FORT WORTH®

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

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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.

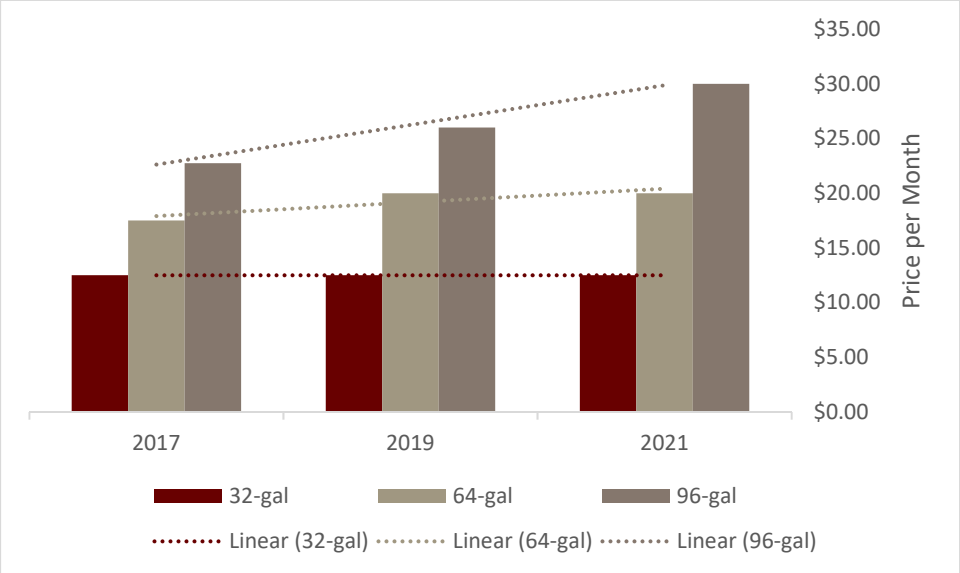
- In the long term, divert from landfill disposal (incorporating recycling, reuse, waste reduction and waste-to-energy activities) **60** percent or more of all waste by 2037.
- Ultimately, evaluate adopting goal of total diversion of 80 percent by 2045.

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.

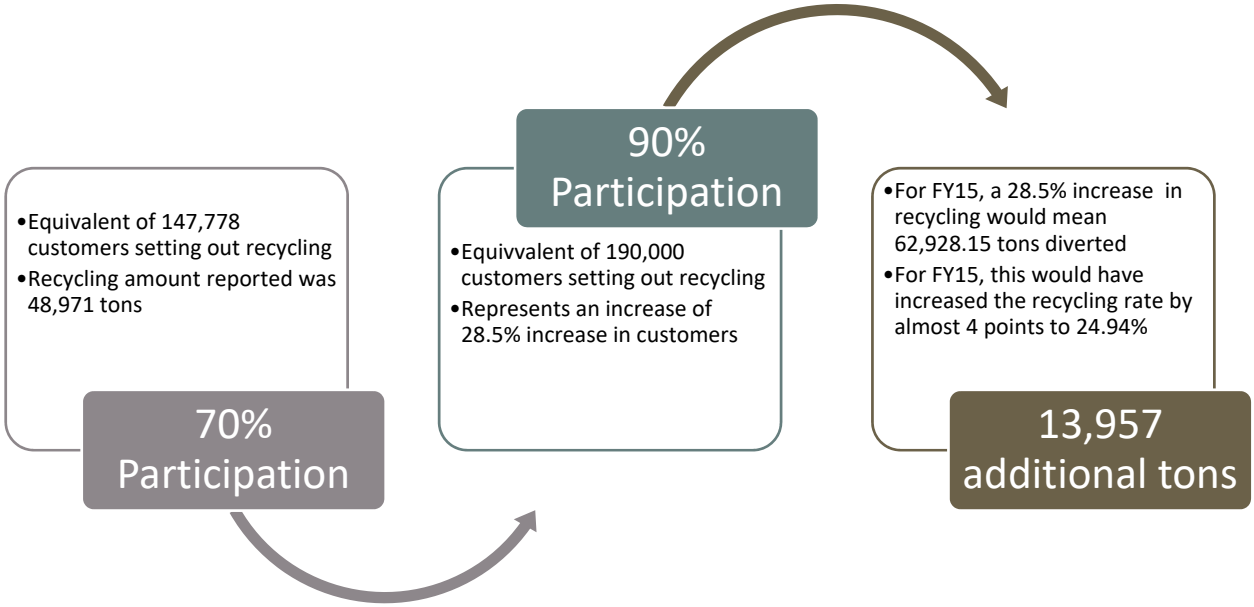


Figure 1-2 Calculation of Potential Impacts on Increasing Recycling Participation in Fort Worth from 70 Percent to 90 Percent

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.

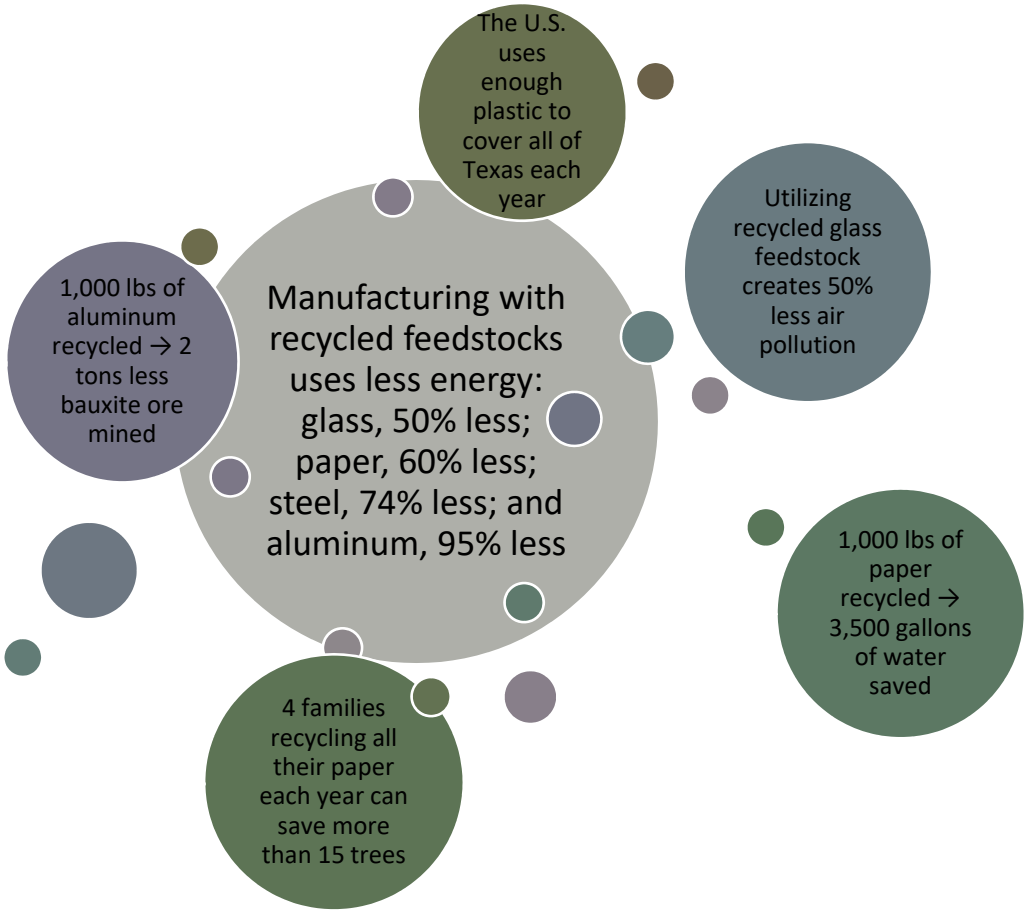


Figure 1-3 Environmental Impacts of Recycling (Source: University of Massachusetts; GBB)

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.

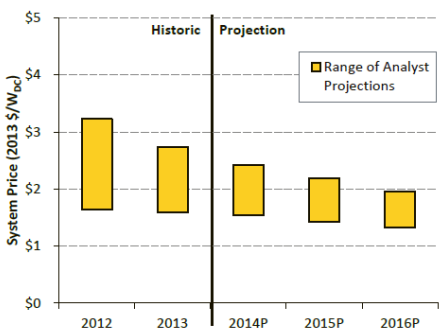
Landfill Diversion Analysis

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:

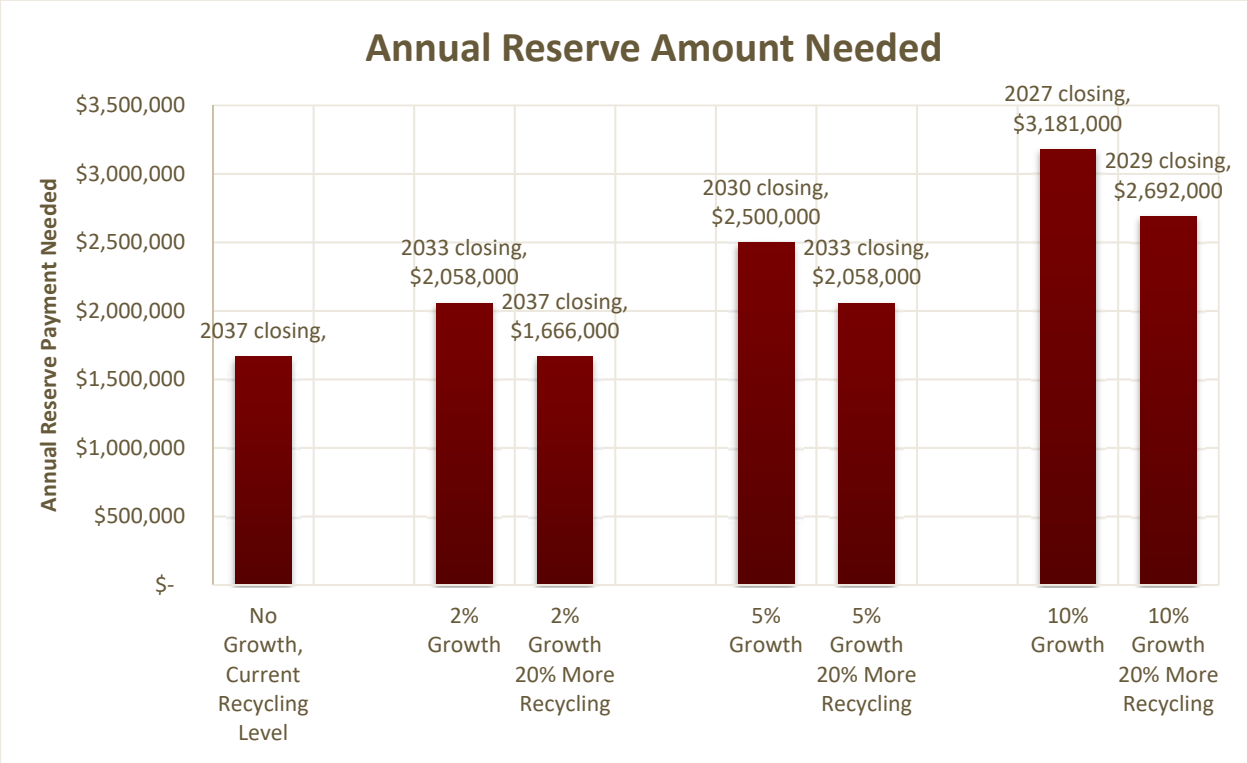


Figure 4-1 Annual Reserve Funds Needed for Future Disposal Facilities with Various Scenarios for Waste Amounts and Estimated Closure Years

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/