recycling and Disposal Facility	WMI of Texas	WMI of Texas	Lewisville	1,371,253	7	9,071,166	Denton	1025B
Camelot Landfill	City of Farmers Branch		Lewisville	256,710	16	4,374,172	Denton	1312B
City of Denton Landfill	City of Denton	City of Denton	Denton	231,990	22	5,177,349	Denton	1590A
Lewisville Landfill	Lewisville Landfill Tx LP	Lewisville Landfill Tx LP	Lewisville	216,331	78	16,953,657	Denton	1749B
Ellis County Landfill	Pine Hill Farms Landfill TX LP	Pine Hill Farms Landfill TX LP	Ennis	68,709	344	23,638,346	Ellis	1745B
CSC Disposal and Landfill	Republic Waste Services of Tx LTD	Republic Waste Services of Tx LTD	Avalon	365	365	15,838,139	Ellis	1209C
Itasca Landfill	Itasca Landfill Tx LP	Itasca Landfill Tx LP	Itasca	225,385	136	37,742,119	Hill	241D
IESI Turkey Creek Landfill	IESI	IESI	Alvarado	517,391	13	7,098,931	Johnson	1417B
121 Regional Disposal Facility	North Texas Municipal Water District	North Texas Municipal Water District	Melissa	876,665	81	70,709,670	Collin	2,294
Republic Maloy Landfill	Republic Waste Services of Tx LTD	Republic Waste Services of Tx LTD	Campbell	109,490	32	3,484,028	Hunt	1195A

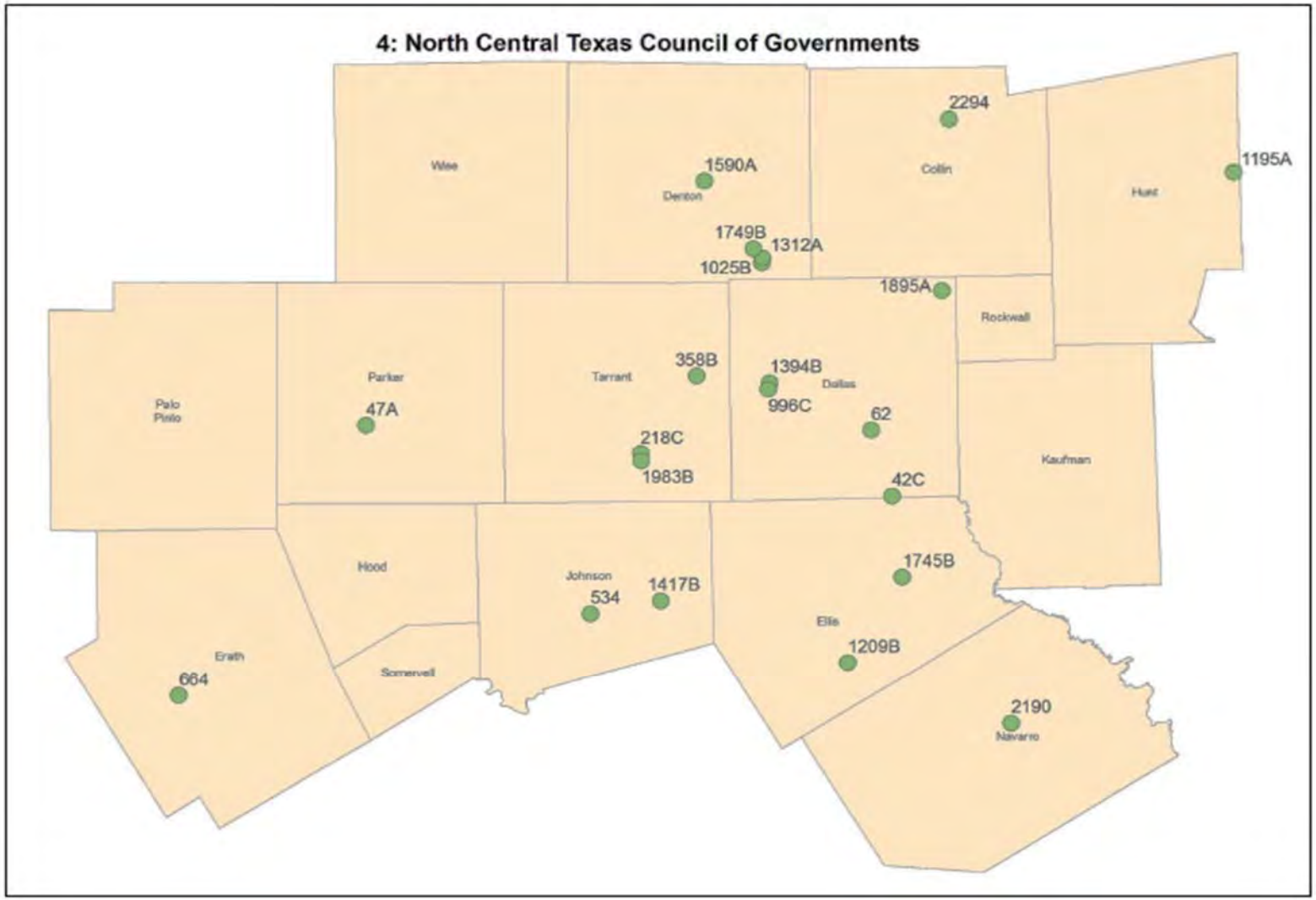


Figure 4-4 Map of Active Landfills in North Central Texas Region, 2014 – Source: TCEQ

Current Goals and Standards

The major criteria for the City's disposal program are fourfold:

1) Is the City's landfill operating in an environmentally acceptable manner?
2) Does the City have sufficient disposal capacity to meet long-term waste management needs?
3) Is the landfill operating efficiently?
4) Is the cost of disposal reasonable?

The landfill must comply with TCEQ regulatory requirements, as well as compliance with federal regulations. The permit that the City has for the landfill affects the design, construction, operation, closure and 30-year post-closure of the landfill. In addition to its ownership of the landfill and its desire to have it operated in an environmentally acceptable manner by a contractor, the City has both a disposal capacity and financial interest in the landfill. Republic's operating contract provides requirements that encourage Republic to operate the landfill in an efficient manner.

Program Evaluation

Providing for adequate waste disposal that is operationally safe, environmentally sound, and cost-efficient

The City conducts aerial surveys to validate and cross-check the estimates made using the TCEQ reporting data. Based on the 2016 annual aerial survey, which reports on usage in 2015, 1.1 million cubic yards of airspace was consumed since the previous survey. This is about 25 percent more capacity consumption than in the prior year, and more than double the capacity consumption occurring in 2011. The 2016 survey reported 24 million cubic yards of remaining airspace. The 2016 survey estimated that the landfill has approximately 22 years remaining capacity. Future capacity at the landfill will be impacted by the following:

- Increases in population and economic activity,
- Potential closure of landfills in the region and reliance on the SELF for waste disposal,
- Improved participation and expanded scope of source reduction and recycling programs, and
- Increased regional landfill capacity.

Taking these factors into consideration, it is projected that the SELF has an anticipated remaining capacity of 19 to 33 years (2036-2050). The lower estimate of 19 years assumes that waste volumes will grow at a rate of 1.7 % per year. The higher estimate of 33 years assumes that the tonnage disposed in SELF will be reduced to an average of 580,000 tons per year over the 33 year period.

Table 4-3 Waste Disposed, Airspace Used, and Remaining Capacity for Southeast Landfill
Source: City of Fort Worth Aerial Survey conducted on January 28, 2016, by Weaver Consulting, LLC

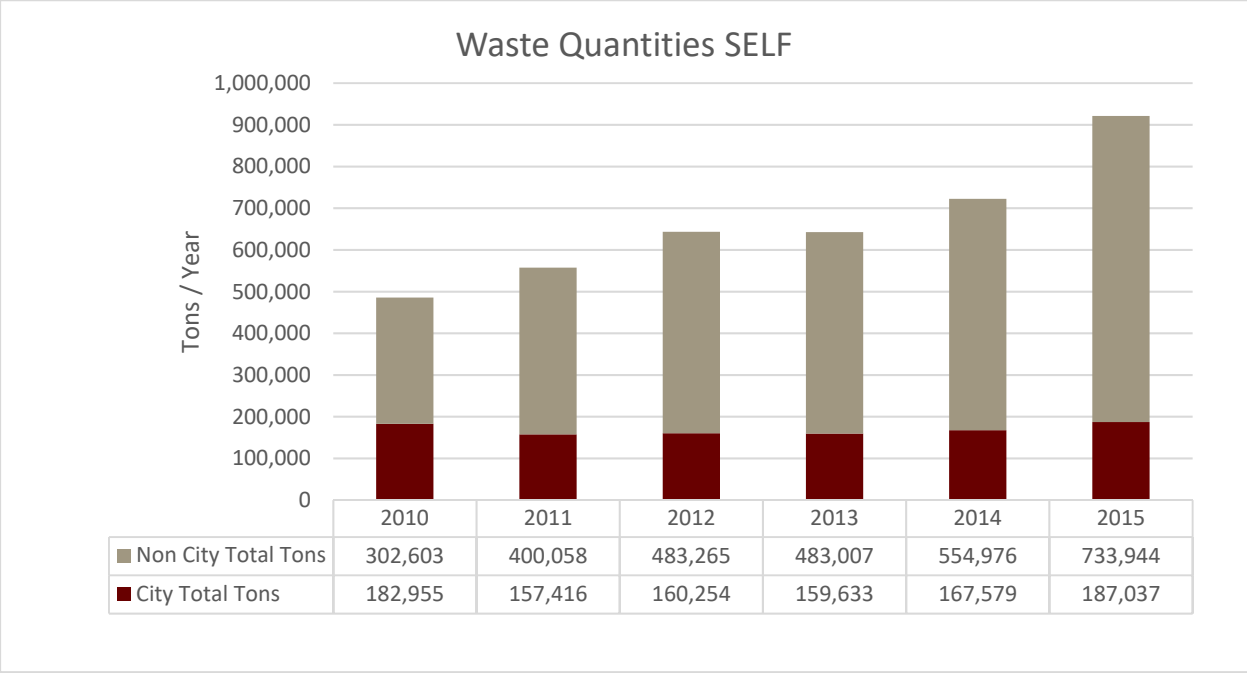
Year	Annual Tons Accepted	Annual Airspace Used (cubic yards)	Total Remaining Airspace (cubic yards)	Estimated Years of Remaining Capacity
2011	557,474	540,000	27,475,700	50.88
2012	643,519	731,000	26,935,700	36.85
2013	642,640	785,500	26,204,700	33.36
2014	722,555	880,200	25,419,200	28.88
2015	920,981	1,103,900	24,539,000	22.23

Factors Affecting Available Capacity

A critical question that must be answered in order to fulfill the mandate of the CSWMP remains: when will additional capacity be required for the City's waste stream?

Waste Volumes Accepted and Population and Economic Increases

Based on data provided by the City, waste volumes have increased significantly since 2010. Figure 4-5 illustrates waste volumes for City Waste and non-City Waste. City waste increased at an average annual rate of 10% and non-City Waste increased at an annual average rate of 15%. The total waste volumes increased at an annual average rate of 13 percent. From 2010, the amount of Non-City Waste has increased from 62% of the total landfilled to 71% of the quantities landfilled.



	2010	2011	2012	2013	2014	2015
Non City Total Tons	302,603	400,058	483,265	483,007	554,976	733,944
City Total Tons	182,955	157,416	160,254	159,633	167,579	187,037

Figure 4-5 Historical Waste Tonnages at SELF, City and Non-City Waste, 2010-2015
Source: City of Fort Worth

In the 2016 Aerial Survey, Weaver Boos reported that a total of 1-Million cubic yards of airspace was consumed during the year. The report indicated that Republic achieved a compaction rate of 1,647 pounds per cubic yard.

Market Practices by Republic and Private Haulers

The City allows private haulers, regardless of the location of waste generation to utilize SELF. The City receives royalties for waste accepted at the facility, and the greater amount of waste accepted, the greater the amount of royalties paid to the City. Hauler decisions on where to deliver waste are based on the distance that has to be traveled to a landfill, the tipping fees charged at the landfill, and company affiliation with the landfill utilized. There are a number of public and private landfills located throughout the North Central Texas region, as shown in Table 4-4.

Tipping Fees

TCEQ has data on tipping fees charged at facilities. Fort Worth is reporting tipping fees at the lower end of the average charged in the region. The reported SELF rate was $20.88 per ton versus the average North Central Texas Regional Council of Governments area rate of $30 per ton. Actual rates will vary considerably depending on the relationship between the landfill and the hauling company, long-term versus short-term contracts and other factors. Table 4-4, below, highlights the published tipping fees for 2015 for the selected regional landfills to which Fort Worth waste would most likely be delivered, if not to SELF. Gate rates, in general, are often much higher.

Table 4-4 Published Tipping Fees for Select Landfills (2015)
Source: TCEQ

Landfill	Rate
Fort Worth Landfill (City owned / Republic Operations)	$20.88
Arlington Landfill (City owned / Republic Operations)	$26.00
Waste Connections C&D Landfill (IESI owned and operated)	$23.12
Camelot Landfill (Farmers Branch owned / Republic Operations	$30.63
DFW Waste Management Landfill (WM owned and operated)	$23.50
City of Dallas (City owned and operated)	$21.50

**Based on reports to TCEQ, actual rates will vary depending on user and landfill contracts*

These relatively low tipping fees provide an incentive for private haulers to use SELF. There is an incentive for the City to allow for high quantities of disposal in the form of royalties, but greater quantities will result in the landfill reaching capacity sooner. A possible way to decrease tonnages going to the landfill would be to increase fees. Currently, Republic has the ability to set rates within the bounds of the contract between the City and Republic.

Regional Business Actions

The City of Arlington Landfill, which is owned by the City and operated by Republic, has an estimated 46 years of remaining capacity, according to TCEQ data. This is the same firm that operates SELF. These two landfills, in the same region and operated by the same firm, have had very different waste activity in recent years. From 2011 to 2015, waste volumes reported at Arlington show a 6 percent increase, while Fort Worth reported a 65 percent increase. There could be several reasons for this disparity, including contractual obligations to the City of Arlington; maximum landfill throughput capacity; or, other factors. Those possibilities notwithstanding, Republic is in a position to make business decisions which determine, in effect, which landfill is utilized for regional waste. This is relevant because it demonstrates that Republic's business decisions regarding waste disposal facility utilization will likely continue to impact SELF.

Waste Connections amended its permit in 2016. The permit amendment is described in Figure 4-6. Essentially, the permit amendment increased the capacity of the landfill by 6.3 million cubic yards. At current rates of disposal, this provides the landfill with capacity to the year 2037.

SUMMARY OF CURRENT PERMIT AND PROPOSED EXPANSION – IESI FT WORTH C&D LANDFILL

Item	Units	Current Condition (Permit 1983B)	Increase due to Expansion	New Condition (Permit 1983C)
Permit Boundary Area	acres	151.73	No Change	151.73
Waste Disposal Footprint Area	acres	77.7	No Change	77.7
Buffer/Other Area	acres	74.0	No Change	74.0
Buffer/Other Area as a Percentage of Permit Boundary	percent	48.8%	No Change	48.8%
Total Waste Disposal Capacity	cubic yards	12,056,000	6,368,000	18,424,000
Remaining Capacity as of 6/11/2014 (latest aerial flyover survey)	cubic yards	3,818,000	6,368,000	10,186,000
Projected Remaining Site Life (approx.) from the date of the aerial flyover survey	years	8	12.5	20.5
Maximum Elevation of Final Cover	ft, MSL	721.5	99.0	820.5
Elevation of Deepest Excavation	ft, MSL	550.0	No Change	550.0

Figure 4-6 Summary Table of Current Permit and Proposed Expansion, from Waste Connections Landfill Permit Application

For the purposes of the CSWMP, analysis of future landfill disposal capacity available to the City includes consideration of the impacts of a successful or unsuccessful permit amendment application by Waste Connections. `

Waste Reduction and Recycling

As previously described, the amount of waste that is recovered through residential recycling programs is approximately 23 percent. There is no available data on the amounts of commercial waste recycling that is currently being achieved. Aggressive reduction and recycling programs have demonstrated an ability to achieve rates of 40 percent or more, such as in Austin. To achieve these rates would require significant investments in recycling efforts. For the purposes of the CSWMP, analysis of future landfill disposal capacity needed by the City includes consideration of the following scenarios: no increase in the current recycling rate, and a 20 percentage-point increase in the current recycling rate.

Potential Disaster Events

The City's landfill may need to be used for the disposal of large quantities of waste that would be generated from a major natural or man-made disaster. These events include tornadoes, wind storms, ice storms and flooding. Each year, the City has to respond to weather related events, and these data are captured in the historic quantities of waste. No event has yet to have a significant impact on the landfill's disposal capacity. A large quantity of material can be processed and recycled, as in the mulching of wood debris. However, there is the potential that in the next few years the City could experience a major disaster event. The tornado events in Moore, OK, generated close to 4 million cubic yards of disaster debris. A 4 million cubic yard event would reduce existing capacity at SELF by approximately 16%.

Landfill Infrastructure Constraints

Waste increases are anticipated over the coming years due to increases in both population and economic activity. Evaluating scenarios that assume high rates of annual increases also requires a careful assessment of infrastructure that is necessary to deliver waste to the landfill, as well as available equipment and space to accept ever increasing amounts of waste. Infrastructure includes access roads to the landfill, scale facilities to weigh the waste, interior roads, and sufficient working face area to effectively manage large quantities of waste. In 2015, the landfill disposed of approximately 1 million cubic yards. This is equivalent to approximately 3,000 tons per day (assuming an in-place density of 1,650 pounds per cubic yard). Trucks of a variety of sizes use the landfill. For preliminary assessment, assume a mix of collection and transfer vehicles having an average of 8 tons per truck. This is equivalent to 360 trucks entering and leaving the facility per day (based on a six-day week). Based on data from the City, Wednesday has the greatest average number of trucks per day – 423 per day. Saturday has the least number at 125 trucks. The SELF is closed on Sunday. Additional data that will need to be evaluated for a more detailed feasibility analysis include: the City's landfill permit, throughput capacity of the SELF scales, and maximum area that could be utilized for working space.

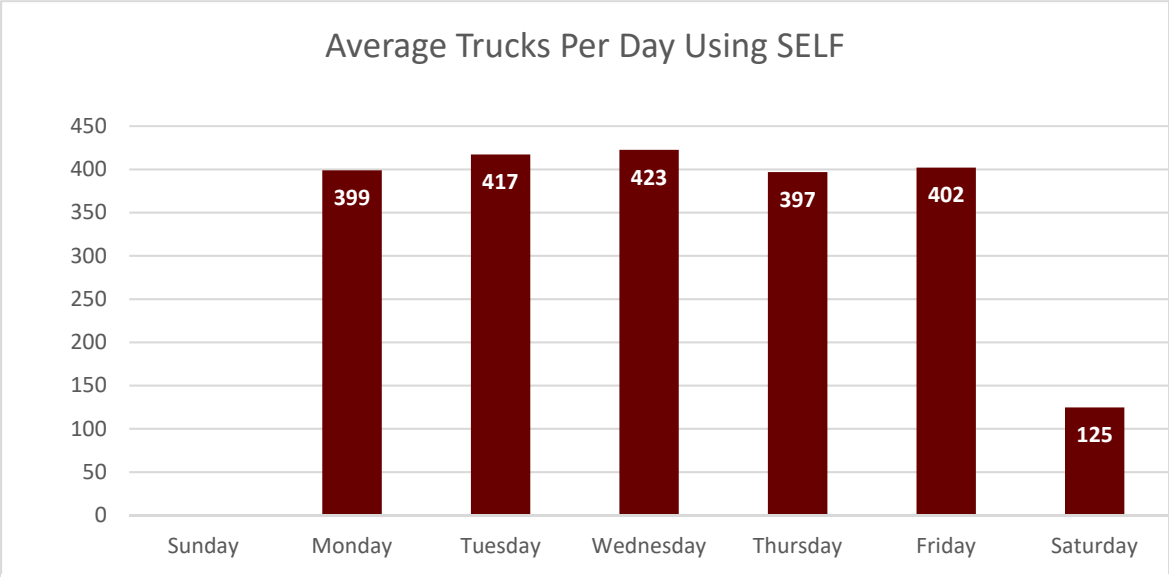


Figure 4-7 Truck Traffic at SELF, 2016
Source: City of Fort Worth

For comparison purposes regarding a landfill's ability to accept waste quantities, the McCommas Bluff Landfill accepts 1.8 million tons per year. This is the most waste accepted by any NCTCOG regional landfill. It is equivalent to approximately 5,800 tons per day. In 2009, the City of Dallas reported that this landfill was managing a total of 1 million tons per year, delivered by a total of 500 vehicles per day, an average of approximately 11 tons per vehicle. In the most aggressive projections for SELF—the highest average annual increase in tonnages—this would be the traffic situation at SELF by 2020.

Scenarios and Landfill Life Projections

4.3 Public Sector Facilities

Program Description

The following section describes solid waste facilities that are owned and/or operated by the City with the exception of SELF, discussed in the Disposal Capacity Section, above. The types of facilities that the City maintains include: drop-off stations and an equipment maintenance yard.

Drop-off Stations:

The City maintains three drop-off stations, shown in Figure 4-8 (next page), with one planned for operating in late 2016. A primary programmatic intention of the drop-off stations is to provide affordable and convenient disposal and discourage illegal dumping. Drop-off stations are located at the following locations.

Drop-off Station	Location
Brennan Drop-off Station	2400 Brennan Ave
Southeast Drop-off Station	5150 Martin Luther King Freeway
Old Hemphill Drop-off Station	6260 Old Hemphill Road
Hillshire Drop-off Station	301 Hillshire Drive

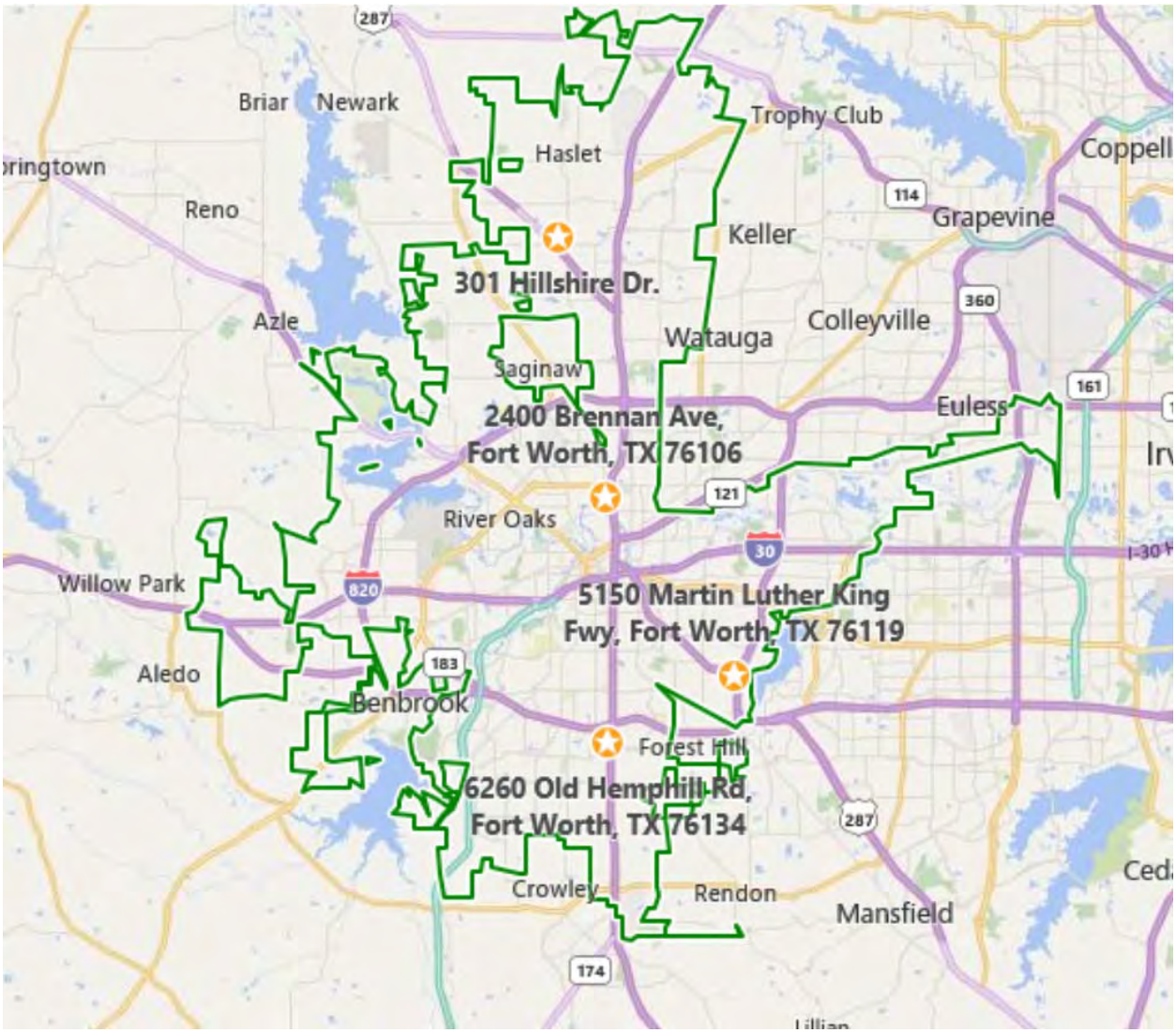


Figure 4-8 Listing and Map of Drop-off Station Locations

Drop-off Stations accept the following materials:

- Bagged garbage
- Recyclables (including scrap metal)
- Bulky items
- Brush
- Yard trimmings
- Tires (limit four per household every six months)
- Old furniture
- Minor remodeling debris (10 cubic yards per month)
- Appliances such as refrigerators and air conditioners that do/do not contain Freon® or other coolants
- Lawn maintenance equipment that does **not** contain gasoline or oil
- Electronics and computers (including televisions - limit two every six months)

An aerial view of the Brennan Drop-off Station is shown in Figure 4-9.

Figure 4-9 Brennan Drop-off Station

Fort Worth residents may pick up free mulch at any of the three (soon-to-be-four) drop-off stations. Mulch is generated from the yard trimming processing at SELF. Piles are clearly labeled, and are self-serve.

Swap Shops are setup at each Drop-off station to provide residents an opportunity to shop for free. Residents can bring reusable items such as bicycles, books, useable lumber and other construction materials, furniture, garden tools/equipment, exercise equipment, etc. to any Drop-off station for re-use by other residents.

Drop-off station staff will make final determination for acceptance into the Swap Shop. Although items can be dropped off and taken at no cost, residents are required to sign a liability waiver before utilizing the shop.

Drop off station staff are currently stockpiling scrap bicycles, fire extinguishers, propane cylinders, and reusable pallets into lots for periodic City surplus equipment auctions.

Environmental Collection Center (also see section 2.3.7 above)

The Environmental Collection Center (ECC) is open to Fort Worth residents and participating cities. The ECC is for residential household hazardous waste disposal and recycling only. Commercial, business or industrial hazardous waste cannot be accepted under Texas regulations.

Mobile collection for household hazardous wastes are held in Fort Worth and participating entities throughout the year.

Current Goals and Standards

The City's solid waste management program is designed to reduce the overall impacts of solid waste generation. To accomplish this, the City provides a range of services that make it convenient to properly dispose of municipal solid waste. A high level of convenience increases the opportunities for residents to recycle materials, especially those that are not served directly through the City's curbside program. These would include residents who live in apartments or condominium complexes.

The options available through the drop-off stations also reduces the amounts of illegal dumping that occurs. The City has made a major push to reduce the amount of illegal dumping.

Program Evaluation

A total of 30,340.84 tons of material was collected at the drop-off stations in FY14-15. This includes 26,511.95 tons of municipal solid waste, 3,828.88 tons diverted recyclables. Other materials collected at the drop-off stations include: 646.82 tons of scrap metal; 270.3 tons of scrap tires; and 452.35 tons of electronics. The enhanced availability of drop-off stations has helped reduce the amount of illegal dumping occurring in the City, as shown in Figure 4-10.

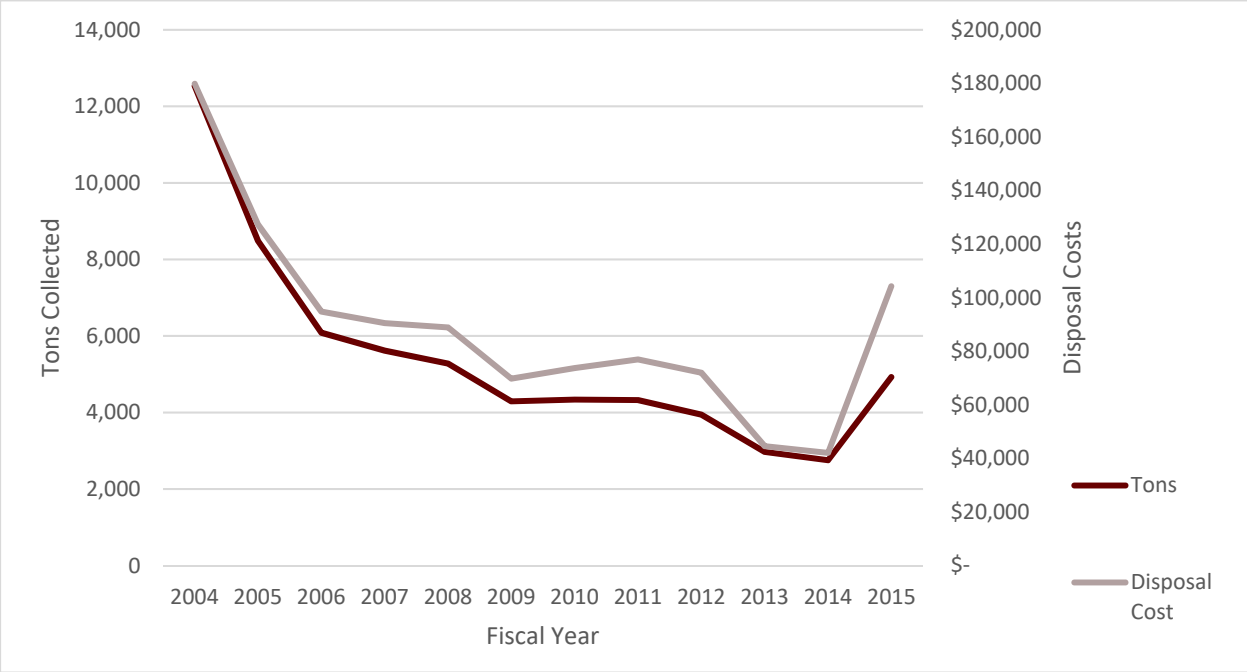


Figure 4-10 Illegal Dumping Cleanups – Tons and Disposal Costs

Combined with increased enforcement and greater public education, the disposal cost of illegal dumping clean-up has decreased from a high in 2004 of $179,862 per year to dispose of 12,534 tons of material to $42,078 in FY13-14 to dispose of 2,752 tons. This occurred even though the city population grew by 31% during the same period, and represented a four-fold reduction in both disposal costs and tons; however, in FY14-15, 4,927 tons were collected and disposed of at a cost of $104,259. Table 4-5 presents data on the continued decrease in illegal dumping from 2004 to 2014.

Table 4-5 Illegal Dumping

FY	Tons	Disposal Cost
2004	12,534	$179,862
2005	8,487	$127,305
2006	6,087	$94,835
2007	5,618	$90,505
2008	5,277	$88,917
2009	4,294	$69,777
2010	4,336	$73,712
2011	4,327	$76,977
2012	3,946	$71,975
2013	2,971	$44,565
2014	2,752	$42,078
2015*	3,508	$52,620

*In 2015, City IDC teams assisted WMI in cleaning up yard waste and bulky items after a storm. Drivers were directed to deliver that waste to the SELF, and not to the Waste Connections C&D Landfill where they usually take their IDC loads. The City suspects, however, that some of those storm clean-up loads were delivered to the Waste Connections landfill and were erroneously attributed to the IDC totals. Presumably, this is the primary factor for the 27.5 percent increase in IDC tons from FY14 to FY15.

4.4 Private Sector Facilities

Program Description

The private sector plays an important role in meeting the City's solid waste management needs. Services that are provided by the private sector in Fort Worth include the following.

- Curbside collection of solid waste, bulk waste, yard waste, and recyclables from single family homes under a contract with the City;
- Collection of solid waste and recyclables under individual contracts with businesses and institutions;
- Transportation of solid waste and recyclables from the City's drop-off stations to disposal/processing facilities;
- Brush mulching operations located at the City's landfill and other locations in the City;
- Operation of the City's landfill under contract with the City;
- Operation of material recovery facilities in the region to process materials recovered from curbside recycling and other recycling activities; and,
- Operation of other municipal solid waste landfills throughout the north central Texas region.

In addition to the eight private landfills that are located in the region (see Table 4-2, above), there are ten private recycling companies and six private mulching and composting operations. In addition, there are several for-profit businesses like thrift shops and resale stores and non-profit organizations like Goodwill and Salvation Army that provide recycling services.

Mulching and Composting Operations

There are seven mulching and composting operations in the area: LETCO; Silver Creek Materials (permitted composting); Mayer Material, Earth Haulers Inc.; Green Ground Composters; Thelin Recycling; and the Organic Recyclers of Texas. Of the seven, all but The Organic Recyclers of Texas and Earth Haulers are located within the city Limits of Fort Worth.

Recycling Facilities

Depending on the type of material, there are several businesses located throughout Tarrant County and the region that accept recycled materials. TimetoRecycle.com is a website designed for easy access to recycling programs available in the North Central Texas region. The goal of this web site is to increase awareness of the benefits of recycling and encourage all citizens in the region to participate in local recycling programs. This website was developed and is maintained by the NCTCOG in cooperation with the Regional Recycling Coordinators Roundtable. Table 4-6 shows a list of recycling facilities from the 2015 TCEQ Directory of Permitted & Registered Facilities.

Table 4-6 Recycling Facilities in Tarrant County

Recycling Facility	City	Paper	Cardboard	Metals	Glass	Plastics	Electronics	Other
American Scrap Metal	North Richland Hills			X				
Big City Crushed Concrete	Fort Worth & Arlington							x
CSI Arlington Recycling	Arlington	x	X			x		
Evergreen Paper Recycling	Fort Worth	x	X	X		x		
Foam Fabricators	Keller							x
Gachman Metals	Fort Worth			X				
Penn Tex Plastics	Fort Worth					x		
WM Recycle America DFW	Arlington	X	X	X	x	x		
Tree Hugger Recycling	Fort Worth	X		X			x	
Westex Iron & Metal	Fort Worth			X			x	x
Republic Services MRF	Fort Worth	X	X	X	x	x		x

Source: North Central Texas Council of Governments; Time to Recycle; March 2015

Transfer Stations

Transfer stations are facilities that are designed to reduce haul costs by transferring waste from collection vehicles to larger transfer vehicles. Generally, a ratio of 3 collection vehicles to 1 transfer vehicle can be achieved. These facilities allow for more efficient use of the collection vehicles and reduces the traffic to the landfill. The advantages have to be compared to the cost of constructing and operating the transfer

station. In the NCTCOG Region there are a total of 17 transfer stations;[27] four are located in Tarrant County. The Tarrant County transfer stations are listed in Table 4-7.

Table 4-7 Transfer Stations in Tarrant County[28]

Transfer Station	2015 Annual Tons
North Texas Recycling Complex, 6100 Elliott Reeder Rd, Fort Worth	27,453
Waste Connections/IESI Transfer Station, 2120 Minnis Drive, Haltom City	29,420
Southwest Paper Stock Inc., 2301 Hemphill St., Fort Worth	8,406
Westside Transfer Station, 12280 West Freeway, Aledo	139,193

Municipal Solid Waste Landfills

As discussed in the Disposal Section, there are 21 total landfills in the NCTCOG region. This includes both public and private landfills. The majority of these landfills have open gates, meaning they will accept waste from any source. Ten of the 21 landfills are owned by the private sector.

Current Goals and Standards

The City's goal to reduce the environmental impacts associated with solid waste management is dependent on a public/private partnership. Historically, the City of Fort Worth has maintained these partnerships to collect, process and dispose of municipal solid waste.

In order to maintain competition for services and to provide greater security of service, the availability of multiple resources and facilities is preferred to reliance on only a few options.

The City also understands the economic value of managing waste within the city boundaries. Facilities to process and dispose of waste can create jobs and other economic development benefits.

Program Evaluation

Regionally, the City has available to it a wide range of facilities for managing municipal solid waste. Over 20 other landfills are located in the NCTCOG region, with a total capacity of approximately 413 million tons, or approximately 48 years of remaining capacity in the region. The City's residential solid waste is disposed of at the City's landfill which is operated by Republic, and the City has a contractual obligation to deliver waste to this facility till the year 2033.

Collection firms providing service to the City's commercial and institutional establishments have the option to deliver waste to the City's SE Landfill or any other landfill in the region. Collection firms do have options, but must weigh potential lower tipping fees with the cost of transporting waste longer distances.

There are a number of companies providing processing services to either mulch, compost or process recyclable materials. As of April 2015, the City was taking its recycling material to the Waste Management facility in Arlington under its processing contract; however, procurement activity in the short term could change that arrangement.

[27] *North Central Texas Regional Solid Waste Management Plan*, October 2015, NCTCOG

[28] *Municipal Solid Waste in Texas: A Year in Review FY 2015 Data Summary and Analysis,* Facility Data for MSW Processing Facilities

5 Solid Waste Services Division Activities

5.1 Education

Program Description

Since FY2008, marketing, education, outreach and media relations activities for the City's Solid Waste Services Division were developed and managed internally by the Division. A portion of the Solid Waste outreach efforts are delivered by the Community Engagement Office. The targeted audiences are neighborhood associations, schools, community centers and similar organizations. The program evaluation provided herein pertains to activities conducted from 2008 onwards.

For the evaluation of the Division's education program, a review was conducted of a variety of materials the City furnished. Numerous items were shared that had been implemented or distributed from 2011 to 2015. In addition, a campaign plan document was also furnished. We understand from staff that the materials provided do not comprise the whole of what Solid Waste has created for outreach to its citizenry.

From the plan and the materials reviewed, it was noted that the educational program develops integrated campaigns for many of their major projects to include but not limited to the "E-Recycling" campaign, "Recycle Right," Recyclebank, and the "Mark It Out" campaigns. Through conversations with City staff, it is also understood they are using social media, City website, targeted mass emails, attendance at community events and internal communications to help achieve their goals.

Here is a description of the materials that were reviewed using GBB's Six-Point Checkup®:

- E-Recycling campaign (Regional Campaign with eight municipal partners):
    - Billboards — campaign messaging was shared throughout North Texas on billboards of various sizes within target markets.
    - Information cards — for distribution at events and key locations providing highlight information on electronic waste recycling and direction to the campaign website for detailed information.
    - Collaterals printed in Spanish and English for demographic consideration.
    - Posters and banners — materials to promote the campaign at events.
    - PowerPoint presentation — displayed during the campaign kick-off press conference introducing the campaign, and providing education on electronic recycling.
    - Website content — detailed information on the campaign was shared on the website: timetorecycle.com/e-recycling.
    - Social media calendar — each partner municipality received a social media calendar complete with content to promote the campaign on their platforms.
    - Press conference — held at the Goodwill Industries of Fort Worth Inc., this well-attended event included campaign kick-off speeches by a City Council member and the Code Compliance Solid Waste Services Assistant Director, Goodwill CEO and attendees participated in a tour of the ComputerWorks recycling facility, and a give-away promoting electronic recycling.

- How Green Can You…..?
  - This media-friendly and press-engaged education program included both activities and campaign components to raise awareness of Recycling Right and Recycling More through being Green.
  - Social media education joined with an invitation to all citizens to enter a drawing to be part of the Green-Off competition while learning more about sustainability in their homes and in everyday activities.
  - An environmentally focused reception/press conference announcing the selection of the two competing families.
  - Personalized education by the City of Fort Worth Sustainability Team for the two families on techniques they could use to lower their water consumption, help reduce energy usage, and lessen their environmental footprint. Additionally, the families shared their journey through online blogs.
  - Promotion of the competition learnings through city-wide communications.
  - Post-competition support for continued education.
  - Components supporting the campaign include:
    - Logos — Each of the logos created reflect an education session used during the competition, and within social marketing promotion.
    - Info Cards — Distributed during the reception / press conference as educational pieces.
  - Powerpoint Template — Displayed during the reception / press conference introducing the campaign, the competition, and providing education and relevance to the campaign.
  - Communication materials — Both printed and electronic communication reached citizens giving campaign and recycling updates.
    - Web graphics and water bill insert.
  - Post-competition marketing signage and handouts for continued education activities by the two families.

- **Recycle Right**
  - The City of Fort Worth, through a partnership with their waste collections service provider, Waste Management, entered into a program with Recyclebank to encourage all homeowners of Fort Worth to "Recycle Right!" based on an incentive rewards program.
  - The City was looking for an opportunity to further promote recycling with the following goals in mind:
    - Increase recycling participation and community engagement;
    - Provide residents with rewards for recycling; and
    - Enhance outreach and engagement activities.
  - Messaging:
    Keeping the messaging simple, direct, and positive; educational pieces both created and reiterated a mindset of "Recycle Right!" while being rewarded for these actions.
  - Marketing Components and Media Assessment:
    The program launched on April 6, 2012 with a very unique press conference hosted by Fort Worth Mayor, Betsy Price. With both radio and television cameras rolling, a City garbage truck dumped a load of just-collected waste at the conference. Mayor Price and City dignitaries donned gloves and sorted out recyclable elements to make a point on how much the City needs to Recycle Right!
  - For the next 6 months, homeowners received and were exposed to:

        - An introduction letter from Mayor Price;
        - Multiple postcards in direct mailings;
        - Water bill inserts;
        - Social media outreach; and
        - Print advertisement.
    - After a year of relationship with Recyclebank, the City re-launched the program through a first anniversary "mini-campaign" consisting of:
        - 1st anniversary – social media blasts; and
        - An all-City mailing of a 1 year anniversary card reminding citizens of the program and incentivizing to participate through gifting.

- **Mark It Out!**
    - Messaging:
      Mark It Out became the call-to-action as a tag-line to "Recycle Right!" This message was developed as a direct outcome from the research and recommendations developed by Action Research.
    - Marketing Components and Media Assessment:
        - Residents stated that junk and other mail having personal information on it prevented them from disposing of it in the recycling cart; and
        - To protect their privacy, some residents stated that they shred mail, but others stated that they toss it in the garbage cart.
    - The marketing component(s) developed for this education program consisted of an informational rack card and marker provided to homeowners in four recycling routes within the City of Fort Worth.

Current goals and standards

The outreach plan that was provided offered some insight into the City's goals and objectives, explained what messages they were designed to convey, and for what purpose. It listed a number of strategies and tactics used, which were evidenced by the materials provided for this review.

The City listed several goals in the plan. Two general goals listed are:

- Messaging should resonate and invoke change; and
- Effective design that promotes "the need to read" action.

The following goals were listed for each campaign the City is promoting:

Recycling Education Outreach Campaign

- Increase the amount of recycling in Fort Worth from its residential customers; and
- Decrease the amount of recycled contamination.

Litter Education Outreach Campaign

- Create a general awareness amongst the City of Fort Worth residents regarding the effects of litter; and
- Decrease the amount of litter within the City of Fort Worth.

Commercial Recycling Education Outreach campaign

- Foster the development of commercial recycling in Fort Worth;

- Educate local businesses on the benefits to recycling; and
- Educate the local businesses on methods of selecting a quality recycling service providers.

Solid Waste Services

- Increase the awareness of the Solid Waste program to include:
  - Yard waste;
  - Bulk and Brush; and
  - Drop-Off Stations.

Program Evaluation

Regarding the goals and objectives listed above, the City did not list any measurable objectives or state how success would be measured, making it difficult to assess how well any of the goals or objectives were met. In addition, for most of the materials produced and outreach efforts undertaken, qualitative descriptions and metrics of performance were not available. Examples of the types of information that can be used to evaluate an education program include:

- Intended purpose or goal of an output or media buy;
- Duration of media buys; distribution of outputs; number of households receiving a message; and,
- Effort results such as event attendance, incoming calls, program compliance, message recall, coverage of the message or event by earned media (e.g., local news), etc.

Without these data to evaluate – that are primarily quantitative in nature – GBB employed its Six Point Checkup® as a means for appraising the City's outreach program. This is a technique for evaluating education programs that looks into six basic elements of outreach.

GBB Six Point Checkup®

1. Communications plan

Do you have a plan? What are your goals and objectives? Who are your target audiences? Have you included research - measurement and evaluation methods?

2. Messaging

What are your messages? Are your messages compelling and persuasive? How could you fine-tune your messages to make them even more persuasive?

3. Education program components

How are you conveying your recycling messages? What methods/tactics are you using – and what additional methods might you use? Do your brochures, website, direct mailers and program elements work well together? Are there new tools that could help you achieve your goals?

4. Education program "branding"

Are your brochures, website and other outreach materials creatively designed and consistently "branded"? How might they be improved to better align?

5. Program and operations data

How has your budget changed over the past five years and how is it likely to change in the near future? Do you have call-center data on complaints? How can you conduct research of your target audiences on a shoestring budget?

6. Media assessment

What kind of media coverage are you receiving? How can you better harness the positive power of the media?

Communication Plan

The outreach plan that the City furnished has many of the elements one would expect for an effective plan, including goals and objectives, research, and a list of strategies and tactics. But there are some key elements missing from the plan, that are likely hindering City staff's ability to effectively determine whether their campaigns are working for them. For example, for research and evaluation, it mentions that various agencies have conducted research to understand the behaviors of solid waste customers. Other research referenced in the plan offered insight into why consumers don't recycle, how effective the Blue Crew is at influencing recycling behavior, and what residents consider to be the most important environmental issue. Insights from the plan are as follows:

Behavior Modification Study, completed by Action Research

- The City of Fort Worth's Solid Waste Services Division partnered with Action Research to employ a community-based social marketing approach to improve the City's recycling program. The current program in Fort Worth is a pay-as-you-throw program, with households paying by size of garbage carts. Households have access to a single stream recycling program as an alternative to throwing their recycling materials in the garbage. As it stands, there is a 22 percent diversion rate in Fort Worth. However, 22 percent of the recycling is contaminated with non-recyclable materials.
- The research goal for this study was to increase residential recycling rates in single family households. The community-based social marketing process was utilized in order to determine the barriers and benefits of recycling specific materials; develop strategies to overcome the barriers and enhance motivation; and design a pilot project. The study was conducted to better understand garbage and recycling behaviors in order to increase recycling rates among residents in single family homes in the City of Fort Worth, Texas.
    - To achieve the research goals for this study the team conducted a waste characterization (audit) study of garbage and recycling carts, and an in-person survey of households. The waste audit data (garbage and recycling carts) was linked to the household survey data. The combination of the garbage and recycling-cart data and household survey data provided a unique way to learn about recycling attitudes that are associated with the residents' actual behaviors. The largest number of household respondents stated their biggest reason for not recycling is:
        - They are too busy
        - It takes time to separate
        - Don't think about it
        - Respondents were mostly confident that they knew what items should and should not be recycled however *there was still some uncertainty about what to do with unmarked plastics, Styrofoam, and soiled chipboard*.

Typically, education and outreach are measured in two ways: outcomes and outputs. Outcomes are changes in level of awareness, changes in attitudes or changes in behavior as a result of seeing or hearing the City's messages (clicks to the website, change in surveyed response on awareness, changes in materials/volume collected). Outputs are just the number of times a message is disseminated to the target audience (number of press releases sent; number of fact sheets distributed, number of events attended,

etc.). It appears neither measurable specific outcomes or outputs were created in the plan, so the City cannot clearly evaluate whether progress was achieved.

The City has a sound list of overarching goals, but it appears that comprehensive research has not been done to support measureable objectives. For example, if from a baseline survey it is known that 75 percent of the public believe the Blue Crew is effective at increasing recycling, then there should be a measurable objective stating a new target for that specific data point—or for another data point deemed critically important. Also, the research can help determine which portions of the general public should be targeted with information, how to target them, and in what context should messaging be provided, so that hours and dollars are spent most efficiently and effectively.

Another component of the plan missing is implementation. This plan lacks a chart explaining, by calendar month, who will do what tasks and what kind of budget is needed. This kind of project management plan is critical for the team's understanding of where resources need to be allocated and when, as well as, where dollars are being spent and why.

Messaging

Effective program messaging isn't just about being clever, unique or memorable. Real effective messaging is relevant and accessible to the target audience. It makes sense to them and matters to them in their lifestyle. Good messaging is also consistent, like branding should be, in order to build familiarity with, and recall of, the topic. The right messaging bridges the way to understanding and support for a topic, which ultimately lead to trial and adoption of the desired behavior. This requires a concerted effort, over time, of redundancy and layering of consistent messaging conveyed through a variety of means.

Program Components

Positively, the City seems to be employing a very good mix of strategies and tactics to conduct outreach on recycling to the citizens of Fort Worth. What is not apparent, from the outreach plan, is why certain strategies and tactics were selected, or the audience for which they were intended. Strategies such as advertising or earned media, brochures or billing inserts, social media or digital advertising, are not something one selects at random; rather, they are selected based upon what one knows about the audience one is targeting. An effective suite of components is created and chosen for the very specific purpose of reaching the target or selected audience in the most economical and effective way possible.

Component Branding

Best practice calls for consistent and unique branding or packaging of information, to build familiarity with the topic through the cumulative effect of distributing materials and to distinguish the topic and be memorable. Typically, a certain look and feel is applied throughout all materials to build the consistent look and set expectations for information. This would include use of a certain color or group of colors, certain consistent imagery, a tagline possible and a consistent typeface.

The materials provided by the City use branding related to individual campaigns with the single unifying use of the City's logo. As an example, the Recycle Right campaign uses the same color palette, font and

overall look. This allows for a consistent look that helps the viewer to identify the message. ***However, no cohesion or consistent branding, except for the City logo is used for all the individual campaigns.***

Program Operations Data

It's important to look beyond expenditures on media buys and printing to the resources (i.e., the people) allocated toward plan development, implementation, and management of the program. In Fort Worth, responsibility of outreach with regards to solid waste is shared between SWSD staff and Code Compliance staff. It is not clear how much of each full-time staff is devoted to the task, but it is clear that everyone is balancing several different responsibilities, and, that the team members charged with outreach are not just located within different divisions, their offices are physically separated, and staff are in different buildings. This physical separation and sharing of oversight makes it potentially difficult for all team members to be aligned on execution of the plan. It may be hard for them to stay aware of who is doing what, and to know in a timely fashion of any pertinent new information, that may influence changes in the plan.

Media Assessment

The last piece of the Six Point Checkup© is the media assessment, where we examine how well SWSD is harnessing the power of proactive, earned media. The City regularly garnishes earned media coverage on nearly every major program or project developed. This includes the development and distribution of media releases, media fact sheets and media pitches. The SWSD staff has, over the years, built strong interpersonal relationships with local media.

5.2 Customer Service, including 311

Program Description

Customer Service is one of four major service areas within Solid Waste Services. Calls to Solid Waste go to the City call center, a separate branch on the organizational chart. Staffed by City employees, this group "handles incoming calls from individuals seeking new service arrangements, registering complaints, modifying existing service arrangements or inquiries of the services provided."[29] The Call Center also handles incoming calls for all divisions of the Code Compliance Department, Transportation and Public Works, Parks and Recreation, and the City Manager's Office. The main published telephone for the City, 817-392-1234, the number published for Solid Waste, 817-392-EASY, and several other 10-digit phone numbers come to the call center. Ultimately, the City intends to implement a 311 system, whereby all incoming calls to the City Fort Worth would be answered by dialing a single number, or simply dialing 311 from a landline. The City call center would be the first operation to be folded into the 311 system; however, that transition is unscheduled as of the end of FY14-15.

[29] City of Fort Worth FY2015 Budget Document, Solid Waste Fund section

The City also offers online customer service opportunities for its collection customers and residents in general. On the web page for Solid Waste Services, there are several interactive features:

- Address lookup to find out your collection schedule and set up reminders;
- Information for the City call center at 817-392-1234;
- A brief survey where one can provide feedback about a customer service experience; and,
- Information and links on how to download a mobile app that provides information and reminders about collection service.[30]

At the higher level, Code Compliance has a Customer Service email form at http://fortworthtexas.gov/codecompliance/customerservice/, online reporting for complaints, and a Customer Service Advocate to address issues, speak to groups, and other support.

Another special customer service effort in the field is the Disabled Carryout Service, wherein customers who are not capable of transporting their garbage and recycling carts to the curb can receive collection at their door. Residents who meet the application criteria receive this service at no additional charge; other customers may apply for the service and pay an additional $30 per month.

According to the FY14-15 Budget document, Customer Service accounts for 2 percent of expenditures by the Solid Waste Fund. The General Fund supports five positions in the call center; Code Compliance supports one position; Animal Care & Control supports three; and, Transportation and Public Works supports one. The center is funded by the Solid Waste Fund, General Fund, and Storm Water Fund and it is assigned to the consolidated customer service center.

Current goals and standards

The 1995-2015 Plan stated a goal of providing "Quality service to residents," and also stated several goals to "assist" ICI organizations with waste management.

The curbside collection Performance Goals from the budget document, mentioned previously in 1.1, also reflect customer service as they address "miss" rates for garbage and recycling collection. The same is true for the "turn-around time" goals associated with dead animal work orders and illegal dump work orders, described in 3.3 and 3.4. As noted, the City meets or exceeds those goals.

The City call center has four performance measures. The first is to answer all calls in an average of 60 seconds or less. The second is to achieve a service level to answer at least 80 percent of calls within 60 seconds. The third is to achieve 90 percent average in our quality monitoring program. The fourth is to achieve 95 percent of working scheduled adherence for representatives compared to their activities.

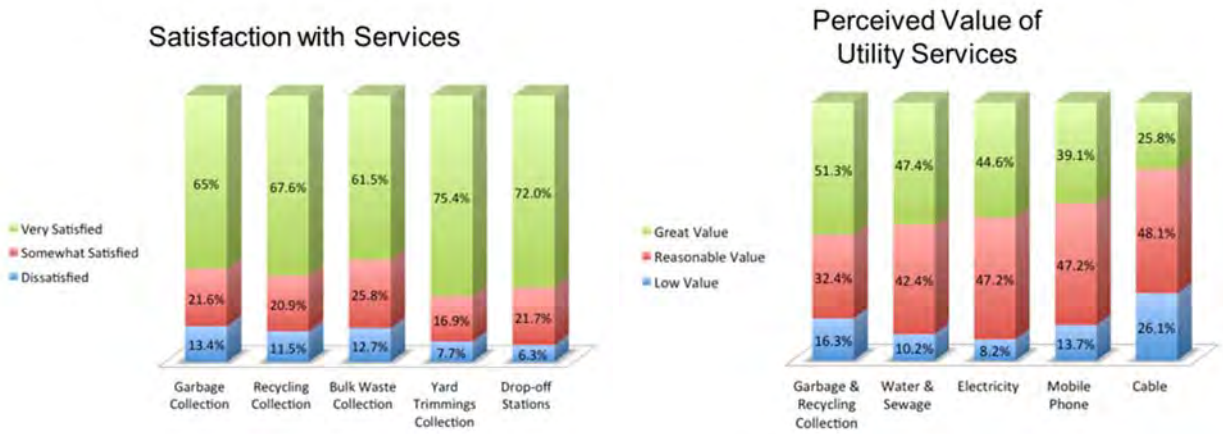
[30] The Google Play and Apple Store web pages indicate that app is very well reviewed by users and has been downloaded by thousands of people.

Program Evaluation

The use of social media, online reporting and complaint tracking, and the mobile app are all sophisticated customer service interfaces that appear to be well-received. Considering that the 2012 survey indicated that more than 57 percent of the respondents still listed "telephone" as their most preferred form of contact with the City, it is important and responsive that the City's efforts to improve telephone access proceed.

Surveys indicate that customers are satisfied with the solid waste services offered by the City. They also find the service level to be a good value to the price paid, more so than other utilities / basic services, as shown in Figure 5-1.

Figure 5-1 Customer Survey Responses – Satisfaction, Value



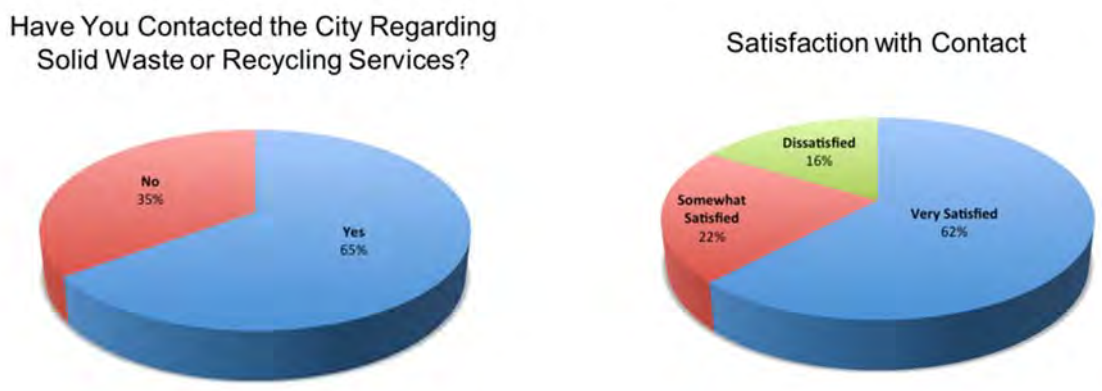
Source: City of Fort Worth 2012 Customer Satisfaction Survey

Evaluation of the survey indicated response overlap of "dissatisfied" and "low value." This could indicate that many of those answers came from the same individuals.

Given the opportunity for open-ended feedback, the respondents' most frequent suggestion was regarding their recycling bins being improperly returned to the curb after collection, allowing them to blow around.

As shown in Figure 5-2, survey results also indicate that approximately 84 percent of individuals who contact the City about their solid waste services were "satisfied" or "very satisfied" with the experience; however, many of the open-ended responses from those who were not satisfied expressed frustration about chronic challenges making contact.

Figure 5-2 Customer Survey Responses – Engagement, Satisfaction



The Code Compliance call center currently meets its goal to answer all incoming calls within an average 60 seconds; the 2015 average was 54 seconds. The goal to answer at least 80 percent of incoming calls within 60 seconds was not met in 2015. However, staff monitoring the performance has worked to improve performance by 40 percent and expects the overall goal will be met in 2016.

5.3 Organizational Structure

In order to evaluate the current state of the Solid Waste Services Division (SWSD), which is a division of the Code Compliance Department (CCD), and identify key issues related to organization's structure affects performance, the following were completed:

- Review of the SWSD's existing organizational structure, specifically the organization chart and personnel responsibilities;
- Limited benchmarking assessment of the City's program in comparison to other communities; and,
- Internal review of organizational performance and opportunities for improvement through interviews with key staff.

Program Description

The City of Fort Worth's solid waste management services are provided by the SWSD. Key responsibilities include the following:

- Collect waste through contracts with private haulers;
- Purchase, deliver, and maintain collection carts;
- Manage the City's SELF through a contract with a private firm;
- Collect Illegally dumped material;
- Manage the Citizens Drop-off centers;
- Manage the City's recycling program;
- Management of landfill site(s) donated to the City;
- Solid Waste related activities associated with City events;
- Emergency management operations for solid waste and disaster debris; and,
- Solid waste work related to non-profit organizations.

To meet all the demands of the solid waste management program, it is necessary to coordinate with a variety of regional, state and federal agencies. The City accomplishes this by participating in organizations such as NCTCOG's Regional Review Committee (RRC), Texas Solid Waste Association of North America (TxSWANA), and other waste related organizations such as the State of Texas Alliance for Recycling (STAR).

In addition to local organizations, the City also coordinates with regional, state and in some cases federal agencies. The NCTCOG has the responsibility to develop regional solid waste management plans and to manage state grant programs locally. The City of Fort Worth is represented on the NCTCOG's Resource Conservation Council. The Texas Commission on Environmental Quality (TCEQ) has the responsibility for permitting municipal solid waste facilities and the management of other state-wide solid waste management regulations, including those related to collection. The Texas Emergency Management Division (TEMD) is responsible for managing the state's emergency management program. The TEMD will review Disaster Debris Management Plans to determine compliance with state and federal guidelines.

SWSD collaborates with a variety of City departments to provide various services to residents:

- Code Enforcement Area Command provides assistance during disaster events;
- Transportation and Public Works Department (TPW) and the Park and Recreation Department provide assistance during disaster events;
- Environmental Management division of the Code Compliance Department manages the household hazardous waste collection program at the ECC;
- Emergency Management Office provides overall management during emergency events;
- Administrative Departments such as Human Resources, and Financial Management Services provide administrative support to the SWSD; and,
- Communications and Public Engagement for public information programs.[31]

The City also relies on a range of community and neighborhood organizations as part of the City's public information programs, including backyard composting and disaster alerts.

Budget and Organizational Structure

The solid waste management fund is an enterprise fund. This means that the City's solid waste program is funded almost entirely from fees charged for the services provided by the SWSD. Other funding sources include recycling sales revenue, landfill lease payments, interest on investments, and grants.

Existing Organizational Structure

The existing organizational chart for the Solid Waste Division is presented in Figure 5-3. Note that the organization chart presented below is in the midst of a transition. There are currently plans to split the Field Operations to be under the direction of two superintendents instead of one; the customer care division is now responsible for IT management and there are potential plans for moving planning to become a separate section under Code Compliance.

[31] This was a relatively recent development, documented in the 2015 City Budget document. Responsibility for public information programs has been transferred to Communications and Public Engagement; previously, and as described in the "Education" section of this document, the program was conducted by staff in SWSD and CCD.

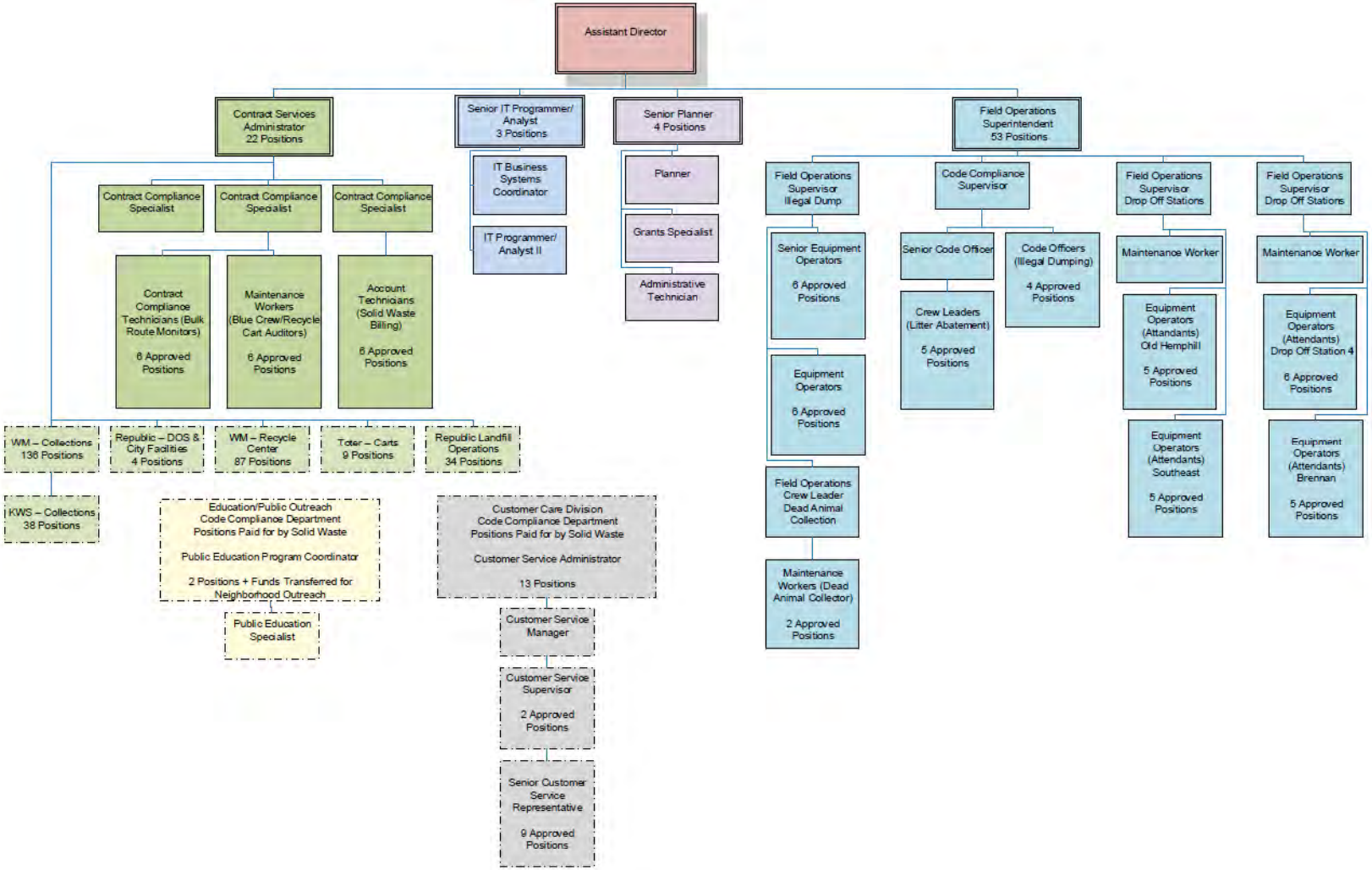


Figure 5-3 FY2016 Solid Waste Services Division Organization Chart

2016 Budget

The staff has a total of 85 to 90 employees to manage a budget of $58.5 million in revenues and $51.5 million in expenditures. The chart in Figure 5-4 shows that 69 percent of the SWSD budget is allocated toward professional services and technical services. The $35.6 million spent on this category is for services primarily to collection waste, operate the City's landfill and provide solid waste containers.

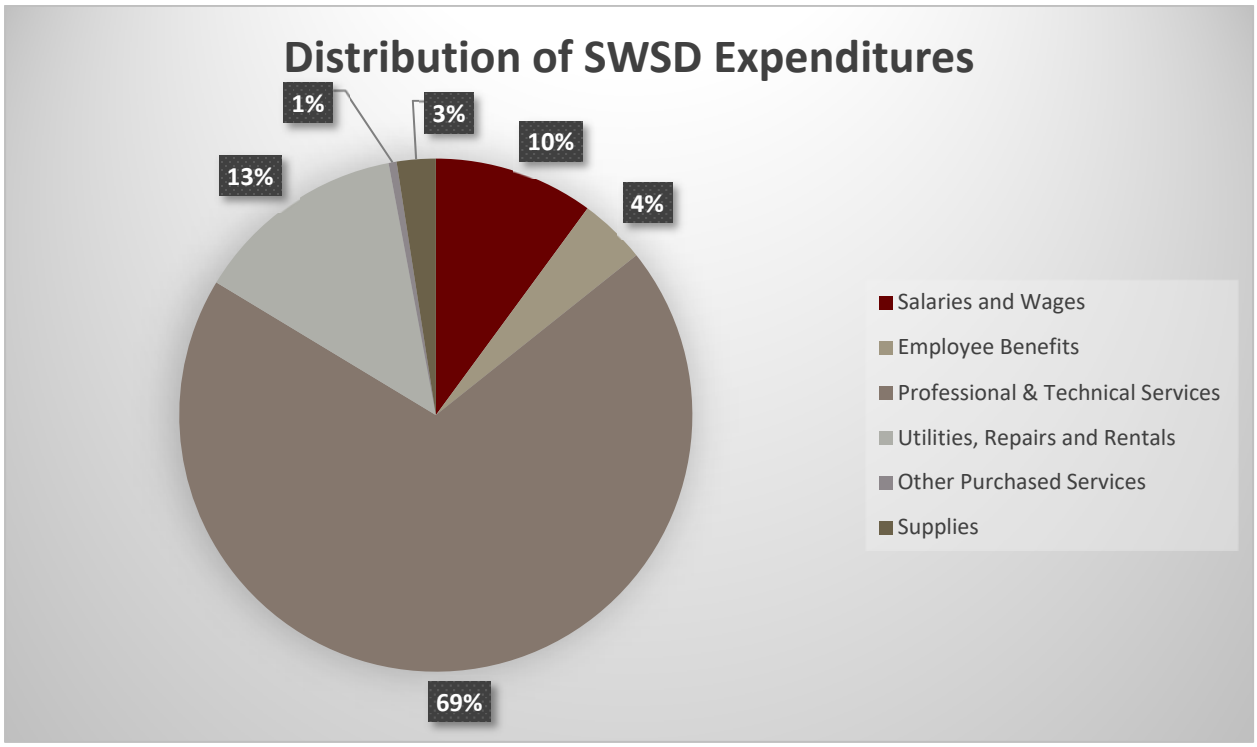


Figure 5-4 Distribution of SWSD Expenditures FY15-16

The City's SWSD currently has a total of 83 authorized positions (AP) to implement a $58.5 million program ($704,819 per AP). To achieve this level of efficiency, the City coordinates with other departments and relies on the private sector to provide services. For comparison purposes, the overall City has a budget of $1.5 billion and a total of 6,407 appointed positions ($234,000/AP).

Organizational Responsibilities

Administration

The SWSD is managed by the Assistant Director (AD). The AD has responsibilities for managing the programs operated by the SWSD, human resource management and overall performance of the SWSD. The AD reports directly to the Director of Code Compliance.

Contracts Management

The City's organizational structure recognizes its reliance on the private sector for all operations, except for operation of the drop-off centers and illegal dumping collection. Contracts management has a total of 22 positions to manage the following contracts, with an estimated total cost of $42 million per year (professional services + utilities and rentals).

Not including professional and other services, the SWSD manages the following contracts for waste collection, processing and disposal.

- WM Collections
- Republic Drop off Stations
- WM Recycling Center
- Toter
- Republic Landfill Services
- KWS Collections

The Contracts Management group also manages the revenue streams for the SWSD. Total revenues are equal to $58 million. Refer below to a summary of the SWSD budget.

Planning

The Planning Section is responsible for various planning activities associated with the City's solid waste management program. Major activities include the completion of a City-wide Disaster Debris Management Plan and the completion of a Comprehensive Solid Waste Management Plan. The Planning group also manages planning activities related to expanding solid waste services to new developments in the community. This group also manages recycling and public information programs, such as master composter programs and commercial waste management efforts.

Field Operations

Field operations are responsible for managing the illegal dumping collection program, the litter abatement crews, the environmental investigation officers, dead animal collection, and the operation of the drop-off facilities. This group also responds to disaster debris events by providing collection support in the event of a disaster that requires additional resources beyond what WMI can provide with its resources.

Information Technology

The IT group is responsible for managing the SWSD information technology program. This group is now being managed by the Customer Care Division.

Public Information

The Public Information Division is outside of SWSD, but provides services to SWSD for public information efforts and citizen communications.

Staff Responsibilities

The organizational structure shows that the Division is led by the Assistant Director. The position has the following key responsibilities:

Assistant Director of Solid Waste Services Division

To direct, manage, supervise and coordinate the activities and operations of the Solid Waste Services Division and the Keep Fort Worth Beautiful program or the including, but not limited to, development, recommendation, and implementation of policy, coordination of service delivery, contract management, interaction with regulatory agencies; to coordinate assigned activities with other divisions, departments and outside agencies; and to provide highly responsible and complex administrative support to the Code Compliance Director.

Other key staff include:

Senior Planner

To perform advanced planning assignments and projects in assigned area of responsibility; may include functioning as a historic preservation officer; and may include supervising, overseeing, and coordinating the work of an assigned division.

Contract Services Administrator

To perform a variety of duties in administering and monitoring provider service contracts or city/federally funded grant programs for a department or division; to ensure services provided and funds expended are in compliance with contract or grant fund specifications; and to perform a variety of administrative and technical tasks in support of assigned area of responsibility.

Senior IT Programmer

To formulate and define system scope and objectives; to solve complex problems considering computer equipment capacity and limitations, operating time, and form of desired results; to prepare detailed specifications from which programs will be written; to design, code, test, debug, and document those programs. Competent to work at the highest technical level of all phases of application systems analysis and programming activities in their area of expertise.

Field Operations Superintendent

To supervise, plan, coordinate, and oversee various assigned field construction, maintenance, repair, or operational activities within an assigned division which may include water, wastewater, parks and community services, golf courses, signs and markings, public events, solid waste management, transportation/public works and other related services; to coordinate assigned activities with other divisions, outside agencies and the general public; and to provide highly responsible and complex staff assistance to assigned senior management staff.

Customer Service Manager

To direct, manage, supervise and coordinate the activities and operations of the Customer Service Division within the Water/Wastewater, Development or Environmental Management Departments including customer billing, revenue collection, and service delivery methods for high volume call centers of assigned department; to coordinate assigned activities with other divisions, departments and outside agencies; and to provide highly responsible and complex administrative support to the Assistant Director of assigned department.

Public Education Coordinator

To manage, oversee and coordinate all department programs within an assigned department; to develop media relations and publicity activities; and perform as the primary spokesperson for a department; to review and monitor all department communication before distribution; and to participate in the preparation and administration of assigned budget; to implement goals and objectives; and to perform a variety of tasks in support of assigned area of responsibility.

Current goals and standards

The City's goals are to provide quality services in an efficient manner. To accomplish this, the City has relied on a blend of both public and private sector organizations to achieve these goals. Specific goals for the solid waste program include the following:

- Efficient use of staffing to achieve the overall program's goals and objectives;

- Clear lines of communication to eliminate duplication of effort;
- A quality management program that focuses on making sure that services provided to residents achieve high standards of quality and efficiency;
- Accountability for performance throughout the program;
- Full utilization of alternative resources to help fund programs, such as NCTCOG grant funding, FEMA funding for disaster debris management and other resources; and,
- Maximizing the benefits of public / private partnerships.

Program Evaluation

SWSD Interviews

The interviews focused on the SWSD mission, its strengths and areas for improvement. In general, the interviews indicated common themes. These include the passion that staff have for providing quality customer service. Staff have a sense that they provide very economical service to residents. They also believe that there is a need to improve the amount of public information efforts to the commercial sector and that the IT system that serves the organization needs significant upgrades to meet the needs of a growing community. The following presents specific comments related to the interviews. Specific observations are described below.

Division Mission and Responsibilities

- The mission of the Division as defined by staff is to provide quality customer service as it relates to the collection of municipal solid waste and recyclables.

- The Division also recognizes its role in protecting the health of the community and enhancing environmental quality. They want the program to be a role model for how to meet the community's needs.

- The SWSD is part of the Code Compliance Department. Major tasks that are conducted by other divisions of the CCD affect solid waste in a significant manner. One example is the operation of the call center and information technology which is staffed by personnel who provide services to other divisions within the department. Specifically, the administrator of the call center is also responsible for Code Enforcement Department IT, Customer Service Analyst and Safety Training.

- Additionally, the SWSD relies on public information staff from the Public Information office of Code Enforcement. This person spends approximately 60% of their time on solid waste, 30% on animal shelter issues and 10% on the remaining issues related to Code Enforcement. There is coordination with the SWSD concerning the topics of public information campaigns. Major responsibilities for Public Information include marketing, education, outreach and media relations. The program has a manager and a marketing specialist. Certain special skilled media work are contracted out.

- The other department that has an impact on operations is that the Water Department is responsible for billing.

- The SWSD also has a major role in disaster debris clean-up. In the event of a disaster, the organization must work with Transportation and Public Works, Parks and Recreation, Emergency Management Operations, Code Enforcement, Public Information, Police and Fire and potentially state and federal agencies.

A Division in Flux

- At the time of this analysis, changes have and are being undertaken to modify the organization's structure. These include dividing the Illegal Dumping and Drop off Stations Operations into two sections versus one section; the Call Center and IT have become combined into one section. There is discussion of moving the Planning Group to become a separate planning group that serves all sections of the Code Compliance Department.
- These moves will have varying impacts on the availability of staff to undertake programs for solid waste management.
- In addition to the changes that are taking place structurally, the SWSD has a new Assistant Director.

Customer Satisfaction

According to an August 2015 survey conducted by ETC Institute of Olathe, Kansas, more than three-fourths of the respondents were satisfied with the quality of curbside recycling; 76 percent were satisfied with residential garbage collection; and 70 percent were satisfied with drop-off stations for garbage, brush, recycling and bulk trash. Staff placed a high degree of focus on providing a high level of customer satisfaction. The results are average for cities of similar size. Higher rates were reported in city budgets including above 95% have been reported in Plano and 87% in Austin.

Additional or changed services

The City provides a range of services primarily to the residential sector. These services include once per week collection of solid waste, once per week collection of recyclables, brush and bulky collection, availability of drop-off centers, illegal dumping collection and public information programs. The individuals interviewed were asked about additional services that should be provided by the SWSM. These are not necessarily short-term or long-term opportunities, but thoughts by staff on potential services that in the future the SWSD could provide to either reduce waste generation or improve the level of service to customers.

- Modify bulky and brush collection to allow for greater recovery of materials
- Enhanced commercial sector program – focus first on education / public information
- Commercial organics collection and processing – if there is infrastructure to implement
- Potential development of conversion technologies once those technologies become economically viable
- Enhanced focus on commercial sector waste reduction and recycling
- Enhanced public information / education programs / social media program
- Enhanced communication programs for field crews to utilize apps for tracking complaints and other issues including monitoring disaster debris – will require major changes to ITMS System – this will involve converting to a web based system
- Expand Drop-off programs to include collection of HHW – will require significant staff training regarding HHW management at these sites
- Fourth Drop-off facility anticipated to be operational October 2016
- More inclusion of law enforcement into illegal dumping program
- Electronics collection services
- Textiles collection service
- Implementation of City MRF
- Establishment of Green Purchasing ordinances

Program Strengths

The individuals interviewed were relatively consistent in the assessment of organizational strengths. These generally include:

- A very motivated and dedicated staff who work together to provide high level of service to residents
- Self-directed teams with a degree of autonomy and responsibility
- A sense that tasks conducted are very strategic in development and implementation
- Efficient service to residents – based on ability to keep rates at same level for long period of time
- A sense that the organization is supportive of their mission

Areas Requiring Improvement

The individuals interviewed were relatively consistent in the assessment of organizational areas of improvement as well. These generally include:

- Need to improve direct resource allocation to SWSD for public information programs. There is also concern for potentially moving Planning out of SWSD when important issues such as implementation of Disaster Debris Management Plan, Comprehensive Solid Waste Plan and the MRF procurement are being undertaken.
- The IT system for solid waste needs a major re-haul in order to better utilize technology for both internal services and field services
- Need to implement programs focused more on the commercial sector
- Need to implement bulk and brush waste separate collection services as a way to improve material recovery
- Public information programs and the need for more FOCUSED programs
- Marketing the Division's programs to its customers as a means of improving program participation and compliance with program requirements
- Need to audit grants of privilege program

Need for Resources

- As mentioned, the organization is in a state of flux. Changes in the structure are moving resources within the Code Compliance Department. There were comments suggesting that the process of hiring individuals is a barrier to meeting needs. This is primarily a Human Resources issue, not a SWSD issue.
- The Public information office is about to secure an additional marketing assistant. Even with this additional staff, it is felt that because this group provides service throughout the Code Compliance Department is short on public information staff for a City of 800,000.
- Additional staff is needed in the IT section to assist in resolving issues with the ITMS system.
- Additional staff will also be required to manage the additional drop-off station and to manage the collection of HHW at these facilities.
- City should evaluate the use of cameras on City vehicles for improved reporting on potential issues related to customer service

Cost Savings Opportunities

- In general, staff believed that they are operating at a very efficient level, with the exception of the ITMS system. Field operations has demonstrated over the years, the ability to cut staff significantly as issues such as illegal dumping is reduced.
- While not an immediate cost savings measure, it was pointed out that the City has responsibilities for closure and post-closure care of the landfill. Republic is responsible for contributing funds for closure and post-closure care based on reporting to TCEQ. It is uncertain whether these funds accurately reflect the City's current liabilities for closure or post-closure care.

Contractor Performance

The City relies heavily on private contractors for both collection and disposal services. In general, staff were satisfied with the performance of the contractors. However, it was indicated that contractors will generally provide the level of service defined in their service agreement. Because the City has limited collection or other services, it is limited in its ability to provide "additional services" without major revisions to contracts. This may have an impact on the level of community satisfaction with the services being provided.

Benchmarking Analysis

The City of Fort Worth is unique among its peers as it relates to municipal solid waste management. Cities including Dallas, San Antonio, Austin, El Paso, Garland, Plano, Denton, Corpus Christi, Lubbock and Amarillo all maintain either their own residential collection program or landfill. The closest match to Fort Worth's program is the City of Arlington where waste is collected by the private sector. Arlington also owns a landfill, and also leases this facility similar to Fort Worth.

Public vs Private Ownership and Operations

To accomplish its mission, the City relies heavily on contract services. Unlike most other large cities in the state except for Arlington, Fort Worth does not directly operate either the residential collection service or the operation of its landfill. The table below illustrates how other cities manage these elements of their solid waste program.

Table 5-1 Benchmarking City Operations: City or Private Operations

City	Collection Service	Recycling Service	Landfill Ownership	Landfill Operations
Fort Worth	Private	Private	City	Private
Arlington	Private	Private	City	Private
Dallas	City	City	City	City
Austin	City	City	Private	Private
San Antonio	City	City	Private	Private
Houston	City	City	Private	Private
Denton	City	City	City	City
Garland	City	City	City	City
Plano	City	City	NTMWD*	NTMWD*
Amarillo	City	City	City	City
Lubbock	City	City	City	City

*North Texas Municipal Water District – a public agency

There are benefits and costs associated with both public and private ownership and operations. Mainly these differences relate to the level of risk a community is willing to accept in providing service, the flexibility in service levels desired and what benefits of private sector efficiencies can be secured. Some of the cities reviewed that provided municipal collection services showed data for customer satisfaction well above Fort Worth's level of satisfaction (note that there are several factors that account for level of satisfaction). Efficiency of operations is one of the primary reasons for privatization. The table below illustrates data from various cities for collection and landfill operations where data is available.

Table 5-2 provides a comparison of various cities' solid waste management budgets.

Table 5-2 FY2016 Solid Waste Budget Comparisons for Major Metropolitan Areas in Texas

City	Revenues (millions)	Expenses (millions)	Expenses per Customer	Employees	Customers (1,000)	Waste Collected (1,000 tons)	LBS. per Customer per Week	Reported Recycling Rate
Fort Worth*	$58.4	$58.4	$286	92	204	228	43	23%
Austin	$82.1	$82.1	$425	414	193	123	25	43%
Dallas	$86.5	$86.5	$360	861	240	233	37	20%
Denton**	$31.2	$31.2	NA	124	NA	185	NA	35%
Garland**	$35.8	$23.5	NA	117	NA	NA	NA	NA
Plano	$24.6	$26.4	$361	76	73	58	31	41%
San Antonio	$100.7	$100.7	$291	577	345	NA	NA	30%
Houston***	$4.8	$73.6	$192	438	382	NA	NA	30%

NA - not available
* Expenses include a $6.6 million interdepartmental transfer
**Denton provides residential and commercial collection service
*** Houston revenues do not include fees to residents - general fund account

Staffing

By relying on private contractors, the City is able to maintain a much smaller staff than other large cities in Texas. Table 5-3 presents staffing levels for other large cities. When private sector employment is added into the evaluation, the total employment is still less than the other cities evaluated. The table below provides a summary of collection and disposal program staffing. Care should be taken when evaluating these numbers as the data is sourced from City budgets which combine multiple services and tasks into either collection or landfill line items. For example, one city may have a separate program for public information that is budgeted outside of the collection program, while others include those staff in the total staffing profile. Program variations also exist in the manner in which solid waste is collected (for example, manual versus automated), extent of recycling efforts, whether a composting program is in place and other programs that may be included in the solid waste budget. Some of the cities cited below operate transfer stations as a means of reducing haul costs. The source of the information presented in this table are city annual financial statements.

Table 5-3 Texas City Solid Waste Staffing Levels

	Collection				Landfill				
City	Conducted by	Customers	Staffing	Customers per Staff	Owned by	Operated by	Landfill Tons	Staff	Tons/Staff
Fort Worth*	Private	265,000	196	1352	City	Private	529,000	34	15,559
Arlington	Private	NA	NA	NA	City	Private	806,000	NA	NA
Dallas	City	NA	NA	NA	City	City	1,631,000	144	11,326
Austin	City	193,000	157	1229	Private	Private	NA	NA	NA
San Antonio	City	345,000	577	597	Private	Private	NA	NA	NA
Houston	City	382,000	362	1055	Private	Private	NA	NA	NA
Garland	City	52,000	63	825	City	City	406,000	29	14,000
Plano	City	72,000	54	1333	**	**	NA	NA	NA
Amarillo	City	62,000	91	681.32	City	City	231,000	20	11,550

*Includes staffing of private companies to collect waste and operate landfill – total SWSD staffing is between 85 and 90

** owned and operated by North Texas Municipal Water District

Rates Charged

Table presents a summary of rates charged by other cities evaluated where data was available from either their budget documents or web sites. Of particular note is the fact that in past years, a rate analysis was fairly straight-forward: each community had a monthly fee for solid waste collection. Now that more communities are moving toward a multiple cart program, rate structures vary depending on the carts.

Table 5-4 Solid Waste Residential Collection Rates in Texas Cities

City	Cart Size				Other	
	24	32	64	96		
Fort Worth		$12.50	$17.50	$22.75		
Austin*	$16.90	$18.15	$23.30	$41.85	$7.65	Per additional environmental fee
Arlington					$13.36	Twice / week bag
Dallas				$24.67	$10.56	Additional cart fee
Denton		$19.75	$20.75	$25.65	$5.25	Recycling Charge
El Paso				$17.00	$17.00	Additional cart fee
Garland				$19.58	$ 6.10	Additional cart fee
Houston					$5.00+$2.21	Admin fee + bag tag fee
Plano**			$11.25	$15.10	$13.25	Additional cart fee
San Antonio***		$20.43	$20.93	$22.18		

*Note that Austin residents generate 27 lbs. of waste per week compared to Fort Worth at 43 lbs./week; the City of Dallas is 37 lbs./week

** Plano cart sizes are 68 gallons and 95 gallons

***San Antonio carts are 48, 64 and 96

Public Information Programs

Fort Worth staff expressed an interest in comparative staffing levels for public information / public education programs. The following are observations from other cities. Again, city organizational structures vary considerably and some of these tasks may be taken care of by other departments (as is the case for the City of Fort Worth). A review of other cities public information programs indicates that Fort Worth is not alone in having minimum public information staff. For example:

- Houston has three individuals who are either customer liaisons or public information staff;
- Garland has one waste minimization officer;
- El Paso has a customer relations clerk;
- Denton has eight individuals involved in public outreach and public education;

City Solid Waste Budget Highlights

The following are excerpts from various city budgets related to solid waste management. These excerpts are designed to provide insight into how other solid waste management organizations focus their efforts and unique program aspects which may be of interest to Fort Worth as it moves to implement its own program.

Austin

One of the main principles of the department's Zero Waste guiding concept is a focus on reducing waste by increasing recycling. In order to intensify the financial incentive for customers to decrease their trash volume is to reduce their cart size and recycle more items. Austin Resource Recovery (ARR) is adopting a per gallon basis for its trash cart rates. The FY 2014/15 car rates are calculated from base rates of $0.16 per gallon for the 24, 32 and 64 gallon carts, and $0.30 per gallon for the 96 gallon cart. Additionally, the base customer charge is increasing by $1.865 to a total of $11.35 per customer account per month. To fund continued improvements to litter abatement, street cleaning and hazardous waste disposal services provided by ARR the FY 2014/15 Budget includes an increase in the Clean Community Fee of $0.75 per month for residential customers and $4.65 per month for commercial customers.

In April 2013, City Council expanded the Universal Recycling Ordinance to include smaller properties and established minimum recycling requirements for all businesses to be implemented by October 2016. The amended ordinance also directed ARR staff to develop organic collection requirements and rules for food service establishment beginning October 2016. The focus of outreach efforts is to promote commercial recycling and composting initiatives and ensure the business community has the technical information and practical tools to meet the City's Zero Waste goal.

Austin Clean Community Fee

All residents in Austin, including single family homes and apartment and condo dwellers, pay a monthly $7.65 Clean Community Fee for services that keep Austin clean and enhance the livability of its neighborhoods and the downtown area. The Clean Community Fee funds the following:

- Street Sweeping
- Litter Abatement
- Recycle & Reuse Drop-Off Center
- Business Outreach
- Austin Reuse Centers
- Zero Waste Program Development

- Clean Austin
- Dead Animal Collection
- Boulevard Sweeping

The fee also covers the enforcement of some City codes. Annexed properties also receive these services and are charged the Clean Community Fee. These fees appear on Austin's residents' monthly utility bill.

Dallas

The City's Sanitation Department will move to an enterprise fund in 2015/16.

In 2014/15, the landfill generated $21 million in revenues from commercial haulers. Operational costs for the landfill are estimated to be $10.09 per ton. The landfill received a total of 1.6 million tons for the same period. The total landfill budget, including costs for managing waste generated from City residents was $16 million. For 2015/16, costs are expected to increase, while revenues are anticipated to decrease. The cost per ton is budgeted to be $12.40/ton.

Denton

Work with a service provider to design, construct and operate a Compressed Natural Gas fueling facility to provide the first public access sustainable CNG vehicle fuel station in the community and the Solid waste Fund fleet.

Work with a service provider to design, construct and operate a Grease & Grit trap processing facility to provide local processing services to the business community.

Developed the MSW Facility permit modification to implement landfill mining operations in order to extract and process valuable recyclable materials and to reuse the recovered airspace for future landfill disposal.

Garland

Landfill Fees

Landfill Fees include charges to private commercial haulers and other surrounding cities for the use of the City's solid waste disposal site. The tipping fees the City charges private commercial haulers are primarily based on prevailing market rates. The current tipping fee for commercial haulers is $35.00 per ton for those utilizing automated equipment and $52.50 per ton for those manually off-loading. In an effort to increase General Fund revenue, the City's Environmental Waste Services (EWS) – Disposal (Landfill) Department has also offered, since 2003, a negotiated tipping fee to commercial haulers who have the capability of providing at least 1,000 tons per month.

Total Landfill Fees are projected to be $6.7 million in FY 2015-16, representing an increase of $637,000 (10.5%) from FY 2014-15 budgeted levels. The growth in revenue is due to an increase in construction activity experienced in the Metroplex area, causing additional tonnage to be disposed by private waste haulers at the Hinton Landfill.

Disposal Fees

Landfill Disposal Fees represent charges to the City's Environmental Waste Services (EWS) - Delivery Department and other City departments for the disposal of refuse. Disposal Fees are tied to the Landfill's cost-of-service rate which is $23.00 per ton for FY 2015-16.

Total Disposal Fees of $3.7 million are included in the FY 2015-16 Adopted Budget, reflecting a decrease of $160,000 (4.1%) from levels budgeted in

FY 2014-15.

Plano

- Maintain Environmental Waste Services Dashboard (Socrata) Measurements
- Maintain a 95.8% or above excellence customer service rating
- Complete Plano's 20-year Solid Waste Plan project
- Complete and implement the 2nd Regional Compost Agreement between North Texas
- Municipal Water District and four (4) additional Member Cities (Allen, Frisco, McKinney and Richardson)
- Evaluate the Recycle Right All-Star Recycling Program
- Increase exposure, publicity and participation of the Green Business Certification Program
- Seek and identify markets for Constructions & Demolition (C&D) material
- Advance existing recycling programs to largest generators of solid waste
- Organize and participate in outreach events to increase awareness of Commercial Recycling programs
- Evaluate the impact of a regional C&D Material Recovery Facility on Plano's C&D recycling program, commercial solid waste stream and North Texas Municipal Water District percentage
- Assess diversion potential of multi-family landscape waste

Arlington

Landfill royalties are $3.5 million per year.

The City of Arlington has provided curbside recycling for nearly 20 years. In the past, residents were provided with 22-gallon recycling bins to place curbside once a week, and recycling was collected manually by the city's contract hauling vendor. In June of 2013, the city's hauling vendor switched from manual to automated collection, and residents were provided with 65-gallon wheeled carts. It is anticipated that participation in recycling, as well as collection volume, will increase due to the convenience of the new carts.

Curbside diversion rate measures the percentage of all residential garbage collected curbside that was diverted from the landfill and recycled instead.

For the first three quarters of the fiscal year, curbside recycling increased 2.7% over the same period last fiscal year (from 23,319 tons to 23,950 tons). The diversion rate is 22% for 4th Quarter 2015.

Amarillo

Provide for the efficient collection of residential and commercial solid waste, as well as to respond to all citizen inquiries in a timely fashion. Improve overall safety by training employees in the areas of bodily injury prevention as well as motor vehicle safety.

Increase public awareness of the importance of recycling by continuing to maintain the City's drop-off recycling program.

After several commercial collection businesses expanded and the Amarillo Independent School District participating in cardboard recycling, there has been a reduction in commercial revenue. Due to several

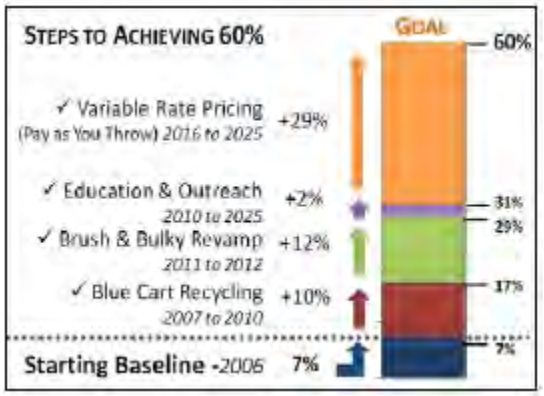
new, expanding subdivisions and increases in the residential route customers, the collection routes will be evaluated for the most efficient and balanced service.

San Antonio

Recycling Plan

Department appropriations are guided by the Recycling and Resource Recovery Plan (Recycling Plan) approved by City Council in June 2010 and revised in January 2013. The Recycling Plan established strategic goals to ensure all single family and multi-family residents have access to convenient recycling programs, businesses have improved recycling opportunities and 60% of all single family residential curbside material collected by the Solid Waste Management Department (SWMD) is recycled by the year 2025.

Since the adoption of the Recycling Plan, the Department has undertaken multiple initiatives in order to reach these goals. The brush and bulky collection was revamped to increase brush recycling, a new brush recycling center opened on the City's South Side, blue cart recycling outreached increased, recycling education to schools increased, four new bulky drop-off centers opened, and City Council approved an ordinance requiring multi-family complexes to provide recycling. As a result, the residential recycling rate is currently at 30%.



Commercial Recycling

Another component of the Recycling Plan is improving recycling opportunities for businesses. In FY 2016, the Department will undertake new initiatives to improve commercial recycling including assistance with performance measurements, expert consulting and recognition programs. Through performance measurements, the Department will help businesses to measure how much they recycle and to track their progress. SWMD will also provide expert consulting to help businesses analyze their waste stream and to develop customized plans to recycle more and minimize costs. Lastly, the Department will develop a business recognition program to share and celebrate innovative recycling practices.

Variable Rate Pricing (Pay as You Throw)

The next step toward achieving a 60% residential recycling rate is implementing variable rate pricing, also known as Pay as You Throw (PAYT). PAYT will provide customers with a blue recycling cart, a green organics cart and a choice between three brown garbage carts (small, medium, large). The larger the brown cart, the greater the monthly rate for the cart. PAYT will incentivize customers to use smaller brown carts and to recycle more with the blue and green carts.

The Solid Waste Budget provided funding for PAYT conversion in phases.. The funding included the purchase of additional refuse trucks and garbage carts. Additional positions were needed such as refuse truck drivers, route inspectors, route supervisor, accounting clerks and recycling coordinator. All solid waste customers were scheduled to be converted to PAYT by mid FY 2017.

Review Findings

Some of the key findings of the organizational assessment include the following.

- The staff are very focused on customer service as their primary mission. A secondary mission is to improve the environment of the City and promoting a sustainable Fort Worth. Establishing a "model" program was also a common theme related to the mission of the Division. The staff demonstrated a high degree of "passion" for providing quality service.

- There is general understanding that, with few exceptions, the residents of Fort Worth are satisfied with the services that are provided. The last survey of residents indicated that satisfaction with solid waste services was 75 percent. Based on data from other cities, this is an average level of residential satisfaction with solid waste management services.

- Maintaining service fee rates with no increases for the past eight years is one of the factors leading to customer satisfaction. If the CSWMP anticipates changes in future rates, the organization should be prepared to clearly communicate the need for increases in rates.

- There is a need for greater attention to education – especially in the ICI sector.

- The City of Fort Worth is unique to other major metropolitan cities in Texas, with the exception of Arlington, in that almost all services are contracted out to the private sector. This fact places certain limitations on the SWSD's ability to expand residential services without renegotiating service contracts.

- The SWSD is in an organizational state of flux. A new Assistant Director took over operations in January of 2016. In addition, there are organizational changes being made by the Code Compliance Department. This presents both opportunities and a sense of uncertainty that is associated with any major organizational change. In discussions with staff they seem positive about the changes anticipated.

- **The IT system needs a major investment**. There are opportunities for improving overall efficiencies through technology, both in the office and out in the field that are being missed.

- The Call Center operations has the long-term goal of transitioning to a 311 service for the City. The Call Center is a critical component of the City's response to a disaster debris event.

- Contract management maintains good communications with subcontractors and staff are satisfied with performance. However, too much reliance on performance of landfill operations is placed in hands of contractor. Closer evaluation of their operations will be necessary to assure the facility is meeting environmental regulations and that the facility is being operated efficiently. Given the long lead times for TCEQ inspections, it would be appropriate to either contract with an engineering firm or hire an in-house staff to perform landfill site evaluations for: environmental compliance, operational efficiencies, and remaining capacity.

- The illegal dumping collection group has demonstrated an ability to reduce quantities significantly over the past several years. The Field Operations Supervisor has established self-directed teams to provide this service. Quantities of illegally dumped materials have dropped significantly over the past several years, allowing for a reduction in collection staff.

- Field Operations also has responsibility for operations of the drop-off stations. The SWSD is in the process of dividing responsibility for managing illegal dumping and drop-off stations. The City is in the process of expanding the number of drop-off centers from three to four which will require

additional staff to manage. The City is also considering adding collection of HHW at these sites, which will also require not only more staff, but a significant amount of training related to acceptance of these materials.

- The City continues to grows, which will place more demand on services. At present, there are requests for few additional staff. However, with the addition of new programs, and the move to expand the merger of Code Compliance Department into the SWSD, there will be a need to revisit staffing levels. The most immediate staffing needs include IT and public information.

- The public information is not directly under the SWSD. It is its separate division within Code Compliance. This reduces the level of public information programs for solid waste management activities. According to the head of public information, approximately 60% of time is allocated to solid waste issues. An additional marketer is planned. As the City looks to make significant changes to the program and services, public information programs and communication are going to be key to public acceptance of the proposed changes.

- There are discussions about moving the Planning group to a separate section of Code Compliance. It will not only have responsibilities for planning associated with solid waste, but it will also assist the other divisions of Code Compliance with their planning needs. This has the potential for diluting solid waste planning activities.

- An area for improvement expressed by staff was enforcement of City policies. This includes enforcement of rules pertaining to what can be placed in recyclable containers and solid waste containers. The Blue Crew program is designed to educate residents and enforce compliance with recycling program. The illegal dumping program has been successful in reducing quantities, but enforcement is limited.

- The City's service fee rates are reasonable and below the average of other comparable City rates.

- The City's staffing levels are within reason for the programs it provides and the customers it serves, especially in comparison to other Cities.

5.4 Reuse

Program Description

The most efficient way to reduce waste is not to create it in the first place. Purchasing reusable new or used materials and choosing to reuse them has several benefits. First, it eliminates the need to harvest, transport and fabricate new materials which saves energy, reduces greenhouse gas emissions, and conserves natural resources. Second, it reduces the quantity of materials requiring disposal. Reuse is preferable even to recycling from both a sustainability and an economic standpoint. Public information programs explaining the economic and environmental benefits of reuse raise the public consciousness on the subject and increase reuse.

The following are all methods of encouraging reuse.

- Mandating or giving preference to reused or reusable items through the City's own procurement policies

- Requiring reusable food service items in City facilities and giving preference to them at public functions
- Augmenting recycling and disposal facilities with "Swap Shops" or reuse centers where the public can "shop" for reusable items donated by the public or recovered from disposal, ranging from furniture and appliances to household chemicals
- Imposing a preference for reusable shopping bags through mandates, fees, or other economic incentives
- Donation or sale of unwanted items to organizations which facilitate reuse, such as religious institutions, community centers, thrift stores and non-profit organizations.
- Food banks to the extent that they often recover excess and unsold food that would otherwise be destined for disposal
- Sustainable building standards often encourage reuse of materials in construction and facilities designed to support reuse such as providing dishwashers for reusable service items

Current goals and standards

Reuse is very difficult to quantify, especially on the part of the general public. Documenting reductions in disposable items purchased by the City or institutions is one method of documenting progress.

Program Evaluation

The private and non-profit sectors provide infrastructure supporting reuse in the form of resale businesses and donation/distribution centers. Voluntary sustainability efforts also encourage reuse as a means of reducing waste of all types.

5.5 Source Reduction

Program Description

Source reduction is defined as measures to reduce the amount of any material entering any waste stream or otherwise released into the environment prior to recycling, treatment, or disposal. In more colloquial language, it is the concept of avoiding waste "in the first place."

Reuse is the practice of reducing waste generation by using a product more than one time.

Pay-As-You-Throw (PAYT)

The City's primary efforts to reduce waste generation through either source reduction or reuse is through the City's "Pay-As-You-Throw" (PAYT) program and through public information programs. Fort Worth is a PAYT city which means you pay for the level of garbage service used, very similar to other utility services.

City residents choose the size of their garbage cart based on their family's size and habits:

32-gallon cart: Good for a family of 1 to 2 people who recycle paper, plastic, metal and glass containers. $12.50 per month (maximum weight allowed for collection is 150 pounds).

64-gallon cart: Good for a 3 to 4 person family that recycles. $17.50 per month (maximum weight allowed for collection is 200 pounds).

96-gallon cart: Good for a larger family that recycles or for smaller families who choose not to recycle. $22.75 per month (maximum weight allowed for collection is 250 pounds).

Public Information Programs

The City has an active public information program that is directed to the general public through a wide range of social media and the press. With respect to source reduction, the City presents articles and information on source reduction and reuse strategies, including backyard composting and don't bag it strategies for dealing with yard waste and leaves. Other methods of source reduction that can be promoted include the following.

Code Enforcement Measures

The City requires residents to set-out waste in the proper containers. If waste exceeds the capacity of the collection carts, the waste can be set-out in special bags sold by the City. The additional charge for these bags helps encourage reduced waste generation.

Other cities have adopted code enforcement measures related to solid waste management. The MSW code which encourages the greatest degree of source reduction is a ban on "mixing" yard waste with garbage for disposal, sometimes referred to as "Don't Bag It" programs. A number of cities in the Metroplex enforce such regulations as a means of reducing the amounts of grass clippings and leaves requiring collection and disposal, and to increase recycling. Because the City has a yard waste collection program that results in recycling this waste through mulching, the City is likely to continue its current program. Yard waste is estimated to account for approximately 13.5 percent of the MSW (Source: EPA).

Current Goals and Standards

The goal of the source reduction and reuse programs is to reduce the amounts of waste requiring collection and disposal. While there are benefits associated with recycling and organic composting, the reduction and elimination of wastes is the most environmentally acceptable means of managing MSW.

Program Evaluation

Over the course of the last ten years, the City has encouraged residents and businesses to generate less waste through its various programs. The results of these efforts can be evaluated by examining the amounts of waste that are sent to the landfill on a per household basis. Table 5-5 and Figure 5-5 illustrate the decrease in the amounts of waste generated per household. The data show that over the period 2004-2013, the waste disposal rate on a household basis has fallen by approximately 10 percent. This translates approximately to 14 percent less solid waste that has to be collected, hauled and disposed. The savings

translates into additional landfill life and lower costs for collection, although collection contracts generally do not recognize savings associated with reduced generation rates.

Table 5-5 Waste Disposal Rates

Year	Pounds Disposed Per Household Per Week
2004	50.02
2005	46.97
2006	44.04
2007	46.20
2008	44.92
2009	45.67
2010	46.21
2011	43.50
2012	43.40
2013	43.09
2014	43.59
2015	47.65

Source: City of Fort Worth

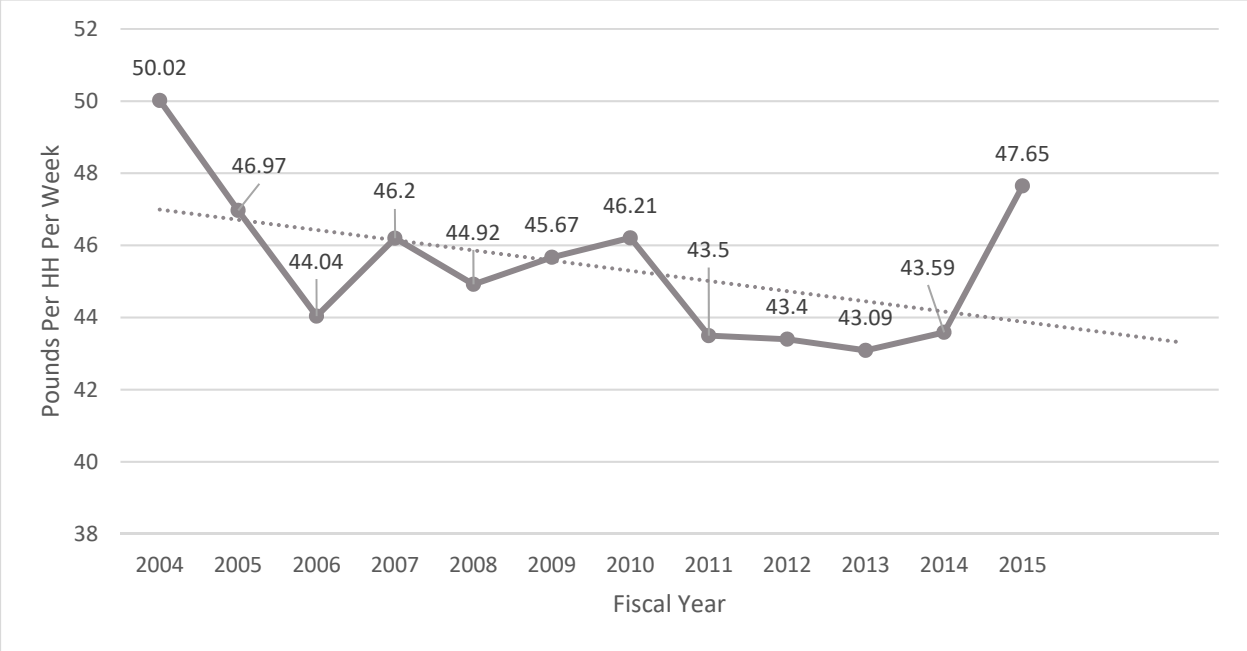


Figure 5-5 Fort Worth Waste Disposal Rates Per Household per Week, 2004 – 2015
Source: TCEQ 2014 Report

The City's waste generation rate has fallen at approximately the same rate as state-wide numbers. A review of data from the TCEQ indicates that the per capita disposal rate, which is similar to the household

data presented above, went from 7.21 pounds per capita per day in 2004 to 6.58 pounds per capita per day in 2014 as shown in Figure 5-6.

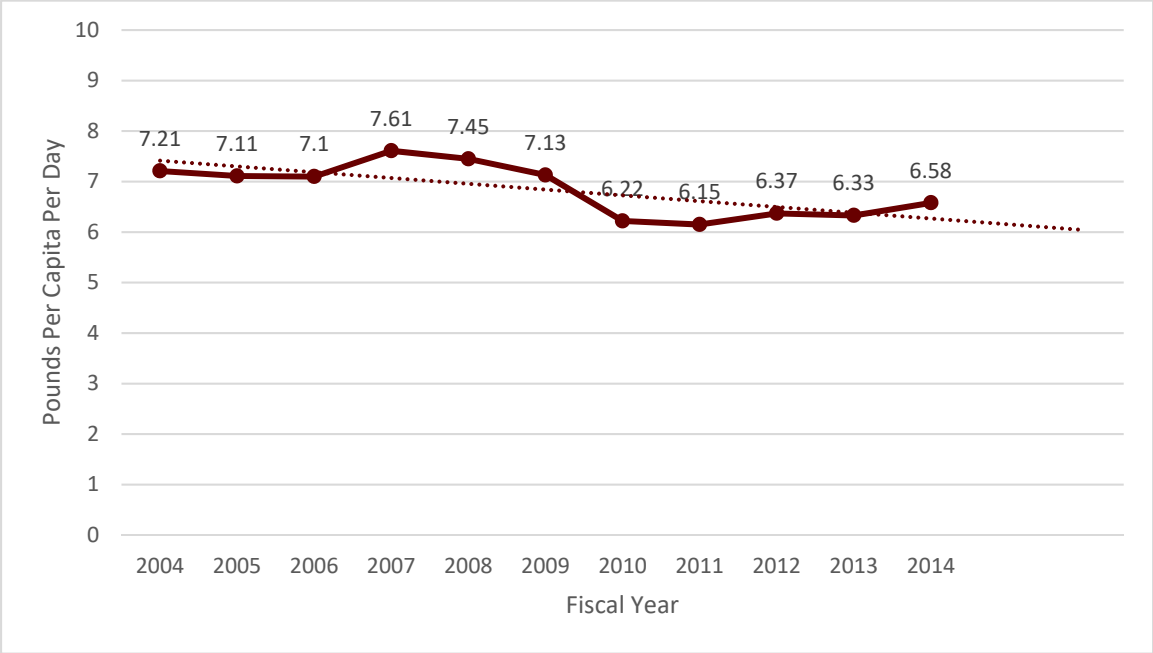


Figure 5-6 Texas Waste Disposal Per Capita per Day, 2004 – 2014

5.6 Ordinances, Rules, and Regulations

Program Description

The regulatory program in City of Fort Worth in regards to solid waste and operations within the city consists primarily of four aspects:

- The Grants of Privilege, which impose certain conditions on the grantees such as hours of operation and the payment of a fee for the ability to provide solid waste collection within the city;
- The multi-family recycling ordinance, which went into effect January 1, 2014;
- The Zoning Ordinance, which has sections related to siting of solid waste facilities and waste management containers and activities allowed on certain land uses and facility types; and,
- Other provisions of City of Fort Worth Code, Chapter 12.5 (Environmental Protection and Compliance), Article VIII (Solid Waste and Recycling) which regulate matters such as enforcement, safety, curbside set-outs, proper containers, hours of operation, fees, etc.

Grants of Privilege

The Grants of Privilege program collects a fee from waste haulers of 5 percent of gross revenues. This money is returned to the General Fund with the intent to pay for street use. It also places the following requirements upon grantees:

- Operate in an efficient and businesslike manner;
- Comply with all pertinent rules, regulations, laws, and ordinances related to collections;
- Regarding vehicles: must be permitted, proper type, covered, adequately identified, in good repair, and refrain from spilling or spreading vectors;

- Use only proper containers for collecting and transporting waste;
- Assume liability for all costs of repair of public streets, bridges, rights-of-way, and other facilities that are damaged as a result of negligence by Grantee;
- Comply with all rules, regulations, laws and ordinances pertaining to the disposal of solid waste
- Refrain from collecting waste between the hours of 11 p.m. and 6 a.m. saving when an exception has been authorized;
- File quarterly reports on tons of waste and recyclables collected, including separate data for commercial and multi-family accounts; and,
- Maintain minimum levels of insurance.

Multi-family Recycling

The multi-family recycling regulation places a regulatory burden on landlords to create, submit, and implement a plan to provide recycling for facilities with eight or more units. A waiver for compliance with the regulation is available if the landlord can prove recycling is impossible or that none of the residents desire to recycle. There is nothing in the regulation stipulating how the recycling system shall be set up, outlining what materials it shall collect, or requiring any person or persons to participate; although these need to be spelled out in the multi-family complex' plan submitted to the city for approval.

Zoning Ordinance

At present, the Zoning Ordinance primarily addresses siting of waste management facilities and reflection of waste management areas on site plans, as summarized below:

- Chapter 4, Article 3: Within a Planned Development district, the location of garbage containers and the screening thereof must be shown on site plans; and, a landfill or recycling center is a permitted land use within a Planned Development district;
- Chapter 4, Article 4: No new waste disposal facilities shall be permitted with 10,000 feet of any airport unless approval is obtained from the FAA, and expansions of existing land disposal facilities within these distances shall be permitted only upon demonstration that the facility is designed and will operate so as not to increase the likelihood of bird/aircraft collisions;
- Chapter 4, Article 7: Developers of Residential Districts who bear a streetscaping requirement can use trash containers to comply with such requirement;
- Chapter 4, Article 8: Contains a table showing non-residential land uses and the district types in which they are permitted; a landfill, recycling center, household hazardous waste or waste tire facility are permitted only in a Planned Development district;
- Chapter 4, Article 11: A listing of district types and activities that are and aren't permitted therein; in an Industrial Park, activity shall not disturb others or cause a nuisance with its solid waste, discharge solid waste into the environment, nor openly burn solid waste;
- Chapter 4, Article 12: Contains a table showing the uses permitted within the form based/mixed use districts; a landfill, recycling center, household hazardous waste or waste tire facility are not permitted in any of those districts;
- Chapter 4, Article 13: Developers of Form Based Districts who bear a streetscaping requirement can use trash containers to comply with such requirement;
- Chapter 5: Supplemental Use Standards, provides specific restrictions or permissions for various land uses; for example,
    - A Bed & Breakfast may not use a dumpster to contain its waste;

- Trash collection and compaction of commercial waste may not occur within 100 feet of residential property (see Figure 5-7 for diagram example of setbacks); and,
- Automated collection vending machines and small collection facilities, not to exceed 500 square feet, for recycling aluminum cans, glass, grocery bags, plastic bottles, magazines, newspapers and other comparable materials may be permitted in accordance with the use tables in Chapter 4, Articles 6 and 8.

- Chapter 6: Sets restrictions of activity when a property is being developed; for example,
  - Garbage containers cannot be located on bufferyards (open or landscaped areas segregating incompatible land uses on adjacent properties);
  - Waste cannot be accumulated in tree protection areas; and,
  - Screening for commercial/institutional uses shall include screening of refuse handling facilities, including refuse disposal and recycling with permanent opaque walls or wooden fences on all sides.

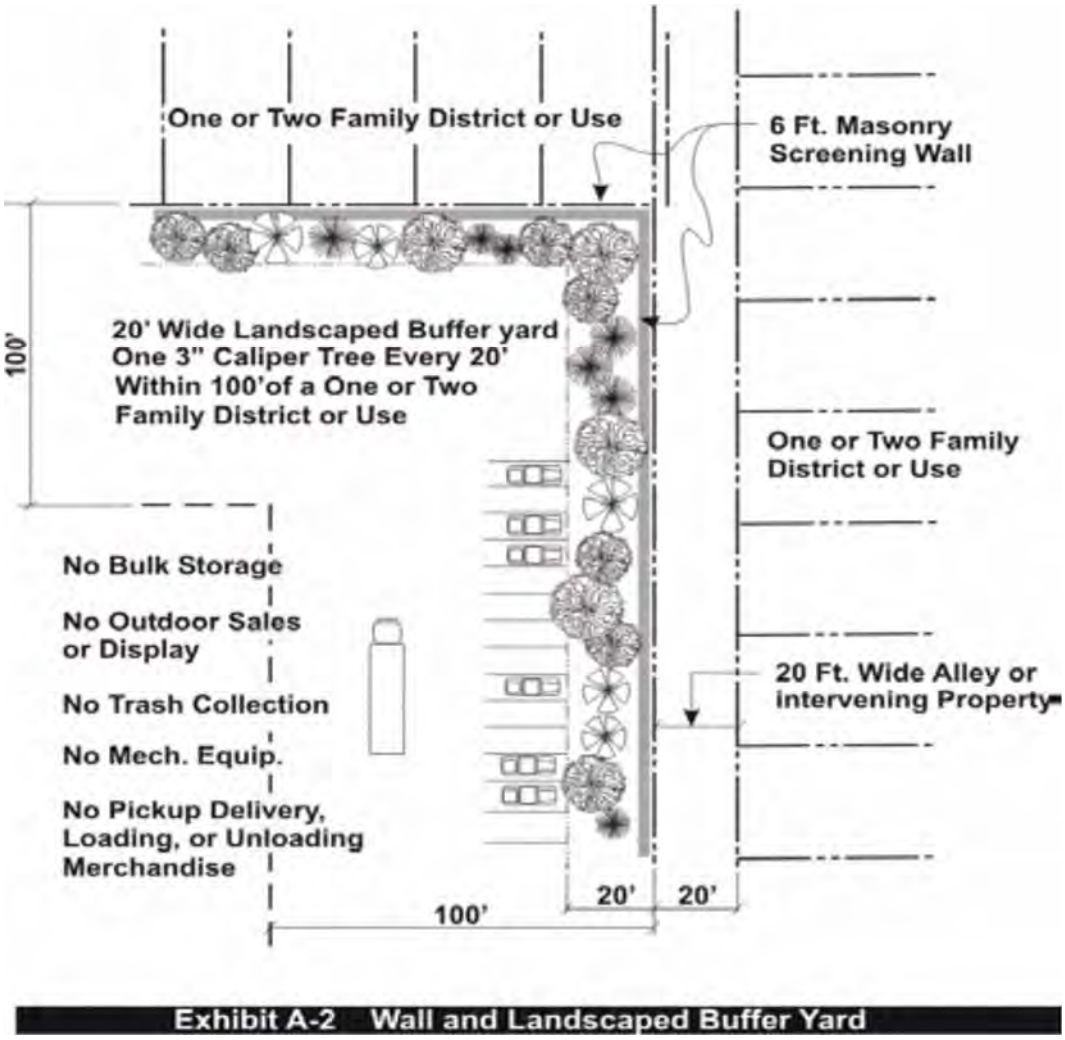


Figure 5-7 Diagram of 100' Setback for Large Retail Stores, Chapter 5, City of Fort Worth Zoning Ordinance

Chapter 12.5 Article VIII

The remaining sections of the solid waste code generally serve to give instructions, ensure safety, set fees, protect quality of life (e.g. controlling noise and vectors), and spell out the administrative functions of the law.

Current Goals and Standards

Aside from the fact that the Grants of Privilege system and increased multi-family recycling were called for in the current 1995-2015 Plan, as discussed above, there were no direct goals or actions related to regulation. Best practices for solid waste regulation vary widely, and are influenced heavily by local traditions, mores, and politics. While municipalities commonly have regulations regarding sanitation, collection vehicles and containers, business permits, and land use, intangible factors can influence the presence or absence of regulations requiring individuals or businesses to take certain actions. For example:

- Communities may have longstanding traditions regarding the disposal of waste, including a "kitchen sink" approach to putting materials at the curb, self-hauling to "the dump," informal but accepted curbside scavenging, or a strong culture of charitable donation and/or reuse. Solid waste systems that do not consider these traditions could meet with resistance.
- The "right" to throw away something one no longer wants may be seen as fundamental, meaning that laws that restrict the ability of an individual to do so—such as requiring recycling—are "wrong." This can be especially true for laws requiring action by businesses, where recycling may be painted as a "burden" for businesses that they should not have to do.
- Alternatively, there may be a strong local value placed on environmental conservation, and the political will of the population may be that reducing waste and protecting the environment is a good and proper use of government action, resulting in more and stronger laws and the enforcement thereof.

Therefore, when considering a regulatory program, a municipality must weigh not only the costs and impacts, but also how the regulation can be successfully implemented by considering local needs, attitudes, traditions, and goals.

Program Evaluation

As described previously, within two years of the law going into effect, 545 multi-family housing complexes have complied with the requirement to plan for and implement recycling programs. The fact that this compliance includes 105 complexes—or, 19.2 percent of the regulated community—requesting waivers for the regulation, especially since its requirements are quite minimal, is not ideal. In addition, as noted, the ordinance has no service capacity requirements nor does it specify which products must be recycled. Therefore, the regulation does not ensure that apartment residents are provided a similar level of recycling service as single family residents, or even that the service they are provided is convenient or adequate.

The Zoning Ordinance currently focuses primarily on containing nuisances, protecting parties from non-compatible uses on neighboring properties, protecting active aviation airspace, shielding residences from inappropriate waste collection activity, and describing which type of district in which solid waste management facilities may operate. The Zoning Ordinance does not currently address other waste management matters as other municipalities have, such as:

- Requiring recycling containers for use by occupants at one or more land use or District types;

- Mandating sight or walking distances for such containers from the users and occupants; or,
- Specifying in the streetscaping burden on developers that compliant trash receptacles must be accompanied by recycling receptacles.

The Grants of Privilege program has been successful in accomplishing two feats which a simple permitting ordinance likely would not: finding an appropriate and reliable funding source for the City to offset the impacts of the collectors' operations, and requiring reporting from haulers. There is room for improvement, however. The funding is not currently used for solid waste management purposes, which would be appropriate for furthering the intention of the Privilege. In addition, the required reporting would be more beneficial to the City as a technical assistance tool if it were more robust.

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September 2017

2017-2037 Comprehensive Solid Waste Management Plan
Appendix E - Recommendations

RETHINKING WASTE For a Greener Fort Worth

GBB SOLID WASTE MANAGEMENT CONSULTANTS

AZ&B

OCG|PR OPEN CHANNELS GROUP

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Introduction

In this task, Gershman, Brickner & Bratton, Inc. (GBB) worked collaboratively with the City to craft recommendations in each of the areas analyzed during the Program Evaluation task. The recommendations draw on feedback from the public, input from the City, and solid waste industry experience, including best practices. Accompanied by implementation plans, these recommendations form the core of the Comprehensive Solid Waste Management Plan (CSWMP) document.

All of the recommendations are organized by the following Categories:

All of the subsections within those categories are listed in the same order as in the Program Evaluation[1], and the content is organized as follows:

Recommendations

Descriptions of the recommendations, including any new goals or standards associated with the recommendation and how the new goal should be evaluated.

Impacts Analysis

Policy or Regulatory Analysis

Landfill Diversion Analysis

Economic Analysis

Other Analysis (Jobs, GHG)

Implementation Schedule

Brief indications if each recommendation should be implemented in the Short-term (1-5 years), Mid-term (6-10 years) or Long-term (10-20 years).

This format includes any policy or regulatory considerations that may be needed, and costs versus benefits will be discussed.

Having reviewed the existing facilities owned or operated by Fort Worth and those available from private industry, this document contains recommendations regarding solid waste processing facilities, including transfer stations, landfills and all their attendant operations, material recovery facilities and other recycling facilities, mulching and composting, energy-from-waste facilities, conversion technologies, and the needed capacity for the planning horizon and focus especially on alternatives other than to landfill.

[1] There is one exception: the section about dead animal management, within Section 1, "Services to Residents," was moved up to directly follow the section about litter abatement. Please see Section 3.4. This was done due to the operational similarity of litter abatement and dead animal management, and for clarity of reading.

For collection and drop-off services, recommendations have been prepared that ensure all residents and businesses have access to recycle and properly manage as much of their waste as possible. Recommendations will be provided for how the solid waste program can help build resource-based economies to expand not only recycling but value extraction and re-manufacturing, commercialization of compost and mulch operations, support of emerging alternative fuel networks, and promotion of reuse, repair, and reclamation enterprises.

The recommendations were originally developed as a working draft. Their content was reviewed after additional public input, and they were shared at an open house to receive feedback from members of the City before being finalized for the CSWMP.

1. Services to Residents

1.1. Curbside Collection of Garbage and Recycling

Recommendations

Continue and Improve Curbside Garbage and Recycling Service

The City should continue to improve its program of providing high quality, comprehensive curbside collection of garbage and recyclables. Various program enhancements have been identified and incorporated below. In addition, the City should continue to expect the contractor to demonstrate continued improvements to reduce missed collections and reported placement issues after servicing.

Improve Recycling Participation

It is recommended that a goal of 90 percent participation in recycling be established. Participation is defined as setting out a correctly-prepared recycling cart at least once monthly. This should be observed and evaluated by the contractor, using Radio Frequency Identification Devise (RFID) tags, in-cab counters, or other method(s) as appropriate.

Transition to Larger Recycling Carts

Over time, the City should introduce the concept of having a recycling cart that is even larger than one's garbage cart. The first phase would be education and outreach about the fact that at any time residents can switch to a 96-gallon recycling cart at no charge. This outreach would be to already-engaged recyclers. The next phase would be outreach messages to "some-of-the-stuff, some-of-the-time" recyclers who might recycle more given the capacity. Finally, the City would evaluate how to make the 96-gallon recycling carts part of a long-term strategy for increasing participation and decreasing contamination, and making the 96-gallon recycling cart the standard.

Reduce Recyclables Contamination

The City's current recyclables contamination rate is approximately 20 percent. It is recommended that an aspirational goal of less than 10 percent contamination be established, separate from actual contractual limits. This contamination rate should continue to be assessed quarterly by the City through an audit at the MRF. Periodic audits of randomly selected recycle and waste carts should take place in order to provide detailed analysis of contamination and/or total available recyclables.

Develop Targeted Education and Outreach

The recent City of Fort Worth Waste Characterization Study documented the contamination issues with the City's residential recycling program. To discourage simple contamination of the recycling carts with non-recyclables, the City should continue its "Blue Crew" program of auditing recycling set out rate and actions. The reports and findings of this program should be used to create more targeted outreach and educational materials and contacts. The City should also examine the existing regulations regarding contamination and properly enforce them, as provided for in the City's Code of Ordinances.

Build Partnerships to Divert Usable Items from Disposal

Many castoff items can be reused or recycled through specialty programs. Examples of these materials include textiles, clothing, shoes, pots and pans, small appliances, furniture, and toys. Processing and reuse or recycling of these materials is done by both for-profit and non-profit organizations. The City should

seek out ways to work with partners or contractors to collect these items at the curb, as a more convenient alternative to drop offs or special collection events.

Consider Removing Glass from Single Stream Collection

Glass breakage during single-stream collection and processing often results in significant glass quantities in residue from material recovery facilities. Glass could be removed from the single stream collection program and collected at the City's drop-off stations. The City should evaluate the impacts of glass removal from the single stream collection program. Container glass constituted 15.8 percent of the source-separated recyclables in the 2014 waste composition study. MRF audits in 2015 and 2016, which measure sorted materials marketed by the MRF, glass constituted more than 22 percent of the materials. Programs in other cities have shown that well-engaged residents will bring glass containers to a dedicated drop-off location, and therefore that 15.8% will not all be "lost" to disposal. Some communities found that when they launched glass-only programs in partnership with the processor, their glass recycling tonnage increased. For example,

- Salt Lake County, UT, accepts glass separately at drop off locations or residents can subscribe directly to the contractor for monthly curbside collection for about $8 per month. The glass is processed into cullet and developed into many recycled bottles or other products.[2] From 2014 to 2016, the Salt Lake County recycling rate increased 6 points to 22 percent.[3]
- Kansas City, MO, collects glass separately at drop off centers and in its curbside program. The contractor processes about 40,000 tons of glass annually into cullet. This represents about 20 percent of the glass in the waste stream; when the glass was collected commingled with other materials, the glass recycling rate was 5 percent.[4] In 2016, Kansas City residents recycled more than 30,000 tons of waste, keeping 30 percent of household trash out of landfills.[5]
- Boise, ID, removed glass from its recycling program in 1996 due to marketing difficulties. In 2009, they developed a partnership with an abrasive manufacturer to offer free glass drop off or optional monthly curbside collection of glass for an additional fee. Since 2011, the program has collected about 37,000 cubic yards of glass. The City estimates that it gets more glass now than when it previously collected it commingled, and the quality is far superior. The City's recycling rate varies seasonally from 27 to 32 percent, which does not include any organics diversion. [6]

Diversion Goals

The current residential diversion rate is approximately 21 percent. In a 2014 waste characterization study, about 23 percent of material discarded as garbage might have been recycled in the single stream program. With near-universal residential access to a comprehensive curbside recycling program, the City should have a short-term goal to increase the residential recycling rate to 30% or higher by 2021. Moving forward, the City should adopt the following goals:

- In the mid-term, recycle 40 percent of all waste by weight generated in Fort Worth (including the residential and the ICI sectors) by 2023, and recycle 50 percent of all waste by weight by 2030.

[2] http://utah.momentumrecycling.com/products-made-from-recycled-glass/
[3] https://slco.org/uploadedFiles/depot/publicWorks/recycle/resources/recyclePamphlet.pdf
[4] http://www.bizjournals.com/kansascity/news/2016/09/14/ripple-glass-growth.html
[5] http://kcmo.gov/news/2017/city-celebrates-earth-day-with-recycling-event-april-22/
[6] http://curbit.cityofboise.org/other-services/glass-collection/ and phone conversation with Boise Solid Waste Program Manager Katherine Chertudy on June 6, 2017.

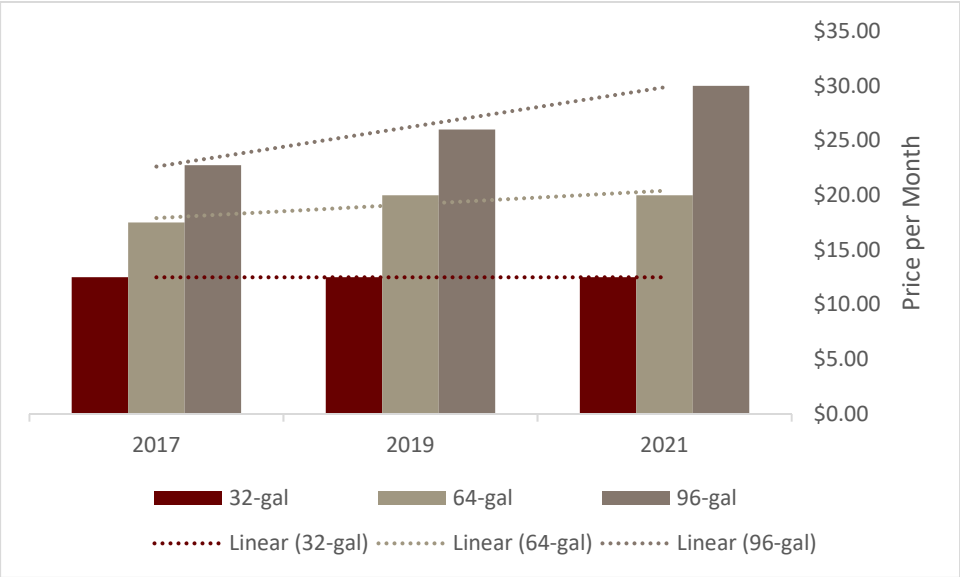
- In the long term, divert from landfill disposal (incorporating recycling, reuse, waste reduction and waste-to-energy activities) **60** percent or more of all waste by 2037.
- Ultimately, evaluate adopting goal of total diversion of 80 percent by 2045.

Encourage Residential Right-Sizing of Carts

Most residents have garbage carts that are 64 gallons or larger, which should be adequate weekly capacity. To encourage recycling and discourage people from using the 96-gallon carts, the City should adjust the per-gallon pricing on carts to make the 96-gallon carts proportionately more expensive than the 64-gallon carts. Currently, the reverse is true—at 24 cents per gallon per month, the 96-gallon cart is disproportionately the cheapest per gallon, and just a nominal $5 more per month.[7]

GBB recommends that the City adjust the pricing on the carts to a pricing structure where each larger sized cart is increasingly more costly , thereby making the largest carts *much* less affordable than presently and significantly higher in price than the 64-gallon carts, with the intention of discouraging their use. To spread out the price increases over time, the City should phase in the price changes over four years via two price adjustments—one every two years. Figure 1-1 demonstrates how each progressively larger cart would be adjusted over time to render the largest carts to be the most expensive. Table 1-1 (next page) shows the details of the example: keeping the 32-gallon cart at its 2016 price; increasing the 64-gallon and the 96-gallon cart in the first adjustment; and, increasing the 96-gallon cart again in the second adjustment. Ultimately, the 64-gallon cart would be more than one and a half times the cost of the 32-gallon cart, and the 96-gallon cart would be one and a half times the cost of the 64-gallon cart.

Figure 1-1 Demonstration of Price Adjustments Over Time



[7] The 64-gallon cart is 27 cents per gallon per month and the 32-gallon cart is 39 cents per gallon per month.

Table 1-1 Hypothetical Revenue Impacts of Adjusting Garbage Cart Pricing

	32 gallons (max 150 lbs.)	64 gallons (max 200 lbs.)	96 gallons (max 250 lbs.)
2017 pricing			
2016 monthly price	$12.50	$17.50	$22.75
Adjustment #1 (years 1-2)			
New monthly price	$12.50	$20.00	$26.00
Adjustment #2 (years 3-4)			
New monthly price	$12.50	$20.00	$30.00

Philosophically, this is an equitable way to fund new and expanded waste diversion programs, because those who generate the most waste pay the most per month. Adjusting the price of the larger containers, however, would increase annual garbage cart revenues potentially by millions of dollars. This is a challenge to the price adjustment, as it could be construed as a "money grab" rather than an effort to improve waste diversion and self-fund such strategic solid waste management efforts.

As part of any campaign and price adjustment, an education program should be developed. The program could be modeled after the "Trash Troubles" class taught to violators of solid waste ordinances in the past. Such a program would help residents "to recycle more and to recycle right."

Maximize Waste Minimization

Through the City's PAYT-based program, individuals are financially incentivized to recycle more and reduce their weekly volume of trash and utilizing a smaller trash cart. To take the current program one step further for those individuals that truly challenge the norm of average solid waste generated, the City should evaluate the benefits of the WasteZero "bag-based" PAYT program – to work in tandem with the City's PAYT program – for residents that can reduce their weekly volume to less than a 32-gallon cart.

Impacts Analysis

Policy or Regulatory Analysis

The City Council would need to establish the recycling goals as City policy. An amendment to the collection contract may be needed to address the additional recycling participation data collection and reporting.

Landfill Diversion Analysis

Increasing participation from 70 percent to 90 percent of households realizes a 28.5 percent increase in participation. In FY14-15, there were 48,971.32 tons of recyclables collected at the curb. If that increased by 28.5 percent, as shown in Figure 1-2 below, it would have represented almost 14,000 additional tons in FY14-15, and nearly 4 percentage points on the recycling rate.

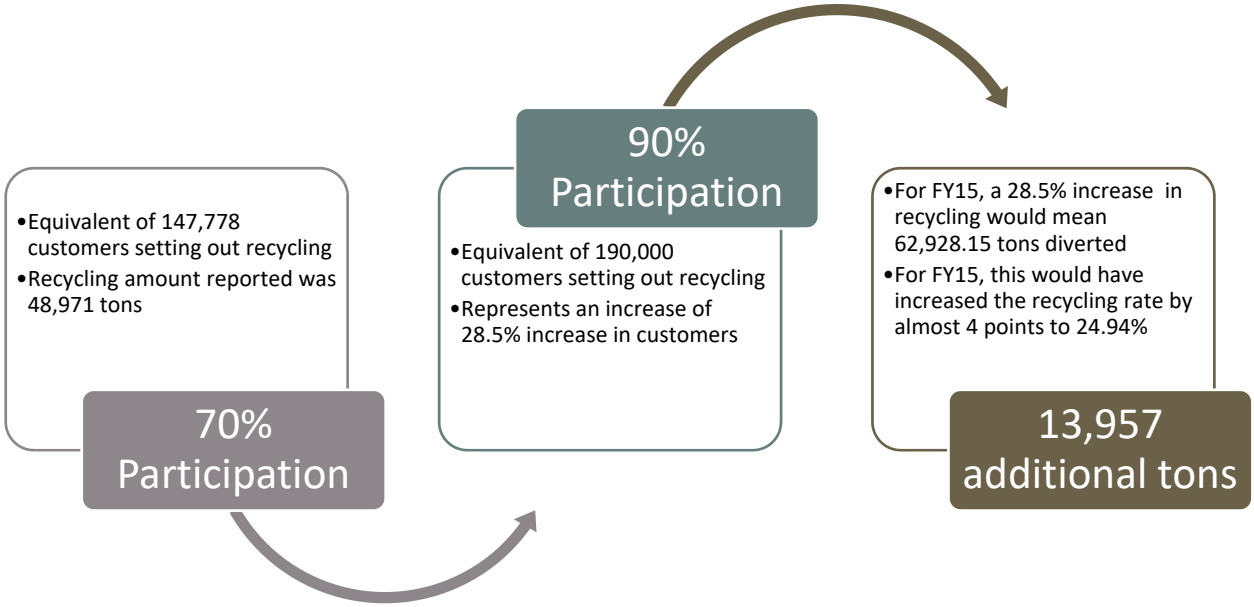


Figure 1-2 Calculation of Potential Impacts on Increasing Recycling Participation in Fort Worth from 70 Percent to 90 Percent

Economic Analysis

Reduced recycling contamination will improve the value of the collected recyclables. While market prices of materials fluctuate, the value of material which is less contaminated—and therefore cleaner and more accurately sorted—is reliably superior to contaminated material. In addition, there is the avoided disposal cost as waste of properly sorted recyclables. If 14,000 additional tons of recyclables had been collected in FY15 through improved participation, the avoided disposal costs to the City would have been approximately $243,000.[8] These additional, properly sorted recyclables, would have had market value, also. There would have been an estimated $243,320 revenue from the sale of 14,000 tons of material, based on a 2015 average blended value of $17.38 per ton, excluding processing fees.

Other Analysis (Jobs, GHG)

The Institute for Local Self Reliance calculates that each 10,000 tons per year (TPY) of household recycling generates 25 manufacturing jobs, in addition to 10 MRF jobs, versus just 1 landfill job. Therefore an additional 14,000 tons of recycling could create 49 jobs just in sorting and manufacturing,

An additional 14,000 tons of recyclables would save water spent in manufacturing, reduce GHG resulting from landfill disposal, reduce by hundreds of thousands the number of trees harvested to make paper and packaging, and avoid thousands of tons of mining waste from being generated. The public input process

[8] 14,000 tons per year x $17.37 per ton = $243,180 per year

for the CSWMP has shown that residents of Fort Worth are concerned about energy and water quality. Figure 1-3 shows some impacts of recycling beyond waste management.

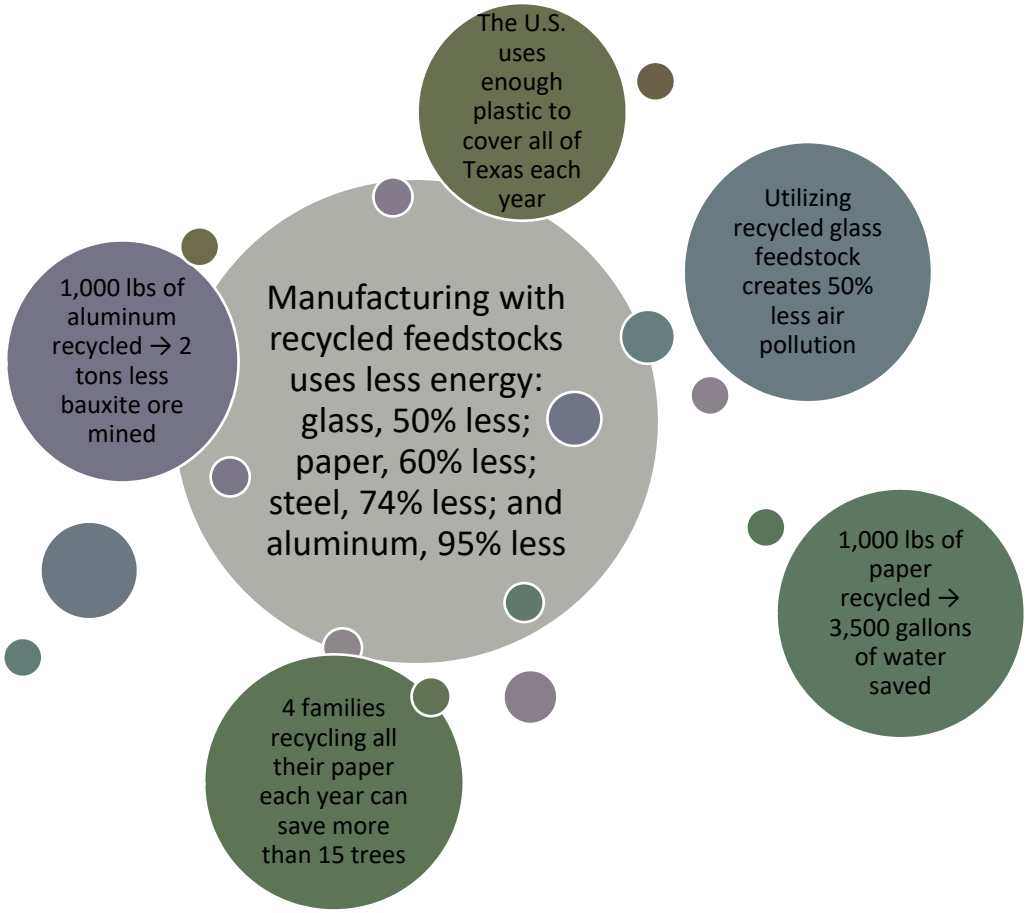


Figure 1-3 Environmental Impacts of Recycling (Source: University of Massachusetts; GBB)

Implementation Schedule

Continue and improve garbage and recycling collection service: Short-, Mid-, and Long-term

Improve recycling participation: Short- to Mid-term

Transition to Larger Recycling Carts: Short-, Mid-, and Long-Term

Reduce recyclables contamination: Short-, Mid-, and Long-Term

Develop targeted education and outreach: Short-, Mid-, and Long-term

Consider removing glass from single stream collection: Short- to Mid-term

Recycling goals: Short-, Mid-, and Long-term

Encourage residential use of right-sized garbage carts: Short to Mid-term

Evaluate Waste Minimization Program (bag-based PAYT): Short-term

1.2. Bulk Collection

Recommendations

Continue and Improve Curbside Bulk Collection

The City should continue and improve its program of providing high quality, comprehensive curbside bulk collection, and evaluate the customer service aspect of such service in the manner in which it does with garbage and recycling collections (misses, surveys, etc.).

Enforce No Yard Waste in Bulky Item Collection

To address the issue of yard debris being mixed in with the bulk set-outs, the City should enforce the provisions it already has disallowing such practice. Residents have weekly access to yard waste collection which includes branches and limbs up to 8 feet in length and 4 inches in diameter, and up to 10 cubic yards per week. There is simply no need to commingle yard waste with a bulk set-out. If customers have larger limbs, trunks, or stumps, those should be set out for special collection physically separate from items such as furniture and appliances. Possible tools for enforcement include tag-and-leave procedures, or assessment of a penalty for an improper set-out. Implementing this separation by the residents and collection by Waste Management, could lead to establishing one specific day a month for setout and collection of true bulky waste items, reducing the days staged from ten (10) to seven (7), and improving the cleanliness of the neighborhoods. Program would be evaluated based on number of improper set-outs.

Evaluate Bulk Reuse Opportunities

The City should partner with charities like Goodwill Industries, The Salvation Army, or local nonprofit(s) to promote reuse options for bulk items. The City could post a site map for all known and partnering charities to help residents identify locations that are closest to their residences. Alternatively, the City could develop a program or work with a nonprofit partner to provide triage and sorting of collected items before dispatching them to one or more charities. Program would be evaluated by asking the charities to report to the City how many calls for pick-ups they had from City customers, or how many pounds (tons) of material the City diverts to reuse from what it collects.

Impacts Analysis

Policy or Regulatory Analysis

The City already has a policy against yard waste being collected with bulk, however this policy is not enforced through the current residential agreement with Waste Management. The City will need to educate its residents on staging brush separately from bulk waste and enforce the existing policy through an agreement modification with Waste Management.

If the City were to ban disposal of yard waste in the landfill, it would require a permit modification per 30 TAC 305.70, amendment to the service agreement with Republic Services, and a new or revised City ordinance.

Landfill Diversion Analysis

The recommendations will have a positive effect on landfill diversion. Yard waste that used to get mixed with bulk should get properly set-out and therefore recycled; bulk will be better able to be diverted for reuse or recycling when not mixed with yard waste. City reports show that, on average, more than half of material set out for “bulk” was actually brush—about 30,000 tons of material—and most of the set-outs

were 50 percent brush or more. If an additional 30,000 tons of material had been recycled instead of disposed in FY14-15, it would have represented more than 9 additional points on the recycling rate, bringing the figure to 29.80 percent.

Economic Analysis

The City will realize avoided disposal costs of yard waste going to landfill now being properly recycled. Yard waste processing cost is less expensive than disposal cost (a $5.18/ton differential as of September 2015).

Yard waste collection will become more cost-efficient, moving collection capacity from expensive bulk routes to cheaper yard waste routes.

Every ton that is deposited in a landfill for disposal is assessed a Municipal Solid Waste Reporting and Disposal Fee of $0.94 by TCEQ. Because of the current yard waste program, the landfill gets a 15 percent credit against the other landfill fees paid to the state, up to the value of the compost operation. It is not a cash rebate or refund, but it does reduce overall annual costs of the landfill. If the City were to "ban" yard waste from the landfill, the compost credit would be 20 percent - the 15 percent standard compost credit plus an additional 5 percent for a defined ban.

Other Analysis (Jobs, GHG)

Banning yard waste from disposal in the landfill would require more separation and sorting at the site than currently in place. LETCO would need additional positions.

Less landfilling of yard waste and bulk will preserve disposal space in the SELF, and mulching the yard waste material instead of landfilling it reduces unnecessary generation of GHG.

Implementation Schedule

Continue and improve bulk collection: Short-, Mid-, and Long-term

Enforce no yard waste in bulk collection: Short-term

Evaluate bulk reuse opportunities: Short-term

1.3. Incentive Programs

Recommendations

Modify Partnership with Recyclebank

Recyclebank was implemented in 2012. In the first two years of the program, the residential recycling rate did not improve and participation in the Recyclebank program actually decreased. Additionally, in the free answer portion of the survey, the City received negative opinions from residents regarding the Recyclebank program. It is therefore recommended that the City greatly modify its partnership with Recyclebank to utilize some of the tools the program offers but better control how funds are spent. This effort will be evaluated by its accomplishment.

The City should redirect the funds it was spending on Recyclebank to recycling specialists, commercial recycling specialists, marketing specialists, positions to do education, and incentives for residents. This program will be evaluated by the success at maintaining the funds for outreach and education and not redirecting them to other cost centers.

Consider Other Incentive Programs

The City should keep investigating options for recycling incentive programs (there are some growing regional programs) or creating their own like the City of Grand Rapids, MI, has done (My GRPoints, http://www.mygrcitypoints.com/). This effort will be evaluated by a research effort or marketplace review annually.

The City has identified an alternate incentive program whereby the Blue Crew audits determine recycling stars. Individual households would be rewarded through individual audits and monthly drawings. The City would promote this program through media outlets and neighborhood communication and education efforts. In addition, the City would promote a school-based recycling challenge that would reward schools for the increase in neighborhood recycling tonnage/volume (this would be achieved by overlying the existing collection routes with school boundaries).

Impacts Analysis

Policy or Regulatory Analysis

If the Recyclebank program is ended, it will be a change in City policy.

Landfill Diversion Analysis

Modifying Recyclebank partnership is unlikely to have any impact on diversion.

Economic Analysis

Modifying the Recyclebank partnership would free up approximately $1,000,000 for the City to spend on education, incentive programs, and the revision of pay-as-you-throw, including the funding of specialist positions. In addition, additional tons recycled by incentive recipients have a positive economic impact. as described in Section 1.1.

Other Analysis (Jobs, GHG)

Feedback on Recyclebank was negative regarding a lack of access to local businesses. An original program, local to Fort Worth, could focus more on providing rewards that people in Fort Worth really want.

Implementation Schedule

Review and Modify Recyclebank partnership: Short-term

Consider other incentive programs: Mid- to Long-term.

1.4. Yard and Food Waste Collection

Recommendations

Segregate Brush from Bulk Collection

Segregate brush from bulky item collection by enforcing an existing policy of not comingling bulk and brush or yard waste. A contract amendment with Waste Management would be required to enforce separated collections bulk and brush/yard waste. In so doing, more yard waste can be diverted from the landfill to mulching or composting.

Pilot-test and Evaluate Residential Food Waste Collection

Develop a residential food residual collection pilot program, possibly co-collecting with residential yard waste, for composting. Gather detailed information from users and about the results, and use that data to evaluate expansion of the program on a subscription basis.

Under-Sink Grinders

Maintain an open line of discussion with the Fort Worth Water Department regarding the technical feasibility of a program to incentivize installation of under-sink grinders in households that do not currently have them.

Expand Master Composter Program and At-home composting

It is the mission of Master Composters to train others in proper composting techniques and the benefits and use of compost. The City should support and expand the existing Master Composter Program. One way to do this is an incentive to get people started composting at home, and then encourage them to train others as Master Composters. The City of Austin[9] offers a 2-step incentive program to help people learn to compost and offset some or all of the cost of a compost bin. Residents can attend a class or watch a video course online. Then they can receive a $75 "coupon" to use at an approved local retailer, or they can purchase whatever bin they want from whatever retailer they like and then apply for a $75 "rebate" from the City.

Don't Bag It

Consider a Don't-Bag-It Program by not accepting grass clippings in plastic bags for disposal. The program would include a period of public education followed by phased enforcement entailing warnings for initial violation(s) followed by refusing to collect improperly prepared at the curb and possible fines.

Evaluate Banning Yard Waste from Disposal in SELF

The City should evaluate the impacts of banning yard waste from disposal in the SELF at least once every five years. The evaluation should consider regulatory requirements and repercussions, and also the possible impacts on diversion, landfill economics, collection systems, and overall costs. If composting is implemented and the composting facility participates in the TCEQ compost refund program, the benefit of an increase of 5 percent of the TCEQ landfill surcharge refund should also be considered. If the analysis supports such a ban, the City should begin an interagency effort to enact such a ban within one year of the finding.

Impacts Analysis

Policy or Regulatory Analysis

Enforcement of not collecting comingled brush and bulk would require a contract change through Waste Management. Residents would need to comply with the existing ordinance requiring segregation of bulk from brush/yard waste.

If the City implements a program to provide economic incentives to residents for installing under-sink grinders, this would also require City Council support and a partnership with the Water Department.

Master Composter is an existing program that will not require changes in policy. The program is not regulated except to the extent that state regulations prohibit the creation of a nuisance or contamination of surface water by back yard composting activities. Master Composters are knowledgeable about how to

[9] http://www.austintexas.gov/composting

compost successfully without creating these objectionable conditions. By promoting increased public participation in back yard composting through the Master Composter Program, the City will be building grass-roots support for any future commercial scale composting that the City may undertake by developing a corps of highly knowledgeable composters who appreciate the environmental benefits of composting.

Residents should be encouraged by the City to mow more often and leave grass clippings on the lawns. Implementation of a Don't Bag It program would require an ordinance.

Landfill Diversion Analysis

The City of Cedar Rapids, IA, allows residents to put compostable food scraps and other household materials like lint and hair in their yard waste carts. In 2015, Cedar Rapids diverted 12.3 pounds per household per week of food waste, representing 25 percent of its MSW, by weight. If Fort Worth diverted an additional quarter of its MSW by weight, the recycling rate in FY14-15 would have been 37.4 percent. If every household in Fort Worth diverted 12.3 pounds of food waste per week, the rate would have been 42.2 percent.[10]

Expansion of the Master Composter Program could have impact on landfill diversion. People who compost at home—even people who previously composted at home but no longer do so—waste less food than people who have never composted.[11] This is an example of how at-home composting reinforces other waste reduction and recycling concepts and behaviors. In addition, growth of at-home composting as a knowledge base or activity among residents of Fort Worth will help pave the way for future possible collection programs for food waste to be composted or converted commercially.

Without back yard composting and residential mulching operation, the volume of grass clippings generated at residences would be significant. During the eight-month growing season, often one to four lawn bags per week per single family household are generated. This is equivalent to approximately 5 to 20 cubic yards of bagged grass clippings per single-family household per year. Fort Worth has approximately 204,000 single-family households[12], so the estimated annual volume of grass clippings if everyone collected their grass clippings for disposal would be over 1 million cubic yards per year. At 400 pounds per cubic yard bulk density, this would correlate to approximately 200,000 tons of grass clippings per year that could end up in the landfill.

Economic Analysis

It is not known how many households currently bag grass clippings for disposal. Therefore, it is not known what the incremental impact of a fully-enforced Don't-Bag-It program would be. However, if 25,000 tons of grass clippings could be diverted, this would represent approximately $400,000 in avoided landfill tipping fees.

[10] All figures for Cedar Rapids sourced from benchmarking interviews conducted by GBB in 2015.
[11] "The Food We Waste," Waste and Resources Action Programme, 2008.
[12] As of September 30. 2015

Other Analysis (Jobs, GHG)

Composting of material creates 3.2 times more jobs than disposal.[13] Facilities that compost, mulch, or recycle natural wood waste employ 4.1 full-time equivalent jobs per 10,000 tons per year of material composted.[14] Extrapolated for 200,000 additional tons of material in Fort Worth, that would be 82 jobs.

Every ton of organic material that is composted and not landfilled returns beneficial nutrients to the soil rather than unnecessarily taking up space in the landfill.

Implementation Schedule

Segregate brush from bulk: Short-Term

Evaluate residential food waste collection: Mid- to Long-Term

Under sink grinders: Short- to Mid-Term

Expand Master Composter: Short-Term

At-home Composting Incentive Program (bin subsidy): Short-Mid term

Don't Bag It: Short-, Mid- and Long-Term

Evaluate banning yard waste from disposal at the SELF: Mid-to-Long Term

1.5. Services to Multi-family Residents

The City does not provide services directly to residents of apartments and condominiums because they do not pay the residential user fee. Most agency interactions, such as with regards to the ordinance, are with the property owners. Multi-family residents do receive some services indirectly, such as outreach and education. In addition, as residents, they should have access to recycle as much as any of their neighbors.

Recommendations

Expand Grants of Privilege to Recycling-only Haulers

The City should create a registration or Grant of Privilege for haulers that collect only recyclables, as opposed to companies that collect all waste. This could include single-material haulers, such as those who collect material on a schedule or a route, but likely not traditional scrap dealers such as metal scrappers or "junk yards." The intention would be to capture information on material that is being recycled or otherwise diverted from disposal for use in future data reporting with regards to a diversion rate. Accordingly, the annual fees paid by Privilege holders would be waived for such recycling-only haulers.

Recycling Reporting

The City should make as a condition of the Grants of Privilege that commercial haulers report on all recycling activities. This program will be evaluated by the percentage of commercial haulers reporting and should have a goal of 100 percent reporting.

[13] "More Jobs, Less Pollution: Growing the Recycling Economy in the U.S." Tellus Institute with Sound Resource Management, 2011.

[14] "Pay Dirt: Composting in Maryland to Reduce Waste, Create Jobs & Protect the Bay," Institute for Local Self Reliance, 2013.

City MRF Accessible to All Private Haulers

The City should establish access to the City contracted MRF by private haulers. This program will be evaluated by its accomplishment.

Multi-Family Recycling Ordinance

The City should continue with implementing the multi-family recycling ordinance, including collection and approval of recycling plans. Once all the plans are submitted, the City should work with the properties to make sure the plans get implemented, providing technical assistance and correcting problems. The City should instruct the privileged haulers that the quarterly reports required by Section 10 a) and 10 b) of the Grant of Privilege Agreement shall include observations of multi-family properties and their compliance with the recycling regulation. Such reports shall include general observations on use of recycling facilities by apartment dwellers and, as appropriate, specific referrals of properties in need of technical assistance by the City. These goals will be evaluated by 100 percent compliance with the requirement for submitting plans, and 100 percent compliance by the haulers in reporting. In addition, the City should set and evaluate against a goal for providing technical assistance. A goal of at least 1 property inspection per week is suggested.

In the longer term, the City should revisit the multi-family recycling ordinance and use this tool to improve the level of service at apartments and condos: single stream collection, minimum distances for container locations from units, etc.

Site Plan Review Process

The City should require new or amended site plans for multi-family properties to demonstrate adequate storage of and access to garbage and recycling management areas. This effort will be evaluated by its accomplishment.

Technical Assistance Program

The City should establish a Technical Assistance Program to assist commercial haulers with waste reduction, reuse and recycling guidance such as waste audits, financing of on-site recycling equipment, improvements to material segregation and storage, and market assistance.

Alternate Collection Strategies

Traditional source separation of recyclables and collection thereof at multi-family properties has been chronically challenging due to participation, operational, and economic hurdles. The City should continually evaluate alternate means to success for diverting and recycling waste from multi-family residences. For example, if properties and haulers are failing to properly implement recycling systems, the City might consider intervening in the collection market for those customers. The City could create one or more franchises for collection of multi-family properties, and award the work competitively, using procurement tools to ensure compliance. In a less direct intervention, the City could impose ordinances that require alternate processes for collection of material from multi-family customers. Examples might include the “wet/dry” method used in San José, CA, or mandating mixed waste processing of garbage collected from those customers. In both of these theoretical examples, there would need to be a facility available to process such material. Evaluation of this effort would need to be determined at the time it is considered.

Impacts Analysis

Policy or Regulatory Analysis

A change to the Grants of Privilege will require change to the law. Changing the site plan requirements will require change to those regulations. Market intervention such as franchises or operational mandates will require changes to regulations.

Landfill Diversion Analysis

There is significant potential for additional diversion by fully implementing at-home recycling for the approximately 77,000 housing units in multi-family buildings with eight or more units. Assuming 250 pounds of recyclables collected per housing unit per year, this would result in an additional 9,625 tons of recyclables collected per year. Assuming this material is currently going to the SELF for disposal, through future recycling efforts this would represent approximately 11,000 cubic yards of airspace preserved each year.

Economic Analysis

Technical assistance in the field and administration of the multi-family recycling regulation will require volunteers (such as a neighborhood recycling leader), and one full-time equivalent City employee to start, with additional staff added based on proven results.

Other Analysis (Jobs, GHG)

In the interest of service equity, residents of multi-family housing should expect and should receive services similar to those of single-family residents in terms of scope and accessibility.

Implementation Schedule

Expansion of the Grants of Privilege to Recycling-only Haulers: Short- to Mid-term

Modification to Grants of Privilege: Short- to Mid-term

Recycling reporting: Short- to Mid-term

New City MRF accessible to all private haulers: Short- to Mid-term

Multi-family recycling ordinance implemented: Short-, Mid-, and Long-term

Site plan review process: Short- to Mid-term

Technical assistance program: Short- to Mid-term

Alternate collection strategies: Long-term

2. Services to Industrial, Commercial, and Institutional Sectors

2.1. Construction & Demolition

Recommendations

Sustainable Building Standard

Develop or adopt a sustainable building standard and permitting process in coordination with Planning and Development that values source reduction, reuse or recycling of construction and demolition (C&D)

waste and also supports markets for recovered C&D materials for new construction. Compliance with the standard may be implemented on a voluntary basis. However, after a period of monitoring the effectiveness of a sustainable building standard by aggregating quantities of C&D material credited through the program, participation in the program may be made mandatory. Such a standard may be implemented in phases beginning with public buildings and new construction. The City may incentivize participation by rebating a significant fee to participants who meet a given standard.

Monitor the availability of C&D waste processors in the area such as concrete crushers, scrap metal dealers, shingle and asphalt re-processors, and glass processors. Make this information readily available such as on a City-sponsored web site associated with the sustainable building standard program. Pursue partnerships with green building organizations such as the U.S. Green Building Council (the organization that administers LEED certifications—there is a North Texas chapter http://www.usgbcnorthtexas.org/) or Green Built Texas. There is already similar action by the City, as precedent: In March 2011, the City of Fort Worth adopted the 2009 International Energy Conservation Code with amendments as the City's building energy code.[15]

The City should work with the Planning and Development Department to establish a program within the permitting process that encourages, incentivizes or fosters a means to increase the diversion and/or recovery of building materials. An example is the City of Plano. That city offers a C&D recycling program that gives builders, contractors and developers the opportunity to divert concrete, wood, brick and metal, as well as traditional recyclables such as glass, plastics, paper and cardboard from construction sites. It is an incentive-based program, and assesses a monetary deposit based on the project's square footage and project type. City of Plano staff are available to offer assistance through support materials, information and training.[16]

The City should evaluate creation of a C&D MRF similar to Texas Disposal Systems in Buda, TX, or Town & Country Recycling located in Prosper, TX, operated on a closed landfill in the Fort Worth area.

Impacts Analysis

Policy or Regulatory Analysis

Implementation of the above recommendations would require that the City of Fort Worth develop an ordinance requiring or incentivizing certification of construction and demolition projects through either an existing sustainable building standard such as Leadership in Energy and Environmental Development (LEED) or through its own, unique certification program. Phased implementation is recommended over a three year period at a minimum. In addition, implementing a C&D recycling deposit program similar to other municipalities would encourage diversion.

Landfill Diversion Analysis

C&D waste recycled or diverted from landfill is not typically included in a recycling rate due to the mathematical impact on a tons-over-tons calculation. Much of what is C&D cannot be recycled or reused, like pressure-treated lumber or contaminated soil, and C&D is generally disposed of in debris landfills, which are not part of the MSW system. It is unknown how much C&D waste generated in the City of Fort Worth is disposed at the Waste Connections Waste Type IV landfill. However, TCEQ reports in *Municipal Solid Waste in Texas: A Year in Review FY 2013 Data Summary and Analysis* that approximately 17 percent

[15] http://energy.gov/savings/city-fort-worth-residential-and-commercial-green-building-requirements
[16] https://www.plano.gov/928/Construction-Demolition-CD-Recycling

of the municipal solid waste landfilled in Subtitle-D landfills in Texas is made up of C&D waste. Comparatively, the SELF reported to TCEQ in 2014 that it accepted 44,444 tons of C&D waste that year. This represents approximately 8.4[17] percent of the waste disposed at the SELF, by weight; however, it is not possible to determine how much of that was generated in the City of Fort Worth. Therefore, the impact of increased C&D diversion is difficult to quantify. In relative terms, ultimately reducing the amount of C&D waste entering landfills by 50 percent would have a significant impact on landfill capacity at both the Southeast Landfill and the Waste Connections Waste Type IV landfill.

Economic Analysis

The cost of implementation of the above recommendations would primarily be the responsibility of the construction and demolition project owners in the form of increased construction and demolition costs. However, additional construction costs associated with attaining sustainable building standards are very often recouped over time through decreased operations and maintenance costs associated with the buildings. Increased demolition costs may be partially recouped through material sales.

Implementation Schedule

Sustainable building standard: Short- to Mid-Term

Evaluate/implement public-private partnership for the C&D MRF: Short-to Mid-Term

2.2. Commercial Collection

Recommendations

Recycling Services as a Condition of the Grant of Privilege

The City should make as a condition of the Grants of Privilege that private haulers must offer recycling to all commercial establishments in Fort Worth. This program will be evaluated by its accomplishment.

Commercial Hauler Diversion Plans

The City should make as a condition of the Grants of Privilege that commercial haulers provide a Diversion Plan to identify the diversion (recyclables, construction and demolition debris, and/or organics) services that will be provided to commercial establishments and multi-family residential properties. The Diversion Plan shall include, but not be limited to, the types of recyclables that will be collected, the vehicles that will be used to collect the recyclable, the storage containers that will be provided to the commercial establishments, and the markets that will be utilized by the commercial hauler for the collected recyclables. This program will be evaluated by the percentage of commercial haulers submitting diversion plans and should have a goal of 100 percent compliance.

Recycling Reporting

The City should make as a condition of the Grants of Privilege that commercial haulers report on all recycling activities. This program will be evaluated by the percentage of commercial haulers reporting and should have a goal of 100 percent reporting by privileged grantees.

City MRF Should be Accessible to All Private Haulers

The City should use its influence to mandate access to the City contracted MRF by private haulers. This program will be evaluated by its accomplishment.

[17] 44,444 / 529,776 tons = 0.0839

Modification to Grant of Privilege Fees

The City should modify the current Grant of Privilege fee charged to commercial haulers from 5 percent to a tiered system based on the overall level of recycling achieved by the commercial hauler. For example, the Grant of Privilege fee could be 8 percent for commercial haulers recycling 24 percent or less, 6 percent if they recycle 25-49 percent, and 4 percent if they recycle 50 percent or more. Revenues from the sale of recyclables should be excluded from the gross revenues for the purposes of the Grant of Privilege fee calculation.

Diversion Goals

The City should have a short-term goal to recycle 40 percent of all waste generated in the City by weight—the same as the Texas state goal. In the long term, the goal should be increased to 50 percent or higher.

Site Plan Review Process

The City should require new or amended site plans for commercial properties to demonstrate suitable container storage, screening and service access to garbage and recycling management areas. This effort will be evaluated by its accomplishment.

Technical Assistance Program

The City should establish a Technical Assistance Program to assist commercial haulers with waste reduction, reuse and recycling guidance such as waste audits, assisting with the purchase of on-site recycling equipment, improvements to material segregation and storage, service access issues and market assistance.

A commercial recycling section may need to be formed within the Planning Section or Solid Waste Administration to support this effort. Dedicated staff for technical assistance duties will be critical for the implementation of the CSWMP. The responsibilities might include updating regulations and policies; enforcing City code; partnering with community groups, haulers, and other City agencies; providing technical assistance to the regulated community; researching new technology and techniques; and, tracking success and preparing reports. This new agency section may require new staffing. Transferring some of the Grant of Privilege fees paid to the City (currently all such fees are transferred to the General Fund) to Solid Waste may be needed to fund this section.

Cart-based Recyclables Collection for ICI Customers

About 1,000 small businesses currently pay for garbage collection in a cart via the City collection contract. The City should evaluate the operational and financial parameters of adding those customers to recycling collection service, including whether or not to charge for recycling service and what an appropriate charge might be.

Clean-Fuel Vehicles

The City should make as a condition of the Grants of Privilege that all solid resource (refuse and recycling) collection vehicles operated by the commercial haulers be late model, low-emission, clean-fuel (such as CNG or ULSD) vehicles. This should be phased in or special accommodation should be made for small haulers. The Sustainability Task Force can be engaged as a partner to help integrate this requirement into larger sustainability efforts. This program will be evaluated by the percentage of commercial haulers operating clean-fuel vehicles and should have a goal of 100 percent compliance.

Disposal Bans

If the City continues to not reach its recycling goals through voluntary efforts of the commercial haulers and commercial establishments, the City should consider mandating banning the disposal of certain

materials (such as a landfill ban on corrugated cardboard, brush, or landscaping material) as long as processors and markets are reasonably available for those materials. Evaluation of this effort would need to be determined at the time it is considered.

Other Means to Foster Diversion

The City needs to continue to seek other ways to work with both with commercial waste haulers and the ICI customers to explore other means to divert materials. The City should also consider implementing a universal recycling ordinance similar to other municipalities (such as Austin) which would phase in recycling requirements. The City should expand the current commercial services contracted to small businesses to include recycling services and broaden the guidelines for small businesses to participate.

Impacts Analysis

Policy or Regulatory Analysis

A change to the Grants of Privilege will require change to the law. Changing the site plan requirements will require changes to those regulations. Disposal bans would require a new law by the City Council. In addition, to implement a "universal recycling program" the appropriate ordinance would need to be approved by City Council.

Landfill Diversion Analysis

The widespread and comprehensive implementation of commercial recycling would greatly enhance landfill diversion.

Economic Analysis

It is expected that there may be a cost for the commercial haulers to develop and implement commercial recycling services in the City and these costs may have to be passed along to businesses in the City.

Other Analysis (Jobs, GHG)

Additional recyclables collected from commercial establishments saves water from manufacturing, reduces GHG resulting from landfill disposal, reduces trees from harvested to make paper and packaging, and avoids thousands of tons of mining waste from being generated. Clean fuel vehicles will reduce GHG in the City.

Implementation Schedule

Recycling services as a condition of the Grants of Privilege: Short- to Mid-term

Commercial hauler diversion plans: Short- to Mid-term

Recycling reporting: Short- to Mid-term

New City MRF accessible to all private haulers: Short- to Mid-term

Modification to Grant of Privilege fees: Short- to Mid-term

Recycling goals: Short-, Mid-, and Long-term

Site plan review process: Short- to Mid-term

Technical assistance program: Short- to Mid-term

Cart-based Recyclables Collection for ICI Customers: Short-term

Clean fuel vehicles: Short- to Mid-term

Disposal bans: Mid- to Long-term

Implementation of a universal recycling ordinance: Short-to Mid-term

Expand Small Business Collection Services: Short- to Mid-Term

2.3. Yard and Food Waste Collection

Recommendations

Develop Database of Food Residuals Generators
Develop a database of ICI generators who wish to divert food residuals from the landfill. Include location of the generator, and type and quantity of food residual generated. Make this information available to food residual haulers in order to identify areas of increased route density. In general, lack of route density is a significant impediment to the availability of food residual haulers.

Support Food Residual Generators
Develop an aggressive technical support program for ICI generators of food residuals who wish to divert this material from the landfill. Provide start-up assistance and on-going training to generators on how to reduce or eliminate contamination of food residuals bound for a composting facility.

Identify and promote local compost operators
Develop a comprehensive list and mapping of regional compost operators to address both pre- and post-consumer streams to encourage food recycling programs. Educate local businesses about the available opportunities to compost their organic waste. In addition, a listing of food waste collectors operating in the Fort Worth area would need to be developed and promoted to Fort Worth businesses.

Compost Facility Siting Study
Initiate a siting study to identify suitable city-owned property for a new, privately-operated composting facility for yard waste, food residuals, and possible biosolids from the Village Creek Wastewater Treatment Facility.

Compost Operations Procurement
Conduct a procurement process to contract for operation of a composting facility with the capability to process not only vegetative material, but also food residuals from Industrial, Commercial and Institutional generators.

Investigate Co-composting Biosolids
Advance further the discussion with the Fort Worth Water Department regarding the feasibility of co-composting biosolids from the Village Creek Wastewater Treatment Facility and of feeding organic material to the facility's bio-digesters .

Impacts Analysis

Policy or Regulatory Analysis

The City has had a long-standing policy of land-applying biosolids whenever possible. If the City is successful in facilitating a composting facility capable of processing biosolids, and if this activity is deemed to be economically feasible, a change in this policy of land application will be justified. This activity will require close cooperation between the Solid Waste Services Division of Code Compliance and the Water Departments.

The City has typically implemented solid waste management activities through public-private partnerships. If the City were to provide the land for a composting facility, preferable land that it already owns, and contracts for private operation, this would be consistent with current practices.

The brush mulching operation at the Southeast Landfill is located within the permitted area of the landfill. The operation is currently not authorized to process feedstocks other than yard waste. If composting were to be implemented, particularly with food residuals, biosolids, or certain other more complex feed stocks, a landfill permit modification would be required from the TCEQ.

Landfill Diversion Analysis

The ICI community has informed the City that their most pressing need is for a facility in Fort Worth that can accept food residuals for landfill diversion. ICI waste is thought to make up approximately two thirds of the total municipal solid waste stream. It is not known how much of this material in Fort Worth is food residuals; however, a waste characterization conducted in Prince William County, VA, in 2013, showed that about 17 percent of commercial MSW is food waste.[18] What is known, however, is that the ICI community is motivated to develop successful food residual diversion programs including minimizing contamination. The City can support their efforts by facilitating the availability of food residual haulers and properly authorized processors.

Economic Analysis

The City currently land applies biosolids through a private contract at a cost of $57 per wet ton including transportation. In addition, the City spends $130,000 per month for ferric chloride which is required to manage odors at the land application sites. This equates to a total cost to land apply biosolids of $64.09 per wet ton. The economic feasibility of composting biosolids along with yard waste and food residuals is dependent on the process employed and especially transportation cost.

If the landscaping material ban is adopted, the Compost Refund program could generate a 15 percent or 20 percent credit towards the Southeast Landfill state fee of $0.94 per ton disposed at the landfill, up to the total cost of operating the mulch or composting facility. At a disposal rate of 530,000 tons per year, 15 percent of the state landfill fee is $74,730 per year; 20 percent is $99,640 per year.

[18] *Waste Composition Study, Summary of 2013-2014 Results, Prince William County, VA*

Other Analysis (Jobs, GHG)

Composting of material creates 3.2 times more jobs than disposal.[19] Facilities that compost, mulch, or recycle natural wood waste employ 4.1 full-time equivalent jobs per 10,000 tons per year of material composted.[20] Extrapolated for 200,000 additional tons of material in Fort Worth, that would be 82 jobs.

Every ton of organic material that is composted and not landfilled returns beneficial nutrients to the soil rather than unnecessarily taking up space in the landfill.

Alternate Collection Strategies

Traditional source separation of recyclables and collection thereof from some commercial sites, such as retail locations, has been chronically challenging due to participation, operational, and economic hurdles. The City should continually evaluate alternate means to success for diverting and recycling waste from ICI locations. For example, if properties and haulers are failing to properly implement recycling systems, the City might consider intervening in the collection market for those customers. The City could create one or more franchises for collection of ICI properties, and award the work competitively, using procurement tools to ensure compliance. In a less direct intervention, the City could impose ordinances that require alternate processes for collection of material from ICI customers. Examples might include the "wet/dry" method used in San José, CA, or mandating mixed waste processing of garbage collected from those customers. In both of these theoretical examples, there would need to be a facility available to process such material. Evaluation of this effort would need to be determined at the time it is considered.

Implementation Schedule

Develop database of food residuals generators: Short-Term

Support food residual generators: Short-Term

Identify and promote local compost operators: Short-Term

Compost facility siting study: Short-Term

Compost operations procurement: Short- to Mid-Term

Investigate co-composting biosolids: Short-Term

3. Services to the Community

3.1. Away-from-Home Recycling Services

Recommendations

Expansion of "Recycle on the Go" Program

As recycling has developed from a cause to a "nice-to-have" to an essential service, residents increasingly expect to be able to recycle when they are on the go or away from home, just as they are able to discard garbage and litter as they go about their days. The City should expand its "Recycle on the Go" program,

[19] "More Jobs, Less Pollution: Growing the Recycling Economy in the U.S." Tellus Institute with Sound Resource Management, 2011.

[20] "Pay Dirt: Composting in Maryland to Reduce Waste, Create Jobs & Protect the Bay," Institute for Local Self Reliance, 2013.

focusing on making it as easy to recycle as it is to discard garbage. The effort will be evaluated by what proportion of City-owned garbage receptacles are paired with recycling receptacles in pedestrian and outdoor areas under the purview of the City and its partners.

Site Plan Review Process

Many of the waste receptacles encountered each day, however, are planned and implemented by developers and private companies. The City should require new site plans and site plan amendments to show that wherever there will be a public use garbage receptacle at a commercial building, there will also be a recycling bin specifically designed and designated for that purpose. This effort will be evaluated based on accomplishment of changing the site plan requirements and implementation of the change by the City agencies.

Implementation of Keep America Beautiful Best Practices

For all away-from-home efforts, recycling containers should adhere to the Best Practices provided by KAB.

- Recycling containers should be appropriate for the types of recyclables expected to be collected.
- There should be a recycling container directly next to every refuse container to make recycling simple and convenient.
- Restrictive lids, such as small openings, should be used on recycling containers to reduce contamination.
- The City should use clear, simple labels with images and language that are easy to recognize and understand what recyclables can be placed in the bin.
- Recycling bins should be of a consistent color and style throughout Fort Worth to assist with program understanding.

This program will be evaluated by comparing containers to these best practices.

Impacts Analysis

Policy or Regulatory Analysis

Changes to site plan regulations will be required to change those requirements

Landfill Diversion Analysis

Pedestrian areas should yield large amounts of ready-to-drink (RTD) containers such as bottles and cans. If every person in Fort Worth recycled one additional plastic bottle, which weighs less than once ounce, empty, it would be 26 tons. Even if that were repeated every week for a year, it would only raise the City's recycling rate about 1 percentage point. Recyclable items in pedestrian areas are often littered, though, and if 1 fewer plastic bottle per day were recycled rather than littered, it would mean more than 11 tons of plastic was prevented from being littered.

Economic Analysis

The recycling receptacles provided and serviced by the City and its partners will have some capital and operational costs associated with their implementation; however, there may be opportunities to roll those costs into instruments such as franchise agreements and service procurements, or to find grant funding.

Other Analysis (Jobs, GHG)

Visibility of recycling all around one emphasizes its importance at each discard opportunity and reinforces the recycling ethic.

Implementation Schedule

Expansion of "Recycle on the Go" program: Short- to Mid-term

Site plan review process: Short- to Mid-term

Implementation of Keep America Beautiful Best Practices: Short-, Mid- and Long-Term

3.2. Special Event Collection

Recommendations

Recycling Requirement

The City should require Special Events (temporary gatherings of 500 or more attendees) to provide recycling (which could include organics composting) services. The recycling services should include, at a minimum:

- Messaging about recycling at both the point of purchase (such as food vendors) and at the point of discard (i.e., waste management containers or areas), and along the way;
- Prohibiting vendors from selling containers or packaging that will contaminate the recycling stream or confuse attendees;
- Pairing recycling receptacles with all waste receptacles;
- Utilizing recycling receptacles that are easy for attendees to recognize and use; and,
- Ensuring that on-site sanitation staff properly segregate recycling from garbage all the way from the receptacles to the collection points. Waste cans at events and festivals are often serviced by volunteers, day labor, or individuals on work-release (incarcerated), who may not be in direct communication with event leadership or who are not engaged in the details of the event. All workers servicing the waste and recycling bins need instruction on taking care not to mix the garbage and recycling. Event organizers also need to ensure that the recyclable materials are properly routed from the event site to a MRF by whatever company or organization removes the receptacles from the event site.

Persons or groups seeking to host a Special Event should be required to develop a Recycling Plan that would address the items above. If organics separation will be required, there must be an appropriate facility available to the event and the site.

Education and Outreach

Regarding other special events, like those at the Will Rogers Memorial Coliseum, and the Texas Motor Speedway, the City should conduct outreach to improve the quality of recycling at those venues and other similar venues.

Impacts Analysis

Policy or Regulatory Analysis

The City regulates Special Events by Ordinance No. 19255-08-2010. Pursuant to the ordinance, persons or groups seeking to hold a Special Event shall obtain a permit from the Public Events Department. Several City departments are responsible for different Public Events: According to the ordinance, The Public Events Department shall be responsible for overseeing the issuance of all permits for Special Events, First Amendment Events, Parades, Neighborhood Events, Neighborhood Parades and events in General Worth

Square. Unless otherwise provided, events occurring in the City's public parks shall be the responsibility of the Park and Recreation Department; events in the Water Gardens shall be the responsibility of the Public Events Department; and events in Burnett Park shall be the responsibility of Downtown Fort Worth, Inc., as contracted with the City. This recommendation will require an amendment to Ordinance No. 10255-08-2010 to include recycling, education awareness and outreach for all future special events.

Landfill Diversion Analysis

The recommendation will have a positive impact on landfill diversion by causing materials generated at Public Events to be directed to recycling or composting processing facilities, instead of the landfill. Given that waste generation at Special Events is dependent on the number of Special Events, the attendance at the events, and the type of wastes generated, it is not possible to quantify the amount of landfill diversion that is possible from this recommendation.

Economic Analysis

There will be additional effort needed by those seeking to hold a Special Event to abide by the City recommended options for recycling, and there will be some increased effort on the City to develop options and review plans.

Other Analysis (Jobs, GHG)

Public-space recycling elevates Fort Worth's identity as a City that values the environment.

Visibility of recycling all around one emphasizes its importance at each discard opportunity.

Implementation Schedule

Recycling requirement: Short-Term

Education and outreach: Short-Term

3.3. Litter Abatement and Illegal Dump Clean-ups

Recommendations

Litter Clean-up Activities and Keep America Beautiful

The Keep Fort Worth Beautiful (KFWB) litter prevention and abatement program is one of the premiere programs in the Keep America Beautiful network. Litter clean-up is not the only goal of KAB affiliates like KFWB, however. In recent years, KAB has embraced public space recycling as an organizational value and cause, and as a way to prevent litter. Texans have long held "not littering" as a value, since the efforts by Texas native First Lady "Lady Bird" Johnson popularizing KAB in 1965, and in particular since the exemplary "Don't Mess with Texas" campaign kicked off in 1985. As part of its messages and programs, KFWB can join KAB in promoting recycling—inherently, proper management of waste—as part-and-parcel of abstaining from littering.

The City should maintain and expand its participation in Keep America Beautiful efforts, including the Cowtown Cleanup and adoption of KAB's recycling messages, including the "I Want to be Recycled" campaign and pursuing ways to connect recycling with not-littering. This program will be evaluated by progress towards accomplishing the following performance levels:

- Continue Cowtown Great America Cleanup on an annual basis, with a goal of maintaining or increasing participation level, currently approximately 1 per 118 residents. In the future, aim to increase participation rate to 1 participant per 100 residents.[21]
- Continue distributing litter cleanup supplies to community groups conducting cleanups.
- Implement a litter cleanup campaign for students to receive community service hours for participating.
- Include recycling messages with anti-litter communications, using KAB materials and messages as a source; at least one message.
- Continue to hold Litter Summits and meetings that would gather stakeholders (public leaders, commercial and non-profit organizations, governmental and quasi-governmental entities, institutions, neighborhood organizations, etc.), set goals, determine measurables, implement said goals and track results.
- Determine the local cost of litter prevention and management.

Garbage and Recycling Receptacles

In addition to outreach, litter abatement programs depend strongly on proper placement of appropriate waste receptacles, so that people can throw away their waste items rather than littering them. It is a natural extension of that effort to make sure there is also proper placement of recycling receptacles, so that people can recycle. Many items that people want to discard while away from home are recyclable—particularly beverage bottles and cans.

Therefore, related closely to the best practices described in 3.1, above, the City should strive to pair garbage cans along pedestrian paths—sometimes referred to as "litter bins"—with recycle receptacles.

- Prepare a plan to identify, fund, and place recycling receptacles in pedestrian areas.
    - The effort should include identifying the pedestrian areas with the greatest levels of littering or with the greatest use of existing garbage receptacles. These areas may be along popular walkways or routes between points. For example, persistent litter spots are often found a few minutes' walk from convenience stores and gas stations along routes to public transportation. As pedestrians finish consuming food or beverage they bought, they often want to discard the packaging immediately rather than holding it until reaching a garbage can.
    - Before placing new receptacles, the City should evaluate the need of various areas by examining the capacity utilization (not just how many times cans are emptied, but how full they are) and, in areas of frequent littering, by employing the KAB litter counting method.
    - Develop a funding level of this effort that is both impactful and sustainable—grant funds may be available on an initial temporary basis;
    - Develop clear signage and labeling for the containers per best practices[22]—research has found simple presence of a receptacle is not sufficient to prevent litter;[23]
    - Implement the container placement plan;
    - Determine how and by whom the receptacles are to be serviced as well as the frequency of service; and,

[21] Current rate reflects participation level of 6,857 individuals and approximately 812,000 residents; future goal rate of 1 per 100 would vary with the population at that time.
[22] Best practices are available from Keep America Beautiful and Eureka! Recycling organizations.
[23] "Littering Behavior in America," Keep America Beautiful, 2009

- Evaluate the effectiveness of the new containers every six months for 2 years by re-examining the capacity usage and/or litter count, adjust collection and method, and frequency as necessary and then evaluate effectiveness once every 2 years thereafter.

This program will be evaluated by setting and achieving annual goals for numbers of containers placed and for year-over-year reduction in litter observed at a targeted site (creating a litter free zone).

Anti-Cigarette Litter Program

The public input efforts conducted as part of this CSWMP process indicated that in addition to being concerned about litter, participants were concerned about water quality. Tobacco products, like cigarette waste, or "butts," are the most-littered material, composing nearly 38 percent of the roadway litter in the country.[24] It can readily be observed that many people who would not otherwise litter will throw cigarette butts on the ground when on foot or in a vehicle. These people probably don't think of cigarette waste as "litter," and many people are unaware that "butts" are made of cellulose acetate, instead believing them to be biodegradable[25] and therefore "harmless," even if they do acknowledge that cigarette litter is unsightly. Cigarette butts are not just unsightly, they can be harmful to water quality and aquatic life when they leach out the chemicals they absorbed from the cigarette smoke. The City should initialize an outreach campaign specifically aimed at cigarette litter and, specifically, the impacts it has on water quality. The program will be evaluated by achievement of creating a cigarette litter campaign and placement of four messages per year, as determined by the annual outreach plan.

Illegal Dump Clean-up

The City should maintain its high level of service and responsiveness to illegal dump clean-ups. In addition to being unsightly and attracting vectors, active dump sites perpetuate additional dumping.

Drop-off Centers

The City should continue its operation of the drop-off stations for residential use, to discourage residents from illegally dumping items or bags of trash.

Dumping Education and Outreach

The City should communicate to residents that they have frequent and free collection for many commonly-dumped items such as appliances, tires, and furniture included in their curbside service or at the drop-off stations, and the illegality of dumping materials in an effort to avoid costs. Through educating the public about the City's cost to abate illegal dumping, residents would be more aware and involved in reporting illegal dumping activities to avoid cost.

Business Dumping

Illegal dumping may be perpetrated by businesses (such as general contractors, small business owners, small clean-up crews, etc.) that are not allowed to dispose materials at the drop off stations or which are without commercial solid waste services. Business dumping can be a complicated set of motivating factors, including perceived lack of access to proper disposal, desire to avoid time and money spent on proper disposal, perception or justification that it is "okay" or a "victimless crime" to dump at particular spots (especially when the dump is cleaned up promptly), and low risk of enforcement or penalties for illegally dumping. To mitigate dumping by businesses seeking to avoid disposal fees, the City should consider the creation of low volume commercial based transfer station or offer City-managed commercial

[24] Source, Keep America Beautiful Litter Overview Fact Sheet, http://www.kab.org/site/DocServer/LitterFactSheet_LITTEROVERVIEW.pdf?docID=9666&AddInterest=1022.
[25] Clean Virginia Waterways, www.cigarettelitter.org

bulk collections to dispose of their materials properly. In addition, the City should evaluate what technologies or techniques could be used to "catch" people using popular illegal dump sites. Examples include adding small businesses to the residential collection contract; providing information on how to contract for service from a legal hauler, including how to calculate how much service is needed; and, information on how to dump at legal locations and the associated cost. Similar to the North Texas Toll Authority publishing the names of the top toll-dodging offenders or "police blotter" publications, the City could consider publicizing businesses caught illegally dumping solid waste.

Impacts Analysis

Policy or Regulatory Analysis

Providing a service for businesses similar to the drop off stations in terms of convenience and cost, installing monitoring technology such as cameras, and enforcing or prosecuting illegal dumping would require policy changes and possible regulatory adjustments.

Landfill Diversion Analysis

Ultimately, some additional tons of recyclables collected from pedestrian areas will be diverted from the landfill, although the larger impact will be on litter abatement, as described in 3.2.

Economic Analysis

Cleaning up litter and dumps is a very expensive way to dispose of solid waste. Resources spent on cleaning up could be redirected, perhaps to servicing the new and additional garbage and recycling receptacles and cigarette stands.

Other Analysis (Jobs, GHG)

Litter and garbage on the ground are issues of which the public is very aware and to which they are very sensitive. Cleanliness of streets and thoroughfares is considered a highly visible indicator of quality of life. This impact can be documented by the City with photographs taken before and after the clean-ups. Neighborhoods should be made aware which clean-ups are City led and which are done by citizens. According to the EPA, discarded items like tires and containers can accumulate water, providing breeding ground for mosquitoes and nesting areas for rodents, both of which are disease-transmitting vectors. Improperly discarded items also contribute to visual pollution, detracting from the attractiveness of both natural and manmade areas.

Implementation Schedule

Litter cleanup activities: Short-, Mid-, and Long-term

Keep America Beautiful efforts: Short-term

Continue Litter Summits: Short to Mid-term

Garbage and recycling receptacles: Mid-term

Anti-cigarette litter program: Mid-term

Illegal dump clean-up: Short-, Mid-, and Long-term

Drop-off stations: Short-, Mid-, and Long-term

Education and Outreach: Short-, Mid-, and Long-Term

Business dumping: Mid- to Long-term

3.4. Dead Animal Management

Recommendations

The City should continue its current dead animal program as it currently stands. It is recommended that the City continue to adopt an objective of completing 100 percent processing of dead animal work orders within 48 hours of receipt. The disposal of dead animals should continue to be done at the landfill.

Impacts Analysis

Policy or Regulatory Analysis

There is no policy or regulatory impact from these recommendations.

Landfill Diversion Analysis

There will be no landfill diversion impact from this recommendation.

Economic Analysis

The dead animal clean-up program costs the City approximately $200,000 per year. Since no programmatic change is recommended, there will be no impact on the yearly cost of this program.

Other Analysis (Jobs, GHG)

Implementation Schedule

The dead animal collection goal of 100 percent completion within 48 hours should be implemented in the Short-term (1-5 years).

3.5. C&D Processing

Recommendations

Monitor C&D Processors

Monitor the availability of C&D waste processors in the area such as concrete crushers, scrap metal dealers, shingle and asphalt reprocessors, and glass processors. Make this information readily available such as on a City-sponsored web site associated with the sustainable building standard program.

The City should evaluate creation of a C&D MRF similar to Texas Disposal Systems in Buda, TX, or Town & Country Recycling located in Prosper, TX, operated on a closed landfill in the Fort Worth area.

Monitor C&D Landfill Capacity

Monitor the remaining capacity of the Waste Connections Waste Type IV landfill through TCEQ annual reporting data.

Impacts Analysis

Policy or Regulatory Analysis

Commercial C&D waste processors such as concrete crushers, scrap metal dealers, etc. are not regulated under municipal solid waste rules. However, C&D material recovery facilities are regulated as solid waste

processors under Type V authorizations. C&D material recovery operations that occur at the landfill are permitted through the Site Development plan and Site Operating Plan addressed in the landfill permit.

In Texas, C&D Waste can be disposed either in Type IV landfills which only accept C&D and inert materials, such as the Waste Connections Waste facility, or in Type I landfills which also accept typical household and commercial municipal solid waste such as the Southeast Landfill.

Landfill Diversion Analysis

It is estimated by TCEQ that in 2013, 17.5 percent by weight of all material landfilled in Texas was C&D waste. In the absence of mandates or policies encouraging sustainable construction and demolition, it is recovered material market prices that drive the level of activity in C&D recycling and reuse. These market prices fluctuate substantially. If the City of Fort Worth were to implement some form of green building standard, either through incentives or mandatory participation, C&D waste recovery would be supported through means other than market forces alone.

In 2015, the Waste Connections C&D Landfill had an estimated six years of remaining capacity. If this landfill were to exhaust its capacity, it would be reasonable to assume that the waste it receives would be directed to the SELF. In 2016, Waste Connections amended its permit, which increased capacity of the landfill by approximately 6.3 million cubic yards of additional capacity. At current rates of disposal, this provides the landfill with capacity to the year 2037.

Economic Analysis

Without additional permitted capacity in the region in Type IV landfills, C&D waste not diverted from disposal will be disposed in Type I landfills. Although tipping fees at the Waste Connections C&D Landfill are slightly higher than the City's tip fee at the Type I Southeast Landfill, this situation is not typical. Type I landfills typically have higher tipping fees than Type IV landfills because regulations governing their design and operation are more stringent and costlier. Therefore, disposal costs for C&D material would probably not increase in the short-term after the Waste Connections site closes because C&D would likely be redirected to the Southeast Landfill. However, in the longer term it is logical to assume that disposal costs for C&D waste will increase if C&D waste is redirected to another Type I landfill in the area after the Southeast Landfill closes. The Type I landfills in the region with longer projected site lives than the Southeast Landfill currently have higher tipping fees than either Waste Connections Landfill or Southeast Landfill.[26] In addition, when Type IV landfill capacity is depleted C&D material diverted to Type I landfills will shorten the lifespan of those landfills, hastening the time at which new Type I facilities must be sited and developed. New Type I landfills are likely to be located farther from the City than the current landfills, resulting in increased transportation cost as well.

Implementation Schedule

Monitor C&D processors: Short-, Mid- and Long-Term

Monitor C&D landfill capacity: Short-, Mid- and Long-Term

[26] Landfills referred to are Hunter Farrell, Grand Prairie, and Arlington; capacity comparison sourced from *Municipal Solid Waste in Texas: A Year in Review, FY2014 Data Summary and Analysis* (TCEQ); tipping fees sourced from *Planning for Sustainable Materials Management in North Central Texas, 2015-2040,* (NCTCOG).

3.6. E-Waste/Specialty/Hard-to-Handle Waste[27]

Recommendations

Extended Producer Responsibility

All computer makers selling products in Texas must provide free recycling of their products; the same is true of television manufacturers (up to either a market share, which was 9.5% in 2015, or by providing a certain number of collections per year).[28] They are accessible to varying degrees of ease, including some which are mail-back programs and others who partner with retail locations for drop-off. The two pieces of legislation that created these programs are intended to create more recycling of these items and take the burden for doing so off of local governments.

Electronics, especially computers and televisions, should be collected and recycled by manufacturers through the policy of extended producer responsibility (EPR). The State of Texas has passed EPR laws regarding the recycling of computers (Texas Administrative Code Title 30, Part 1, Chapter 328, Subchapter I) and televisions (Texas Administrative Code Title 30, Part 1, Chapter 328, Subchapter J). The programs established pursuant to the Texas laws are the Texas Recycles Computers Program (www.TexasRecyclesComputers.org) and the Texas Recycles TVs Program (www.TexasRecyclesTVs.org).

The City should support either the increase of the market share percentages mandated by the State from the manufacturers or the one proposed by the Recycling Leadership Program (a minimum of 200 collection sites offering free TV/computer recycling in the state) in order to be commensurate with current needs - similar to the Washington and Oregon programs.

The City has and should continue to support EPR as a waste management technique for electronics and certain other items, and should continue to do so during the planning period. The City should pursue and support EPR rules and legislation, in addition to supporting the efforts of the Texas Product Stewardship Council and adopting a resolution in support of EPR (similar to the one developed by the Texas Municipal League). To help support the programs, the City should educate residents that computer and televisions can be recycled pursuant to the two State programs. Additionally, residents should be directed to electronics recycling options through the web sites listed above. Residents can also go directly to the Electronic Manufacturers Recycling Management Company (www.mrmrecycling.com), a consortium of many of the larger electronics manufacturers which provides a centralized resource for customers to recycle.

The two State programs do not require collection from sites such as the City's drop-off stations. While Goodwill currently collects these items at the City's drop-off stations, it is understood they may be ceasing that service. The City should work with TCEQ and local businesses (such as Best Buy and Staples) and non-profits (such as Goodwill) to identify a cost effective way to collect and recycle computers, televisions and other electronics at the City's drop-off stations.

Sharps Collection at Drop-off Stations

In addition to educating residents in the proper management of sharps and general medical waste, the City should install sharps collection containers at the drop-off stations.

[27] For Household Hazardous Waste and pharmaceuticals, see Section 3.7.
[28] www.texastakeback.org

Fireworks and Ammunition

The City should continue to direct residents with fireworks or ammunition to contact the Fire Department at 817-392-6850 or FWFire@fortworthtexas.gov to schedule a drop-off or arrange a pick-up of unwanted ammunition, ammunition loading supplies, fireworks, and other explosives.

Impacts Analysis

Policy or Regulatory Analysis

The recommendations do not require new policies or regulations.

Landfill Diversion Analysis

The continued success of these programs and the implementation of these recommendations will continue to divert these materials from the landfill. Diversion of even small amounts has an important impact on the environment due to the highly polluting nature of the materials.

Implementation Schedule

Extended producer responsibility: Short-, Mid- and Long-Term

Sharps collection at drop-off centers: Short-, Mid- and Long-Term

Fireworks and ammunition: Short-, Mid- and Long-Term

3.7. HHW and pharmaceuticals

Recommendations

Household Hazardous Waste Collection

The City should continue the household hazardous waste (HHW) services at the Environmental Collection Center (ECC), the Mobile Collection Units (MCUs), and the interlocal agreements associated with this program. This program will be evaluated by its service levels meeting or exceeding the requirements per population, as in 30 TAC §335.62(a) and illustrated in Figure 3-1.

Figure 3-1 HHW Collection Requirements based on Service Area Population[29]

[29] 30 TAC §332.62(a)(1)

Pharmaceuticals Collection

Regarding pharmaceuticals, the City offers guidance but little in the way of service. There are risks associated with putting medications in the garbage untreated, and also with flushing or washing them down household drains. Although there are instructions provided by Federal agencies such as the Food and Drug Administration and the U.S. EPA regarding how to properly prepare medications to be safely discarded in household garbage, the steps are not user friendly. A November 2015 report by the Journal of the American Medical Association observed significant increases in overall prescription drug use and polypharmacy (use of 5 or more medications) in recent years and continuing trends over the past 15 years. In this context, proper disposal will become a greater issue over time. The City should pursue equitable options to provide easy to use and easy to understand disposal of medications. Possibilities include take-back boxes, distribution of mail-back envelopes, collection events, the promotion of local product stewardship efforts, and the support of EPR legislation to this affect. This program will be evaluated by the increase in the ratio of collection opportunities to population against a goal to be set upon further evaluation.

Product Stewardship

In addition to providing solid waste services, the City should continue to participate in product stewardship interest groups, such as the Texas Product Stewardship Council, and promote extended producer responsibility (EPR) as an alternative to government-provided collection programs for potentially polluting materials. Likewise the City should support national and state HHW and pharmaceutical legislation.

Paint Collection

The City should pursue opportunities for EPR of paint in Fort Worth or Texas as a whole. Paint is one of the materials most frequently brought to HHW programs unnecessarily. Once turned in as "HHW," however, it must be treated as such, sometimes consuming half of a program's budget for no ecological reason.[30] Within three years, the City should refine a legislative position regarding EPR for paint and other hard to handle items and pursue this position at the state or national level. In the meantime, the City should pursue options to collect paint for reuse rather than as HHW, similar to Austin's ReBlend or Plano's Conservation Colors programs.

Impacts Analysis

Policy or Regulatory Analysis

Expansion of take-back boxes for pharmaceuticals will require changes to national policy regarding controlled substances. Shifting focus of electronics recycling to EPR programs could be a policy adjustment. Promotion of EPR for paint is also likely a policy adjustment or creation.

Landfill Diversion Analysis

Continuation of the HHW program and possible expansion of electronics recycling in the City will have ongoing positive impacts on diverting potentially-polluting materials from landfill.

[30] http://productstewardship.site-ym.com/?PSI_and_Paint

Economic Analysis

Destruction of pharmaceuticals costs exceedingly more than landfilling—at an average cost of $1.27 per pound that is over $2,500 per ton.[31] This is in addition to costs to staff locations or events, which often include costly law enforcement personnel to provide security.

Other Analysis (Jobs, GHG)

The materials covered by these programs—household hazardous waste, paint, electronics, and pharmaceuticals—have negative potential environmental impacts if soil, air, water, or people are exposed to them which are belied by their proportion of the waste stream by weight.

Implementation Schedule

Household hazardous waste collection: Short-, Mid-, and Long-term

Pharmaceutical collection: Short- to Mid-term

Paint collection: Short- to Mid-term

4. Solid Waste Management Facilities

4.1. Alternative Energy & Emission Standards

Recommendations

Compressed Natural Gas and Alternative Fuel Trucks and Equipment

Another effort that can reduce both ozone and greenhouse gases is the replacement of diesel with compressed natural gas (CNG) fleets. Waste Management Inc. (WM) needs to replace its fleet with CNG vehicles in accordance with the existing solid waste collection contract. Since September 2014, Knight Waste Services, WM's MWBE subcontractor has already replaced its fleet with CNG vehicles. The City should evaluate the potential of the replacement of its City-owned solid waste vehicles to CNG after the infrastructure has been put in place for the WM fleet. The City and WM should evaluate the use of TERP (Texas Emission Reduction Program) and other funds for expanding the number of CNG vehicles. These funds can be used to assist in the incremental costs associated with the replacement of fleets to lower emission vehicles.

The City should also evaluate the potential of requiring Republic Services to replace the SELF equipment with either CNG or low-emission vehicles.

Landfill Gas-to-Energy

The City of Fort Worth is in a non-attainment area for ozone. There are significant health and economic impacts associated with being in a non-attainment area. According to the U.S. EPA:

> *Breathing air containing ozone can reduce lung function and increase respiratory symptoms, thereby aggravating asthma or other respiratory conditions. Ozone exposure also has been associated with increased susceptibility to respiratory infections, medication use by asthmatics, doctor visits, and emergency department visits and hospital admissions for individuals with respiratory disease. Ozone exposure may contribute to premature*

[31] http://www.recyclingstar.org/txpsc-releases-the-results-of-its-pharmaceutical-collection-survey/

death, especially in people with heart and lung disease. High ozone levels can also harm sensitive vegetation and forested ecosystems.[32]

As part of the City's Southeast Landfill (SELF) permit, it must operate and maintain a landfill gas management plan, although it does not require the implementation of a gas to energy system. The current plan is designed to reduce the amounts of landfill gases that are emitted into the atmosphere. This is accomplished through a series of wells. Once captured, the landfill gas is flared. There are hundreds of landfills in the country that are capturing this gas for energy recovery. Energy recovery can include: (i) conversion of the gas into electricity which can be sold back to the utility used by the City; (ii) use as a combustion fuel; or (iii) upgrade to meet commercial natural gas standards and sold into the pipeline or CNG filling stations.

One measure that can reduce both ozone and greenhouse gases is the capture of methane generated at the Landfill and utilizing this gas for energy recovery. The City should conduct a Landfill Gas-to-Energy Feasibility Study.

The City's landfill agreement currently has provisions for the City to jointly invest with Republic in a gas to energy system. The agreement also provides that both parties will share in the revenues generated from a landfill gas to energy system. Currently, the City and Republic are exploring the options for implementing a gas to energy system. In order to determine when such a project is feasible, the City and Republic should commission an independent analysis of the feasibility of a landfill gas to energy project. Key issues that need to be evaluated in the assessment include:

- Quality of the gas generated at the SE Landfill
- Quantities of gas generated at the SE Landfill
- Capital costs associated with the replacement with CNG fleets
- Operational costs associated with the system
- Energy markets that are most suitable for the gas generated (markets may include conversion to electricity, piping the gas to a nearby commercial or governmental entity that can burn low-quality gas, or conversion of the gas to commercial grade).
- Potential for using Renewable Energy Credits or Texas Emission Reduction Credit Programs
- Facility ownership and operation responsibilities

The current design philosophy of landfills is to reduce as much water from infiltrating the waste as a means of reducing the potential for polluting groundwater resources. Landfills do have to design facilities to meet specific liner requirements which generally include two feet of clay and a HDPE liner. Landfills also include a system for collecting water that infiltrates the waste (referred to as leachate). As a means of enhancing gas recovery potential and to increase the long-term capacity of the landfill, cities such as Dallas and Denton have incorporated leachate recirculation into their landfill design and operation. Generally, the leachate recirculation concept is to increase water throughput into the landfill as a means of accelerating the decomposition process. This in turn accelerates gas generation and also increases the rate at which the landfill subsides, thereby providing room for additional waste within the landfill's permit constraints. Data is still being analyzed to determine the benefits and costs associated with this process. Not all landfills can effectively use this technology. As part of the Landfill Gas-to-Energy Feasibility Study, this alternative too should be evaluated.

[32] http://www3.epa.gov/ozonedesignations/

Photovoltaic Solar on Future Closed SELF

There are a growing number of landfills that are now using the closed areas of the landfill for photovoltaic (PV) solar energy development. PV solar generates electricity. Panels can be placed over the entire area of the landfill and generate electricity. The SELF has a disposal area of 172 acres; however, this does not mean that the entire 172 acres can be used for PV, as there are configuration limitations associated with these types of systems to maximize electric generation. There may be buffer areas of the landfill that could be developed prior to closure of the landfill that should be evaluated for PV, especially if grants funds can be secured for such a project.

A PV System on a closed landfill near Atlanta Georgia. Source: Feasibility Study of Economics and Performance of Solar Photovoltaics at the Vincent Mullins Landfill in Tucson, AZ.

Given the SELF still has a remaining life of 20 years, this is a long-term option for this site; it could be extended even further depending on whether the landfill is expanded in the future. This option could be considered for other landfills in Fort Worth. Over time, it is expected that PV solar technology will continue to become increasingly more efficient in the generation of electricity and cost per Kw.

Waste Conversion Technologies

During the 1980's and 1990's over 150 facilities were constructed to burn waste for energy recovery in the U.S. These mass-burn and refuse derived fuel technologies operate much in the same manner as a coal burning power plant. As of October 2015, there are 80 operating waste-to-energy facilities in the US. The majority of these facilities combust MSW for the generation of electricity which then is sold back into the power grid. These facilities can reduce the volume of waste requiring disposal by 85 to 90 percent. However, these facilities are extremely capital intensive projects. For example a facility to manage the 525,000 tons of MSW disposed of at the SELF, would require a capital investment of approximately $250 to $350 million. The net operating costs for these facilities, including debt service, range from $75 to $100 per ton which is significantly higher than the $20 to $30 per ton disposal fees charged in the north central Texas region. This rate differential is not anticipated to change significantly in the near or mid-term, making waste-to-energy challenging from a fiscal perspective; however, a waste-to-energy option takes the pressure off the SELF as a disposal option and provides a long-term solution to this growing city.

There have been advances in the industry that are designed to improve efficiency and reduce air emissions generated by these technologies. Some of the technologies under investigation now include the following.

- Gasification
- Pyrolysis
- Liquefaction

There are a number of variations on the above technologies. In recent years there have been a number of feasibility studies conducted on these options. While there are operating facilities in Japan and Europe, the assessments performed to date indicate that there are significant technical and economic risks associated with these options. The City should continue to monitor and evaluate these technologies, but they are not anticipated to be feasible in this area in the near to mid-term.

Impacts Analysis

Policy or Regulatory Analysis

If a LFGE system is to be implemented, a landfill permit modification will have to be submitted to the TCEQ for approval. This is not an extensive process.

The State encourages the development and utilization of renewable energy through the renewable energy credit (REC) program. The program requires Texas electric utilities to purchase a certain percentage of their electricity from renewable sources. However, the demand for RECs is low at this time in the state due to the large number of wind to energy projects that are in existence.

There are policies in place at this time that encourage the development of renewable energy sources such as PV solar, however these incentives are less than they were in previous years. At the time a system is deemed feasible, a review of state and federal incentives should be undertaken. The closure and post-closure care plan for the SELF would have to be modified. There is precedence for this application receiving approval. The Tessman Road Landfill in the San Antonio area has an active PV system on its closed area. Sale of electricity generated by the SELF would require coordination with Oncor. The Texas Public Utility Commission (PUC) is responsible for regulations related to power sales from renewable energy resources. The PUC does have in place regulations that do encourage the use of renewable energy sources. These include regulations that utilities purchase renewable energy resources as part of their generation mix. The majority of this requirement is now being met with wind power. Oncor also sponsors programs that provide grants for PV projects for local governments and commercial establishments.

The implementation of a waste-to-energy project would require approval from the TCEQ by the issuance of an operating permit. The operation must also meet local and state air quality regulations.

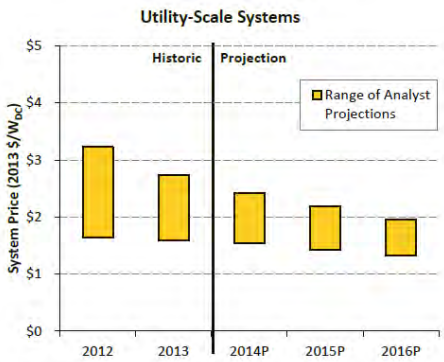
Landfill Diversion Analysis

If a waste-to-energy facility were to be feasible, the diversion of waste from the landfill could reach up to 85 percent. Facilities can be designed to recover recyclable materials prior to combustion, and metals and aggregate post-combustion.

Economic Analysis

The recovery of landfill gas is designed to generate useful energy in the form of either gas or electricity. Two factors are having a negative impact on the feasibility of these types of projects. First, tax incentives for construction and operation of a landfill gas to energy project have expired. Secondly, energy prices are at historic lows. These low energy prices will affect the revenues that will be generated from the project. Depending on the quantity and quality of landfill gas, the capital costs associated with this kind of project can range from several hundred thousand dollars to tens of millions of dollar. The cost of a feasibility study for gas to energy at the landfill is expected to be in the $50,000 to $100,000 range.

Currently, PV solar is more expensive than generating electricity from fossil fuels. This trend is improving as technologies improve and greater demand improves on production efficiencies. The City will need to evaluate potential electric energy market options including using the power on-site or sale to the electric power grid.



Source: Photovoltaic System Pricing Trends, US Department of Energy.

The implementation of a gasification or combustion waste-to-energy project would require significant capital investment. At current landfill tipping fees, the cost of disposal would increase an estimated three-fold.

Other Analysis (Jobs, GHG)

The change from diesel to CNG is anticipated to reduce greenhouse gases up to 30 percent. The implementation of a gas to energy project will further reduce air emissions by offsetting demand for fossil fuels. Gas now captured at the landfill is flared, which reduces of emissions of LFG, only.

PV Solar is a clean energy resource. Generation of electricity at the landfill will replace electricity generated from non-renewable resources such as coal.

Waste-to-Energy facilities will have to meet strict air pollution guidelines, but will result in an increase in air emissions. Facilities could generate jobs at these facilities – approximately 35-50 full time jobs, depending on processing taking place at the facility. These facilities are also controversial. The lengthy process to initialize a facility has associated costs: the most recent WTE facility built in the U.S. by the Solid Waste Authority of Palm Beach County in Florida, took six and a half years from technology selection to initialization of commercial operations. The City Council can anticipate significant public opposition to the development of a waste-to-energy facility. Concerns will likely be raised about costs, air pollution issues, and disincentives to recycling.

Implementation Schedule

Compressed natural gas trucks and equipment: Short- to Mid-Term

Landfill gas-to-energy: Short-Term

Photovoltaic solar on future closed SELF: Short-, Mid- to Long-Term

Other waste-to-energy technologies: Mid- to Long-Term

4.2. Disposal Capacity

Recommendations

Preserve Capacity at SELF

An analysis of recent changes to waste intake at the SELF, the current capacity, and projected waste volumes in the City and in the region indicates that the SELF could reach capacity during the planning period of this CSWMP or shortly thereafter. This would result in the City needing to take action to secure additional disposal capacity during the lifetime of the CSWMP. The Program Evaluation report discusses projected scenarios and possible closing dates. The time to secure additional capacity depends on the

type of facility that will be used: 3-5 years for contracting with an existing regional facility and up to 10-15 years for the development of a facility such as a new landfill or a waste-to-energy facility. Actions that will delay the closing of the SELF include expanding the current facility and enhancing recycling, waste reduction, and composting efforts. Any option has risks and opportunities. Regardless of the option selected by the City, it must start making policy decisions in the short-term regarding how to provide for adequate disposal capacity in the mid-to-long term.

First and foremost, the City should take the following actions to preserve capacity at the SELF:

1) Continue to monitor waste acceptance rates at the SELF and evaluate annual aerial survey data to determine current and future capacity impacts. Review data with Republic and discuss anticipated waste volumes for short and near-terms.
2) Evaluate potential changes to the existing landfill contract with Republic to reduce waste flows by either limiting quantities or significantly increasing disposal fees. This will likely impact the annual rents paid by Republic to the City.
3) Substantially increase waste diversion through aggressive reduction, recycling, and composting in both the residential and ICI sectors.
4) Advance evaluating facility-based options for expanding the SELF to extend life, such as expanding the height or airspace capacity.
5) Develop a specific plan for a future disposal facility (2035-2060), including facility requirements, material recovery potential, site criteria, budget and permitting process. This option could include contracting with an existing regional landfill or a new City owned facility. This option could also include disposal alternatives such as waste-to-energy or other non-landfill technologies.

Identify Long-Term Disposal Capacity

In the above list, Action 1 will inform decision making; Actions 2 and 3 will delay closure somewhat, but not substantively. If Action 4 (expansion of the SELF) is not feasible, or provides only short-term capacity, the City will have to move forward during the planning period with Action 5, making decisions regarding the following:

- Selection of a new landfill site;
- Contracting for capacity from another landfill; or
- Constructing and operating an alternative disposal method such as a waste-to-energy plant.

The planning horizon for determining when action is required to identify and secure long-term disposal capacity will depend on the City's decisions regarding how it intends to do so.

Expand the SELF

In 2016, a study is underway to determine the feasibility of expanding this landfill. The actual time required to secure an expansion will depend on a number of local variables including: any additional permits required such as a FEMA CLOMR; ability to secure funding for the project; and, formal opposition to the permit application.

- Projected timeframe for securing a permit amendment: 5 and 8 years *after* land is secured.
- Most significant variable: ability to secure the property.

Create a new landfill that the City will secure and permit

Because of the continued growth of the region, identifying a new site for a landfill will be challenging. Once identified, the facility will have to secure necessary permits. Construction of the site will include infrastructure, administrative buildings, scales, and landfill cells. This path could be done through a public-private partnership approach to share in the significant large initial capital requirements.

- Projected timeframe: 8 to 13 years. This includes 2 to 3 years for evaluating public-private partnership options; site selection and property procurement; 3 to 5 years for permitting; and, 3 to 5 years for engineering and construction.
- Most significant variable: public opposition.

Identify new capacity through contracts with existing facilities in the region

The City could secure capacity from one of the existing landfills in the region. There are both public and private landfills that have capacity in the region. The City could contract for this capacity, but there are long-term risks associated with this approach. Included in consideration of this option is the likely need for transfer facilities to be identified, permitted and constructed.

- Projected timeframe: 4 to 7 years for procurement and contract negotiations.
- Most significant variable: Ability to secure reasonable rates and long-term capacity guarantee.

Select and move forward with an alternative waste disposal method

Options for alternative waste disposal include waste-to-energy, anaerobic digestion, and other large scale technologies such as mixed waste processing. While there are several options that have been proven on a commercial scale to manage a large percentage of the waste stream, they are generally much more expensive per ton than landfill disposal. Lead times for these options are also significantly greater due to high capital costs.

- Projected timeframe: For a waste-to-energy facility, 10 to 15 years. This includes 2 years to conduct a thorough feasibility analysis; 3 to 5 years for site selection, preliminary engineering, financing, and energy market negotiations; 2 years for procurement; 3 to 5 years for permitting; and, 3 to 5 years for construction and facility acceptance.
- Most significant variables: public opposition; ability to finance.

Establish a reserve fund to pay for future development of new capacity

Each of the potential actions above—expanding the SELF, building a new landfill, contracting for capacity at another landfill, and building an alternative facility—has associated costs. The City should begin setting aside funds immediately in preparation for those costs. The following are some estimated costs for each action:

Expand the SELF

Estimated costs of developing an amended facility are primarily associated with permitting and design, unless additional land can be secured near the landfill. It is uncertain if this option is technically viable at this time. Permitting and design costs, including the potential for a public hearing are estimated to be approximately $3 to $6 million. The cost of securing the required property has yet to be determined.

Create a new landfill that the City will secure and permit

Estimated costs of developing a new site are considerably more than expanding the SELF, but will provide longer term capacity if properly sited and designed. A recommended site would not be any less than 1,000 acres. It is anticipated that a new landfill would be located a number of miles outside the City limits. This

will likely require that transfer stations be included in the capital costs associated with the new facility. Transfer stations will also require a similar site selection, permitting and construction process. The estimated cost to build a new landfill is $23.5 to $36.5 million, as shown in Table 4-1.

Table 4-1 Projected Costs for New Landfill Development

Item	Projected Costs
Site Selection	$500,000 for planning, public involvement & engineering
Land Acquisition	$10 - $15 million, depending on size and location
Permitting	$3 -$6 million, depending on public information campaign and whether or not a public hearing is required
Construction of infrastructure and first cell	$10 - $15 million, depending on facilities
Total	$23.5 – $36.5 million

Figure 4-1 illustrates the estimated annual reserve funds that should be set-aside to pay for future facilities including a new landfill and a transfer station. The chart illustrates seven scenarios:

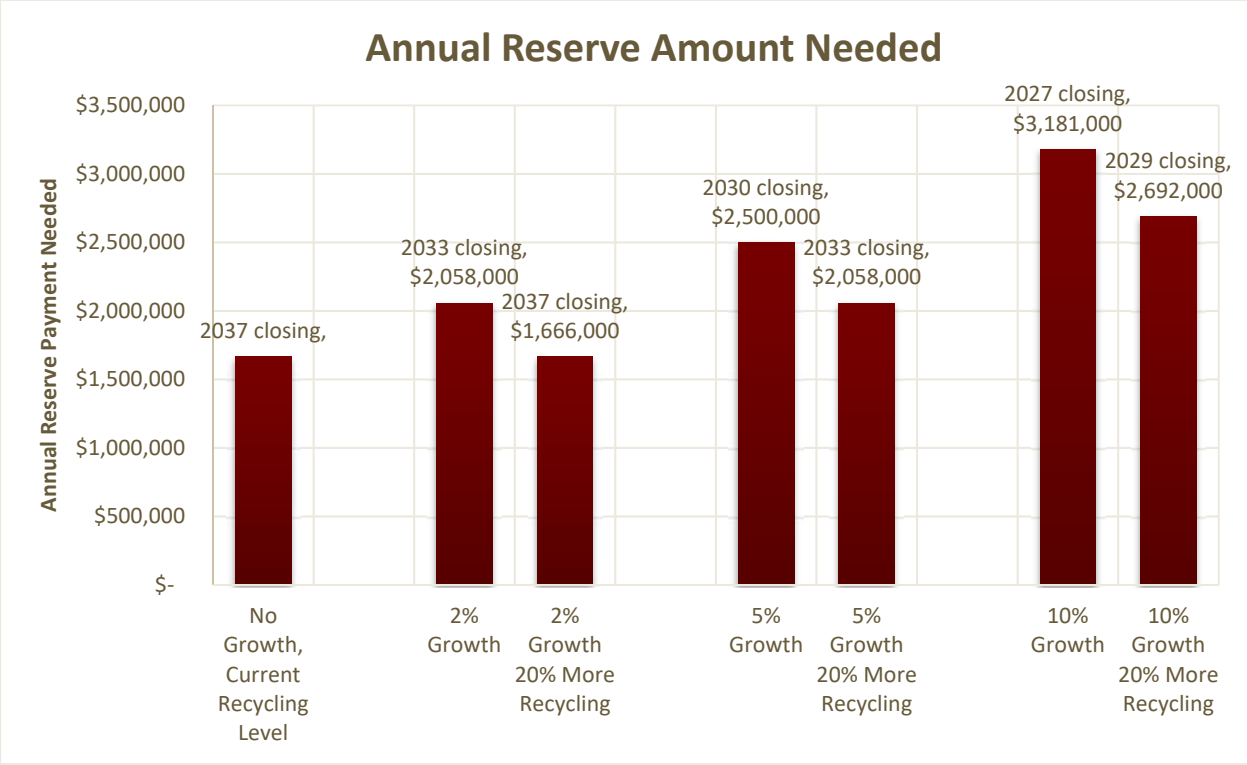


Figure 4-1 Annual Reserve Funds Needed for Future Disposal Facilities with Various Scenarios for Waste Amounts and Estimated Closure Years

Scenario 1 assumes that waste volumes will remain constant at 2015 levels, approximately 920,000 tons per year. Scenarios 2 through 7 utilize annual growth rates of 2 percent, 5 percent, or 10 percent, and are shown with and without the mitigating influence of an additional 20 percentage points on the current recycling rate. The projections behind the annual reserve contribution assume a total investment of approximately $35 million for a new landfill and transfer station. If there is no growth in the waste stream, the landfill is projected to have 20 years remaining capacity, and each year a set-aside amount of $1.6

million would be required. If there is growth in the waste stream, the closure date will approach more quickly and the annual payments will need to be larger. If more aggressive recycling takes place, of closure will be somewhat delayed and the annual payments are affected accordingly. For example, if waste amounts increase by 5 percent, SELF will reach capacity in 2030; however, if by then, the recycling rate is 20 points higher than at present, the reduction in waste disposed could "buy" an additional three years. The later SELF closes, the less the reserve payment needs to be each year in order to set aside $35 million.

Identify new capacity through contracts with existing facilities in the region

The cost of securing additional capacity through contracts is the procurement process and contract negotiations. These costs could be approximately $1 to $3 million. There is considerable long-term fiscal uncertainty regarding the potential additional costs that would be incurred by relying on another landfill. These costs would include potentially higher tipping fees at the selected landfill and the risk of not having a landfill available if-and-when that facility runs out of capacity. In addition, because haul distances would increase, a transfer station would also be required under this scenario.

Select and move forward with an alternative waste disposal method

There are proven technologies for managing the waste stream other than land disposal. These options are typically much more expensive to construct and operate than traditional landfilling. The most-often utilized of these technologies in the U.S. is mass-burn combustion of MSW. Construction costs range from approximately $85,000 to $120,000 per ton of daily capacity. Net operating costs, after the sale of electric power is taken into consideration, can range from $75 to $100 per ton.

Impacts Analysis

Policy or Regulatory Analysis

The City should initiate discussions with Republic to explore possible changes in the operation of the Landfill to extend landfill capacity. Currently there is not an incentive to increase in-place densities or penalties for low compaction rates. To accomplish this, a contract amendment would be necessary.

Another policy issue that needs to be revisited is the fact that there are no constraints on Republic in terms of waste acceptance rates. The contract requires that Republic accept waste that is directed to it by the City. There are no limitations on the quantities of waste that Republic accepts from either the Fort Worth commercial sector or from other cities. Limiting waste acceptance will have an impact on the revenues that Republic would generate and would decrease the revenues the City secures from landfill operations. In 2014, the SE Landfill agreement resulted in a total revenue of approximately $3.5 million to the City. The revenue increases or decreases depending on waste quantities accepted and the annual total revenue stream associated with accepted waste.

Landfill operations are regulated by the TCEQ. If a permit amendment or new permit is required to secure long-term capacity, these applications will have to go through the TCEQ permit process. The application process is extensive and requires an examination of land use, transportation issues, protection of biological resources, protection of cultural resources, and water quality protection. The application must also meet specific design criteria for liners, groundwater protection, leachate collection, and final cover systems. Extensive site geological and groundwater assessments are required. The application also requires a detailed operational program to deal with potential operational nuisances and extensive closure and post-closure care plans. The review process can take a year or more to complete. It is also possible that, depending upon the amendment, a public hearing may be required, which can last up to an additional year.

The City of Fort Worth owns the SELF and has an agreement with Republic to operate the facility that includes a guarantee that all City waste as defined by the agreement, will be delivered to the facility. This agreement would have to be amended to allow for any creative approaches to extending the life of the SELF—for example, a waste exchange with another municipality.

Similarly, the City has an agreement with Waste Management for collection of residential customers. The City directs WMI where to dispose waste. Changes in circumstances could require contract changes in that case, also. If WMI incurs cost savings due to the less costly haul distances, these savings affect the costs to provide the services, and should be shared with the City. Such a condition would require a modification to the collection agreement.

Landfill Diversion Analysis

Assuming that existing policies continue regarding collection and disposal practices, no waste diversions are anticipated. The City could require, through a contract amendment with Republic, to limit the amounts of waste accepted at the landfill.

Economic Analysis

Any modifications to reduce the waste flow rate, and thereby extend capacity will impact revenues for both the City and Republic. However, this will also accelerate the time that additional capacity will have to be identified through either an increase to the existing landfill, a new facility, or contracts with regional landfills.

Continued acceptance of waste at the 2015 rates will increase the funds generated from the lease agreement. The landfill agreement with Republic establishes a base rent fee and variable rent fees that are based on the amount of non-City waste accepted at the landfill. A preliminary assessment of waste quantities going to the landfill in 2015 compared to 2014 indicates that the amounts of waste accepted will increase from approximately 525,000 tons to 830,000 tons (based on four quarters of TCEQ reporting). In the short-term, this will result in an increased rental fee of approximately $400,000 to $500,000 per year in rental payments. However, once the SELF reaches full capacity, or the Republic agreement ends prior to full capacity, it will not generate rental fees.

It should be recognized that while there are revenue benefits associated with accepting greater tonnages at the landfill, there are also economic consequences of this increased rate of disposal. The sooner the landfill space is consumed, the sooner capital will have to be invested to secure additional disposal capacity.

Other Analysis (Jobs, GHG)

Implementation Schedule

Preserve Capacity at SELF: Short-term

Identify Long-Term Disposal Capacity: Short- and Mid-term

Establish a reserve fund to pay for future development of new capacity: Short-term

4.3. Public Sector Facilities

Recommendations

Additional Drop-off Stations

The City has three operational drop off stations with a fourth planned to be opened in late 2017. These facilities provide residents with an additional option for disposal of MSW, bulk waste and recyclables. As the City's population increases, it is recommended that an additional fifth or sixth drop-off stations should be implemented. In addition, evaluating the feasibility of a centralized low-volume commercial based transfer station would be recommended for expanding the convenience of small businesses and clean-up crew wastes.

Open Drop-off Stations to All Tarrant County Residents

The should review the feasibility of opening the drop-off stations to all Tarrant County residents. The arrangement might be similar to the interlocal agreement whereby residents of other communities utilize the HHW facility. The intention will be to encourage and reinforce recycling to "daytime residents" of Fort Worth who work inside the City but live elsewhere, and for whom facilities might be more convenient than in their home communities.

Impacts Analysis

Policy or Regulatory Analysis

The timing and location of the new drop-off stations will need to be evaluated. Sites for these facilities are viewed favorably by the broader community as it provides improved service. They have the potential to be viewed unfavorably by residents located in close proximity to drop-off stations due to increased traffic and the perception that nuisances are associated with managing MSW. If properly designed and managed, each of these nuisances can be mitigated.

Drop off stations that accept MSW must be registered with the TCEQ.

Landfill Diversion Analysis

The drop-off stations provide an opportunity for increased recycling. Apartment tenants who do not receive weekly recyclable collection services have been allowed to use the drop-off stations to recycle single stream materials. A waste composition study in 2013 found that apartment dwellers' particularly have a lot of paper and cardboard to recycle—it composted about 20 percent of the waste stream, by weight.[33]

Economic Analysis

The economic impacts associated with drop-off stations is the construction and operation of the facilities. The current budget for three drop-off stations including disposal is approximately $2.5 million per year. The estimated cost of constructing the fourth and future stations is approximately $1.5 million to $2.0 million per drop-off station.

Other Analysis (Jobs, GHG)

Aside from making disposal and recycling more convenient for Fort Worth residents, the availability of drop-off stations helps reduce the amount of illegal dumping taking place in the City. A total of 17 staff people are assigned to the operation of the three currently active drop-off stations.

[33] *Waste Composition Study, Summary of 2013-2014 Results, Prince William County, VA*

Implementation Schedule

Additional drop-off stations: Short- to Mid-Term

Evaluate Low-volume Commercial Transfer Station: Short- to Mid-Term

Open Drop-off Stations to All Tarrant County Residents: Short-term

4.4. Private Sector Facilities

Recommendations

Private Sector Recycling Facilities

There are a number of private sector businesses who are in business of recycling paper, metals, plastics, glass, electronics, brush and yard waste and other materials. These facilities play an important role in meeting the City's recycling goals. The City should work with the recycling industry in and around Fort Worth to promote their activities and encourage private businesses to recycle materials through this industry. There are a number of trade and environmental organizations that can assist in this marketing effort.

Eco-Industrial Park

Hosting an Eco-Industrial Park (EIP) is a way for local governments to foster the connectivity of the market-place and offer greater options for waste reduction to residents and businesses without necessarily being direct participants in those lines of business. The parks help connect generators of various wastes—better viewed as resources—with processors, remanufacturers, and other users of the materials. In other words, a city can "provide" additional opportunities without having to "run" the facilities.

The concept of an EIP is one that uses integrated planning and economic development to build up a center for converting recyclables into finished products and creating jobs. It uses principles of industrial ecology, elements of integrated solid waste management, and tools of economic development to develop a circular economy whereby waste energy and material from one business are consumed by another. The facility networks businesses and industries to reduce waste and improve use of energy and materials.

While there will likely be some processing ongoing at an eco-industrial park, or EIP, these facilities do not take in MSW—i.e., they are not solid waste management facilities. These facilities co-locate circular economies of processors and end users. They generally are not retail locations or sell directly to consumers; instead, the finished products move from the sustainability park to distributors or retailers, or possibly another user who will refine the product further.

Creation of an EIP requires a wide-ranging interagency effort form the City as part of a larger public-private partnership. For its part, the City can do or assist with the following:

- Identify companies, focusing on those that already promote use of recovered feedstocks
- Inquire about and encourage the use of recovered feedstocks
- Pursue supply by researching available material and drafting supply agreements
- Assist with finding a suitable site, location integration, industry financing, and regulatory adoption
- Evaluate the activity, including the incoming materials and the outputs, byproducts, and wastes generated

The primary role of government in developing an EIP is to get the site. At a minimum, the site needs transportation like roads and ports; suitable buildings to use or rehab; and other infrastructure like loading docks, heavy duty pavement, etc. Better sites have usable buildings, utilities, and parking; interior spaces for administration, production, labs, and storage; and, exterior spaces for staging and loading. The best sites have heavy industrial infrastructure such as wastewater treatment and digesters; access to steam, gas, sufficient power; tanks, drains, and sewers; or, fiber-optic and other networks.

The City should pursue a long-term strategy for developing an EIP for the purpose of building up local markets for recovered feedstocks, diverting materials from disposal, and creating sustainable "green" jobs.

Partnerships with Educational Facilities

The City should develop partnerships with Universities and Colleges (i.e. Texas Christian University) as potential innovators to establish one or more centers of learning or excellence. Examples of the relevant academic fields include Civil Engineering (for landfill design and gas extraction), Mechanical Engineering (MRF design), Electronic Engineering (software development as well as robotics) Environmental Sciences, Chemistry, Biology, Psychology (behavior modification), Education, Marketing, Geography (demographic analysis), and Sociology (group's values identification).

Appropriate Staffing

Section 2.2 describes how a commercial recycling section may need to be formed within the Planning Section or Solid Waste Administration to support the commercial recycling effort. Such section would be a potential team for the duties associated with developing an EIP and the centers of excellence.

Impacts Analysis

Policy or Regulatory Analysis

There are no policy or regulatory issues with these recommendations.

Landfill Diversion Analysis

The commercial sector accounts for approximately two thirds of the waste that is generated in the City. Currently, there are no City-sponsored recycling collection programs for the private sector. To meet future recycling goals, the private sector must be encouraged to increase the level of recycling. By promoting and increasing the availability of the local recycling industry to the private sector, beyond the current commercial recycling website, significant reductions in the disposal of waste can be achieved.

Economic Analysis

Other than public information and staff coordination efforts, the cost of the recommendation to encourage private sector recycling facilities is low. The recommended staffing is in the order of magnitude of 0.5 to 4.0 FTE of a professional-level position. The economic benefits include promoting more economic activity by private enterprises.

Other Analysis (Jobs, GHG)

Increased use of local recycling businesses will add jobs to the local economy. Because there are no specific reporting requirements by these industries, it is not possible to determine the exact number of jobs that would be created by increased commercial recycling; however, the Texas Recycling Data Initiative conservatively projects that processing of MSW in the state of Texas generates over 12,000 jobs,

or about 20 jobs per 10,000 tons.[34] Manufacturing processes that use recovered feedstock—particularly locally-sourced goods—reduce the amount of energy, water, and raw materials needed. Any manufacturers participating in an EIP would be co-located with consumers of some or all of their wastes, further reducing their environmental impacts.

Implementation Schedule

Promotion of private sector recycling facilities: Short-, Mid- and Long-Term

Eco-Industrial Park: Long-Term

Education Partnerships: Mid-Term

Develop Commercial Recycling Section: Short- to Mid-Term

5. Solid Waste Services Division Activities

5.1. Education

Recommendations

Though the City is executing several different, adequately-funded campaigns to encourage positive behaviors and raise awareness of issues, it will be better served by creating a comprehensive outreach plan.

Create a Comprehensive Outreach Plan

The outreach plan should include the following elements:

- Research obtained from all sources, including the most recent collected over the last year.
- Use all the information gathered through research to identify the top three programs the City should implement.
- Use the research to identify three to five specific segments of the Fort Worth population to target with the program information, rather than trying to reach all residents.
- Create measurable objectives for specific audience segments, to ensure money and effort is focused efficiently and with an outcome that is meaningful. For example, if research indicates that some percent of the population favors the notion of curbside organics collection, then a measurable objective would be to, among that same population, increase the percentage that favors it by a certain date. Note that this requires the City to poll residents at the end of their efforts in the same way it did to obtain the baseline information.
- Select only the strategies and means for reaching these audiences that will truly reach them.
- Develop an implementation plan and schedule that identifies individuals responsible for each task, with deadlines and resources named. Include a regular weekly or biweekly face-to-face meeting schedule among all team members, if even for 30 minutes, to review items completed, tasks to be done, challenges to work out, etc.

[34] Texas Recycling Data Initiative Biennial Report, January 2015, State of Texas Alliance for Recycling

Identify target audiences to reach and programs or topics to address

Based on the research conducted over the last year, and all other recommendations made in this document, GBB recommends the following specific areas of focus, targeted audience segments, and strategies for reaching them, as shown in Table 5-1.

Table 5-1 Recommended Areas of Focus for Targeted Audience Segments

Audience Segment	Program/Topic
Residents *(Implement no more than 2 or 3 at one time)*	• "Right-sizing" your garbage cart • Pharmaceutical disposal (partner with the water utility on this) • Sharps collection • Illegal dumping • Fireworks • Electronics • Bulk/Yard Waste • Storm Event – Tree limbs and brush • Recycle More/Recycle Right!
Businesses	• Business recycling (traditional) • Food/organics • Event Recycling (NASCAR/Stock Show, etc.)
Multi-family	• The multi-family recycling ordinance - BMPs
Nonprofits	• Reuse

Develop a solid waste division brand

The brand should have a unique set of features (color palette, typeface, grid and imagery) to help join all communications pieces together under one umbrella. This will help build recognition for the materials as being "about solid waste and recycling" and will enable a more enduring impact by each individual piece.

Combine outreach efforts and team members into one unit

The City should roll all oversight of the outreach into one Division, or at least, seat all team members involved in the outreach together physically to facilitate more frequent and unplanned communication opportunities and build the team. In addition, structure the outreach team to be focused on strategic solid waste topics (as experts) instead of diluting their responsibilities to cover multiple programs and various department aspects. Staffing should be set by a ratio of 1 full time equivalent team member per every 200,000 residents.

Consumer Choice – Plastic Bag Campaign

The City believes the best approach to single use plastic bags is to promote the options to the community for each consumer to determine their own choice in how, when and why to use or not to use plastic bags. Consumers will be educated on "reusable bags", reusing plastic bags prior to disposing (collecting after pets) and recycle plastic film/bags at local retail store during their next shopping spree.

Synergy with the Blue Zones Initiatives

Expand on the discussion and potential shared/supporting programs of:

a) "Move Naturally" + "Ten on Tuesdays" + CFW Wellness Program

b) Food Deserts + CFW Commercial Scale Composting Efforts

c) Community Gardens + Growing Food Locally + CFW Commercial Scale Composting Efforts

Encourage Green Entrepreneurship

The City should develop a grant program to foster entrepreneurs who are building the green economy. Support could be used for costs such as equipment purchase or professional services like public relations, site planning, or information technology.

Impacts Analysis

Policy or Regulatory Analysis

The City focuses the evaluation of its marketing campaigns on both A) strategically developed, cohesive, and engaging outputs with a defined demographically driven call-to-action and, when possible, B) the correlated measurable outcomes. Whereas the majority of the campaigns have been qualitatively driven, a more unified relationship between education and operations will yield an enhanced concentration on quantitative, measureable outcomes.

Landfill Diversion Analysis

Education in solid waste serves two primary functions: instructing customers on how to properly participate in and receive services, and messaging to encourage efforts to reduce and recycle and to create engagement in these and more sustainability actions. Ongoing engagement in the solid waste system is vital for achieving the goals of the solid waste diversion, and need to embrace contemporary tools and be responsive to input.

Small changes make a difference. If each household recycled, on average, 5% more material by weight, it would be an additional 3,415 tons per year, or about 1 percentage point on the recycling rate. If each household recycled, on average, 1 pound more per week, it would be an additional 54,889 tons per year, or about 1.67 percentage points on the recycling rate.

Economic Analysis

The way the outreach has previously executed, using two departments that are physically separated, is likely causing some confusion and costing money and lost time. The re-organization in 2016 will hopefully improve upon that condition.

Other Analysis (Jobs, GHG)

While the City lacks an overarching communications plan for Solid Waste Services, all of the marketing efforts and collaterals have been developed based on strategies and research identified in the 2014-2015 Action Research Report that effectively captures all that is known from a research perspective about residents' knowledge, attitudes and behavior regarding recycling behavior. A communications plan that identifies who its target audiences are; includes measurable objectives for reaching those audience segments; and identifies carefully considered strategies that are chosen for their unique ability to reach the different audience segments is recommended. Without a comprehensive outreach plan that includes these elements, the City might be missing out on opportunities to get the most efficient and effective use of its budget.

Implementation Schedule

Create a Comprehensive Outreach Plan: Short-term

Identify target audiences & program/topics by priority and/or by Short- to Mid-Term range

Develop solid waste division brand campaign: Short-term

Combine outreach efforts and staff: Short- to Mid-Term

Consumer Choice – Plastic Bag Campaign: Short-Term

Blue Zone Partnership Promotion: Short-Term

Encourage Green Entrepreneurship: Mid-term

5.2. Customer Service, including 3-1-1

Recommendations

As a way to evaluate customer service, the City should continue to have the following operational performance goals regarding misses, incoming customer calls, and response times, which reflect a commitment to excellence and which result in high customer satisfaction:

- Provide once a week curbside garbage collection with less than one missed collection per 1,000 households.
- Provide once a week curbside recycling collection with less than 1 missed collection per 1,000 households.
- Collect 90 percent of all Illegal Dump Cleanup work orders within 5 days of receipt.
- Maintain an average answer time for all calls to the Code Compliance Center of 60 seconds.
- Answer at least 80 percent of calls to the Code Compliance Center within 60 seconds.

In addition, the City currently has a goal to complete 100 percent of incoming Dead Animal Cleanup work orders within 48 hours of work order receipt. The City far exceeds this goal—for example, in April 2015, over 99 percent of work orders were completed within 24 hours. For this reason, the City should set a more aggressive, tiered goal:

- Complete 75 percent of incoming Dead Animal Cleanup work orders within 24 hours of receipt, and 100 percent within 48 hours.

The above goals will be evaluated by their accomplishment.

In addition to these quantitative goals, the City should continue to conduct satisfaction surveys of its customers to gather opinion data regarding services. The surveys should be conducted every two or three years, and the questions should be consistent from year to year in order to track any changes or trends in customer satisfaction. Any response that suggests that less than 75 percent of customers are “satisfied” (or some similar category) should be evaluated as an action area for improvement, and a plan for addressing the shortcoming should be prepared within 6 months.

The 1995-2015 Plan had a customer service goal to provide assistance to the ICI sector. For the 2017-2037 CSWMP, this topic has been moved to its own planning discussion, as described in Section 2.2.

Impacts Analysis

Policy or Regulatory Analysis

These goals are consistent with the current goal of providing excellent customer service and industry-leading response times.

Landfill Diversion Analysis

These goals, themselves, cannot be evaluated for direct impact on landfill diversion; however, customers who are happy with the performance of the agency and feel the City services offer good value may be more inclined to engage in programs or respond positively to messages regarding landfill diversion.

Economic Analysis

The agency currently spends a marginal amount on customer service and performs at a high level. Continuing this effort should have minimal impact, economically.

Other Analysis (Jobs, GHG)

If at some time during the planning horizon customer service call management is transferred from the domain of Code Compliance, or somehow consolidated with the efforts of other agencies (e.g., adoption of 3-1-1), the goals formulated here may need to be evaluated and adjusted.

Implementation Schedule

Have appropriate operational performance goals regarding misses, incoming customer calls, and response times: Short-, Mid- and Long-Term

Set a more aggressive, tiered goal for addressing Dead Animal Cleanup work orders: Short-term

Conduct satisfaction surveys of City collection customers: Short-, Mid- and Long-Term

5.3. Organizational Structure

Recommendations

In order to continue providing a high level of customer service while remaining agile, efficient, and prepared for implementing this CSWMP, the City should take the following actions with regard to the SWSD:

Need to Continually Evaluate Priorities

- Need to improve direct resource allocation to SWSD for public information programs. There is also concern for potentially moving planning out of SWSD when important issues such as implementation of Disaster Debris Management Plan, Comprehensive Solid Waste Plan and the MRF procurement are being undertaken.
- The IT system for solid waste needs a major re-haul in order to better utilize technology for both internal services and field services
- Need to implement programs focused more on the commercial sector
- Need to implement bulk and brush waste separate collection services as a way to improve operations and increase diversion
- Public information programs and the need for more FOCUSED programs
- Marketing the Division's programs to its customers as a means of improving program participation and compliance with program requirements

- Need to audit grants of privilege program

Need for Resources

- As mentioned, the organization is in a state of flux. Changes in the structure are moving resources within the Code Compliance Department. There were comments suggesting that the process of hiring individuals is a barrier to meeting needs. This is primarily a Human Resources issue, not a SWSD issue.
- The Public information office is about to secure an additional marketing assistant. Even with this additional staff, it is felt that because this group provides service throughout the Code Compliance Section is short on public information staff for a City of 800,000 residents.
- Additional solid waste and recycling staff is needed to provide the technical evaluation and outreach to specific areas of the community, in addition to the general educational efforts.
- Additional staff is needed in the IT section to assist in resolving issues with the ITMS system.
- Additional staff will also be required to manage the additional drop-off station and to manage the collection of HHW at these facilities.
- City should evaluate the use of cameras on City vehicles for improved reporting on potential issues related to customer service
- To implement a wide variety of new programs identified in this CSWMP, the City will require approximately three new planning positions to focus on commercial sector efforts. One of the major responsibilities for those positions would be to advance implementation of the CSWMP.
    - Establish focus groups of stakeholders and advocacy groups to work on action items
    - Develop an annual CSWMP Accomplishment Report with Bi-Annual Implementation Updates, including refreshed data on financial information and other varying conditions.
- The City should also secure additional resources, through contract services to conduct periodic technical and environmental compliance of Fort Worth facilities including the drop-off centers and the SELF.
- Once the City determines its course of action related to a new disposal facility, it will be appropriate to designate a lead person to manage the landfill site selection process, public information efforts, managing permitting and development of a new site. Planning, engineering and legal resources will also be required for these efforts.

Cost Savings Opportunities

- In general, staff believed that they are operating at a very efficient level, with the exception of the ITMS system. Field operations has demonstrated over the years, the ability to cut staff significantly as issues such as illegal dumping is reduced.
- While not an immediate cost savings measure, it was pointed out that the City has responsibilities for closure and post-closure care of the landfill. Republic is responsible for contributing funds for closure and post-closure care based on reporting to TCEQ. It is uncertain whether these funds accurately reflect the City's current liabilities for closure or post-closure care.
- The City is taking steps through the Capital Improvement Plan to establish necessary reserves for future disposal facilities. While not necessarily a cost savings measure, a healthy reserve fund at a time when major investments are required, will reduce major price shock when funds are needed.

Impacts Analysis

Landfill Diversion Analysis

Improved operational efficiency will allow the City to more effectively manage the programs planned as part of the CSWMP. The CSWMP does include a number of new programs that are especially focused on the ICI sector. This sector accounts for a majority of the waste generated in the City. Investments in staff and technical resources in these areas will improve the potential of achieving program goals and increase overall diversion.

Economic Analysis

Improvements in technical resources will allow the City's current resources to be more productive. Currently, the City is generally behind the private sector and other communities in the use of technology for assessing program compliance and data management. By increasing the productivity of the City's enforcement programs, the amount paid for recyclable contamination can be anticipated to decrease.

Implementation Schedule

Continually Evaluate Priorities: short-, mid-, and long-term

Need for Resources: short-term

Cost Savings Opportunities: short- and mid-term

Establish focus groups of stakeholders and advocacy groups to work on action items: mid-term

Develop an annual CSWMP Accomplishment Report with Bi-Annual Implementation Updates, including refreshed data on financial information and other varying conditions: mid-term

5.4. Reuse

Recommendations

Non-Profit Organizations

Start a dialogue with non-profit organizations involved in the reuse or resale of materials to identify their needs and desired support by the City, if any. Expand promotional efforts by City to increase the awareness and locations of the existing "reuse" centers (both non-profit donation-based, as well as for-profit buy-back/resale).

City Programs

The City should include "reuse" in its waste reduction messaging, including in its educational materials for curbside set-out of reusable items, in general outreach materials, and in other available outlets such as newsletters, City TV programming, etc. Single Use Plastic Bag Program – It's the consumer's choice: Reuse or Recycling

The City should evaluate implementing a separate curbside collection program in partnership with a contractor (similar to SimpleRecycling), to divert and reuse non-typical single-stream recyclable items such as: textiles/clothing, shoes, pots, pans, dishes and flatware, furniture, toys, and small appliances.

The City should also modify the current "Swap Shop" program at each drop-off station, to expand the focus and collection of all reusable/resalable donated materials in conjunction with a non-profit such as: Goodwill, Salvation Army or Christian Community Action.

Impacts Analysis

Policy or Regulatory Analysis

This activity is not affected by policy or regulation. This activity will demonstrate the City's commitment to sustainable practices, waste minimization and community support.

Landfill Diversion Analysis

The incremental effect of this program in landfill diversion is not expected to be significant.

Economic Analysis

The cost of this program is expected to include limited staff time and publicity to develop participation on the part of non-profits.

Implementation Schedule

Non-profit organizations: Short-Term

City Programs: Short-Term

5.5. Source Reduction

Recommendations

Waste Reduction Goals

Over the course of the past ten years, from 2003 to 2014, the per-household disposal rate has decreased 12.6 percent. This is due in part to increased recycling and lightweighting of many packaging items, a development which has had a deflating effect on waste tons generated across the country. The City should set a goal of reducing per-household waste generation by 10 percent over the course of the planning period. The goal would be to reduce waste generated overall, including recycled tons. For a typical household, this would be a reduction of 200 to 250 pounds over 20 years, equivalent to about 5 weeks' worth of waste at the current generation level. Other ways to promote the reduction of waste would be through the following initiatives:

Master Composter Program

Support and expand the existing Master Composter Program, as described in Section.1.4.

Evaluate Banning Yard Waste from Disposal in SELF

The City should evaluate banning yard waste from disposal in the SELF, as described in Section 1.4.

Don't Bag-It Program

Reinvigorate the "Don't Bag-It" Program by not accepting grass clippings in plastic bags for disposal. The program would include a period of public education followed by phased-in enforcement entailing warnings for initial violation(s) followed by refusing to collect grass in plastic bags at the curb and possible fines.

Backyard Composting Rebate

The City should evaluate implementing an economic incentive for backyard composting, such as the program from Austin described in Section 1.4.

Shop Wisely Program

The City can include in its public education messages encouragement of smarter shopping for food and consumer goods. The U.S. Department of Agriculture has initiated a Food Waste Challenge, with a goal of reducing food waste by 50 percent by the year 2030. The City could support and promote this program locally, which already has many tools and resources ready for use by individuals and local coordinators. This could be an interagency effort in conjunction with the Consumer Health Division, the Public Engagement Office, the Sustainability Task Force, and similar offices and bodies.

Impacts Analysis

Policy or Regulatory Analysis

Master Composter is an existing program that will not require changes in policy. The program is not regulated except to the extent that state regulations prohibit the creation of a nuisance or contamination of surface water by backyard composting activities. Master Composters are knowledgeable about how to compost successfully without creating these objectionable conditions. By promoting increased public participation in backyard composting through the Master Composter Program, the City will be building grass-roots support for any future commercial scale composting that the City may undertake by developing a corps of highly knowledgeable composters who appreciate the environmental benefits of composting. It is the mission of Master Composters to train others in proper composting techniques and the benefits and use of compost. They have also been proven to be strong advocates for improved solid waste management practices.

Landfill Diversion Analysis

Expansion of the Master Composter Program would not have significant impact on landfill diversion.

The volume of grass clippings generated at residences is significant during the eight-month growing season, often one to four lawn bags per week per single family household. This is equivalent to approximately 5 to 20 cubic yards (median amount of 12.5 cubic yards) of bagged grass clippings per single-family household per year. Fort Worth has approximately 204,000 single-family households.[35] The estimated annual volume of grass clippings, if every household set out the low-end estimate of 5 cubic yards per year, results in over 1 million cubic yards per year. At 400 pounds per cubic yard bulk density, this correlates to approximately 200,000 tons of grass clippings per year. 25 to 50 percent of households setting out only one bag per week of grass clippings during the growing season equates to approximately 50,000 to 100,000 tons of grass clippings per year.

Economic Analysis

It is not known how many households currently bag grass clippings for disposal. Therefore, it is not known what the incremental impact of a fully-enforced Don't-Bag-It program would be. However, if 25,000 tons of grass clippings could be diverted, this represents almost $500,000 in avoided landfill tipping fees.

Other Analysis (Jobs, GHG)

Diversion of grass from the landfill would result in decreased greenhouse gas production because landfilled organics such as grass decompose anaerobically and produce methane, a very potent

[35] As of September 30. 2015

greenhouse gas. Whereas, when the same material decomposes in open air, or aerobically, it produces carbon dioxide which is a much less potent greenhouse gas than methane.

Implementation Schedule

Waste Reduction Goal: Short- to Mid-Term

Master Composter program: Short-, Mid-, and Long-Term

Don't Bag-It program: Short-, Mid-, and Long-Term

5.6. Ordinances, Rules, and Regulations

Recommendations

Grants of Privilege

The above sections—in particular, Section 1.5 regarding multi-family properties, and Section 2.2 regarding ICI customers—describe recommended changes to the terms of the Grants of Privilege. Generally, they include:

- Making as a condition of the Grants of Privilege that private haulers must offer recycling to all commercial establishments and/or multi-family properties in Fort Worth. The services provided to multi-family properties must be comparable to those provided to single-family home customers.
- Making as a condition of the Grants of Privilege that all solid resource (refuse and recycling) collection vehicles operated by the commercial haulers be late model, low-emission, clean-fuel (such as CNG or ULSD) vehicles.
- Modifying the Grant of Privilege fee charged to commercial haulers from 5 percent to a tiered system based on the overall level of recycling achieved by the hauler.

Also, as described in Section 2.2, if the City creates a new agency section for commercial recycling activity, it should transfer some of the Grant of Privilege fees to Solid Waste to fund this section, in part or in whole.

Multi-family Recycling Ordinance

As described in Section 1.5, the City should instruct haulers that the reporting requirements of the Grants of Privilege include providing certain detailed, accurate, and actionable information regarding their multi-family customers. This goal will be evaluated by the accomplishment of developing the new instructions and by compliance with the instruction on the part of the haulers.

As of 2015, 87 complexes—or 16.4 percent of the regulated community—requested waivers for the regulation. The ordinance has no service capacity requirements nor does it specify which products must be recycled, nor marketing requirement. The regulation should be updated to ensure that apartment residents are provided a similar level of recycling service, educational and outreach programing elements as single family residents, and to narrow the exemption loophole and thereby include more residents. Additionally the Multi-family recycling ordinance should be updated to include housing complexes with three or more units versus the current requirement of eight or more units. This will be evaluated by its accomplishment, and an increase in the number of compliant properties until the waiver rate is 10 percent or less (53 or fewer properties—i.e., an additional 34 properties come into compliance).

The Zoning Ordinance

The City should consider amending the Zoning Ordinance to address the following waste management matters:

- Requiring recycling containers for use by occupants at one or more land use or District types (such as retail, multi-family housing, light industrial, etc.);
- Mandating sight or walking distances for such containers from the users and occupants; or,
- Specifying in the streetscaping burden on developers that compliant trash receptacles must be accompanied by recycling receptacles.

Disposal Bans

As described throughout other sections of this document, the City should closely evaluate banning disposal of yard waste in the SELF. In addition, the City from time to time should consider the positive and negative potential impacts on diversion of other disposal bans, such as cardboard.

To reduce absolute tonnage deposited in the SELF, thereby conserving capacity, the City should evaluate banning disposal of C&D therein. Banning its disposal in the SELF could also provide momentum to other efforts to increase recycling of C&D.

Scrap-tire Disposal Ordinance

The City should continue adoption and implementation or an ordinance to assure the proper disposal of scrap tires from generation to end-use. The existing "draft ordinance" will address requirements for storage, handling, accumulation, transportation and disposal, and provide penalties for violations.

City's Green-Purchasing Ordinance and Internal Recycling Policies

In order to advance sustainable practices and foster green businesses towards a closed-loop or circular economy, the City should consider developing a Green-Purchasing Ordinance modeled after the City's MWBE Ordinance. Such a Green-Purchasing Ordinance would establish that a certain percentage of any purchase the City makes beyond a certain dollar amount should be given preferentially to City-certified green businesses. Policies such as these often include price protections (allowing the purchase of more expensive options, if environmentally preferable) or mandate certain performance levels (minimum percentage of recycled content of a product or the ability of products to be readily recycled), or both. As for internal recycling policies, an internal recycling ordinance should be developed which would require all City facilities to have recycling containers and systems for use by employees, volunteers, and members of the public, and require employees to participate in the program(s) as a standard of meritorious performance.

Universal Recycling Ordinance

A Universal Recycling Ordinance, like the one adopted by Austin, TX, requires all businesses and multi-family properties to provide access to recycling for all employees, clients, customers, and residents. The ordinance also includes stipulations regarding the qualities of the recycling systems and the education and outreach needed to implement them. Furthermore, it provides for technical assistance for companies to comply with the ordinance. The City should consider adoption of such an ordinance to supplement, or perhaps supplant, other such ordinances and provide universal coverage by law. As a precursor to the development of a URO, the City should expand its internal recycling and reuse programs as a way to demonstrate how implementation of the URO might be realized by other organizations.

Zone Based Collection

The City should initiate the evaluation of alternate means to success. One example could be to extend coverage of City services provision to particular types of land uses within the zoning ordinance—for example, mixed-use properties that feature residential, retail, and office facilities in the same location.

Impacts Analysis

Policy or Regulatory Analysis

A change to the Grants of Privilege will require change to the law. Changing the site plan requirements will require changes to those regulations. Disposal bans, green purchasing, and universal recycling would require the approval of such new ordinances by the City Council.

Landfill Diversion Analysis

The intention of most of these recommended regulatory changes is to improve access to service and participation in programs by the residents and businesses of Fort Worth. Better access to recycling service when working, walking, shopping, and dining will have the immediate impact of diverting individual recyclable items and also the far-reaching impact of reinforcing and reiterating the message of recycling as a community value in the city.

Improved access to recycling service for multi-family and ICI customers should result in measurable increases in waste diverted from disposal. A ban on disposal of yard waste could result in significant tonnage diverted, as described in further detail in Section 1.4.

Economic Analysis

There are always complex and systemic economic impacts of regulations that artificially manipulate a marketplace: additional collection service will bring additional costs, but greater diversion from the SELF to composting, recycling, or reuse should bring savings and economic good in the form of resource conservation and new jobs.

Other Analysis (Jobs, GHG)

When considering a regulatory program, a municipality must weigh not only the costs and impacts, but also how the regulation can be successfully implemented by considering local needs, attitudes, traditions, and goals. Failure to do so can result in poor participation, or even an inability to get new programs or initiatives approved and funded.

Implementation Schedule

Recycling services as a condition of the Grants of Privilege: Short- to Mid-term

Commercial hauler diversion plans: Short- to Mid-term

Recycling reporting: Short- to Mid-term

Modification to Grant of Privilege fees: Short- to Mid-term

Site plan review process: Short- to Mid-term

Clean fuel vehicles: Short- to Mid-term

Disposal bans: Mid- to Long-term

Scrap-tire Disposal Ordinance: Short- to Mid-term

Internal Recycling Policies: Short- to Mid-term

Green-Purchasing Ordinance: Mid- to Long-term

Universal Recycling Ordinance: Mid- to Long-term

5.7. Blue Zones

Blue Zones Project is a community-wide well-being improvement initiative to help make healthy choices easier for everyone in Fort Worth. The concept involves making changes in the community and in one's activities, which fall into one of nine principles for living longer, healthier lives. The aim of the Blue Zones Project is to enable small changes that contribute to community-wide benefits: lowered healthcare costs, improved productivity, and a higher quality of life.[36]

The environmental and economic impacts of the programs described below—collection of litter and composting of organic waste—have been discussed previously. Within the context of the Blue Zones Project, the impacts would be further engagement of the public with how to apply the Blue Zones principles to all aspects of one's life. Implementation should be in the short-term, and continue through the life of the CSWMP.

Cross Promotion of Compatible City Programs

One of the nine principles in the Blue Zones Project is "move naturally." This is the idea of building enjoyable, low-intensity activities into one's daily routine. The City should cross-promote "Ten on Tuesday" as an ideal activity for moving naturally. Ten on Tuesday is a project in North Texas[37] that asks people to pledge to pick up ten pieces of litter on Tuesdays. The aim is to keep North Texas waterways clean of debris that washes into them during rain events.

Furthermore, Ten on Tuesday could be promoted by FitWorth, the City-endorsed effort to close the value-action gap within health and create a culture that values health first.[38] A walk through the neighborhood or a hike along a waterway to pick up litter is the type of behavioral awareness and role model empowerment the program endorses. The City should promote Ten on Tuesday within the FitWorth framework.

Composting to Encourage Local Food Production

A food desert is an area where fresh produce grocery stores are far and few in between. Both rural areas and large cities can be food deserts, and even in suburban neighborhoods lacking in public transportation options can make travel to a proper grocery store difficult.[39] The Centers for Disease Control has expressed concern about the difficulty for or inability of people who live in a food desert to access fresh produce,

[36] https://fortworth.bluezonesproject.com/
[37] http://reverselitter.com/tenontuesday/
[38] http://fitworth.org/about-us/our-solution
[39] https://www.bluezones.com/2011/08/navigating-the-food-desert/

whole grains, low-fat milk and other healthy foods and make healthy choices.[40] The Blue Zones Project is also concerned about food deserts, as it intends to create environments to help people make healthier choices. Two of the tools that Blue Zones recommends for overcoming a food desert are to employ market forces to induce change and to grow one's own fruits and vegetables at home or in a community garden. The City should continue to evaluate ways to implement composting of organic waste on both the commercial and at-home or community scale. Local production of soil resources fuels local production of produce, which in turn increases the availability of affordable, fresh food for local residents.

[40] http://www.cdc.gov/features/fooddeserts/

FORT WORTH®

September 2017

2017-2037 Comprehensive Solid Waste Management Plan
Appendix F - Solid Waste 5-Year Capital Improvement Plan
2017-2021

RETHINKING WASTE For a Greener Fort Worth

GBB SOLID WASTE MANAGEMENT CONSULTANTS

AZ&B

OCG|PR OPEN CHANNELS GROUP

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BACKGROUND/HISTORY:

Prior to 2003, the City collected residential garbage. Through a competitive purchasing process, the City selected a private contractor to replace City services. Commercial collection is open market with customers that can choose their own contractor. Single-family residents receive once a week, garbage, yard trimmings and recycling services and once a month bulk collections as a part of their monthly bill. They pay for these services through their Water Bill. In FY14-15, there were 212,563 residential customers, and there were 217,442 residential garbage carts in distribution. The use of a Pay As You Throw (PAYT) system is where residents are billed by garbage cart size with recycle carts, yard trimmings and bulk provided free of charge, but subject to weekly setout limits.

The Code Compliance Department - Solid Waste Services manages the private contracts and still provides other core services. Solid Waste Services consists of three primary sections: Contract Compliance, Litter & Illegal Dumping Operations and the Citizens Drop-off Stations.

The Contract Compliance Section is responsible for overseeing multiple City contracts for the residential solid waste collection and recycle processing services which are provided by Waste Management, operations of the City's Southeast Landfill and transportation services for drop-off station containers provided by Republic Services. Solid Waste Services also manages the Grants of Privilege Program for authorized and permitted commercial solid waste haulers. This program collects 5% of the contractor's gross receipts and is transferred to the General Fund for street repairs and maintenance.

The Litter and Illegal Dumping Operations section is responsible for overseeing and responding to reported illegal dump complaints or sites, Dead Animal Collections, litter abatement and related code enforcement activities. Code Enforcement Officers dedicate approximately 40% of their time to solid waste education, enforcement and abatement. This results in a transfer from the Solid Waste Fund to the General to pay for this portion of their salary and benefits.

The Citizens Drop-off Station section coordinates and manages the three (3) existing Citizens Drop-off Stations (built after the 2003 change to solid waste collection), with the fourth (4th) under construction. The Drop-off Stations are accessible for all Fort Worth residential solid waste customers to dispose of and recycle materials that are accepted in the residential collection

program. They provide a convenient and accessible solution for higher volumes of waste that is produced during landscaping, move in/move out, spring cleaning, etc. Since the Drop Off Stations were built, illegal dumping has dropped significantly.

Most solid waste contracts run in 10 year increments. The collection contract was renegotiated in 2013 and will be up for review again in 2023.

RESIDENTIAL COLLECTIONS AND SERVICES:

The City offers a Pay-As-You-Throw (PAYT) volume-based residential container sizing system to encourage recycling and discourage waste generation. Three residential container sizes are offered: 32 gallons, 64 gallons and 96 gallons. **The City charges a variable rate for each container size: $12.50 per month for 32 gallons, $17.50 per month for 64 gallons, and $22.75 per month for 96 gallons.**

Just over 60 % of the carts in service are 64 gallons with the 32 and 96 gallon carts representing about 20 %each. All garbage and recycling carts are owned by the City and provided to the customer free of charge.

The City operates a Call Center to handle service issues and answer questions. It operates Monday through Saturday from 7:00 a.m. to 6:00 p.m. Customers can also use a smart app on mobile devices or use a portal on the web.

Collection contractors are connected to the City through an application that provides real time data and streamlines service requests. Contractors service over 600,000 carts/setouts weekly with a missed collection rate of less than 1%. Reported missed collections are picked up within 24 hours.

In Fiscal Year (FY) 14-15, 329,849 tons of waste was collected or dropped off by residential customers. The average weekly set out (garbage and recycling) per household was 48 pounds: 40 pounds of garbage and 8 pounds of recycling. This multiplies out to approximately 2,428 pounds

of garbage and recycling per household, per year. Additionally, 31,879 tons of bulk waste and 28,973 tons of yard waste were collected. The average number of residential customers was 211,111, or an average of 302 pounds of bulk waste and 275 pounds of yard waste per household respectively. All of the yard waste collected is diverted from the landfill used for mulch by Living Earth Technologies (contracted by Republic Services).

Participation in garbage collection is presumed to be 100 % for paying and occupied housing units, the recycling participation rate is estimated to be 65 to 70 %. The diversion rate in FY 2015 was 20.71%. Recent analysis shows more recyclable metal and plastic is going to the landfill through the garbage carts than is being recycled in the blue recycling carts. The historic 10 year expenditure allocation is shown below in Figure 1.

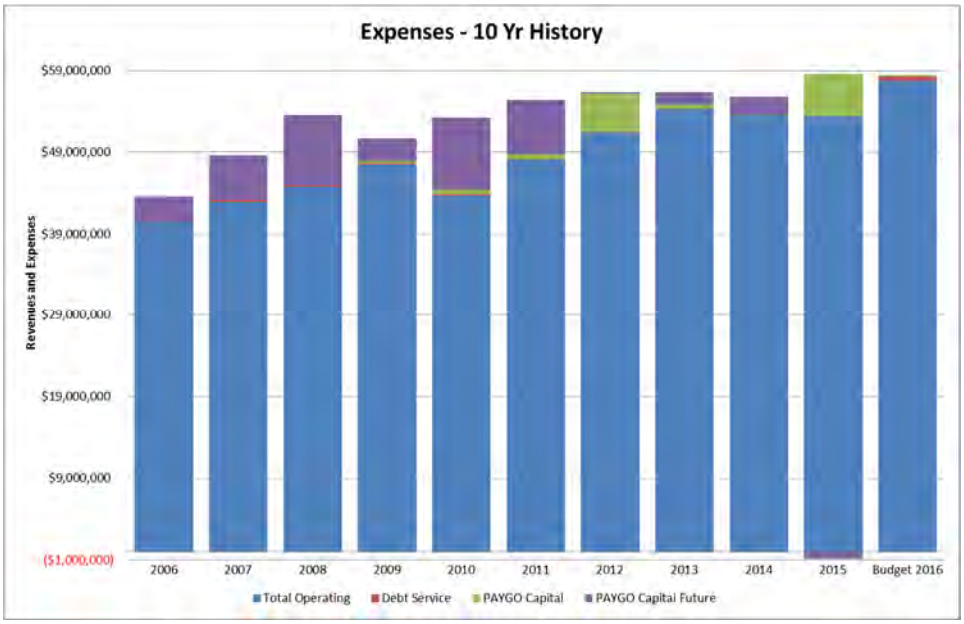


Figure 1 - Historic 10 Year Program Expenditure Allocation

Revenue sources include: Residential Service Fees (which include Compliant & Non-compliant collections and Yard Trimming Cart sales), small business Commercial Service Fees, Landfill Lease/Operations revenues, Recycling Processing revenues, Community Education Funding (required by contract), minimal miscellaneous programs and the Grant of Privilege fees (pass through to the General Fund for street maintenance or other areas). The historic 10 year and FY 2016 Annual Revenue shown below in Figure 2.

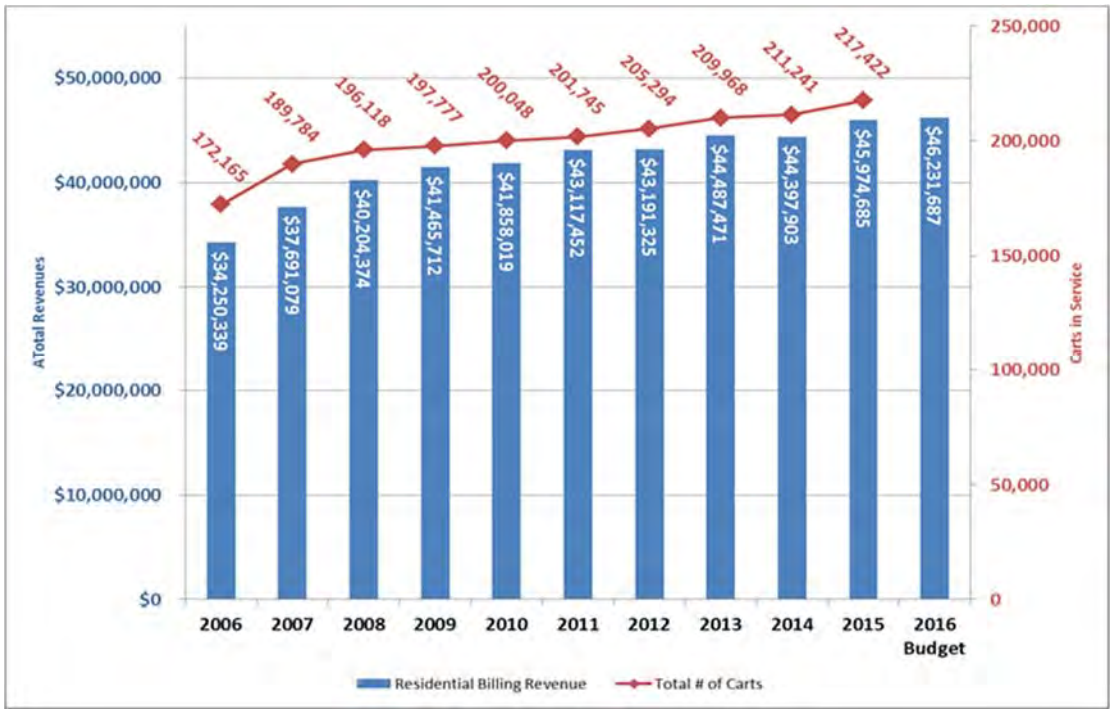


Figure 2 - Historic 10 Year & FY 2016 Annual Revenue

COMPREHENSIVE SOLID WASTE MANAGEMENT PLAN (CSWMP)

In 2014, the City began a long journey to update and revise Fort Worth's existing Solid Waste Plan (CSWMP) The previous plan was developed in 1995; nonetheless, the world has changed significantly since then. The new plan will layout future improvements, programs and new technology for providing a safe and cost effective/integrated solid waste program through 2035. The draft plan will be presented to City Council in mid 2016. We have included some of the plans findings/recommendations as part of the proposed Five Year CIP Plan.

Resource Reduction & Recycling Rate Description

The Texas state recycling goal is 40 %; the national recycling rate average from U.S. EPA is 34.5 %, and recent Columbia University research puts the national recycling rate average at around 29 %. A January 2015 report called: The Texas Recycling Data Initiative, showed a tons-over-tons statewide municipal solid waste (MSW) recycling rate of 18.9 %.

Figure 3 shows the characterization of the average Fort Worth curbside set-out. In recent years, not including yard waste, Fort Worth residents have source separated from the garbage 22 to 23 % of their waste. A waste sort conducted in March 2014 of garbage and recycling found that the subject residences source separated a bit more than average, at 28 %. However, nearly that much recycling by weight—i.e., what could have been recycled—remained in the trash and was lost to landfill. This comparison shows that even without yard waste recycling, Fort Worth should ultimately be able to recycle much more than the 30 % goal rate.

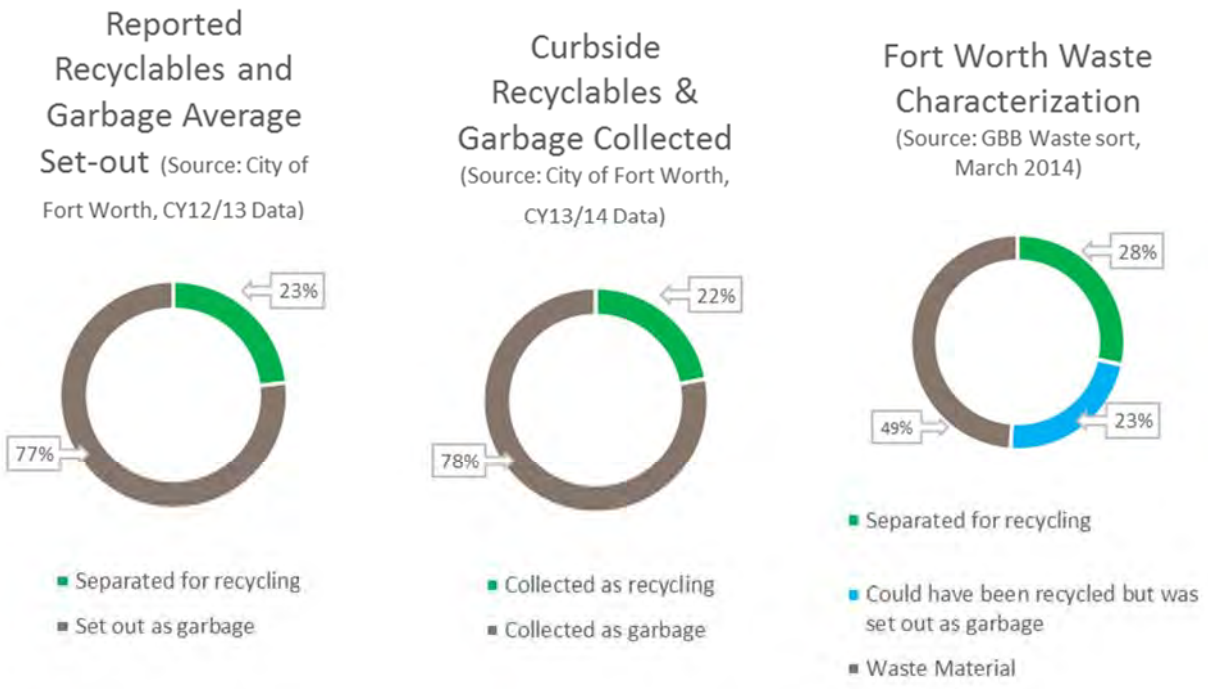


Figure 3 - Average Curbside Set-out Compared to Actual Waste Stream Characterization

Bulky Waste Program Description

Collection of bulk material is provided once monthly during a designated week. This service is for items that are too large, heavy, or otherwise unable to fit in a garbage cart. Bulk collection is not for excessive amounts of garbage, and bagged waste is not accepted. Other items not accepted in the bulk collection program include electronics, appliances containing coolant or gasoline, hazardous materials such as chemicals or poisons, automotive parts (including batteries and tires), glass, rock, soil, concrete, or tile. Volume is limited to 10 cubic yards per collection.

Crews collect bulk set-outs throughout the designated week. Residents may set out their bulk items as early as 6 p.m. the Friday before the collection week, and crews have until 5 p.m. on the Saturday, at the end of the collection week, to pick up the material. During the life of the current 1995-2015 Plan, unbudgeted costs for this program have been reduced due to program improvements, residents conforming to the set out instructions and establishing the three (3) Drop-off Stations.

In a 2012 Customer Service survey, 70.4 percent of respondents indicated that they use the bulk program. In the same survey, 87.3 percent of respondents said they were “somewhat” or “very” satisfied with the bulk collection program.

Southeast Landfill (SELF) Program Description

Residential and commercial waste that cannot be recycled through either a material processing facility or mulching/composting operation is disposed of at SELF. SELF is owned by the City and operated by Republic Services, Inc. under a contract with an expiration date of December 31, 2033. The SELF permit was amended in 2010 to add capacity. The Landfill is located at 6288 Salt Road, Fort Worth.

A total of 907,800 tons of debris was landfilled in calendar year 2015, including residential and commercial waste. The City’s residential waste stream accounted for 187,677 tons (20 %) of the total 907,800 tons disposed at the landfill. The remaining amount is from private collectors providing service to the businesses and institutions in the City or collecting waste from other municipalities or industrial, commercial and institutional (ICI) customers outside the City.

There are no limitations on the amount of waste Republic is allowed to accept at the landfill, as long as they stay in compliance with all regulations and maintain efficient service to the City. At the current rates of disposal, the Landfill has 22-24 years remaining capacity (Source: Annual Report to TCEQ – FY 2016).

Commercial waste that is generated by the private sector is hauled to one of several regional landfills including SELF, Table 1 below, summarizes the landfills that are located within the region.

Construction and demolition (C&D) waste generated in Fort Worth is disposed at either one of the several Type I landfills (MSW landfills), or the Type IV C&D landfills. There is one permitted Type IV Landfill in the area and it is owned and operated by Progressive Waste. This C&D landfill is located on Dick Price Road. It currently accepts approximately 359,000 tons per year and has eight (8) years of remaining permitted capacity. Progressive Waste is actively seeking a permit modification to increase the site capacity and extend the site life, but will need to complete the public hearing process.

Landfill	Owner	Operator	Location	Disposal Tons	Remaining Capacity (years)	Remaining capacity (tons)	Disposal Rate $/ton	Compaction Rate
City of Fort Worth	**City of Fort Worth**	**Republic**	**Fort Worth**	**501,336**	**46**	**23,261,387**	**21.84**	**1,747**
121 Regional Disposal Facility	North Texas Municipal Water District	North Texas Municipal Water District	Melissa	782,790	112	88,114,323	$ 31.00	1,426
City of Arlington	City of Arlington	Republic	Arlington	781,354	12	9,185,762	$ 26.77	1,670
DFW Recycling and Disposal Facility	WMI of Texas	WMI of Texas	Lewisville	1,289,401	11	11,865,964	$ 19.00	1,760
Camelot Landfill	City of Farmers Branch		Lewisville	298,875	20	6,023,197	$ 28.90	1,785
Charles M Hinton Jr. Regoinal Landfill	City of Garland	City of Garland	Rowlett	342,020	49	20,880,811	$ 26.37	1,200
City of Denton Landfill	City of Denton	City of Denton	Denton	176,509	32	5,673,041	$ 43.50	1,009
Ellis County Landfill	Pine Hill Farms Landfill TX LP	Pine Hill Farms Landfill TX LP	Ennis	57,154	522	29,812,238	$ 28.00	1,496
City of Grand Prairie Landfill	City of Grand Prairie	City of Grand Prairie	Grand Prairie	162,366	43	5,736,143	$ 32.00	909
IESI Fort Worth C & D Landfill*	IESI	IESI	Fort Worth	359,439	10	3,457,732	$ 29.95	1,560
IESI Weatherford Landfill	IESI	IESI	Weatherford	173,240	11	1,837,511	$ 30.00	1,400
Hunter Ferrell Landfill	City of Irving	City of Irving	Irving	146,573	67	11,078,627	$ 40.00	1,574
Itasca Landfill	Itasca Landfill Tx LP	Itasca Landfill Tx LP	Itasca	186,726	237	54,053,503	$ 28.30	2,193
Lewisville Landfill	Lewisville Landfill Tx LP	Lewisville Landfill Tx LP	Lewsiville	174,687	141	24,611,226	$ 17.96	2,230
Republic Maloy Landfill	Republic Waste Services of Tx LTD	Republic Waste Services of Tx LTD	Campbell	97,828	39	3,774,141	$ 29.42	1,234
City of Dallas Mccommas Bluff Landfill	City of Dallas	City of Dallas	Dallas	1,461,947	45	66,338,351	$ 21.50	1,400
CSC Disposal and Landfill	Republic Waste Services of Tx LTD	Republic Waste Services of Tx LTD	Avalon	6,680	655	18,052,237	$ 30.25	1,163
Waste Management Skyline Landfill	WMI of Texas	WMI of Texas	Ferris	1,120,301	20	22,301,520	$ 18.50	1,440
City of Stephenville Landfill	City of Stephenville	City of Stephenville	Stephenville	6,955	81	402,957	$ 40.00	850
IESI Turkey Creek Landfill	IESI	IESI	Alvarado	425,462	17	7,171,192	$ 32.00	1,460
Total				***8,551,643***		***413,631,863***		
Average				***427,582***	***109***	***20,681,593***	***29***	***1,475***

Table 1 - Regional Landfill Listing

Staff feels the City is well positioned to finalize the CSMWP by engaging City Management, Elected Officials and gaining broad community support to capitalize on numerous improvements in the next 20 years.

FIVE YEAR FORECAST

While balancing our current projections, assumptions and conservative Fund Balance allocation, we are projecting the next five (5) years would be balanced and avoid a potential residential rate increase until 2018 or 2019. Figure 4 shows the projected revenues and expenditures.

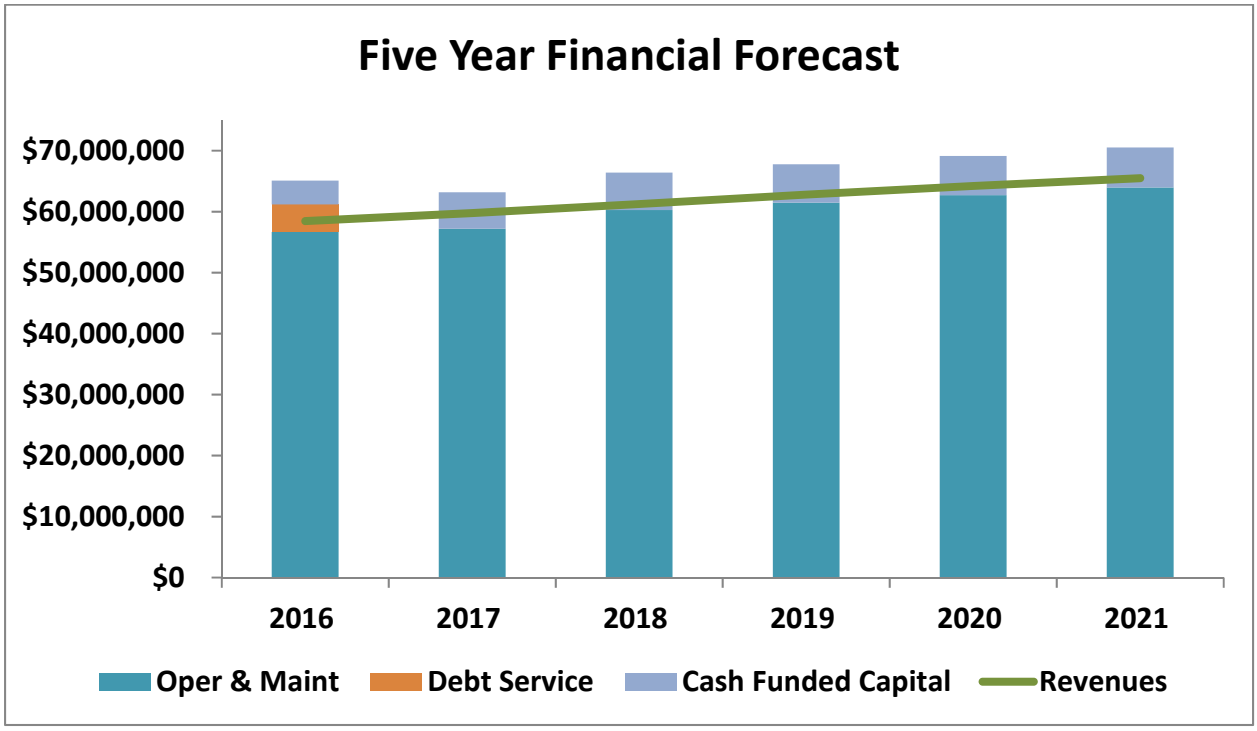


Figure 4 - Five Year Financial Forecast

Capital Improvement Strategy:

The development and implementation of the Five Year CIP will assure that the Solid Waste Fund is managed to flatten industry-based and cyclical environmental events and minimize residential rate fluctuations between major contracted services, program enhancements and capital projects.

Capital Revenue Sources:

Fund Balance

The Solid Waste Enterprise Fund balance serves as the source of cash funding for capital projects in order to meet the City of Fort Worth's 20 year solid waste and related environmental program needs. Over $30.8 million is available to support the annual operational budget, annual Pay as you Go Capital projects and Five Year CIP plan. Approximately $2.7 million of the amount transferred will fund a portion of the FY2016 capital projects.

Residential Service Fee

As noted earlier, the residents pay a monthly Solid Waste Services fee based on the size of their trash cart, for any extra bags of trash ($10 per bag or stickered bags) and for all non-compliant bulk or brush piles ($65.00 for each five (5) cubic yards of material, plus a one (1) time administration fee of $10.00 per collection). Since all three (3) streams of revenue are fluid and change constantly, the annual additional revenue stream is projected based on a historic three (3) year average, which is $67,502.00 annually.

SELF Lease Payment

Since the SELF is owned by the City and contracted with Republic Services for operational lease and management aspects, the City receives an average annual lease payment from Republic of $750,668.00 plus an average annual tonnage adjustment of $446,903.00 to account for the volume of material disposed of at the SELF.

Summary of Planned Capital Investment by Source

Projects are identified in three key areas:

1. Plans & Evaluations
2. Building, Equipment & Land Acquisitions
3. Program Enhancements through Staffing Additions

Table 3 (on the next page) provides an overview of proposed costs and implementation schedules for each of the projects to be included in the five-year 2016-21 Solid Waste CIP Plan. It is important to note that cost estimates for many solid waste projects are difficult to prepare without project evaluations and/or a site characterization completed through consultant/engineering studies.

Projections for Solid Waste Fund							
CIP REVENUE	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**	**TOTAL**
Current Solid Waste Cash Balance	$ 23,421,000	$ 24,621,000	$ 24,333,012	$ 22,973,153	$ 19,677,544	$ 13,878,264	
Revenues	$ 58,450,241	$ 59,619,246	$ 60,811,631	$ 62,027,863	$ 63,268,421	$ 64,533,789	
Expenses	$ 57,250,241	$ 59,907,235	$ 62,171,489	$ 65,323,472	$ 69,067,700	$ 70,386,184	
Projected Cash Balance	**$ 24,621,000**	**$ 24,333,012**	**$ 22,973,153**	**$ 19,677,544**	**$ 13,878,264**	**$ 8,025,870**	
PROJECTED CIP EXPENSES	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**	**TOTAL**
Vehicle & Equipment Replacement - Solid Waste	$99,100.00	$164,500.00	$175,000.00	$175,000.00	$200,000.00	$200,000.00	$1,013,600.00
Street Sweepers & Vacuum Trucks	$550,000.00	$550,000.00	$225,000.00				$1,325,000.00
Drop-off Station Buildings	$2,250,000.00	$500,000.00					$2,750,000.00
Litter Prevention - Big Belly Containers		$1,000,000.00					$1,000,000.00
Solid Waste Administrative Office Consolidation (Fire Station #12)		$1,265,000.00					$1,265,000.00
Vehicle Computer Installations		$30,000.00					$30,000.00
Environmental Collection Center / Household Hazardous Waste Equipment		$150,000.00					$150,000.00
Drop-off Station Equipment		$200,000.00					$200,000.00
Compressed Natural Gas Conversion Vehicle/Equipment Replacement		$165,000.00	$165,000.00	$165,000.00	$165,000.00	$165,000.00	$825,000.00
Call Center Expansion		$870,000.00					$870,000.00
Code Compliance Consolidation			$2,000,000.00	$4,000,000.00			$6,000,000.00
Brennan Conversion to T-station			$750,000.00	$2,500,000.00			$3,250,000.00
5th Westside Drop-off Station				$2,500,000.00	$4,200,000.00		$6,700,000.00
Future Land & Facilities Use Needs			$5,000,000.00	$2,000,000.00			$7,000,000.00
Eco-park Land Project						$5,000,000.00	$5,000,000.00
SELF Landfill Gas Reclamation System					$3,000,000.00	$2,000,000.00	$5,000,000.00
							$ -
TOTAL	**$2,899,100.00**	**$4,894,500.00**	**$8,315,000.00**	**$11,340,000.00**	**$7,565,000.00**	**$7,365,000.00**	**$ 42,378,600**
PROJECTED FUND BALANCE	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**	**TOTAL**
CIP Projected Revenue Summary	$ 58,450,241	$ 59,619,246	$ 60,811,631	$ 62,027,863	$ 63,268,421	$ 64,533,789	
CIP Projected Expense Summary	$ (57,250,241)	$ (59,907,235)	$ (62,171,489)	$ (65,323,472)	$ (69,067,700)	$ (70,386,184)	
Source or Use of Fund Balance	$ 1,200,000	$ (287,989)	$ (1,359,858)	$ (3,295,609)	$ (5,799,279)	$ (5,852,395)	
Projected Cash Balance	$ 24,621,000	$ 24,333,012	$ 22,973,153	$ 19,677,544	$ 13,878,264	$ 8,025,870	

Table 3: Summary of CIP Projects with Project Costs by Year

1. Low-volume Commercial Transfer Station Evaluation Plan

Project ID: **SW.CIP.2017-1** *Council District #:* To be Determined

Location: Central-Downtown *Size:* Citywide

Narrative:
Evaluate the direct benefits of converting an existing Drop-off Station (potentially Brennan) or opening a new centralized transfer station allowing small businesses and commercial clean-up crews to dispose of their commercial waste.

Cost Summary:
Table 4 presents the proposed costs associated for the Low-volume Commercial Transfer Station Evaluation plan.

Table 4

Low-volume Commercial Transfer Station Evaluation	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	TOTAL
Develop a comprehensive evaluation of adding or converting DOS to address small commercial solid waste volumes.	$ 25,000						$ 25,000
TOTAL	**$ 25,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 25,000**

2. Land & Facilities Use Study

Project ID: **SW.CIP.2017-2** *Council District #:* All Districts

Location: Citywide *Size:* To be Determined

Narrative:
Evaluate the City's current and future land and facility needs to accommodate long-term disposal options of the City's solid waste stream, including residential, commercial and industrial segments. This study will consider current volumes and recycling rates while also incorporating increases in both solid waste stream and recycling rates independently, while considering other alternative disposal options.

Cost Summary:
Table 5 presents the proposed costs associated for the Land & Facilities Use study.

Table 5

Land & Facility Use Study	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	TOTAL
Evaluate existing land & facility use and future 20 years+ requirements for Fort Worth	$ 60,000	$ 35,000	$ 35,000				$ 130,000
TOTAL	**$ 60,000**	**$ 35,000**	**$ 35,000**	**$ -**	**$ -**	**$ -**	**$ 130,000**

3. Eco-Park Feasibility Study

Project ID: **SW.CIP.2017-3** *Council District #:* All Districts

Location: South or Southeast *Size:* 25-30+ acres

Narrative:
As part of the 20 Year Comprehensive Solid Waste Plan, Fort Worth could benefit significantly from the development of an Eco-Park District that could support more regional economic development aspects for materials recovery and reuse. In addition, through establishing a local Eco-Park, future educational partnerships could develop collaborative joint business adventures to advance recycling markets for all residential and commercial materials, reducing the dependence on foreign markets.

Cost Summary:
Table 6 presents the proposed costs associated for the Eco-Park Feasibility study.

Table 6

Eco-Park Feasibility Study	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Evaluate necessary land & facility needs to support a local Eco-Park Project within City Limits	$ 25,000	$ 45,000	$ 25,000			$ 95,000
TOTAL	**$ 25,000**	**$ 45,000**	**$ 25,000**	**$ -**	**$ -**	**$ 95,000**

4. Comprehensive Solid Waste Management Plan – Expanded Recommendations Studies

Project ID: **SW.CIP.2017-4** *Council District #:* All District

Location: Citywide *Size:* Citywide

Narrative:

Upon the completion of the CSWMP, the top three to five key recommendations will be prioritized and supported with further evaluation and/or supporting implementation resources over the next five years. The actual recommendations will be selected from the list based on overall impacts balanced with short-term implementation strategies within commercial recycling opportunities, residential recycling processing agreement and improving the overall residential services with future enhancements.

Cost Summary:

Table 7 presents the proposed costs associated for Comprehensive Solid Waste Management Plan – Expanded Recommendations Studies.

Table 7

Comprehensive Solid Waste Management Plan – Expanded Recommendations	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	TOTAL
Advance three key recommendations identified by plan: Commercial Recycling Program, Residential Recycling Processing Agreement & Residential Service Improvements	$ 25,000	$ 50,000	$ 50,000	$ 25,000			$ 150,000
TOTAL	**$ 25,000**	**$ 50,000**	**$ 50,000**	**$ 25,000**	**$ -**	**$ -**	**$ 150,000**

5. Grants of Privilege Audit Evaluation

Project ID: **SW.CIP.2017-5** *Council District #:* All Districts

Location: Citywide

Narrative:
Commercial solid waste companies must permit their vehicles and pay the City of Fort Worth a five percent (5%) franchise fee of gross solid waste billed revenues. The City has not completed and in-depth audit of the current permitted companies nor evaluated the impact of companies that operate without being permitted until they are determined to be out of compliance. This audit is to confirm the accuracy of each permitted company and verify the revenue stream owed to the City.

Cost Summary:
Table 8 presents the proposed costs associated with the Grants of Privilege Audit Evaluation.

Table 8

Grants of Privilege Audit	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Develop audit of all existing GOP solid waste vendors to ensure accurate franchise fee is paid to City through use of outside a consulting firm.	$ 35,200					$ 35,200
TOTAL	**$ 35,200**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 35,200**

6. Landfill Gas Reclamation Evaluation

Project ID: **SW.CIP.2017-6** *Council District #:* District 8

Location: 6288 Salt Road *Size:* Approximately 300+ acres

Narrative:
In partnership with Republic Services (current lease contractor for landfill), the City has determined a beneficial application of upgrading the current landfill gas collection system to allow for the necessary volumes and control mechanisms, ensuring controlled quality and quantity of methane gas. In addition, once operational, both partners would execute the most beneficial contract with a third party to purchase the methane gas towards generating a renewal energy source while reducing the greenhouse gas impacts. This study would evaluate and identify the most beneficial project (high BTU vs. low BTU) and third party proposal from vendors.

Cost Summary:
Table 9 presents the proposed costs associated with the Landfill Gas Reclamation evaluation.

Table 9

Southeast Landfill Gas Reclamation Evaluation	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Develop environmental engineering design / financial evaluation for renewable landfill gas engery generation plan with a consulting engineer.	$ 45,000	$ 25,000				$ 70,000
TOTAL	**$ 45,000**	**$ 25,000**	**$ -**	**$ -**	**$ -**	**$ 70,000**

7. Drop-off Station (DOS) Building Site Plan & ECC/HHW Equipment Project

Project ID: **SW.CIP.2017-7** *Council District #:* All Districts

Location: Citywide

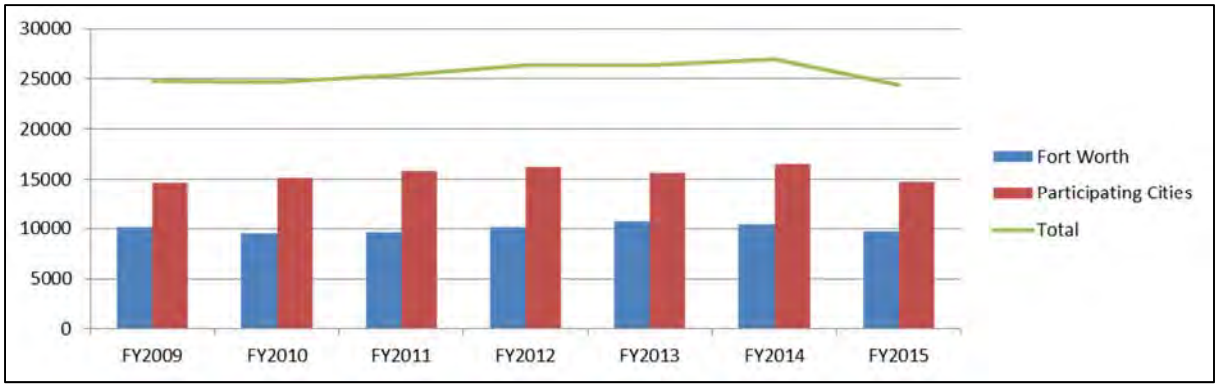
Narrative:
As identified by staff and the CSWMP consultant, the three (3) existing DOS sites will need significant site plan layout modifications to incorporate the additional staff, programs of services and collection activities. In addition, additional equipment and system components will be included to assist citizens, staff and operational standards. This project will fund the architect support for site plan layout to maximize each different site, while equipping them with identified items.

Cost Summary:
Table 10 presents the proposed costs associated with the Drop-off Station Building & ECC/HHW Equipment Project.

Table 10

Drop-off Station (DOS) Building & ECC/HHW Equipment	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Develop operational plan and site design for implementing new programs into the existing three (3) DOS.	$ 500,000					$ 500,000
TOTAL	**$ 500,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 500,000**

Annual Visits to the Environmental Collection Center



8. Westside (5th) DOS Land & Construction Project

Project ID: **SW.CIP.2017-8** *Council District #:* District 3

Location: Westside of City *Size:* Approximate 4-7 Acres

Narrative:

As identified by citizen's request and supported by staff and the CSWMP consultant, the fifth (5th) citizen's DOS will need to be designed, located and implemented along the western side of the City within the next two (2) to five (5) years. Staff hopes to work in conjunction with another commercial solid waste vendor to co-locate or develop a public-private partnership in developing the next DOS, building synergy and long term cost savings. However, if a beneficial partnership cannot be executed in a timely manner, the City will need to advance this project solely after securing the appropriate land.

Cost Summary:

Table 11 presents the proposed costs associated with the Westside (5th) DOS Land & Construction Project.

Table 11

Westside (5th) DOS Land & Construction	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Conduct feasibility and financial analysis for implementing additional DOS.		$ 2,200,000	$ 2,500,000	**$ 2,000,000**		$ 6,700,000
TOTAL	**$ -**	**$ 2,200,000**	**$ 2,500,000**	**$ 2,000,000**	**$ -**	**$ 6,700,000**

9. Future Land & Facilities Use Needs Assessment Project

Project ID: **SW.CIP.2017-9** *Council District #:* All Districts

Location: To be Determine *Size:* To be Determined

Narrative:
As identified within the current development of the 20 Year CSWMP, future land and facilities will need to be evaluated to ensure the long term solid waste disposal needs of Fort Worth will be available and secured. This project is to begin the process of setting aside or purchasing appropriate land and/or facilities that could help ensure long term disposal needs will be adequate. Based on current in-bound volumes, recycling rate and remaining capacity at the City's SELF, there is between 19-33 years of remaining landfill life/air space available.

Future of Site:
The future land and facilities to be used in the next five (5) to thirty-five (35) years will be determined at the conclusion of this assessment project.

Cost Summary:
Table 12 presents the proposed costs associated with the Future Land & Facilities Use Needs Project for the next five (5) years only. The five (5) year cost does not include the full $35.5 million capital allocation projected for Fort Worth's next landfill site which would need to be detailed out through a fifteen (15) year plan.

Table 12

Future Land & Facilities Use Needs	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Needs Assessment to determine the financial impact for future land & facilities use needs will be for the next 5 years and planning towards 35 years.		$5,000,000	$7,500,000	$2,500,000	$4,500,000	$ 19,500,000
TOTAL	**$ -**	**$ 5,000,000**	**$ 7,500,000**	**$ 2,500,000**	**$ 4,500,000**	**$ 19,500,000**

10. Eco-park Land Project

Project ID: **SW.CIP.2017-10** *Council District #:* To be Determined

Location: Citywide *Size:* Approximate 25-32 acres

Narrative:
As identified by staff and the CSWMP consultant, and confirmed by the recent softening of the recycling markets and reduction of available material recovery facilities (MRFs) in the Fort Worth area, building a Fort Worth based Eco-park would support long term economic growth, development and advocate stronger regional material avenues. In addition, as an off-set of the SELF site, if the Eco-park were to be located on property within close proximity, the landfill gas reclamation project could provide a renewable energy source to businesses/manufacturers within the Eco-park. Furthermore, this Eco-park could offer a platform to partner with an educational institution for pilot projects, educational programs, and future partnerships.

Cost Summary:
Table 13 presents the proposed costs associated with the former Eco-park Land Project.

Table 13

Eco-park Land	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Conduct feasibility and financial analysis for implementing an Eco-Park Program within City limits and/or City property.				$ 5,000,000	$ 2,000,000	$ 7,000,000
TOTAL	**$ -**	**$ -**	**$ -**	**$ 5,000,000**	**$ 2,000,000**	**$ 7,000,000**

11. Solid Waste Administration Staff Consolidation - Fire Station #12 Project

Project ID: **SW.CIP.2017-11** *Council District #:* District 2

Location: 120 N.W. 22nd Street *Size:* Approximate 6,000 sq. ft.

Narrative:
Due to the historic growth and consolidation of the Solid Waste and Code Compliance Department, the shortage of office space has led to staff members having to office in shared spaces, non-typical office areas (converted breakroom, conference areas and building entry/exits) and to office remotely from other staff members. All these aspects have increased operational costs, administrative challenges and coordination of effective deployment of resources. This project would provide temporary relief in consolidating all the necessary administrative and leadership team members of the Solid Waste Command Area into a centralized location, while allowing additional consolidation within the other command areas within the Code Compliance Department.

Cost Summary:
Table 14 presents the proposed costs associated with the Solid Waste Administration Staff Consolidation - Fire Station #12 Project.

Table 14

Solid Waste Administration Staff Consolidation - Fire Station #12	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Finish remodeling the Fire Station #12 to accommodate short term staffing for all Solid Waste Administration & north Fort Worth operational staffing.	$ 1,265,000					$ 1,265,000
TOTAL	**$ 1,265,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 1,265,000**

12. Code Compliance Department Consolidation Project

Project ID: **SW.CIP.2017-12** *Council District #:* To be Determine

Location: To be Determine *Size:* Approximate 15,000 – 20,000 sq. ft.

Narrative:
Due to the historic growth and consolidation of additional programs of services into the Code Compliance Department, the shortage of office space has led to staff members having to office in shared spaces, non-typical office areas (converted breakroom, conference areas and building entry/exits) and located remotely across the city and from other staff members. All these aspects have increased operational costs, administrative challenges and coordination of effective deployment of resources. This project would provide permanent consolidation for all the necessary administrative and leadership team members of the Code Compliance Department into a centralized location and including all other command areas.

Cost Summary:
Table 15 presents the proposed costs associated with the Code Compliance Department Consolidation Project.

Table 15

Code Compliance Department Consolidation	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Complete design and construction of 15k - 20k square feet of centralized office space to staff the entire Code Compliance administrative & leadership staff.		$ 2,000,000	$ 4,000,000			$ 6,000,000
TOTAL	**$ -**	**$ 2,000,000**	**$ 4,000,000**	**$ -**	**$ -**	**$ 6,000,000**

13. City of Fort Worth 311 Call Center Construction Project

Project ID: **SW.CIP.2017-13** *Council District #:* District 6

Location: 4100 Columbus Trail *Size:* Approximate 10,000 square feet

Narrative:
As the City moves toward a more consolidated and collaboratively coordinated Customer Service Call Center (and possible a formal 311 based structure), additional office space is needed to incorporate the increased call volume and related tasks, work load and reporting activities. This additional space will be completed within the existing Southside Service Center after Solid Waste and/or Stormwater Operations relocates from their current office areas.

Cost Summary:
Table 16 presents the proposed costs associated with the City of Fort Worth 311 Call Center Construction Project.

Table 16

311 Call Center Construction	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Complete design and construction of additional Call Center unit.	$ 870,000					$ 870,000
TOTAL	**$ 870,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 870,000**

14. City of Fort Worth SELF Landfill Gas Reclamation System Project

Project ID: **SW.CIP.2017-14** *Council District #:* District 8

Location: 6288 Salt Road *Size:* Approximate 300+ acres

Narrative:
In partnership with Republic Services (current lease contractor for landfill), the City has determined a beneficial application of upgrading the current landfill gas collection system to allow for the necessary volumes and control mechanisms, ensuring controlled quality and quantity of methane gas. In addition, once operational, both partners would execute the most beneficial contract with a third party to purchase the methane gas towards generating a renewal energy source while reducing the greenhouse gas impacts. This project would fund the identified system upgrades needed to support the long term supply of required methane gas.

Cost Summary:
Table 17 presents the proposed costs associated with the SELF Landfill Gas Reclamation System Project.

Table 17

SELF Landfill Gas Reclamation System	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Complete design and construction of enhancing the SELF Gas system to support generating renewable energy.		$ 3,000,000	$ 2,000,000			$ 5,000,000
TOTAL	**$ -**	**$ 3,000,000**	**$ 2,000,000**	**$ -**	**$ -**	**$ 5,000,000**

15. City of Fort Worth Litter Abatement Equipment Enhancement

Project ID: **SW.CIP.2017-15** *Council District #:* All Districts

Location: Citywide

Narrative:
As the Code Compliance Department has taken on the City's litter prevention and collection program in support of the City's Stormwater Permit and Environmental Management efforts, additional equipment has been identified for the Solid Waste team. This equipment will allow the Litter and Illegal Dumping crews to increase their productivity, debris collected and response time to reported areas of concern.

Cost Summary:
Table 18 presents the proposed costs associated with the City of Fort Litter Abatement Equipment Enhancement.

Table 18

Litter Abatement Equipment	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Purchase of additional Litter Abatement equipment: riding vacuums, sweepers and portable power carts/mules.	$ 175,000	$ 225,000				$ 400,000
TOTAL	**$ 175,000**	**$ 225,000**	**$ -**	**$ -**	**$ -**	**$ 400,000**

16. City of Fort Worth Drop Off Station Equipment Project

Project ID: **SW.CIP.2017-16** *Council District #:* All Districts

Locations: Citywide

Narrative:
As the Solid Waste team begins to collect additional residential volumes of donated materials and becomes a centralized location for community-based volunteer groups to perform litter collections, additional site equipment is needed to assist with operational improvements. Each DOS will need the required equipment (storage, litter collection supplies, power brooms and roadside signage) to maximize collections and minimize operational costs.

Cost Summary:
Table 19 presents the proposed costs associated with the Drop Off Station Project.

Table 19

DOS Equipment	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Purchase various additional equipment for all four (4) DOS to enhance operations and cleanliness of site.	$ 150,000					$ 150,000
TOTAL	**$ 150,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 150,000**

17. City of Fort Worth Litter Prevention – Streetscape Pedestrian Container Champaign Project

Project ID: **SW.CIP.2017-17** *Council District #:* All Districts

Locations: Citywide

Narrative:
The Code Compliance Department has taken on the City's litter prevention and collection program in support of the City's Stormwater Permit and Environmental Management efforts, the need for additional community-based trash and/or recycling containers has been identified by the Solid Waste team. The solar powered Big Belly units offer operational effectiveness as well as educational messaging associated with a citywide litter prevention program.

These units or other identified "streetscape" pedestrian containers will be strategically placed or coordinated with the appropriate City departments so that trash and/or recyclables are contained until serviced instead of becoming litter all across the City, streets, parks, creeks and neighborhoods.

Cost Summary:
Table 20 presents the proposed costs associated with the Streetscape Pedestrian Containers.

Table 20

Litter Prevention - Streetscape Pedestrian Container Champaign	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Install 275+ Big Belly Trash Compactor units or other identified containers throughout strategic locations to aid in litter prevention.	$ 1,000,000					$ 1,000,000
TOTAL	**$ 1,000,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 1,000,000**

18. Litter/Illegal Automation Units Project

Project ID: **SW.CIP.2017-18** *Council District #:* All Districts

Location: Citywide

Narrative:
The Code Compliance Department has taken on the City's litter prevention and collection program in support of the City's Stormwater Permit and Environmental Management efforts, adding laptops or tablets to each of the litter and illegal dumping crew vehicles will improve the operational effectiveness and response time. In addition, these units will offer a tracking application to document crew productivity, and efficiency in real time to determine if corrective action is necessary.

Cost Summary:
Table 21 presents the proposed associated costs for the Litter/Illegal Automation Units project.

Table 21

Litter/Illegal Automation Units	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Adding computer tablets to each crew vehicle to automate dispatching & completing Work Orders in the field in real time.	$ 27,344					$ 27,344
TOTAL	**$ 27,344**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 27,344**

19. ECC/HHW Equipment Project

Project ID: **SW.CIP.2017-19** *Council District #:* All Districts

Location: Citywide

Narrative:
As the Solid Waste team begins to collect Fort Worth residential volumes of Household Hazardous Waste (chemicals and products) at the existing DOSs, which will allow greater volumes of material from contracted/partnering cities to be processed at the Environmental Collection Center. Each DOS will need the required equipment (containment barrels, portable trailer or stationary storage unit) to maximize collections and minimize operational costs.

Cost Summary:
Table 22 presents the proposed costs associated for the ECC/HHW Equipment project.

Table 22

ECC/HHW Equipment	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Adding four (4) portable HHW trailers to use for collections at DOSs.	$ 125,000					$ 125,000
TOTAL	**$ 125,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 125,000**

20. CNG Vehicle/Equipment Replacement Project

Project ID: **SW.CIP.2017-20** *Council District #:* All Districts

Location: Citywide

Narrative:
In partnership with Waste Management, the City's future CNG fueling station will be implemented at the current MLK DOS facility. Therefore, Solid Waste has identified future equipment and vehicles to be replaced, which will utilize CNG fuel instead of diesel or gasoline. This will project will help lead the City and area with cleaner emission based vehicles and reduce the negative impact of our air quality and greenhouse gases.

Cost Summary:
Table 23 presents the proposed costs associated for the CNG Vehicle/Equipment Replacement project.

Table 23

CNG Vehicle/Equipment Replacement	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Replacing future vehicles/equipment with CNG fueling options instead of diesel.	$ 165,000	$ 165,000	$ 165,000	$ 165,000	$ 165,000	$ 990,000
TOTAL	**$ 165,000**	**$ 165,000**	**$ 165,000**	**$ 165,000**	**$ 165,000**	**$ 990,000**

21. Brennan DOS Conversion to T-station Project

Project ID: **SW.CIP.2017-21** *Council District #:* District 2

Location: 2400 Brennan Avenue *Size:* Approximate 3-7 acres

Narrative:
Based on the low-volume commercial transfer station study, the benefits of converting an existing Drop-off Station (currently Brennan) to allow small businesses, property owners and commercial clean-up crews to dispose of their non-compacted commercial solid waste in parallel with the citizens residential volumes. Since the commercial businesses do not currently support the DOS through fees, a future fee structure may be necessary.

Cost Summary:
Table 24 presents the proposed costs associated for the Brennan DOS Conversion to T-station plan.

Table 24

Brennan DOS Conversion to T-station	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Develop environmental engineering design / construction plan with a consulting engineer.		$ 750,000	$ 2,500,000			$ 3,250,000
TOTAL	**$ -**	**$ 750,000**	**$ 2,500,000**	**$ -**	**$ -**	**$ 3,250,000**

22. Keep Fort Worth Beautiful/Litter Program Expansion Project

Project ID: **SW.CIP.2017-22** *Council District #:* All Districts

Location: City-wide

Narrative:
As determined by staff and the CSWMP consultant, additional staffing is necessary to expand the program efforts and increase community participation in litter prevention and collection efforts. These additional educational and marketing staff members would be specifically targeted towards the litter and beautification efforts to develop direct results, instead of covering multiple department programs, which has been proven most effective across other programs within the state and country.

Cost Summary:
Table 25 presents the proposed costs associated with the Keep Fort Worth Beautiful/Litter Program Expansion project.

Table 25

Keep Fort Worth Beautiful/Litter Program Expansion	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Add Educational & Marketing Staffing to support future program enhancements.	$ 62,575	$ 62,575				$ 125,150
TOTAL	**$ 62,575**	**$ 62,575**	**$ -**	**$ -**	**$ -**	**$ 125,150**

23. Solid Waste Superintendent Addition

Project ID: **SW.CIP.2017-23** *Council District #:* All Districts

Location: City-wide

Narrative:
As part of the City strategically restructuring the Code Compliance Department in FY2016, Solid Waste absorbed personnel transfers from Parks and TPW to manage the Litter Abatement Program and Environmental Collections Center. The realignment resulted in 62 approved positions reporting to one Superintendent. To eliminate span of control issues currently handicapping the current program areas, the recommended additional Superintendent would assist in successfully managing six sections effectively and efficiently. The position would directly support the Assistant Director in management and implementation of ongoing program initiatives, deployment of staff and resources to the community, addressing public concerns and attendance at neighborhood meetings as necessary. Funding this management position would facilitate reducing operating overhead and improving significant milestones in performance and operational management KPIs as tied to the Code Business Plan. Significant improvement would include implementing the City's street sweeping program, increases in tons of litter collected (9%), additional miles of roadways cleaned (27%), improve response time to litter complaints (100% within 48 hours) and decrease time residents spend dropping off at the Drop Off Stations (8%).

Cost Summary:
Table 26 presents the proposed costs associated for the Solid Waste Superintendent addition.

Table 26

Solid Waste Superintendent	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Add Operational Superintendent to break operational area into two (2) separate segments.	$ 120,734					$ 120,734
TOTAL	**$ 120,734**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 120,734**

24. Material Management Program Addition

Project ID: **SW.CIP.2017-24** *Council District #:* All Districts

Location: Citywide

Narrative:
As determined by staff and the CSWMP consultant, additional staffing is necessary to expand the program efforts and increase the business community participation in waste reduction, recycling and other beneficial sustainability-based initiatives (similar to the Miller/Coors accomplishments). Advancing the proactive commercial waste and recycling efforts will be critical in advancing the City recycling goal towards 40%, and only with targeted efforts by City staff members to individual businesses and commercial groups. These additional educational and marketing staff members would be specifically targeted towards the commercial solid waste, recycling and sustainability efforts and create direct results.

Cost Summary:
Table 27 presents the proposed costs associated for the Material Management Program addition.

Table 27

Material Management Program	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Add Educational & Project Planning staffing to support future program enhancements.		$ 67,075	$ 67,075	$ 67,075		$ 201,225
TOTAL	**$ -**	**$ 67,075**	**$ 67,075**	**$ 67,075**	**$ -**	**$ 201,225**

25. Residential Services Education Program Addition

Project ID: **SW.CIP.2017-25** *Council District #:* All Districts

Location: Citywide

Narrative:
As determined by staff and the CSWMP consultant, additional staffing is necessary to expand the program efforts and increase community awareness and participation in all of the solid waste collection services and programs. These additional educational staff members would be specifically targeted towards residential services, increasing the recycling rate and developing direct results, instead of covering multiple department programs, which has been proven most effective across other programs within the state and country.

Cost Summary:
Table 28 presents the proposed costs associated for the Residential Services Education Program addition.

Table 28

Residential Services Education Program	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Add Educational Specialist to increase residents awareness and use of the service within established guidelines.	$ 125,150	$ 62,575				$ 187,725
TOTAL	**$ 125,150**	**$ 62,575**	**$ -**	**$ -**	**$ -**	**$ 187,725**

26. Illegal Dump Officers & Call Center Staff Addition

Project ID: **SW.CIP.2017-26** *Council District #:* All Districts

Location: Citywide

Narrative:
As the City moves toward a more consolidated and collaboratively coordinated Customer Service Call Center (and possibly a formal 311 based structure) and direct enforcement activities, additional staff is needed to incorporate the increased call volume and citation work load. These additional staff members will increase the response time of reported issues, decrease neighborhood-based concerns and will improve the customer service level through all Code Compliance activities.

Cost Summary:
Table 29 presents the proposed costs associated for the Residential Services Education Program addition.

Table 29

Illegal Dump Officers & Call Center Staff	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Add additional officers and customer service representatives for enhanced program results.	$ 380,000.00					$ 380,000
TOTAL	**$ 380,000.00**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 380,000.00**

27. DOS & Litter Abatement Enhancements Program Addition

Project ID: **SW.CIP.2017-27** *Council District #:* All Districts

Location: Citywide

Narrative:
The Code Compliance Department has taken on the City's litter prevention and collection program in support of the City's Stormwater Permit and Environmental Management efforts, adding additional cross trained crews will streamline the transition between the DOS and Litter Collection efforts as needed and in turn will improve the operational effectiveness and response time. In addition, these crews will increase the actual productivity of both areas.

Cost Summary:
Table 30 presents the proposed costs associated for the DOS & Litter Abatement Enhancements Program addition.

Table 30

DOS & Litter Abatement Enhancements	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	TOTAL
Add Operational crew members for Litter Abatement & Sweeping program activities.	$ 145,000					$ 145,000
TOTAL	**$ 145,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 145,000**