



REPORT FOR
**CITY OF DALLAS LITTER AND
ILLEGAL DUMPING ASSESSMENT
STUDY**

SUBMITTED TO
CITY OF DALLAS

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TABLE OF CONTENTS

	<u>Page No.</u>
EXECUTIVE SUMMARY	
1.0 EVALUATION OF EXISTING PROGRAMS.....	1-1
1.1 Litter Prevention	1-2
1.2 Illegal Dumping Prevention.....	1-5
1.3 Education and Outreach.....	1-6
1.4 Litter Abatement	1-9
1.5 Illegal Dumping Abatement.....	1-12
1.6 Enforcement.....	1-14
2.0 COMPARISON OF ANNUAL COSTS	2-1
2.1 Annual Costs of Dallas Compared to Other Texas Cities.....	2-1
2.2 Litter Prevention	2-2
2.3 Illegal Dumping Prevention.....	2-2
2.4 Education and Outreach	2-2
2.5 Litter Abatement	2-2
2.6 Illegal Dumping Abatement.....	2-2
2.7 Enforcement.....	2-2
2.8 Total Spending Compared to per Capita Spending.....	2-3
3.0 GAP ANALYSIS AND RECOMMENDATIONS.....	3-1
3.1 Develop, Implement, and Track Geographically-Focused Approach	3-2
3.2 Improve Regional and Local Collaboration.....	3-5
3.3 Integrate Proactive Methods to Prevent Litter and Illegal Dumping	3-6
3.4 Increase Community Engagement in Litter Collection and Prevention	3-6
3.5 Educate the Public to Increase Understanding and Participation	3-7
3.6 Reduce Incidence of Litter and Illegal Dumping by Keeping a Clean Community	3-8
3.7 Become More Proactive to Reduce Illegal Dumping from Construction Activities.....	3-8
3.8 Become More Proactive to Reduce Litter and Illegal Dumping from Commercial Sources	3-9
3.9 Enhance Enforcement of Litter and Illegal Dumping Laws	3-9
4.0 CASE STUDIES	4-1
4.1 City of Fort Worth, Texas.....	4-1
4.2 City of Philadelphia, Pennsylvania.....	4-3

LIST OF TABLES

	<u>Page No.</u>
Table 1-1: Litter Prevention Program Costs	1-3
Table 1-2: Illegal Dumping Prevention Program Costs.....	1-5
Table 1-3: Education and Outreach Program Costs.....	1-8
Table 1-4: Litter Abatement Program Costs.....	1-10
Table 1-5: Illegal Dumping Abatement Program Costs	1-13
Table 1-6: Enforcement Program Costs.....	1-14
Table 4-1: Summary of Litter and Illegal Dumping Programs.....	4-1
Table 4-2: Summary of Litter and Illegal Dumping Programs.....	4-4

LIST OF FIGURES

	<u>Page No.</u>
Figure 1-1: Trash Bag Kiosk in Corpus Christi	1-3
Figure 1-2: Overflowing Refuse Cart	1-4
Figure 1-3: Debris in Creek Flowing into Lake Ray Hubbard.....	1-9
Figure 1-4: Homeless Encampment Cleanup at Stemmons Freeway and Medical District.....	1-10
Figure 1-5: Before and After Litter Abatement at Lake Cliff.....	1-12
Figure 2-1: City of Dallas Annual Costs.....	2-1
Figure 2-2: Annual Costs for Nine Texas Cities	2-1
Figure 2-3: City of Dallas Costs Compared to Other Texas Cities.....	2-3
Figure 3-1: Litter in Relation to Reinvestment Areas	3-3
Figure 3-2: Images of Litter Data Collection App.....	3-4

APPENDICES

- Appendix A: Strategies to Combat Litter and Illegal Dumping
- Appendix B: City of Dallas Geographic Information Systems Maps

EXECUTIVE SUMMARY

The City of Dallas (City) Office of Environmental Quality (OEQ) retained Burns & McDonnell to conduct a litter and illegal dumping assessment study. The purpose of this Study is to provide an understanding of City's ongoing efforts and costs to address litter and illegal dumping and compares them to other cities. Based on extensive interviews with City staff and results of a gap analysis, Burns & McDonnell provides recommendations for how the City can implement a more strategic and preventative approach to combatting litter and illegal dumping. The Litter Task Force (LTF) is an important part of the City's coordination efforts to reduce litter and illegal dumping. Burns & McDonnell coordinated with the LTF throughout the development of this Study and incorporated the LTF's comments into this report. This report is organized into the following four sections, and the remainder of this Executive Summary highlights key aspects of each section.

- Section 1.0: Evaluation of Existing Programs
- Section 2.0: Comparison of Annual Costs
- Section 3.0: Gap Analysis and Recommendations
- Section 4.0: Case Studies

Evaluation of Existing Programs

As described in Section 1.0, Burns & McDonnell interviewed staff from each of the departments that are part of the LTF to understand the City's current efforts and their associated costs. The LTF is composed of staff from the following departments:

- 311
- Code Compliance Services (CCS)
- Marshal's Office
- Office of Environmental Quality (OEQ)
- Office of Homeless Solutions (OHS)
- Park and Recreation (PKR)
- Planning and Urban Design (PUD)
- Public Works
- Sanitation (SAN)
- Stormwater Management (SWM)
- Trinity Watershed Management (TWM)
- Water Utilities (DWU)

Each department's litter and illegal dumping program costs were classified into one of the six categories based on their primary objective:¹

- Litter prevention
- Illegal dumping prevention
- Education and outreach
- Litter abatement
- Illegal dumping abatement
- Enforcement

A description of each of the ongoing programs and a summary of key findings for each category is provided in Section 1.0. While the City is undertaking many programs to address the challenges of litter and illegal dumping, the majority of the efforts tend to be reactive rather than preventative.

Comparison of Annual Costs

As described in Section 2.0, Burns & McDonnell worked with the City to document litter and illegal dumping program costs. The City spends a significant sum annually, approximately \$20.4 million on preventing, combatting, and cleaning up litter and illegal dumping. This Study includes program expenditures from across City departments with responsibility for litter and illegal dumping. Each department reported program costs associated with prevention, education and outreach, abatement, and enforcement. Expenditures by private businesses are not included in this Study, but they are likely significant. In addition, value contributed by volunteers is excluded from the total costs in the Study. The costs are compared with the costs reported by the nine cities included in the Texans For Clean Water (TFCW) Study.²

A summary of the annual costs the City spends in each category is provided in Figure ES-1, and a summary of the collective costs spent in each category by the nine cities included in the TFCW Study is provided in Figure ES-2.

¹ The six categories align with those used in "The Cost of Litter and Illegal Dumping in Texas," prepared for Texans for Clean Water by Burns & McDonnell (February 2017). The study is available on-line at:

http://www.texansforcleanwater.org/uploads/1/0/9/3/10936519/cost_of_litter_and_illegal_dumping_final.pdf

² The nine cities in the TFCW Study include the Cities of Austin, Corpus Christi, El Paso, Fort Worth, Houston, Laredo, Lufkin, Midland, and San Antonio

Figure ES-1: City of Dallas Annual Costs

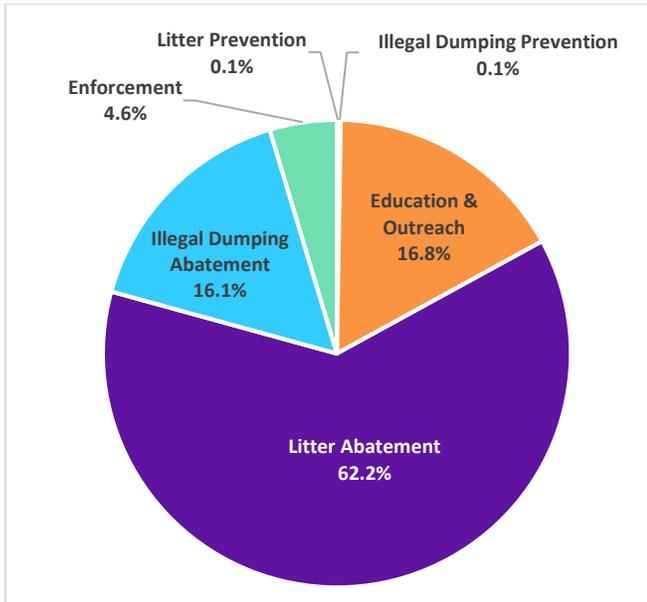
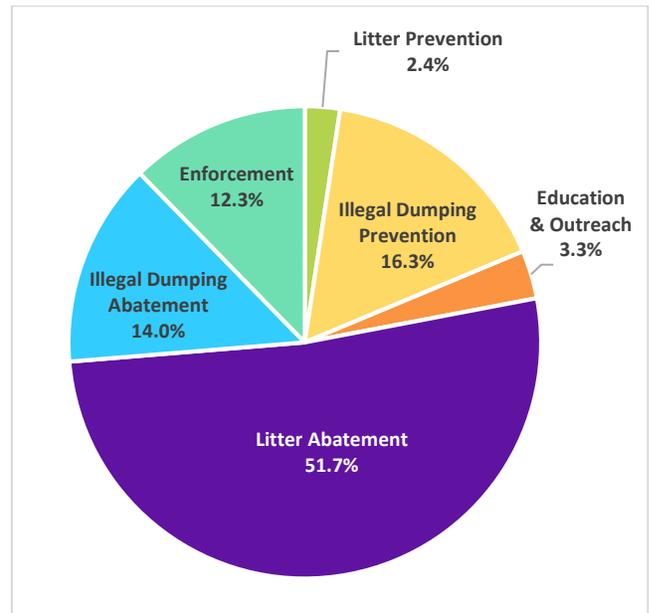
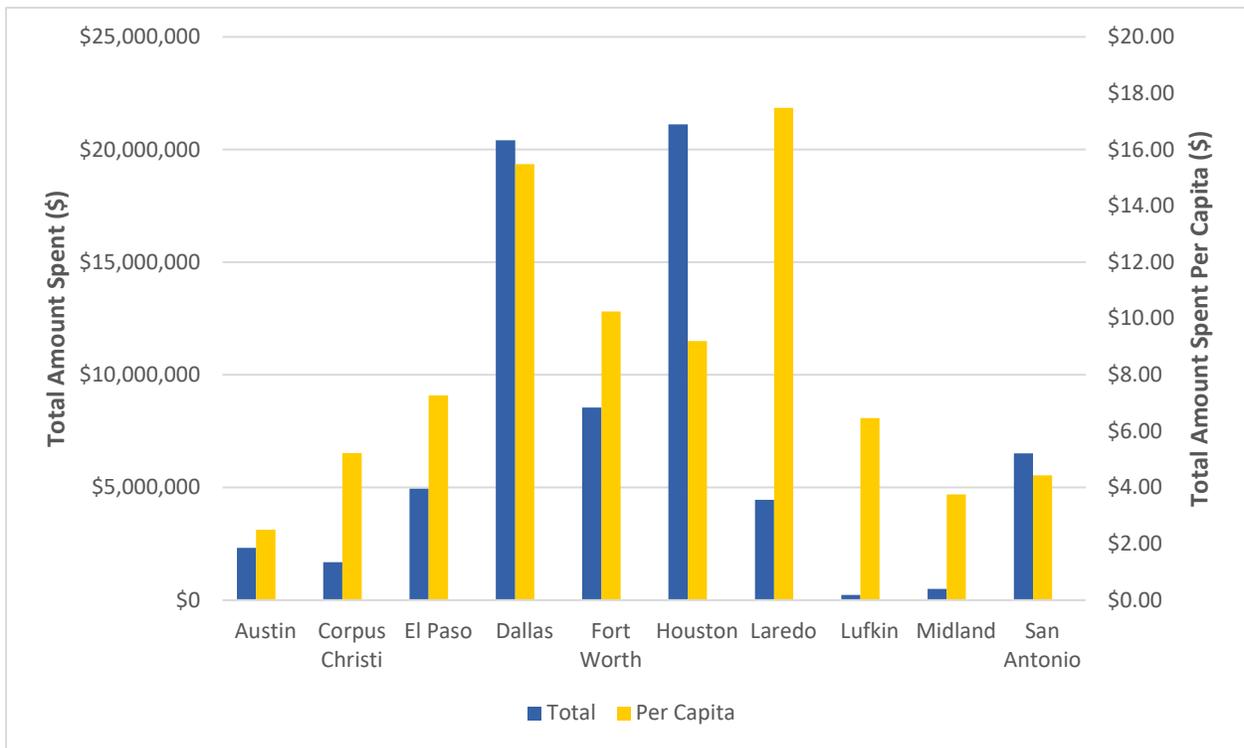


Figure ES-2: Annual Costs for Nine Texas Cities



Annual costs for the ten cities studied in Texas on litter and illegal dumping activities is compared on a total and per capita basis in Figure ES-3.

Figure ES-3: City of Dallas Costs Compared to Other Texas Cities



The City is the third largest city in Texas with a population of more than 1.3 million. It spends \$20.4 million annually on litter and illegal dumping activities. This amount places it near the top in terms of total spending and per capita spending.

Gap Analysis and Recommendations

As detailed in Section 3.0, Burns & McDonnell provides a gap analysis of the City's current efforts to address litter and illegal dumping. Burns & McDonnell also provides a combination of strategies and recommendations for the City to implement to reduce litter and illegal dumping. Based on information received from the City and comments received during the Litter Task Force Workshop,³ Burns & McDonnell identified nine recommended strategies. The detailed gap analysis and recommendations are provided in the Strategies to Combat Litter and Illegal Dumping table in Appendix A. The nine recommended strategies are summarized below.

1. Develop, Implement, and Track Geographically-Focused Approach

Gap: With the number of programs in place across multiple city departments, there is a need to develop a **more strategic approach** to addressing litter and illegal dumping.

Recommendation: The City should **establish leadership** for the litter and illegal dumping strategy and **analyze geographical data to inform its selected strategies**.

2. Improve Regional and Local Collaboration

Gap: City departments and regional entities do not always coordinate to **identify shared objectives or cooperate to pool resources to target key audiences in areas with a high incidence of litter or illegal dumping**.

Recommendation: To effectively leverage limited resources for litter and illegal dumping, the City should continue to **improve coordination of resources among departments** and other regional entities.

3. Integrate Proactive Methods to Prevent Litter and Illegal Dumping

Gap: **The City does not have many ongoing prevention activities**.

Recommendation: The City should **improve the promotion of existing free waste disposal services available to residents and consider adding collection stations** to improve access to waste disposal facilities in areas where a transfer station is not easily accessible.

³ Burns & McDonnell met with members of the Litter Task Force on August 28, 2018 to discuss the proposed recommendations.

4. Increase Community Engagement in Litter Collection and Prevention

Gap: The City does not place an emphasis on opportunities to engage directly with residents.

Recommendation: The City should focus on opportunities where City staff can directly interact with residents to develop community leadership and sense of ownership in an effort to reduce litter and illegal dumping.

5. Educate the Public to Increase Understanding and Participation

Gap: The City currently leads or supports multiple outreach campaigns that address aspects of litter and illegal dumping, but the efforts are not always coordinated.

Recommendation: The City should develop a strategic approach to identify target audiences in areas where litter and illegal dumping are a concern on which to focus its education activities.

6. Reduce Incidence of Litter and Illegal Dumping by Keeping a Clean Community

Gap Analysis: The City does not currently evaluate whether waste disposal services are adequately designed or collected on a frequency to prevent litter and illegal dumping.

Recommendation: The City should ensure that residents have access to convenient disposal options, particularly in high traffic public spaces, and analyze data received by 311 to focus efforts on where additional services are needed.

7. Become More Proactive to Reduce Illegal Dumping from Construction Activities

Gap Analysis: The City does not currently have a program to communicate to construction contractors the existing disposal options for construction and demolition waste or to increase awareness of penalties associated with illegal dumping.

Recommendation: The City should focus on improving communication of existing locations for proper management of construction and demolition (C&D) materials and educating construction contractors about the penalties of illegal dumping.

8. Become More Proactive to Reduce Litter and Illegal Dumping from Commercial Sources

Gap Analysis: The City currently does not encourage or require businesses to develop Litter Prevention Plans.

Recommendation: The City should provide technical assistance to businesses and commercial fleet owners to develop Litter Prevention Plans and consider making them a requirement in geographical areas where there is a high incidence of litter.

9. Enhance Enforcement of Litter and Illegal Dumping Laws

Gap Analysis: The City does not provide training to law enforcement officials or regularly evaluate the effectiveness of existing environmental laws, and the **Marshal's Office is the only department with a primary focus on illegal dumping and litter crimes.**

Recommendation: The City should regularly review environmental laws to ensure they are effective deterrents to environmental crimes and provide training to relevant law enforcement staff who can augment the efforts of the Marshal's Office.

Case Studies

As described in Section 4.0, Burns & McDonnell includes case studies of the efforts by the City of Fort Worth, Texas and the City of Philadelphia, Pennsylvania to combat litter and illegal dumping. The City of Fort Worth was selected because it is the City of Dallas' largest neighbor in the Trinity River Watershed. The City of Philadelphia was selected because it is a comparatively large city located along a major river, and the city is developing new strategies to reduce litter and illegal dumping. A description is provided of each city's strategic approach and a summary of the specific programs implemented to address litter and illegal dumping as related to the six categories to address litter and illegal dumping.

1.0 EVALUATION OF EXISTING PROGRAMS

The City has 11 departments that support efforts to address litter and illegal dumping for various areas or facilities within the City. The City established a Litter Task Force (LTF) that includes key members from each of the departments to promote coordination and information sharing among staff. Burns & McDonnell interviewed City staff from each of the following departments to discuss their current efforts and to understand potential challenges.

- 311
- Code Compliance Services (CCS)
- Marshal's Office
- Office of Environmental Quality (OEQ)
- Office of Homeless Solutions (OHS)
- Park and Recreation (PKR)
- Planning and Urban Design (PUD)
- Public Works
- Sanitation (SAN)
- Stormwater Management (SWM)
- Trinity Watershed Management (TWM)
- Water Utilities (DWU)

A description of each department's programs follows. For the purposes of this Study, the City's efforts are classified into one of six categories, which include:

- Litter prevention
- Illegal dumping prevention
- Education and outreach
- Litter abatement
- Illegal dumping abatement
- Enforcement

The following sections describe the City's ongoing programs for each of the six categories. This includes a discussion of the following:

- **Ongoing programs:** This section describes ongoing efforts that the City has implemented to address litter and illegal dumping.
- **Cost:** This section provides a summary of the costs for the cost category. Annual costs for the City are compared to the nine cities included in the study, “The Cost of Litter and Illegal Dumping in Texas,” prepared for Texans for Clean Water (TFCW Study).¹ Section 2.0 also evaluates the financial costs specific to each category. A description of each program, including the department responsible and the annual cost, is provided in the summary table for each category. The strategy number noted in the summary tables corresponds to the strategy number found in the Strategies to Combat Litter and Illegal Dumping provided in Appendix A.
- **Key findings:** This section evaluates the efforts that the City is currently implementing and highlights program challenges. Examples of programs successfully implemented by other cities are also included.

1.1 Litter Prevention

Litter prevention includes activities and programs designed to encourage residents to change their behavior to not litter. This section describes the ongoing programs classified in the litter prevention category. A summary of the annual costs of each program is included in Table 1-1.

Ongoing Program: MOWmentum is a city-wide program supported by the Public Works Department that focuses on litter prevention through local volunteer-sponsored beautification projects. The individual or group sponsoring the beautification project determines the project area, which means that the program benefit is generally limited to the immediate local community.

Cost: The City does not currently have a significant emphasis on litter prevention activities. It spends \$25,000 annually, or about 0.1 percent of the total direct costs of managing litter and illegal dumping. Most of its litter and illegal dumping funding, over 78 percent, goes toward abatement-related activities. This low amount for litter prevention is consistent with the findings of the TFCW Study. Collectively, the nine cities spent 2.4 percent on litter prevention in 2016 compared to nearly 52 percent on abatement-related activities.

¹ The Cost of Litter & Illegal Dumping in Texas (February 2017). Prepared for Texans for Clean Water by Burns & McDonnell. The study is available on-line at: http://www.texansforcleanwater.org/uploads/1/0/9/3/10936519/cost_of_litter_and_illegal_dumping_final.pdf

Table 1-1: Litter Prevention Program Costs

Name	Description	Department	Annual Cost	Strategy
MOWmentum	Sponsor (individuals, neighborhood associations, or businesses) commits to planning and maintaining a project for a minimum of five years. The program focuses on supporting projects that improve rights-of-way and neighborhoods.	Public Works	\$25,000	2

Key Findings: A greater focus on tracking projects across the City as well as the longevity of each project would help clarify MOWmentum’s positive impact. In addition, the City would benefit from focusing additional funding and programs on litter prevention activities. While litter abatement and illegal dumping abatement are important efforts, allocating most funding to abatement-related activities puts the City in a reactive stance rather than a proactive one. Without additional prevention efforts that actively engage residents, it will be difficult for the City to convince its residents of the need to take greater pride in maintaining a clean community to reduce the amount of time and cost to clean up litter.

For example, a successful program implemented by the City of Corpus Christi that reduced litter on its beaches is providing free trash bags in kiosks to visitors with a “Don’t Litter” message printed across the bag. An example of one of the trash bag kiosks is shown in Figure 1-1. The City could consider a similar approach by installing trash bag kiosks at municipal parks where littering is a repeat concern.

Figure 1-1: Trash Bag Kiosk in Corpus Christi

In addition, there is a need to evaluate whether existing trash receptacles are of sufficient capacity or collected on a frequency based on use to prevent litter. Inadequate trash receptacles contribute to windblown litter, which can then contribute to the likelihood of residents not properly disposing of waste in the provided trash or recycling receptacles. An example of an overflowing refuse cart that is contributing to litter is shown in Figure 1-2.

Figure 1-2: Overflowing Refuse Cart

For example, the City of Houston worked to minimize litter by placing trash receptacles across its network of parks to provide convenient trash receptacles in high traffic areas. This strategy can be expanded to other high traffic areas, such as trash receptacles at street intersections and in parking lots to help encourage motorists to dispose of their trash properly rather than tossing it on the ground. Litter is commonly found in parking lots or around fast food restaurants frequented by customers throughout the day. To combat this problem, the City of Laredo implemented an ordinance that requires businesses to provide trash receptacles in their parking areas, and medium and large commercial establishments to develop and submit a Litter Prevention Plan prior to the start of their operations. The Litter Prevention Plan is intended to address strategies that commercial entities, grocery stores, and food establishments can take to mitigate litter by considering wind direction, placement of trash receptacles, waste collection schedule, and proper disposal of collected trash at a permitted landfill. The City of Dallas could consider first encouraging commercial entities to adopt their own Litter Prevention Plan on a volunteer basis, and if there is insufficient progress to reduce litter, then the City make a Litter Prevention Plan a requirement.

Another source of litter on streets and in parks is homeless encampments. Encampments range from a single person to groups of homeless people who may establish informal campsites in wooded areas or under overpasses. Litter accumulates around the encampments as waste is discarded and is often scattered by wind or enters nearby waterways. The City of Fort Worth Police Department has a budget of \$1,800 per year to hand out trash bags to homeless help prevent litter. The trash bags also make it easier for the sanitation department to collect the waste while emptying other trash receptacles on the route. The City of Fort Worth's Clean Slate program contracted through the Presbyterian Night Shelter hires area homeless people to pick up litter. In 2017, Clean Slate had a budget of \$48,000 and hired over 40 homeless people,

who collected 3,856 tons of litter from streets, parks, waterways, and around homeless encampments. In addition, the program helps homeless individuals to obtain regular full-time work with health benefits to enable them to transition out of living in a homeless shelter. Based on the program's success, the City of Fort Worth recently approved \$465,000 to hire an additional 15 homeless people for fiscal year 2019. OHS is currently is in the final planning stages to implement a similar program for the City of Dallas, which it plans to implement in September 2018.

1.2 Illegal Dumping Prevention

Illegal dumping prevention includes activities and programs designed to provide convenient alternatives to encourage residents and businesses to dispose of waste properly. This section describes the ongoing programs classified in the illegal dumping prevention category. A summary of the annual costs of each program is included in Table 1-2.

Ongoing Programs: Recently, the U.S. Army Corps of Engineers installed pipe fencing at the Lower Chain of Wetlands to prevent vehicle access in an area where illegal dumping was a repeat problem. The Sanitation Department also operates a municipal landfill, the McCommas Bluff Landfill, and three transfer stations where residents may dispose of non-hazardous waste for free.

Cost: Similar to litter prevention, the City does not currently support many illegal dumping prevention activities. The fencing installed at the Lower Chain of Wetlands cost \$30,000, which represents 0.1 percent of the total amount spent on litter and illegal dumping by the City and less than the collective 16.3 percent spent by the cities in the TFCW Study.

Table 1-2: Illegal Dumping Prevention Program Costs

Name	Description	Department	Annual Cost	Strategy
Lower Chain of Wetlands Fencing	US Army Corps of Engineers paid to install a pipe fence to close off an area to keep vehicle traffic out to prevent illegal dumping.	TWM	\$30,000 ¹	3
Landfill and Transfer Station Drop-Off Centers	The City operates the McCommas Bluff Landfill and three transfer stations where residents may dispose of ordinary, non-hazardous solid waste for free with proof of residency.	SAN	\$- ²	6

¹ The annual cost for this program is a one-time initial cost to construct the fence. The on-going cost to maintain the fence was not quantified.

² The direct cost data was not available for inclusion in this study.

Key Findings: The two main determining factors that contribute to a person's decision to illegally dump are convenience and economic cost. According to the Marshal's Office, the profile of an illegal dumper is

most commonly someone involved in the construction and demolition or landscape industry but may also include residents who dispose of material on vacant lots. Illegal dumpers are typically smaller contractors or independent contractors who perceive a greater benefit in terms of revenue by avoiding the additional travel time of driving to a landfill and paying the disposal costs to properly dispose of their waste. **The Sanitation Department is planning a pilot project to provide a new drop-off center in the southeast quadrant of the City near the intersection of US Highway 175 and Bruton Road.** Currently, waste disposal is available to residents for no charge at the McCommas Bluff Landfill or any of the three existing transfer stations located within the City. By adding another location for residents to dispose of items, the City's goal is to make proper waste disposal more convenient to capture items that would otherwise be illegally dumped. Several cities in the TFCW Study, including Austin, Fort Worth, and Lufkin, identified drop-off centers as an important preventative measure. The City would benefit from greater promotion of the free collection services offered to residents at the McCommas Bluff Landfill and the three transfer stations. One method would be to communicate these services through water bill inserts.

The City primarily tracks illegal dumping through the 311 Customer Service Center, which is the most common way residents report illegal dumping cases. The 311 operator routes illegal dumping calls to the Marshal's Office if the activity is in progress or to the appropriate department to respond and abate the site. The location of the illegal dumping site is also tracked by 311 and can be displayed on GIS maps to depict a where illegal dumping occurs as well as frequency (i.e., "hot spots"). The ability to show where illegal dumping occurs and the number of reports will help the City target its prevention efforts on areas where it is of most concern.

1.3 Education and Outreach

Education and outreach programs are intended to promote awareness and provide information about legal options for proper disposal or recycling. This section describes the ongoing programs classified in the education and outreach category. A summary of the annual costs for this category are provided in Table 1-3.

Ongoing Programs: The two ongoing anti-litter awareness and education initiatives, the Clean Stormwater and Reverse Litter campaigns, focus outreach primarily through media. SWM funds the Clean Stormwater Campaign that relies on reaching residents through various media (e.g., radio, social media, and newspaper or magazine ads). Reverse Litter is an example of a regional campaign funded by the cities of Dallas, Denton, and Fort Worth as well as the Tarrant Regional Water District. The Reverse Litter campaign encourages residents to adopt a non-littering lifestyle. The campaign promotes anti-litter and anti-illegal dumping messaging through billboards, bus ads, posters, and social media (e.g.,

Facebook, Twitter, Pandora, Instagram, and Snapchat). The “Ten on Tuesday” initiative encourages businesses, schools, community groups, and individuals to reverse litter by picking up ten pieces of trash and recyclable materials each Tuesday or once per week. As of September 2018, Reverse Litter reported over 27,500 “Ten on Tuesday” pledges from residents across the Dallas-Fort Worth region.

An example of education and engagement programs include the CCS Neighborhood Code Representatives. The City is divided into seven Community Code Districts, each with its own representative. The code representatives frequently present to neighborhood associations and other civic organizations to explain litter and illegal dumping challenges and concerns related to code compliance. At meetings, they engage with residents on how to improve the environmental conditions within their community. A challenge is that attendees of the outreach meetings tend to be residents who already are aware of litter and are taking measures to prevent care about their environment and participate in litter cleanup activities. A focus needs to be on how to engage new groups and the root cause of litter and illegal dumping.

Cost: The City spends approximately \$3.4 million annually on programs to educate the public about reducing litter and proper waste disposal. Education and outreach activities make up nearly 17 percent of the total amount that the City spends on litter and illegal dumping related activities, which is about five times higher than the amount collectively spent by the nine cities in the TFCW Study.

Table 1-3: Education and Outreach Program Costs

Name	Description	Department	Annual Cost	Strategy
Neighborhood Code Representatives	Provide outreach to residents to prevent littering and illegal dumping. Representatives speak to neighborhood groups, churches, and community organizations.	CCS	\$1,630,800	5
Radio Advertisements	English and Spanish advertisements on local radio stations to address illegal dumping and keeping neighborhoods clean.			
Public Information Coordinator	Maintains Facebook, Twitter, and Nextdoor accounts to address litter and illegal dumping.			
Clean Stormwater Campaign	Media campaign to promote awareness of litter and negative impacts litter has on waterways. Media used includes radio spots, social media, and ads in newspapers and magazines.	SWM	\$100,000	5
Reverse Litter Campaign	DWU and SWM each provide funding and partial staff time to support the Reverse Litter Campaign that protects North Texas waterways from trash and debris.	DWU, SWM	\$204,000	5
Public Education and Outreach/ Public Involvement and Participation	SWM public education and outreach programs for residents.	SWM	\$1,449,300	5
Litter Education and Outreach	Four staff members and cost of materials cost to educate students about the effects of litter. OEQ also partners with Keep Dallas Beautiful for the annual National Cleanup Day. In 2017, there were approximately 150 volunteers that contributed \$7,400 in volunteer value.	OEQ	\$23,800	5
Litter Education and Outreach	Outreach to residents and community groups, such as homeowners' association meetings, about litter and debris cleanup as well as beautifying city parks.	PKR	\$11,100	5

Key Findings: The City would benefit from emphasizing additional engagement opportunities that directly work with residents to get involved with addressing litter and illegal dumping efforts in their community. Media access for outreach campaigns, particularly television, is expensive, and the effect on residents of the online portion of the media campaigns is difficult to measure because the impact is measured in number of “impressions.” An impression means a digital ad is accessed by webpage but not necessarily viewed by the web user. Outreach through messaging campaigns communicates awareness of the negative impacts caused by litter and illegal dumping but does not necessarily lead to sustained action by residents. Building community participation through the Community Hand Tool Program provided by CCS and Operation Beautification lead by PUD are examples of community programs that promote awareness and to influence personal behavior. One education program that works to promote social responsibility is the Waste in Place curriculum developed by Keep America Beautiful (KAB), which the City of Lufkin has implemented in its schools. The curriculum was developed to teach pre-K to sixth graders about responsible solid waste handling practices through hands-on activities and how students can

prevent litter. Curricula can be tailored to include classroom and service activities that educate students on preventing litter and its negative impacts, such as water quality.

1.4 Litter Abatement

Litter abatement includes the cleanup activities and programs to remove litter from the environment. This section describes the ongoing programs classified in the litter abatement category. A summary of the annual costs of each program is included in Table 1-4.

Ongoing Programs: Most litter abatement funding is from ongoing large-scale cleanup efforts during the year. For example, the Public Works Department manages multiple contracts to maintain rights-of-way (ROW) covering more than 5,300 acres across the City. ROW maintenance consists of litter cleanup and mowing from March until November. Public Works also manages contracts for the Thoroughfare Sweeping program, which involves sweeping City streets once per month throughout the year. DWU conducts cleanups of six city-owned reservoirs, including Lake Ray Hubbard. The cleanups require hiring a contractor and using cranes and barges to collect trash and debris. During the Lake Ray Hubbard cleanup in 2017, DWU removed more than four tons of single-use plastic bottles. Figure 1-3 shows accumulated debris and large quantity of plastic material that DWU collected from a creek flowing into Lake Ray Hubbard.

Figure 1-3: Debris in Creek Flowing into Lake Ray Hubbard



TWM also conducts regular waterway maintenance projects during the winter months, which remove large quantities of accumulated trash and brush. During fiscal year 2017, TWM removed over 8,000 cubic yards of material. In addition to the regular maintenance programs, 311 regularly receives calls about litter within the City. Of the more than 443,500 calls 311 received in fiscal year 2017, over 34,000 are related to litter.

OHS manages a contract for homeless encampment cleanups within the City. Homeless encampments are often found under overpasses along main thoroughfares and in wooded areas near streams. The contractor follows a rotating schedule to pickup litter and waste left at homeless encampments across the City. On average 12 homeless encampments are abated and over 22 cubic yards of waste are removed per week. Figure 1-4 shows a homeless encampment being cleaned up.

Figure 1-4: Homeless Encampment Cleanup at Stemmons Freeway and Medical District



Cost: Litter abatement represents the largest of the six spending categories. Annually, the City spends over \$12.7 million or more than 62 percent of the total direct costs of managing litter and illegal dumping. This percentage is higher than the nearly 52 percent collectively spent by the nine cities in the TFCW Study. Among large Texas cities, the City of Dallas contributes a similar amount to litter abatement as the City of Houston, which contributes over 63 percent.

Table 1-4: Litter Abatement Program Costs

Name	Description	Department	Annual Cost	Strategy
311 Service Requests	311 Customer Service Center receives requests regarding litter and illegal dumping and routes them to appropriate department.	311	\$263,000	2
Lake Ray Hubbard Cleanup	Annual cleanup of Lake Ray Hubbard to remove trash and debris. Cost includes hiring a contractor and DWU staff time to oversee the cleanup.	DWU	\$162,000	6
Litter Abatement	Funding to support litter abatement activities and purchase supplies for cleanup events.	OEQ	\$450,000	6

City Median and Right-of-Way Cleanup	Cost to hire contractor to remove litter and mow every 14 days from March to November. Total of approximately 1,750 acres. Includes Public Works staff management and oversight of contractor.	Public Works	\$1,489,300	6
TxDOT Maintenance Cleanup	Cost to hire contractor to remove litter and mow every 28 days from March to November. Total of approximately 3,600 acres. Includes Public Works staff management and oversight of contractor.	Public Works	\$2,069,300	6
Thoroughfare Sweeping	Cost to hire contractor to sweep along the curb and median line once per month. Includes Public Works staff management and oversight of contractor.	Public Works	\$888,800	6
Winter Work Projects	Cleaning trash and brush from along creeks and floodways.	TWM	\$6,802,700	6
Homeless Encampment Cleanup	Cost to hire contractor to clean up and abate homeless encampments.	OHS	\$577,500	6

Key Findings: The amount of resources the City directs to litter abatement activities highlight the magnitude of the challenge that litter poses, particularly to waterways and reservoirs, where litter can contribute to increased biological activity that poses a concern to the quality of the City's water supply.

The number and geographical scope of area waterways also indicates the importance of a regional response to litter. Rain events contribute to the litter challenge by washing large amounts of floatable litter into City waterways from other upstream communities. Figure 1-5 shows floatable litter along the edge of Lake Cliff, which includes single-use plastic bottles and food packaging. In addition, the act of abating litter can create the unintended perception among residents that dropping litter on the ground is acceptable because the City will clean it up. Addressing these challenges requires intergovernmental as well as inter-departmental coordination. The City of San Antonio's "Remember the River" initiative focuses on educating the community of the impact that non-point source pollution, including litter, has on area waterways. The initiative also brings together multiple city departments, the Texas Department of Transportation, and additional support from local organizations and community groups.

Figure 1-5: Before and After Litter Abatement at Lake Cliff

The use of performance measures, such as litter indexes or surveys, can also help understand the impact that the City efforts have on reducing litter and help build political and community support. For example, City staff could conduct litter indexes in different areas at regular intervals and use the results to adjust funding and litter abatement initiatives. An app being developed by Burns & McDonnell for the City of Kansas City, Missouri, will enable city staff to easily survey a site and log the type and severity of litter observed through a mobile phone interface. The data collected, including photos, will identify sources and types of litter that are particularly problematic that need to be addressed to maintain the community environment. By collecting geocoded data, the information can also be analyzed using geographic information system (GIS) mapping technology. If the City of Dallas opted to collect this type of data, it could use this technology to evaluate data in combination with existing GIS data collected by 311 to more strategically identify litter and illegal dumping trends within the City.

1.5 Illegal Dumping Abatement

Illegal dumping abatement includes the response programs necessary to collect the large volumes of improperly discarded waste and to return the environment to its natural state. This section describes the ongoing programs classified in the illegal dumping abatement category. A summary of the annual costs of each program is included in Table 1-5.

Ongoing Programs: The CCS and the Marshal's Office indicated that most illegal dumping comes from sources within the City. Abating illegal dump sites is important from an environmental perspective, as well as to minimize the potential for future illegal dumping. Illegal dumping reports initially are received by 311 or reported by CCS code compliance officers. The City's Nuisance Abatement program managed by CCS is responsible for removing dumped items from private property. Nuisance Abatement receives cleanup requests after an owner fails to abate the property within seven days of a notice of violation.

Private residences and vacant lots within neighborhoods are the most common type of property for abatement requests. Vacant lots make convenient locations for illegal dumping because they may be overgrown, and the illegal dumpers may not perceive their actions as affecting a property owner. However, if illegal dumping is not addressed quickly, others may develop the perception that the practice is acceptable and illegally dump their material as well.

Cost: The City spends about \$3.3 million on illegal dumping abatement activities. This amount is slightly more than 16 percent of the total amount spent on litter and illegal dumping by the City, which is more than the collective 14 percent spent by the nine cities in the TFCW Study. **The City spends the most of any single city included in the TFCW Study – the City of San Antonio comes in second. In comparison the City of San Antonio, which is also geographically diverse and has a similar population size, spends almost \$2.2 million in illegal dumping abatement activities.**

Table 1-5: Illegal Dumping Abatement Program Costs

Name	Description	Department	Annual Cost	Strategy
Nuisance Abatement	Cleanup of private property (residences). Code receives service requests through 311 and inspects the property. Inspectors issue notices of violation to property owners. The property owner is given seven days to cleanup property. If the property is not cleaned, then the case is referred to Nuisance Abatement to make the property compliant.	CCS	\$2,893,900	6
Litter and Illegal Dumping Abatement	Daily cleanup of waste in rights-of-way along roads leading to the McCommas Bluff Landfill.	SAN	\$389,600	3

Key Findings: A primary factor contributing to a quick response to illegal dumping sites is the availability of appropriately trained staff and equipment to collect dumped items (e.g., collection vehicles or other specialized equipment that can access different terrain). The City of El Paso augments its litter abatement activities by assigning brush and bulky special collections staff to cleaning up illegal dump sites. **In addition, while the City spends a large amount on illegal dumping abatement, it represents a reactive response. Attention needs to focus on how to engage residents to take initiative within the community.** The City could consider a coordinated initiative by multiple departments to focus cleanup and community engagement in pilot areas and measure the number of illegal dumping cases reported during the pilot study to see which actions result in a significant impact on reducing illegal dumping.

1.6 Enforcement

Enforcement involves taking legal action against the people responsible for littering and illegal dumping. This section describes the ongoing programs classified in the enforcement category. A summary of the annual costs of each program is included in Table 1-6.

Ongoing Programs: The Marshal's Office Environmental Crimes Unit is a specialized unit of 13 marshals responsible for enforcement of environmental crimes within the 385 square miles of the City. The unit patrols the Trinity River Corridor to monitor chronic illegal dumping sites and has authority to arrest violators. The Marshal's Office conducts criminal investigations of illegal dumping, prepares evidence, and files criminal cases for prosecution. However, the Marshal's Office does not have the resources of the Police Department and relies on City staff and resources from other departments to assist with enforcement activities. The Marshal's Office has a limited number of surveillance cameras for placement at illegal dump sites, which impacts the ability of the Marshal's Office to collect traceable evidence to charge an illegal dumper. Multiple cameras are needed to capture the scene, the vehicle's license plate, and the violators.

Cost: Enforcement is the third smallest spending category after litter prevention and illegal dumping prevention. The City spends less than \$1 million on enforcement, or nearly five percent of the total amount spent on litter and illegal dumping. In comparison, the nine cities in the TFCW Study collectively spend more than 12 percent on enforcement.

Table 1-6: Enforcement Program Costs

Name	Description	Department	Annual Cost	Strategy
Environmental Crimes Unit	Monitor chronic illegal dumping sites, file criminal cases, and patrol the Trinity River Corridor. Conducts criminal investigation of illegal dumping and arrest violators.	Marshal's Office	\$913,200	9
Security Officer	TWM employs a security officer who monitors illegal dumping activity along the Dallas Floodway.	TWM	\$32,500	9

Key Findings: Cooperation among City departments and different jurisdictions is needed for the enforcement process to function well. Two CCS staff are assigned to support the Marshal's Office, who assist with mounting surveillance cameras at illegal dump sites and retrieving the cameras to download the collected video. To provide the best opportunity to charge an alleged violator with a crime, the Marshal's Office first needs to receive reports of illegal dumping as quickly as possible. The task of obtaining traceable evidence becomes more difficult with the passage of time. For example, surveillance cameras overwrite prior video if not retrieved and downloaded. To charge an alleged violator with a

crime, requires the assistance of CCS to collect and transport the material to the landfill to be weighed. The weight of the material determines the severity of the crime. More than five pounds of material is a Class B misdemeanor, equivalent to a Driving While Intoxicated charge. If more than 200 pounds of material is dumped and the person receives payment, then the crime is a State Jail Felony. It is also a State Jail Felony if more than 1,000 pounds of material is dumped and the person did not receive payment. In addition, the Marshal's Office must obtain and review video footage for visible evidence and the alleged violator to be interviewed to create a strong case for prosecution. A challenge is that the two CCS staff may face competing demands for their time and are not always available to assist with environmental enforcement. This makes it more difficult to maintain cameras and obtain video as well as collecting evidence that could lead to apprehending and charging an illegal dumper.

The Marshal's Office indicated that their workload could keep an additional two code enforcement officers busy continuously. The code enforcement officers could be specifically trained to work with the Marshal's Office to respond to illegal dumping requests and to make determination if the Marshal's Office needed to be involved. The Marshal's Office could then place greater attention on patrolling chronic illegal dumping sites as well as documenting traceable evidence to provide to prosecutors for environmental court cases.

Another challenge identified by the Marshal's Office is that residents are unaware of the criminal consequences that may result from illegal dumping, which highlights a need for additional education and engagement of residents. The Marshal's Office is developing revised signage to post near illegal dumpsites to clearly communicate the severity of the environmental crime as well as posting the four locations within the City where residents can dispose of items for free. One tactic to discourage illegal dumping that the City of Laredo uses is creating high case visibility by reporting illegal dumping prosecutions in the local newspaper and to television stations. The problem of illegal dumping can also shift as additional enforcement attention is directed in an area. Consequently, effective enforcement requires a regional approach and cooperation among different law enforcement agencies to share evidence to apprehend violators.

2.0 COMPARISON OF ANNUAL COSTS

The information in this section is consistent with the cost information that is described in Section 1.0. It is provided here so that it is available in one place and this section provides a more in-depth analysis of costs. Burns & McDonnell worked with the City to document the litter and illegal dumping program costs. The City spends a significant sum annually, approximately \$20.4 million on preventing, combatting, and cleaning up litter and illegal dumping. This Study includes program expenditures from across City departments with responsibility for litter and illegal dumping. Each department reported program costs associated with prevention, education and outreach, abatement, and enforcement. Expenditures by private businesses are not included in this Study, but they are likely significant. In addition, value contributed by volunteers is excluded from the total costs in the Study. The costs are compared with the costs reported by the nine cities included in the TFCW Study.¹

2.1 Annual Costs of Dallas Compared to Other Texas Cities

A summary of the annual costs the City spends in each category is provided in Figure 2-1, and a summary of the collective costs spent in each category by the nine cities included in the TFCW Study is provided in Figure 2-2.

Figure 2-1: City of Dallas Annual Costs

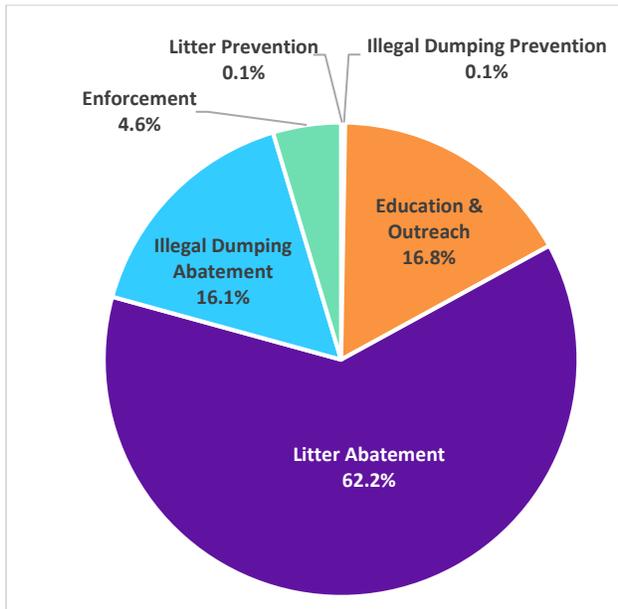
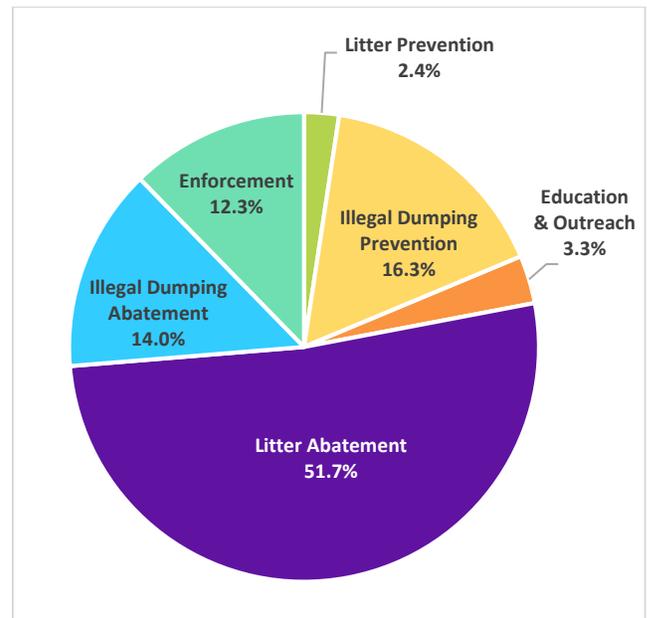


Figure 2-2: Annual Costs for Nine Texas Cities



¹ The nine cities in the TFCW Study include the Cities of Austin, Corpus Christi, El Paso, Fort Worth, Houston, Laredo, Lufkin, Midland, and San Antonio

2.2 Litter Prevention

Litter prevention is the smallest spending category by the City. Annually, the City spends 0.1 percent or \$25,000 of its total direct costs on managing litter and illegal dumping. The City spends a much lower percentage on litter prevention efforts than other Texas cities, which spend 2.4 percent or an average of about \$133,000 per year.

2.3 Illegal Dumping Prevention

Illegal dumping prevention is the second smallest spending category by the City. The City spends 0.1 percent or \$30,000 annually of the total amount spent on litter and illegal dumping. The other Texas cities spend 16.3 percent or an average of about \$911,000 per year.

2.4 Education and Outreach

Education and outreach is the second largest spending category by the City. The City spends more than five times as much as the other Texas cities on a percentage basis. The City spends 16.8 percent or over \$3.4 million annually as compared to the other Texas cities, which spend 3.3 percent or an average of about \$188,000 per year.

2.5 Litter Abatement

Litter abatement is the largest spending category by the City, which is consistent with the other Texas cities. Annually, the City spends 62.2 percent or more than \$12.7 million of its total direct costs on managing litter and illegal dumping. The other Texas cities spend 51.7 percent or an average of \$2.9 million per year.

2.6 Illegal Dumping Abatement

Illegal dumping prevention is the third largest spending category by the City. The City spends 16.1 percent or \$3.3 million annually of the total amount spent on litter and illegal dumping. The other Texas cities spend 14 percent or an average of \$781,000 per year.

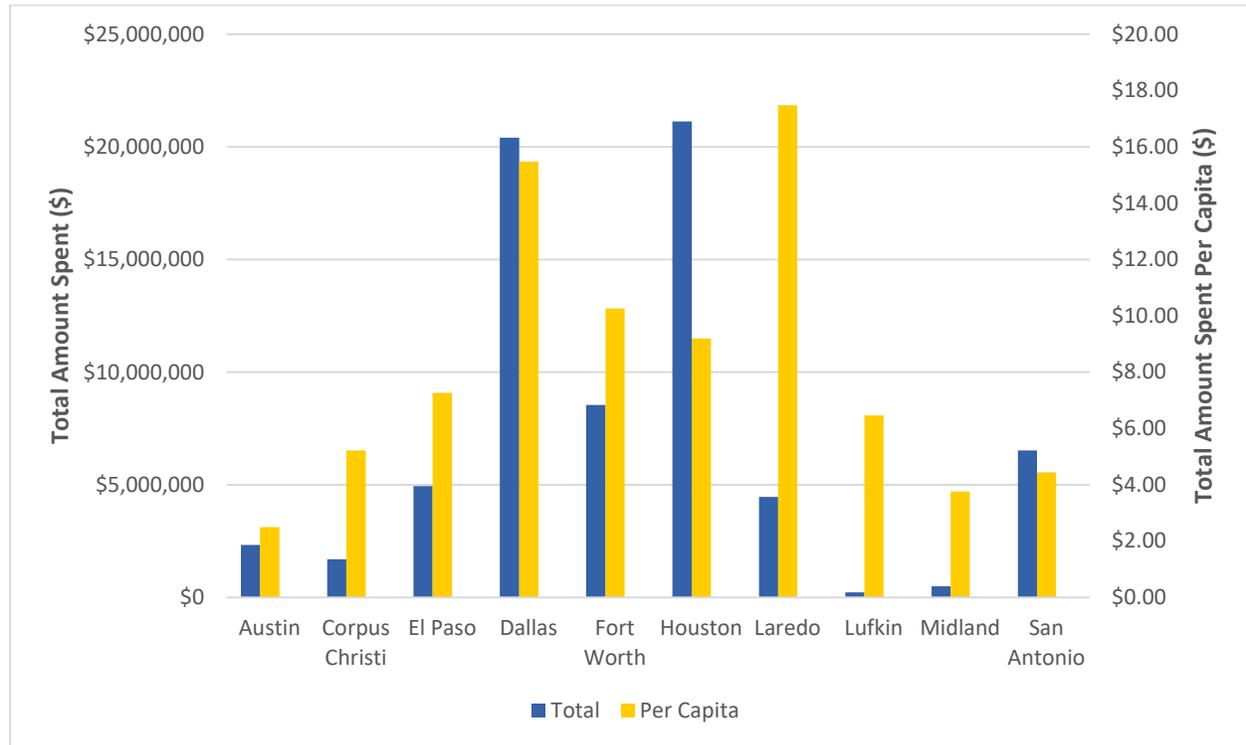
2.7 Enforcement

Enforcement is the third smallest spending category by the City. The City spends 4.6 percent or almost \$946,000 annually of the total amount spent on litter and illegal dumping. The other Texas cities spend 12.4 percent or an average of nearly \$692,000 per year.

2.8 Total Spending Compared to per Capita Spending

Annual costs for the ten cities studied in Texas on litter and illegal dumping activities is compared on a total and per capita basis in Figure 2-3.

Figure 2-3: City of Dallas Costs Compared to Other Texas Cities



The City is the third largest city in Texas with a population of more than 1.3 million. It spends \$20.4 million annually on litter and illegal dumping activities. **This amount places it near the top in terms of total spending.** Only the City of Houston spends more at \$21.1 million annually. The City of San Antonio, which has a slightly higher population than the City spends about \$6.5 million annually. On a per capita basis the City spends \$15.48 per person. Of the other Texas cities per capita spending ranges from a low of \$2.50 per person up to \$17.48 per person. The City of Laredo spends the most on a per capita basis, but with a population of 255,000 it is one fifth the size of the City of Dallas. The City of San Antonio, which has a similar population size, spends \$4.44 per person. The City of Houston, which spends slightly more than the City on a total basis but with nearly twice the population, spends \$9.20 per person. The figure shows that the City spends a robust amount on litter and illegal dumping on both a total and a per capita basis.

3.0 GAP ANALYSIS AND RECOMMENDATIONS

This section includes a gap analysis of the City's current efforts to address litter and illegal dumping within the six categories identified in Section 1.0.¹ A gap analysis is a comparison of actual performance with potential or desired performance. Burns & McDonnell also recommends a combination of strategies and recommendations for the City to implement to reduce litter and illegal dumping. Based on information received from the City and comments received during the Litter Task Force Workshop,² Burns & McDonnell identified nine recommended strategies.

The gap analysis and recommendations are organized based on the list of strategies in Appendix A. The first two strategies are overall programmatic strategies, which include the City developing a more strategic geographical approach to how it directs resources and improving regional and local collaboration to coordinate resources to address litter and illegal dumping. The other seven specific program recommendations align with each of these six categories. There are more strategies than categories because two strategies address litter and illegal dumping from two groups, construction activities and commercial sources, which contribute significantly to the incidence of litter and illegal dumping within the City.

The list of gaps and strategies was developed based on best management practices to address litter and illegal dumping issues. To develop the specific program recommendations, Burns & McDonnell reviewed strategies implemented by other cities and litter and illegal dumping resources developed by Keep America Beautiful. The list of strategies is designed as a starting point that the City can build upon to address the specific needs of local communities.

Based on discussions with City departments, Burns & McDonnell prioritized the specific tactics, identified the primary departments responsible for implementing each tactic, and indicated the degree to which the City has implemented the specific tactic in the table in Appendix A. The following provides insight on how to interpret symbols included in the Appendix A table:

- Recommended priority programs are indicated by a star (★)
- Programs that are substantially implemented and should be maintained are identified by a square (■)

¹ The six categories are litter prevention, illegal dumping prevention, education and outreach, litter abatement, illegal dumping abatement and enforcement.

² Burns & McDonnell met with members of the Litter Task Force on August 28, 2018 to discuss the proposed recommendations, and this section reflects the discussion.

- Partially implemented programs where additional development or expansion would be beneficial are indicated by a triangle (▲)
- The categories addressed by a program are indicated by a circle (●)
- Program gaps are identified by red shading

The following sections broadly summarize the primary gaps and associated recommendations.

3.1 Develop, Implement, and Track Geographically-Focused Approach

3.1.1 Gap Analysis

Based on information provided by each department and discussions with City staff, the City of Dallas has implemented many programs necessary to successfully abate litter and illegal dumping. However, with so many programs in place across a number of city departments, there is a need to develop a more strategic approach to addressing litter and illegal dumping. Key gaps are that the City does not have defined leadership for coordinating how to address issues across the City. In addition, the City does not have a strategic approach, which could include undertaking efforts to identify specific geographical areas in which to direct limited resources to have the most impact. For example, the City collects detailed geographic information about litter and illegal dumping through the 311 Customer Service Center but does not fully incorporate it into the process of developing strategic objectives.

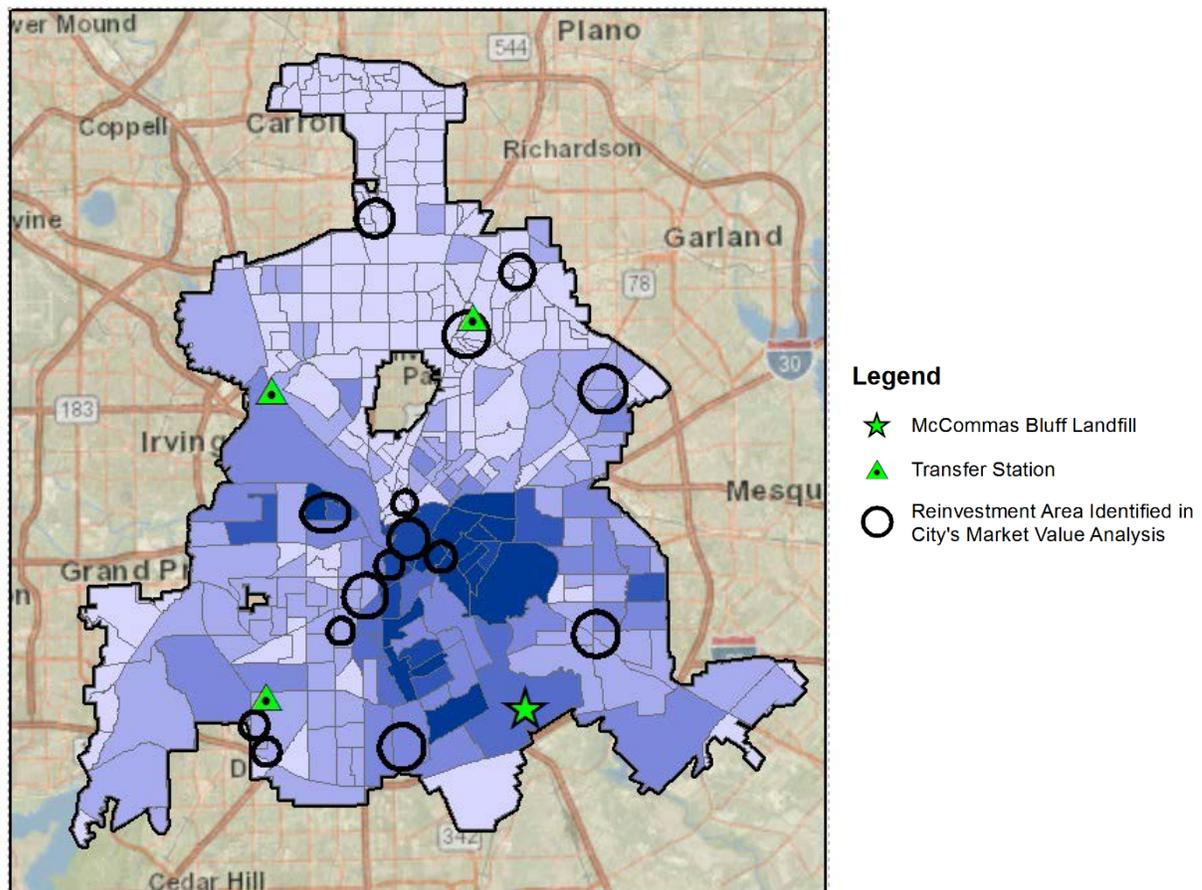
3.1.2 Recommendations

While the City is implementing multiple programs focused on litter and illegal dumping, there is a need for the City to be more strategic in selecting geographic locations where the City should focus future resources. While Burns & McDonnell recognizes there will be a need for some efforts to continue on a citywide basis, prioritizing geographic areas to focus limited resources should provide an opportunity to significantly reduce litter and illegal dumping in the most problematic areas of Dallas. A greater level of detail is provided for this strategy because it is critical to the overall implementation and progress tracking for the other program recommendations.

1. **Establish Leadership for Litter and Illegal Dumping Implementation Strategy:** Since there are multiple City departments with varying priorities on litter and illegal dumping, it is important to establish effective leadership on a citywide basis. The City should identify who within City management will take ownership and provide the direction for the litter and illegal dumping implementation strategy. The current Litter Task Force can serve as the coordinating body to promote collaboration and sharing of information across the departments.

2. **Prioritize Geographic Areas to Address Litter and Illegal Dumping:** Based on data provided by the 311 Department, Burns & McDonnell developed a series of maps that show locations of reported litter, illegal dumping, homeless encampments and panhandling from 2014 – 2017, as shown in Figures B-1 – B-6 in Appendix B. This geographic analysis should be considered a starting point for the City to increase use of geocoded data in data analysis to focus anti-litter and anti-illegal dumping programs on specific target areas.³ Furthermore, litter and illegal dumping survey data can be combined with other strategic city initiatives (e.g., Market Value Analysis) to align City’s efforts with overall strategic planning. To provide an example, Figure 3-1 shows where litter is most reported via 311 and includes an overlay of priority areas for increasing market value to identify potential areas where the City could focus resources in the future. Going forward, the City (or with assistance from Burns & McDonnell) should prioritize specific geographic areas on a more comprehensive basis.

Figure 3-1: Litter in Relation to Reinvestment Areas



³ The 311 data is the most comprehensive citywide data available, but it should be considered in addition to other information received by City staff about actual conditions in the City as some residents may not report all instances of litter or illegal dumping.

3. **Develop Geographically Focused Litter and Illegal Dumping Reduction Plans:** Based on priority geographic areas (as discussed above), the City should develop specific tactical-level plans addressing litter and/or illegal dumping. These plans should identify the activities to be implemented on a collaborative basis by all appropriate City departments over one year. The plans should also address roles, responsibilities, schedule and costs. The City will also need to decide how many geographic areas can be addressed within a defined period.
4. **Evaluate Program Effectiveness:** It will also be important to evaluate the effectiveness of various strategies to reduce litter and illegal dumping, as some activities may prove to be more effective than others. One approach to monitor the effectiveness of programs would be develop a geographic-focused data collection tool. The tool would be used to track changes in litter and illegal dumping in the City and could be integrated with the other maps communicated in this section. An example of a data collection app developed by Burns & McDonnell is shown in Figure 3-2. This example was from a project for the City of Kansas City, Missouri, where the city needed to track the presence of litter across the city.

Figure 3-2: Images of Litter Data Collection App

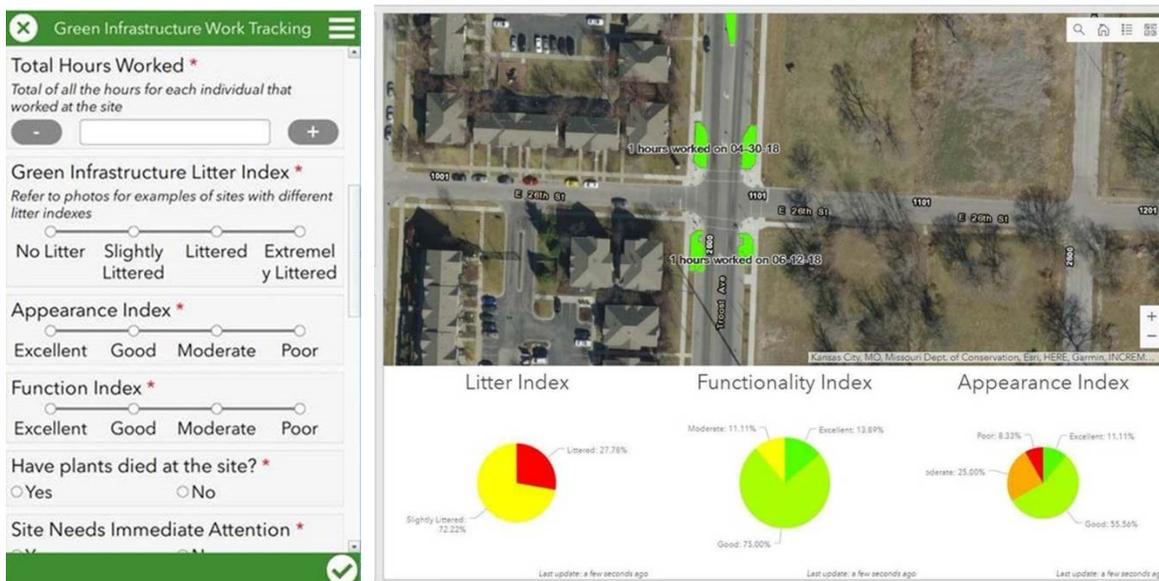


Image of a customizable smart digital form to log work and site conditions that can be completed on mobile phones, tablets, and laptops (left), and dashboard to analyze survey results and to view reports from the field for any site in the City.

5. **Update Geographic Focus and Plans Annually:** The preceding recommendations present a series of steps the City should implement on a recurring basis to address litter and illegal dumping. The City should continuously evaluate the key geographic areas and focus future resources. While there will likely be a need to provide continual efforts in some areas of the City, implementing a comprehensive

approach should afford the opportunity over time to shift efforts to new geographic areas. Strategies found to successfully reduce litter or illegal dumping can then be expanded to other areas of the City.

6. **Align Funding to Program Objectives:** The City should confirm that allocated funding is coordinated and consistent with the identified strategies based on the results of the data analysis and program evaluation.

3.2 Improve Regional and Local Collaboration

3.2.1 Gap Analysis

There currently is a need for greater coordination between the City and other regional and local entities to address litter and illegal dumping. Multiple litter and illegal dumping efforts by City departments require more coordination to ensure that the various activities are consistent with the City's strategic objectives, as discussed in the strategy to Develop, Implement, and Track Geographically-Focused Approach. In addition, City departments do not always coordinate to identify shared objectives or cooperate to pool resources to target key audiences in areas with a high incidence of litter or illegal dumping. The City can also be more proactive to actively encourage businesses to proactively address litter and illegal dumping in their surrounding community. While the City has made significant efforts to collaborate with surrounding cities, there could be a benefit for enhanced coordination.

3.2.2 Recommendations

The City has multiple litter and illegal dumping programs run by various departments. To effectively leverage limited resources for litter and illegal dumping, the City should continue to improve coordination of resources among departments. However, the effort to reduce litter and illegal dumping represents a significant undertaking for the City, which requires greater coordination of resources and cooperation from partners within the community. The City should continue seeking opportunities to partner with other agencies, local government departments, regional planning agencies, non-profit organizations, and/or private corporations to generate support and to leverage resources. In addition, continuing to improve coordination among local, state, and federal law enforcement personnel can lead to more effective enforcement of illegal dumping cases. By working with other partners, the City can promote a more consistent message about stopping litter and illegal dumping to the community and work to align strategic objectives, where possible, to avoid duplicative activities.

3.3 Integrate Proactive Methods to Prevent Litter and Illegal Dumping

3.3.1 Gap Analysis

While the City spends significant resources to abate litter and illegal dumping, the City is not directing an adequate level of funding on prevention activities. The City would benefit from more consistent promotion of the existing free waste disposal services either curbside or at the McCommas Bluff Landfill and existing transfer stations. In addition, the City could benefit from the establishment of a new collection station in an area where there is significant illegal dumping and lack of a nearby drop-off facility.

3.3.2 Recommendations

The “broken windows theory” is often applied to litter and illegal dumping, which states that the presence of either litter and illegal dumping leads to a greater likelihood of more occurring. To break the cycle, the City needs to identify more proactive methods to prevent litter and illegal dumping to mitigate the effort spent on cleanup activities. A relatively simple prevention strategy is to improve the promotion of existing free waste disposal services that are currently available to residents at the McCommas Bluff Landfill and the three existing transfer stations as well as the curbside collection services.

A longer-term prevention strategy includes evaluating the areas served by existing transfer stations and to consider adding collection stations to improve access to waste disposal facilities in areas where a transfer station is not easily accessible. In addition, the City should proactively consider litter and illegal dumping in the design of new buildings and public spaces, such as planning of new transit-oriented developments and land use zoning revisions.

3.4 Increase Community Engagement in Litter Collection and Prevention

3.4.1 Gap Analysis

The City has many outreach efforts about litter and illegal dumping but does not place an emphasis on opportunities to engage directly with residents. There is also an opportunity to better align outreach or engagement efforts in areas of the City where the incidence of litter and illegal dumping is high.

3.4.2 Recommendations

The City should prioritize direct community engagement over broad outreach campaigns. The goal of stopping litter and illegal dumping requires increasing awareness ultimately changing their behavior. Efforts should focus on opportunities where City staff can directly interact with residents to develop

community leadership and sense of ownership. For example, neighborhood outreach meetings provide greater opportunity for City staff to interact directly with individuals to engage residents to take ownership of their community and to work cooperatively with residents on how best to focus limited resources to prevent litter and illegal dumping. Community cleanups and Adopt-a-Spot/Sponsor-a-Spot programs, like the City's existing MOWMentum program, involve individuals and businesses to commit to taking an active role to improve their community.

3.5 Educate the Public to Increase Understanding and Participation

3.5.1 Gap Analysis

The City currently leads or supports multiple outreach campaigns that address aspects of litter and illegal dumping, including Reverse Litter, the Clean Stormwater Campaign, and Litter Free Dallas. As noted in Section 2.4, education and outreach is an area where the City is spending on average five times more than other Texas cities. While substantial efforts are in place for education and outreach, the City could benefit from developing a more consistent message to increase awareness about preventing litter and illegal dumping. In addition, the City could be more effective in strategically using outreach and engagement activities to target key audiences.

3.5.2 Recommendations

The City should refocus on community engagement activities that provide opportunities for City staff to interact with residents rather than broad outreach campaigns. To change individual behavior and to encourage participation by the community requires that the City educate the public to increase awareness of the negative impacts of litter and illegal dumping. The City already has many education and outreach efforts in place but should improve coordination to promote a consistent message about stopping litter and illegal dumping and ensure maximum impact of limited resources. The City should identify target audiences in areas where litter and illegal dumping are a concern on which to focus its education activities. The City should tailor the methods it uses based on the litter and illegal dumping issues experienced within the community, which could include informing new residents about available collection services, working with local schools to implement a litter and illegal dumping curriculum, and promoting coverage of litter and illegal dumping to increase awareness of environmental enforcement cases.

3.6 Reduce Incidence of Litter and Illegal Dumping by Keeping a Clean Community

3.6.1 Gap Analysis

The City has multiple existing programs that focus on keeping the community clean, including regular thoroughfare sweeping and right-of-way cleanup activities. However, the City does not currently evaluate whether waste disposal services are adequately designed or collected on a frequency to prevent litter and illegal dumping. The City also provides a high level of waste service to residents through the McCommas Bluff Landfill, the existing transfer stations, and residential curbside collection, but the City could improve efforts to promote these existing waste services to residents.

3.6.2 Recommendations

The appearance of a community is key to preventing litter and illegal dumping as their presence can create the appearance that they are acceptable. The City has many existing programs in place to respond to litter and illegal dumping. One way the City can reduce the incidence of litter is to periodically evaluate where it provides waste receptacles and their collection frequency to ensure that residents have access to convenient disposal options, particularly in high traffic areas such as public transportation locations and transition points where items are commonly discarded. By improving the communication to residents of available services at existing collection stations, the City will reduce the likelihood of residents improperly disposing of waste. In areas where litter and illegal dumping are identified as a concern that are not near the McCommas Bluff Landfill or an existing transfer station, the City could consider adding a new collection station. The City should analyze data and reports received by 311 to help focus efforts on areas where additional services are needed.

3.7 Become More Proactive to Reduce Illegal Dumping from Construction Activities

3.7.1 Gap Analysis

CCS, the Marshal's Office, and SAN identified small and independent construction contractors as the primary source of illegal dumping within the City. The City does not currently have a program to communicate to construction contractors the existing disposal options for construction and demolition waste or to increase awareness of penalties associated with illegal dumping. In addition, the City does not have a requirement for collection containers at constructions and remodeling sites.

3.7.2 Recommendations

One of the primary sources of illegal dumping within the City is from the improper disposal of construction and demolition (C&D) waste by small and independently owned construction contractors. The City should focus on improving communication of existing locations for proper management of C&D materials and educating construction contractors about the penalties of illegal dumping. In areas where illegally dumped C&D waste is a concern, the City could consider conducting more frequent construction site visits.

3.8 Become More Proactive to Reduce Litter and Illegal Dumping from Commercial Sources

3.8.1 Gap Analysis

Another significant source of litter and illegal dumping within the City is from commercial sources, including grocery stores and food establishments. These types of businesses often have a high volume of customers or are the source of single-use packaging, which can often be found discarded in the surrounding area. The City currently does not encourage or require businesses to develop Litter Prevention Plans. These plans proactively identify the causes of litter and illegal dumping and the measures that each business can take to prevent them. Another source of litter is from commercial fleets. The City could improve efforts to educate fleet managers about managing materials to prevent litter on-site or while hauling loads.

3.8.2 Recommendations

The City should encourage businesses to develop Litter Prevention Plans to proactively identify strategies that they can implement to prevent litter. The City could provide technical assistance to businesses and commercial fleet owners to develop Litter Prevention Plans and consider making them a requirement in geographical areas where there is a high incidence of litter.

3.9 Enhance Enforcement of Litter and Illegal Dumping Laws

3.9.1 Gap Analysis

As noted in Section 2.7, the City spends about one third the amount that other Texas cities spend on enforcement-related activities in terms of the overall budget for litter and illegal dumping activities. The City does not provide training to law enforcement, judges, and prosecutors about applicable municipal ordinances, state laws, investigation techniques, and the prosecution process to improve the prosecution of environmental crimes. The City does not have a process to regularly review existing laws, rules, and

ordinances to determine if they need to be modified to effectively deter future violations. Most illegal dumping efforts are focused on the Marshal's Office. While the Marshal's Office does a good job enforcing environmental laws, it has limited resources to respond to the number environmental cases across the City.

3.9.2 Recommendations

Litter and illegal dumping laws should be regularly reviewed to ensure they are effective deterrents to environmental crimes. The Marshal's Office is assigned the task of enforcing environmental laws within the City but needs additional resources to patrol and investigate environmental crimes in an area the size of the City of Dallas. While other law enforcement officers, such as Police Department officers, main responsibility is not enforcing environmental crimes, they can assist the Marshal's Office by reporting illegal dumping sites observed while on patrol. Providing training and guidance on how to report illegal dumping cases, will support the Marshal's Office to more effectively enforce environmental crimes. In addition, cooperation among departments within the City as well as other cities and regional governments, such as Dallas County, is critical to preventing environmental crime. Equipping environmental enforcement officers to collect small illegal dumped items encountered while on patrol can also reduce the cost of requesting assistance from other departments to transport the waste to the landfill.

4.0 CASE STUDIES

This section includes case studies of the efforts by the City of Fort Worth, Texas and the City of Philadelphia, Pennsylvania to combat litter and illegal dumping. The City of Fort Worth was selected because it is the City of Dallas' largest neighbor in the Trinity River Watershed. The City of Philadelphia was selected because it is a comparatively large city located along a major river, and the city is developing new strategies to reduce litter and illegal dumping. Sections 4.1 and 4.2 describe each city's strategic approach and includes a table summarizing the specific programs implemented to address litter and illegal dumping as related to the six categories to address litter and illegal dumping.

4.1 City of Fort Worth, Texas

The City of Fort Worth is in the process of finalizing its first comprehensive Environmental Master Plan. Once completed, the plan will outline strategies and guide the City's programs and services to safeguard community resources and protect human health, safety, and the environment. The plan will specifically address litter and illegal dumping by supporting abatement programs, blight control, and hazardous material management. Current programs implemented by the City of Fort Worth to combat litter and illegal dumping are communicated in Table 4-1, which is based on the case study from the TFCW report.

Table 4-1: Summary of Litter and Illegal Dumping Programs – City of Fort Worth

Name	Description
Litter Prevention	
Anti-Litter Signage	The North Texas Tollway Authority (NTTA) posted "Litter Costs You Money" signs along the Chisholm Trail Parkway to discourage littering.
Trash Bags for Homeless	The City of Fort Worth Police Department spends \$1,800 per year to distribute trash bags at homeless encampments to promote cleanliness and prevent litter.
Illegal Dumping Prevention	
Drop-off Stations	The City of Fort Worth offers four drop-off stations across the city for residents to dispose of items such as tires, yard trimmings, old furniture, appliances, electronics, and extra household garbage. The City spends about \$1.4 million annually to run the drop-off stations.
Education and Outreach	
"Still Littering, Seriously?"	The City of Fort Worth conducts an anti-litter campaign called "Still Littering – Seriously?" by posting banners at the four drop-off stations, on city trailers, and on postcards. Giveaways such as pocket ashtrays and car litter bags passed out at community and neighborhood events help reemphasize the anti-litter message.
School Education Programs	The City of Fort Worth Community Engagement Office conducts five different programs that educate school-age children about preventing litter, including Captain Crud and the Cruddies, What's Wrong with this Picture?, Freddie the Fish, Recycle Right, and Captain Crud and the Buddies.

Reverse Litter	The City of Fort Worth engages residents to embrace a non-littering lifestyle through financial support of the Tarrant Regional Water District (TRWD) Reverse Litter Program. TRWD along with the cities of Dallas, Fort Worth, and Denton sponsor “Ten on Tuesday,” a Metroplex-wide litter abatement campaign that encourages businesses, schools, community groups, and individuals to pick up ten pieces of litter each Tuesday.
Adopt-a-River/Adopt-a-Drain	TRWD supports the Adopt-a-River and Adopt-a-Drain education and outreach programs. Adopt-a-River allows volunteer groups to adopt and clean a designated section of the Trinity River. Adopt-a-Drain provides volunteer groups with storm drain awareness placards and commit to keeping the exterior of the drains free of litter and debris. TRWD spends \$25,000 annually on the two programs.
Anti-Litter Education	The City of Fort Worth provides various anti-litter education through stormwater quality, recycling, and other environmentally-conscious campaigns and outreach projects.
Litter Abatement	
Litter Abatement Crews	City of Fort Worth Solid Waste Services (SWS) Division employs five litter abatement crews of five SWS employees pick up litter in rights-of way. The City spends \$1.1 million on the crews annually.
Storm Drain Cleaning	City of Fort Worth Transportation & Public Works Department stormwater maintenance crews clean storm drains and accompanying infrastructure, which includes vegetated conveyances (non-street) and culverted street crossings. Litter removal costs the department about \$777,400 per year.
Trinity River Trash Bash	The TRWD sponsors the biannual volunteer clean-up event. The events cost about \$166,400 annually.
Right-of-Way Cleanup	The NTTA hires a contractor to keep the right-of-way free of litter and debris on the Chisholm Trail Parkway.
Downtown Litter Abatement	Downtown Fort Worth Inc. (DFWI) provides trash cans in the downtown area to prevent litter and employs contractors to sweep streets in the downtown area prior to special events. DFWI spends \$1 million annually on litter cleanup.
Litter Cleanup at Schools	Custodians of the Fort Worth Independent School District (FWISD) are responsible for clearing litter from school property. FWISD spends about \$50,000 annually.
Transportation Litter Abatement	The Fort Worth Transportation Authority (FWTA) removes litter and illegally dumped items from FWTA properties at a cost of about \$345,000 per year.
Homeless Litter Abatement	The City of Fort Worth recently approved an annual budget of \$465,000 to expand its existing Clean Slate program to hire homeless to pick up litter.
Illegal Dumping Abatement	
Illegal Dump Site Abatement	The SWS Division crews remove about 2,800 tons of debris annually from illegal dump sites identified by code compliance officers. Five crews including a boom operator and truck driver collected the material. The program costs the city \$1 million per year.
Waterway Illegal Dumping Abatement	The TRWD spends \$85,000 per year to remove illegally dumped items from dams and trash collectors.
Illegal Dumping Abatement at Transit Locations	The FWTA spends \$5,000 annually to remove illegally dumped items from bus shelters and train stations.
Enforcement	
Residential and Commercial Property Enforcement	The City of Fort Worth Code Compliance Department (Code) compliance officers respond to complaints received via phone, email, or online about illegal dumping on residential or commercial property. The code compliance officer will serve a notice to the property owner if there is a code violation. If the violation is not resolved, the

	officer will issue a citation and a fine base don't he quantity of litter observed. The City spends nearly \$1.5 million annually on illegal dumping abatement.
Code Rangers Program	To reduce the workload for compliance officers, the Code Rangers Program trains citizen organizations to identify and submit reports of suspected code violations. The training costs the City \$37,400 annually.

4.2 City of Philadelphia, Pennsylvania

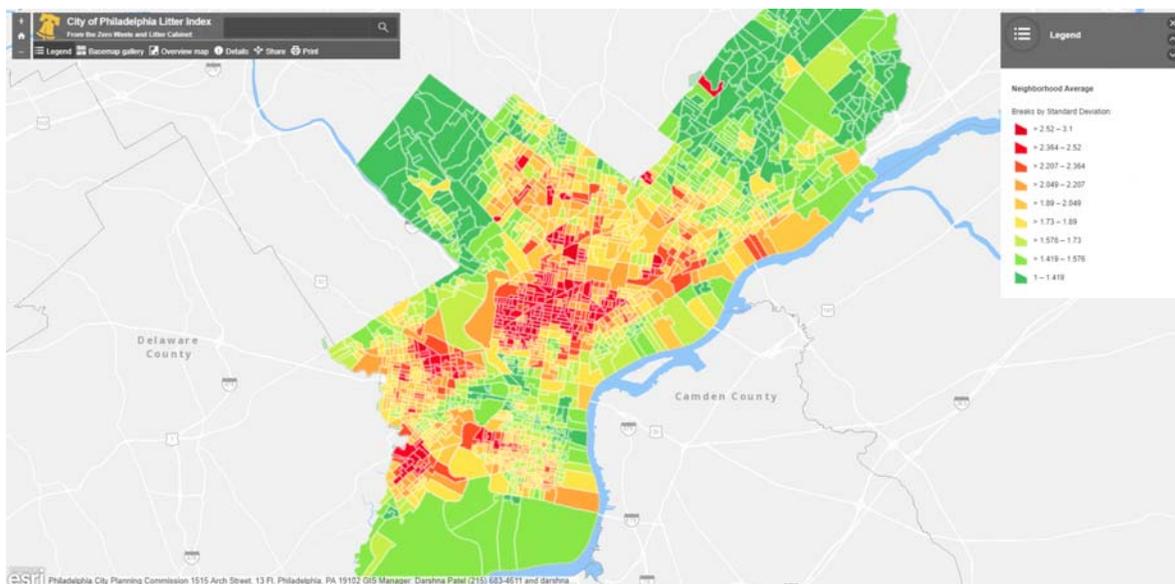
In 2016, the City of Philadelphia established a Zero Waste and Litter Cabinet (Litter Cabinet) charged with coordinating and promoting collaboration among municipal departments, business, and the community to clean up litter and reduce waste. The Litter Cabinet includes five subcommittees comprised of members from municipal departments, council representatives, and community stakeholders who address five strategic areas: data collection, engagement and communications, enforcement and cleaner public spaces, and behavioral science.

The Zero Waste and Litter Cabinet released the first Zero Waste and Litter Action Plan (Action Plan)¹ in 2017, which is specifically designed to be a data-driven, comprehensive, and coordinated plan to reduce the amount of material in the waste stream and prevent litter. The Action Plan sets a goal of increasing waste diversion by 90 percent and becoming litter-free by 2035. The plan also describes how the City of Philadelphia will promote education about preventing and managing litter to engage stakeholders through partnerships and stakeholder organizations, including government agencies, private businesses, community organizations, and other stakeholders. The Litter Cabinet is responsible for establishing measurable standards to demonstrate progress towards the goals of the Action Plan. As part of the effort to track measurable progress, the City of Philadelphia completed its first city-wide map-based litter index in 2018.² Surveyors included trained City department staff who surveyed and documented litter on streets, sidewalks, vacant lots, and public property according to the ranking criteria in Keep America Beautiful's Litter Index and Community Appearance Index. Staff used tablets and cloud-based forms to collect ranking and observations along with GPS coordinates for each location. The map based on the results of the City of Philadelphia's Litter Index is shown in Figure 4-1.

¹ Zero Waste Litter Cabinet Action Plan: http://cleanphl.org/wp-content/uploads/2017/07/Zero_Waste_and_Litter_Action_Plan.pdf

² City of Philadelphia Litter Index: <http://phl.maps.arcgis.com/apps/View/index.html?appid=4856a523514c4c02ba0e28e6a0e8c42c>

Figure 4-1: City of Philadelphia Litter Index Map



Current programs implemented by the City of Philadelphia to combat litter and illegal dumping are communicated in Table 4-2.

Table 4-2: Summary of Litter and Illegal Dumping Programs – City of Philadelphia

Name	Description
Litter Prevention	
CleanPHL ³	Provides single web page where residents can learn about litter and illegal dumping in their community. Residents may view the Litter Index results for their neighborhood and learn about specific community resources to help keep their neighborhood clean. Residents can find information about sanitation convenience centers, trash and recycling collection schedule, neighborhood advisory council, and volunteer groups to maintain local parks, streets, or watersheds.
Philadelphia More Beautiful Block Captain Program	Volunteer block captains coordinate residents to maintain the cleanliness and efforts to beautify the neighborhood. Block captains serve as liaisons between residents and City government to provide departmental resource materials, information, and services relating to block cleanliness. The City holds an annual competition judge blocks on organization, cleanliness, improvements, and participation. The winning blocks are recognized at a banquet and receive a cash reward.
Bandit Signs Brigade	The City of Philadelphia held its first illegal sign roundup in June 2018 to remove illegally posted temporary signs. Over 24 community groups collected more than 8,000 illegal signs posted in public rights-of-way. Participating groups earned \$0.50 per sign up to \$250 to remove illegal signs.
Lidded Collection Containers	The City of Philadelphia is distributing lidded collection containers to prevent items from being blown out while awaiting pickup.
Pilot Study of Waste Collection Receptacle Placement	The City of Philadelphia varied the number and location of waste receptacles along main thoroughfares and in parks to study how changes affected the time needed to

³ CleanPHL: <https://cleanphl.org/>

	collect waste and cleanup litter. The information collected is being studied and will be used to inform the City's strategic placement of public waste receptacles.
Illegal Dumping Prevention	
Sanitation Convenience Centers	The Streets Department operates six Sanitation Convenience Centers located throughout the City of Philadelphia, which are available to residents to dispose of household waste and large bulky items for free.
Education and Outreach	
Zero Starts with One	Zero Starts with One is the City of Philadelphia's new communications and engagement initiative to emphasize that reducing waste and litter requires a commitment and coordinated effort by the entire City. Activities include improving collaboration among City departments and increased outreach to residents and private sector stakeholders as well as grassroots community organizing.
Philacycle ⁴	Philacycle provides residents the opportunity to recycle, learn online, volunteer, and recruit neighbors to earn points that may be redeemed for rewards online, used at local businesses, or donated to charity.
GreenFutures ⁵	The GreenFutures Education for Sustainability program run by the Office of Environmental Management and Services is designed to be a holistic framework to equip students, schools, administrators, families, and the community about embracing sustainability principles. The program's focus areas include sustainability, consumption and waste, energy and efficiency, greenscapes, and health.
Waste Watchers	Waste Watchers is a grassroots community organizing program to empower residents to educate their communities and conduct neighborhood cleanups. Waste Watcher Captains and teams assist event organizers and educate event attendees about proper waste disposal and make sure collected materials are properly sorted at large public events.
Litter Abatement	
Vacant Lot Abatement Program	Philadelphia promotes clean neighborhoods through its Vacant Lot Abatement Program. The program enforces the City's property maintenance codes through inspections and cleanups. The City's program addresses over 40,000 properties that are overgrown or full of litter. Residents can submit a request through 311 to request a vacant lot cleanup. The City sends the property a warning and then follows up if the property owner has not cleaned up the property within the required period. The property owner is billed for the cost of the City to clean up the property. If the property owner does not pay, the City places a lien against the property.
Waterways Restoration Team (WRT)	The Water Department's WRT regularly examines streams and performs cleanup work throughout the City of Philadelphia. The WRT crews focus on litter hotspots and responds to complaints by department staff and the public. In 2017, the WRT conducted 740 cleanups and removed over 1,600 tons of debris from waterways. The WRT works with other departments to clean or restore the waterways, partnering with Philadelphia Parks and Recreation, the Pennsylvania Fish and Boat Commission, and other non-profit groups.
Floatables Skimming Program	The Water Department's Floatables Skimming Program operates specially designed boats to remove litter from waterways.
Neighborhood Cleanups	The Streets Department provides support for neighborhood cleanups by supplying equipment needed for cleanups and collecting the trash after the event. Organizations, including schools, churches, and civic associations, may make a request

⁴ Philacycle: <https://www.recyclebank.com/philacycle>

⁵ GreenFutures: <https://www.philasd.org/greenfutures/>

	for block cleaning support. The Street Department supports 6,000 block cleanups annually.
311 Contact Center	Residents may submit reports of litter and illegal dumping to 311, which are routed to the appropriate department.
Illegal Dumping Abatement	
Illegal Dumping Crew	The Streets Department employs a 13-member crew to clear illegal dumping sites along over 2,500 miles of streets that costs the City of Philadelphia about \$600,000 annually.
Enforcement	
Litter Enforcement and Cleaner Public Spaces Subcommittee	The Litter Enforcement and Cleaner Public Spaces Subcommittee regularly reviews the current enforcement, fines, and penalties for littering and dumping in the City of Philadelphia. The subcommittee's role is to understand which enforcement strategies most effectively combat litter and to coordinate the City of Philadelphia's enforcement efforts. The subcommittee also uses collected data to determine strategies to improve waste management and collection.
Streets & Walkways Education and Enforcement Program (SWEEP)	Through education and enforcement, a team of 61 SWEEP officers enhance individual and community efforts to maintain a clean City by increasing awareness of Sanitation Code requirements. SWEEP officers meet with business owners and apartment buildings to review cleanup responsibilities and will work with residential communities to address areas of concern. SWEEP is responsible for enforcing the law against violators and may issue warnings or citations to individuals. Litter enforcement officers use computerized tracking of code violation notices to streamline adjudication of violations. Residents can submit potential code violations to SWEEP online or through 311. The City of Philadelphia budgeted about \$2.9 million for the program in 2018.
Surveillance Cameras	The City of Philadelphia is planning to purchase an additional 50 surveillance cameras to monitor known illegal dumping hot spots.

APPENDIX A – STRATEGIES TO COMBAT LITTER AND ILLEGAL DUMPING

Appendix A: Strategies to Combat Litter and Illegal Dumping

Strategy or Program Number	Strategy or Program	Strategy or Program Description	Priority	If Implemented, Department(s) Responsible	Degree of Implementation	Litter Prevention	Illegal Dumping Prevention	Education & Outreach	Litter Abatement	Illegal Dumping Abatement	Enforcement
	1 Develop, Implement, and Track Geographically-Focused Approach	Collect geographic data to inform strategy development and evaluate litter and illegal dumping programs to assess their success and needs for continued development.									
1A	Establish Leadership of Litter and Illegal Dumping Implementation Strategy	Identify who within City management will take ownership and provide direction for the litter and illegal dumping strategy.	★			●	●				
1B	Prioritize Geographic Areas to Address Litter and Illegal Dumping	Collect data on presence and frequency of litter and illegal dumping to enable progress to be measured and reported. Use of geospatial data can be used to determine priority areas that need additional attention. The City should recognize that some efforts will need to continue in some areas that are not geographically prioritized areas (e.g., roadways and waterways).	★			●	●				
1C	Develop Geographically Focused Litter and Illegal Dumping Reduction Plans	Develop specific tactical-level plans to address litter and illegal dumping. Plans should identify activities to be implemented by all City departments for the year and address roles, responsibilities, schedules, and costs. Many activities are identified in this worksheet.	★			●	●				
1D	Evaluate Program Effectiveness	Use surveys and audits to track/evaluate information about sources of litter and illegal dumping to inform state and local governments about program effectiveness and resources needed.	★			●	●				
1E	Update Geographic Focus and Plans Annually	Update strategies and plans on an annual basis. Some areas of the City will require continual efforts (e.g., roadways and waterways). Changes in level of litter and illegal dumping may require a shift in strategy or primary area of focus. Successful strategies can be expanded to other areas of the City.	★			●	●				
1F	Align Funding to Program Objectives	Ensure that funding is coordinated and consistent with the program objectives based on the results of the data analysis and program evaluation.	★			●	●				
	2 Improve Regional and Local Cooperation	Improve cooperation among local governments, businesses, and nonprofits to coordinate litter and illegal dumping resources.									
2A	Develop Local and Regional Partnerships	Develop partnerships with local and regional organizations, such as businesses, non-profit organizations, regional planning agencies, and other governmental entities to leverage resources.	★			●	●				
2B	Provide Citizen Reporting Opportunities	Provide simple citizen reporting opportunities to report observed littering behavior or illegal dumping sites (e.g., websites, smart phone apps, and telephone hotlines).	★	311	■				●	●	
2C	Improve Coordination with Local, State, and Federal Law Enforcement Personnel	Improve coordination with other local, state, and federal agencies to enforce illegal dumping laws and to understand roles and jurisdiction (e.g., Dallas County, TCEQ, TPWD, US EPA, and US DEA).		Marshal	▲	●	●				●

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3	Integrate Proactive Methods to Prevent Litter and Illegal Dumping	Focus on preventative measures to reduce litter and illegal dumping.									
3A	Consider Adding New Collection Stations	Continue to evaluate where illegal dumping is occurring relative to existing transfer stations and the McCommas Bluff Landfill. Consider adding new collection stations where there is not a nearby transfer station to provide residents with a convenient waste disposal option.	★								
3B	Improve Promotion of Existing Free Waste Disposal Services at Landfill and Transfer Stations	Improve promotion of free waste disposal services that the City provides to residents at the McCommas Bluff Landfill and the existing transfer stations as well as curbside collection services.	★	SAN	▲						
3C	Keep Areas Near Landfill and Collection Stations Clean	Cleanup areas around landfills and transfer stations to discourage illegal dumping.		SAN	■		●				
3D	Prevention through Environmental Design	Design visible spaces to reduce likelihood of littering or illegal dumping (e.g., lighting and landscaping to enhance visibility, security cameras in problem areas). For example, consider anti-litter and anti-illegal dumping measures when revising land use zoning and in the design of transit oriented developments.	★			●	●				
4	Increase Community Engagement in Litter Collection and Prevention	Emphasize community-level engagement opportunities to generate community support and to increase sense of pride in local community.									
4A	Neighborhood Outreach	Communicate litter and illegal dumping issues at community events with residents that provide an opportunity to interact directly with individuals rather than through broad social media campaigns.	★	CCS, DWU, Public Works, PUD	▲				●		
4B	Community Cleanups	Institute community cleanups (e.g., neighborhoods and parks) to encourage involvement by community members, and recruit businesses to join in the events.	★	CCS, DWU, PKR, PUD	■				●		
4C	Adopt-a-Spot	Develop an adopt-a-spot program (e.g., highway, street, park, etc.) that community organizations can get involved with to clean-up litter. Make sure that community participants understand the long-term commitment to maintaining the selected area. The City's MOWMentum program is a local example.		DWU, Public Works	▲				●		
4D	Sponsor-a-Spot	Develop a sponsor-a-space program where commercial entities can sponsor cleanups in exchange for recognition via a sign. Make sure that sponsors understand the long-term commitment to maintaining the selected area.							●		
5	Educate the Public to Increase Understanding and Participation	Develop a public awareness campaign to stop litter and illegal dumping.									
5A	Develop a Consistent Message and Identify Target Audiences for Litter and Illegal Dumping Education and Outreach	Understand target audiences, identify areas where litter and illegal dumping are a problem, and communicate a consistent message about importance of stopping litter and illegal dumping. Transition to more direct community engagement and not just rely broadcast messaging.	★			●	●	●			

Appendix A: Strategies to Combat Litter and Illegal Dumping

Strategy or Program Number	Strategy or Program	Strategy or Program Description	Priority	If Implemented, Department(s) Responsible	Degree of Implementation	Litter Prevention	Illegal Dumping Prevention	Education & Outreach	Litter Abatement	Illegal Dumping Abatement	Enforcement
5B	Educate Waste Generators about Proper Disposal	Educate waste generators (e.g., users of public transportation, motorists, and residents) about waste services provided by the City and local ordinances and how to properly dispose of waste. Identify areas where litter and illegal dumping are a concern to focus education activities for specific communities.	★	CCS, DWU, OEQ, SWM	■	●	●	●			
5C	Inform New Residents of Collection and Disposal Services	Provide information about available solid waste services to new customers, so they do not need to turn to illegal dumping as a means to dispose of waste.	★				●				
5D	Implement Litter and Illegal Dumping Curriculum	Work with local schools to develop/implement litter and illegal dumping curriculum (e.g., Keep America Beautiful Waste in Place curriculum).	★			●	●	●			
5E	Promote Litter and Illegal Dumping Coverage in Local Media	Build relationships with local media markets and provide stories about litter and illegal dumping to increase awareness of litter and illegal dumping issues and environmental enforcement cases.	★			●	●	●			
5F	Use Litter and Illegal Dumping Signage	Use signage to clearly describe litter and illegal dumping regulations in priority areas of concern.	★	PKR, Marshal	▲	●	●				
6 Reduce Incidence of Litter and Illegal Dumping by Keeping a Clean Community		Reduce the likelihood of litter and illegal dumping by providing regular cleanup services.									
6A	Regularly Provide Thoroughfare Sweeping	Regularly sweep streets and sidewalks. Prioritize areas where quantity of litter is greatest.	★	Public Works	■				●		
6B	Regularly Maintain Public Spaces to Reduce Litter	Regularly monitor and clear public areas where litter is likely to accumulate (e.g., catch basins, right-of-ways) to reduce street litter and waterborne litter.	★	DWU, Public Works, TWM	■				●		
6C	Provide Adequate and Convenient Waste and Recycling Receptacles	Provide trash, ash receptacles for cigarette butts, and recycling at high traffic locations, public transportation locations, and transition points where items are commonly discarded. Re-evaluate number of waste receptacles and collection frequency in areas with high incidence of litter and illegal dumping and adjust level of service as needed.	★	SAN, PKR	▲	●					
6D	Encourage Business Improvement Districts to Include Reducing Litter and Illegal Dumping as Part of Mission	Encourage business improvement districts to include reducing litter and illegal dumping as part of their operating mission.		Downtown Dallas, Inc.	■				●		
6E	Improve Communication of Existing Collection Stations and Consider Additional Collection Station Locations for Bulk Items	Communicate to residents the existing collection options and access to transfer stations and McCommas Bluff Landfill for disposing of waste for no charge. Consider providing additional collection stations in areas where there is high incidence of illegal dumping and difficult to access transfer stations for collecting bulk items to reduce chance of improper disposal.	★	SAN	▲		●				

Appendix A: Strategies to Combat Litter and Illegal Dumping

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6F	Provide Trash Pickup for Homeless Encampments	Cleanup homeless encampments or provide trash pickup services to sites with high numbers of homeless (e.g., In lieu of a ticket, police can distribute trash bags at homeless campsites that could be then be more easily collected by city services).		OHS	■				●		
6G	Hire Homeless to Cleanup Litter	Develop program to employ homeless to pick up litter that helps to transition homeless to full time work.	★	OHS	▲				●		
7	Become More Proactive to Reduce Illegal Dumping from Construction Activities	Focus on reducing litter and illegal dumping from construction activities.									
7A	Improved Communication of Existing Locations for Proper Management of Construction and Demolition (C&D) Materials	Communicate to C&D contractors the existing disposal options for C&D waste.					●				
7B	Conduct Periodic Construction Site Visits	Law enforcement or building inspectors conduct periodic construction site visits to verify disposal practices by construction managers and subcontractors.	★	Building Inspection, OEQ, SWM	▲		●				
7C	Require Collection Containers at Construction and Remodeling Sites	Require dumpsters or roll-off containers to be used at construction and remodeling sites.	★				●				
8	Become More Proactive to Reduce Litter and Illegal Dumping from Commercial Sources	Focus on reducing litter and illegal dumping from commercial activities.									
8A	Work with Commercial/Institutional Entities to Encourage or Require a Litter Prevention Plan	Encourage development of Litter Prevention Plans. The City could focus on plans for owners of commercial entities, grocery stores, food establishments, and venues of large events that typically generate litter. The City could initially make this a voluntary measure and require it by code if litter is not adequately addressed. As a voluntary measure the City could recognize participants through a recognition program.	★			●					
8B	Provide Technical Assistance to Implement Litter Prevention Plans	City to provide technical resources to monitor efforts to develop Litter Prevention Plans and to assist entities to implement litter prevention plans.	★			●		●			
8C	Education for Commercial Fleet Managers	Educate fleet managers about how to properly manage materials to minimize creation of litter on-site and while hauling loads. For example, equipping vehicles with guards or covers to prevent light materials from being blown out during transport and becoming litter.	★			●		●			
9	Enhance Enforcement of Litter and Illegal Dumping Codes and Regulations	Enforce litter and illegal dumping laws to stop littering and illegal dumping.									
9A	Continue and Consider Expanding Monitoring of Illegal Dumping Sites	Actively monitor known hotspots with law enforcement patrols or surveillance cameras. Consider purchasing additional surveillance cameras to expand monitoring at additional repeat illegal dumping sites.	★	Marshal	▲						●

Appendix A: Strategies to Combat Litter and Illegal Dumping

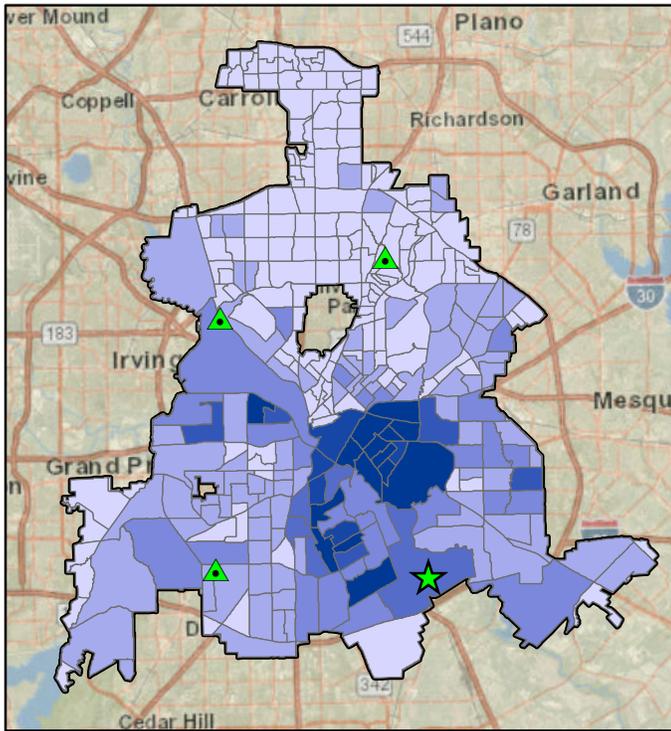
Strategy or Program Number	Strategy or Program	Strategy or Program Description	Priority	If Implemented, Department(s) Responsible	Degree of Implementation	Litter Prevention	Illegal Dumping Prevention	Education & Outreach	Litter Abatement	Illegal Dumping Abatement	Enforcement
9B	Provide Training to Law Enforcement, Judges, and Prosecutors about Importance of Preventing Litter and Illegal Dumping	Provide training courses to inform law enforcement, judges, and prosecutors about how to respond to environmental crimes. Focus training on applicable municipal ordinances and state laws, investigation techniques, and prosecution process to successfully prosecute litter and illegal dumping.	★								●
9C	Encourage Law Enforcement Personnel to Enforce Laws for Illegal Dumping Crimes	Encourage law enforcement to enforce laws for litter and illegal dumping crimes in addition to environmental peace officers and code enforcement staff.	★	Marshal	■						●
9D	Review Existing Laws, Rules, and Ordinances	Review existing laws, rules, and ordinances to determine if they are consistent with Keep America Beautiful's Model Illegal Dumping and Litter Control Ordinance and update as needed. For example, temporary sign ordinance and abandoned property, neglect, and nuisance ordinances.	★			●	●				●
9E	Re-evaluate Effectiveness of Existing Penalties for Litter and Illegal Dumping	Review existing penalties to determine if they need to be modified to serve as an effective deterrent to future violations.	★	CCS, Marshal	■						●
9F	Citations for Improper Set Outs	Use citation process to cite improper set outs and include flyer with information about proper set outs and available waste services.	★	CCS	▲					●	●
9G	Share Database of Repeat Offenders	Develop centralized database of for repeat offenders to enable graduated penalties and share with other local governments and enforcement agencies.	★	Marshal	■						●
9H	Re-evaluate Administrative Hearing Process to Prosecute Illegal Dumping Cases and Make Adjustments if Needed	Re-evaluate existing administrative hearing process and make adjustments if needed to increase efficiency to allow municipal judges to focus on more serious crimes.	★	Marshal	■						●
9I	Review Effectiveness of Environmental Courts and Make Improvements as Needed	Review effectiveness of existing environmental courts to determine if improvements can be made to aid in prosecution of environmental crimes.	★	Marshal	■						●
9J	Require Cleanup Activities for Violators	Require those convicted of illegal dumping to provide community service to clean up other illegal dump sites.	★	Marshal	■					●	●
9K	Collection of Small Illegally Dumped Items by Environmental Enforcement Officers	Equip environmental enforcement officers to be able to collect small illegally dumped items (e.g., a bag of residential solid waste). Saves additional resources rather than calling a clean-up crew.								●	

Key

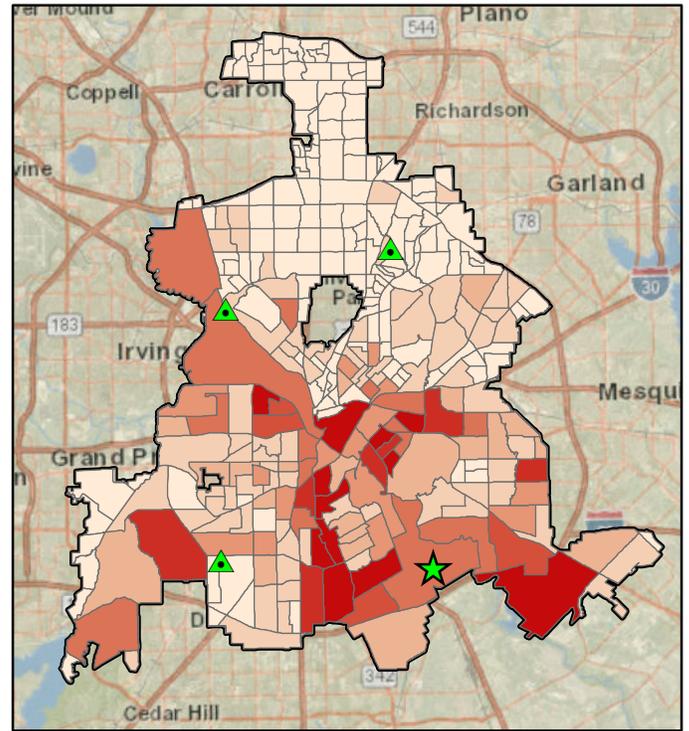
- ★ Indicates a priority program for implementation
- ▲ Indicates a partially implemented program where additional development or expansion would be beneficial
- Indicates a program currently substantially implemented to maintain
- Indicates program addresses identified category
- Program not currently in place, represents a "gap"

APPENDIX B – CITY OF DALLAS GEOGRAPHIC INFORMATION SYSTEMS MAPS

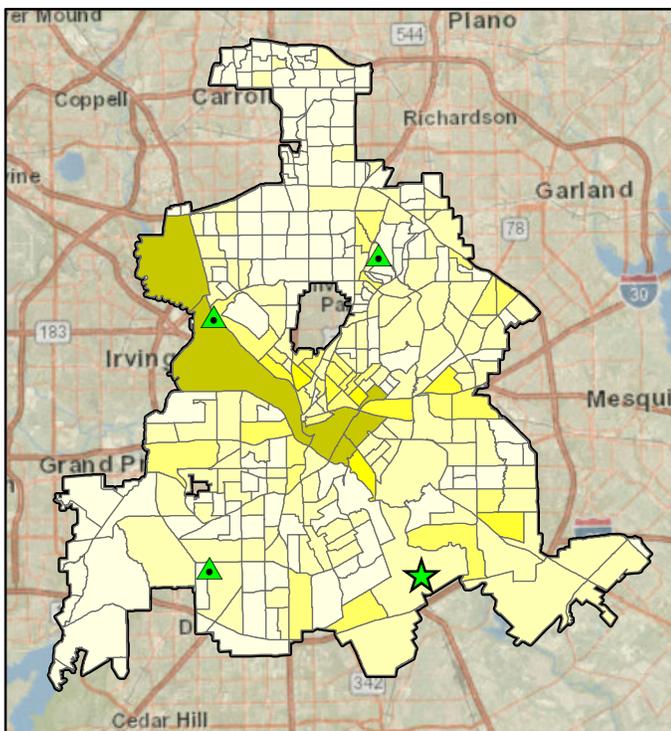
Figure B-1: City of Dallas Litter Study (All Observations 2014-2017)



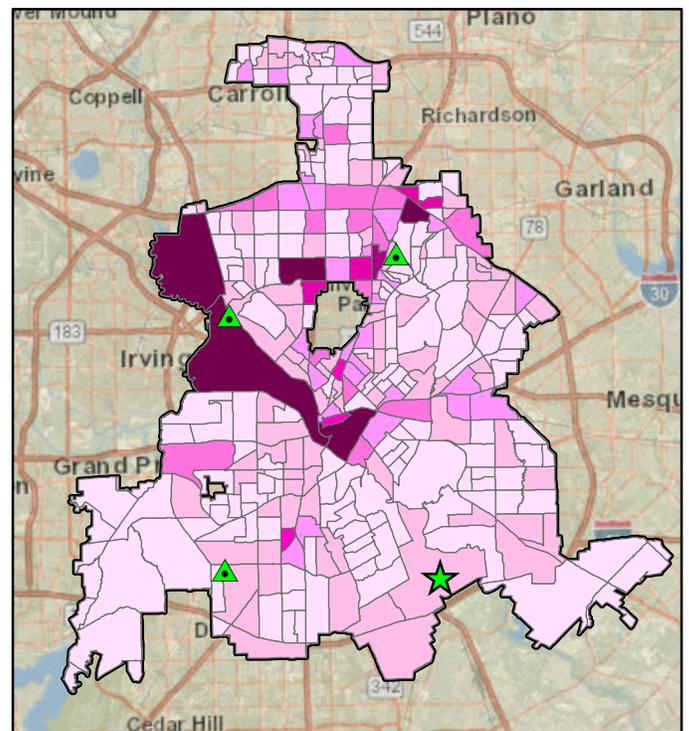
Litter - All observations



Illegal Dumping - All observations



Homeless Encampments - All observations



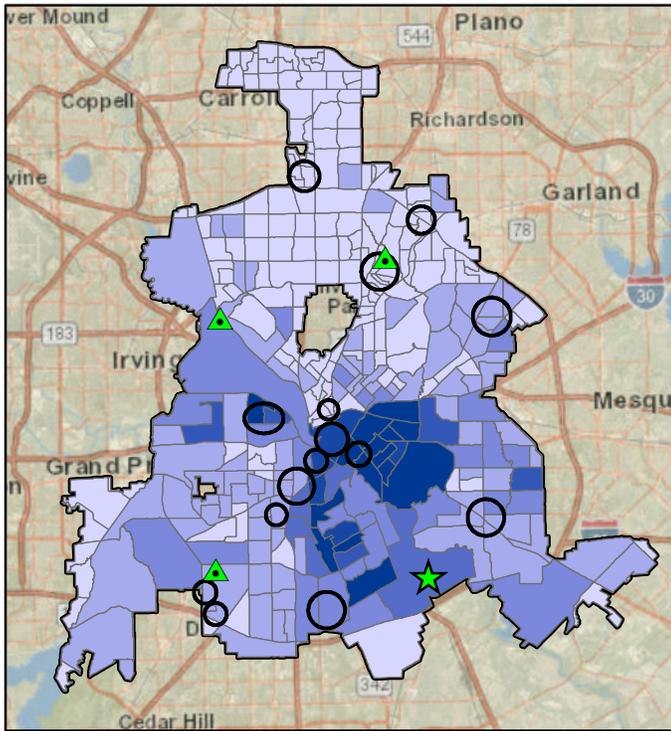
Panhandling - All observations

Legend: ▲ Transfer Station ★ Landfill

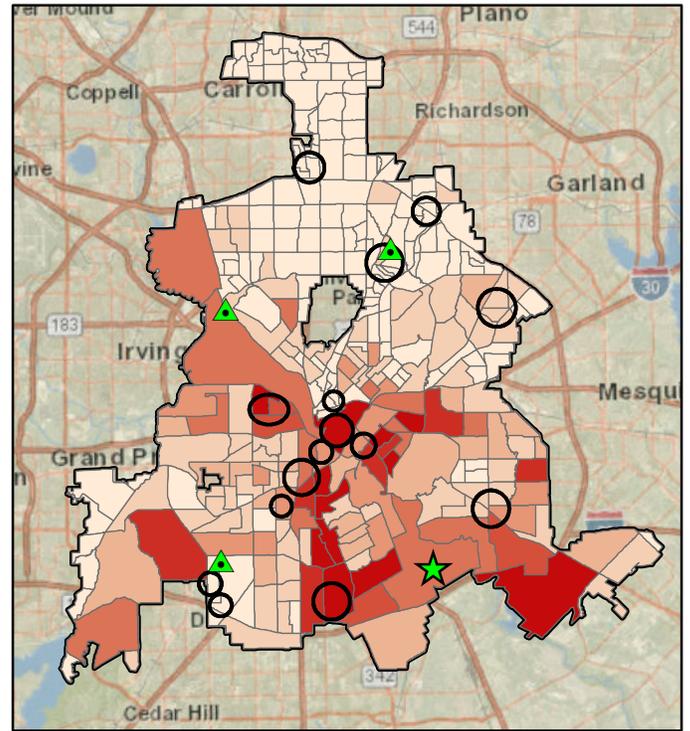
Symbol Levels presented as Standard Deviations from the mean:



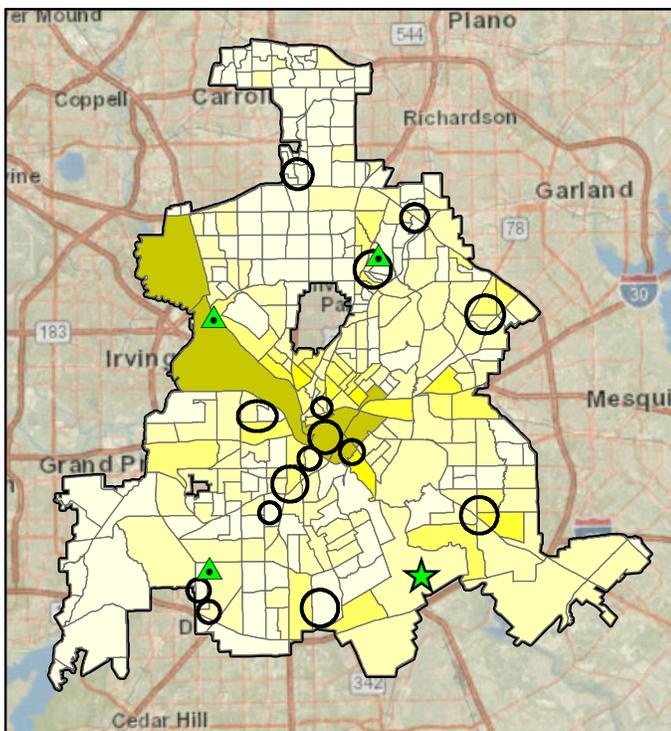
Figure B-2: City of Dallas Litter Study in Relation to Reinvestment Areas



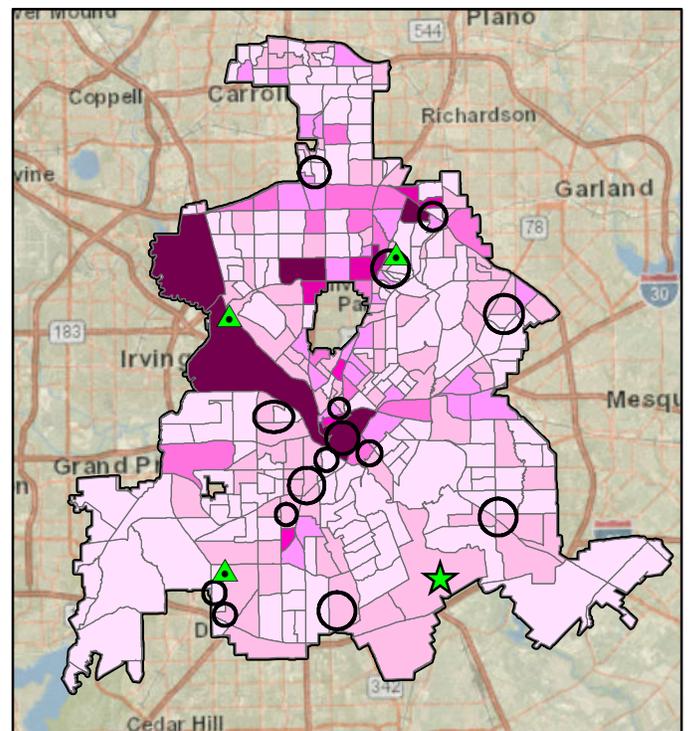
Litter - All observations



Illegal Dumping - All observations



Homeless Encampments - All observations



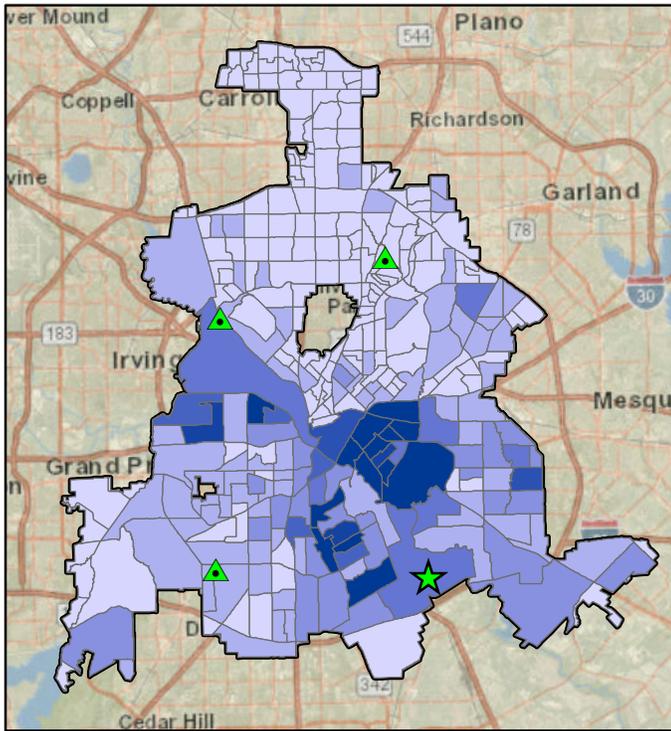
Panhandling - All observations

Legend: ▲ Transfer Station ★ Landfill ○ Reinvestment Area

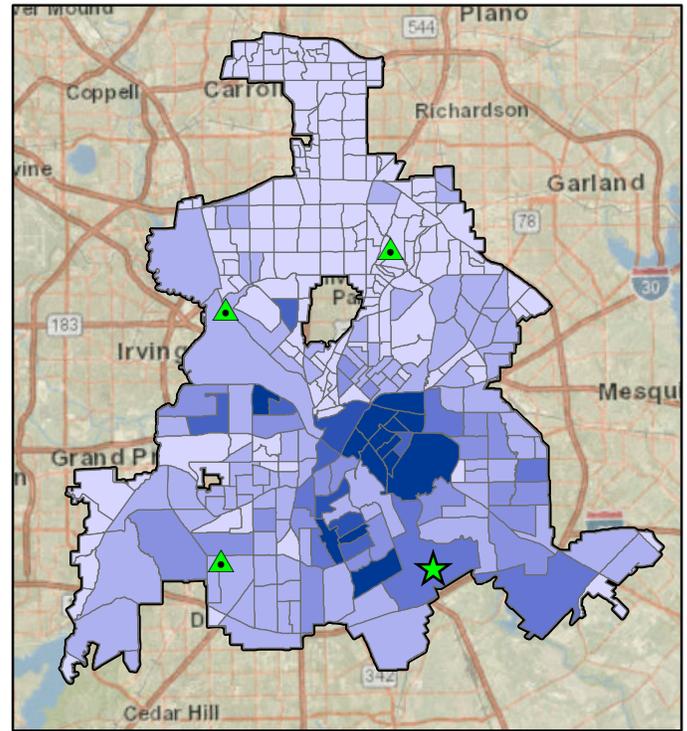
Symbol Levels presented as Standard Deviations from the mean:



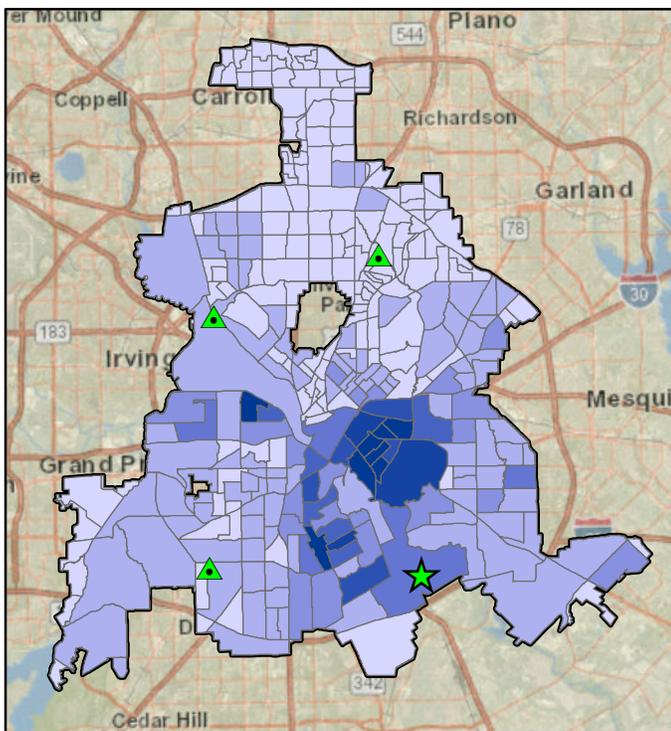
Figure B-3: City of Dallas Geographic Litter Analysis (2014-2017)



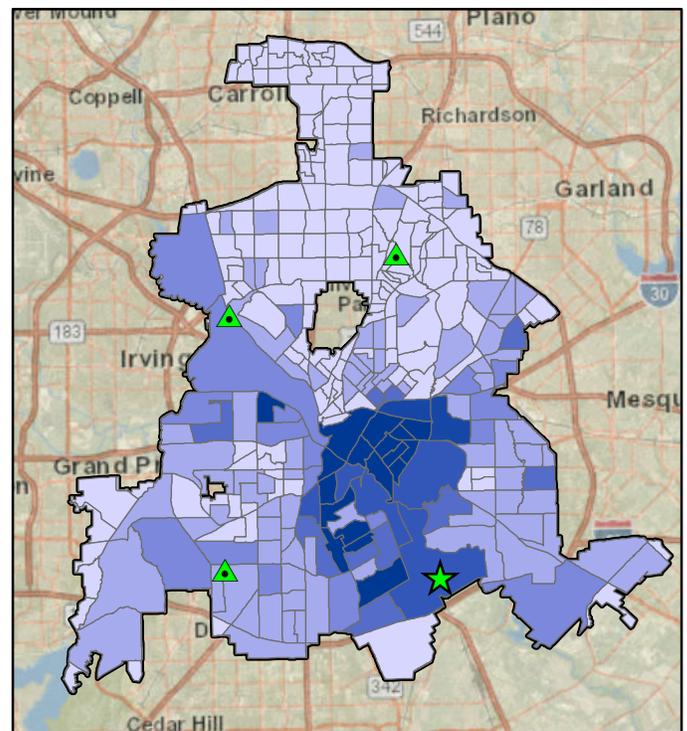
Litter - 2014



Litter - 2015



Litter - 2016



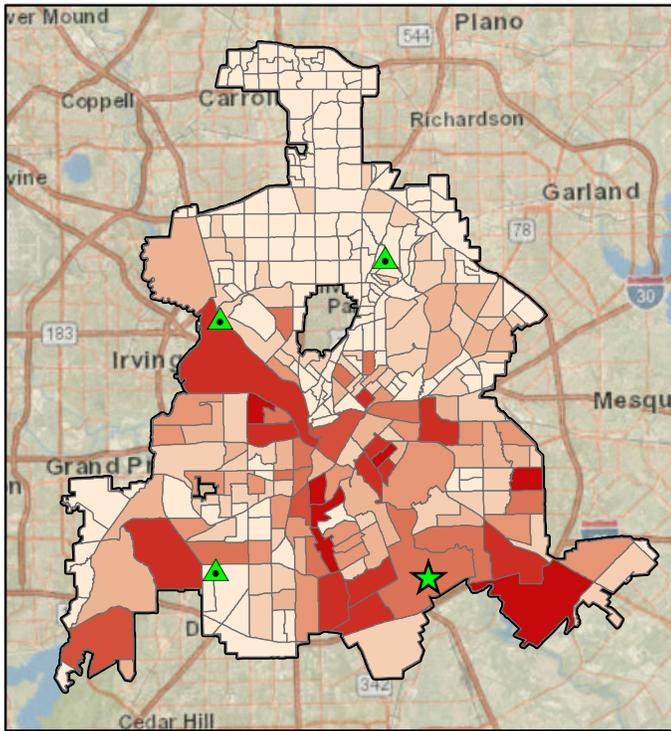
Litter - 2017

Legend: ▲ Transfer Station ★ Landfill

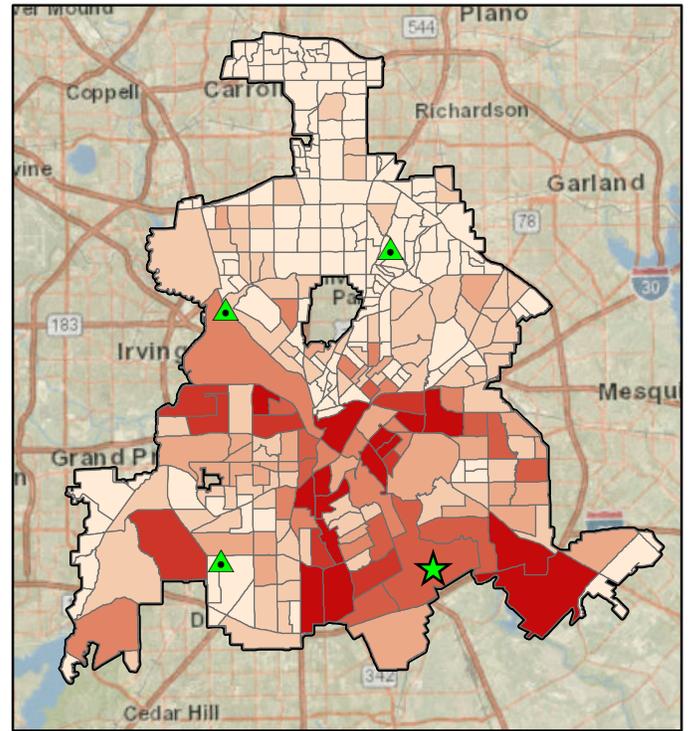
Symbol Levels presented as Standard Deviations from the mean:



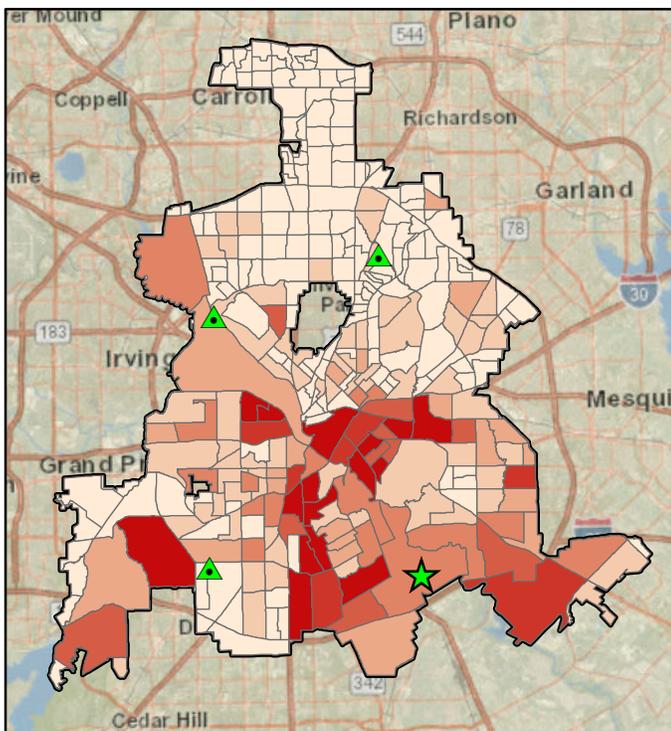
Figure B-4: City of Dallas Illegal Dumping Analysis (2014-2017)



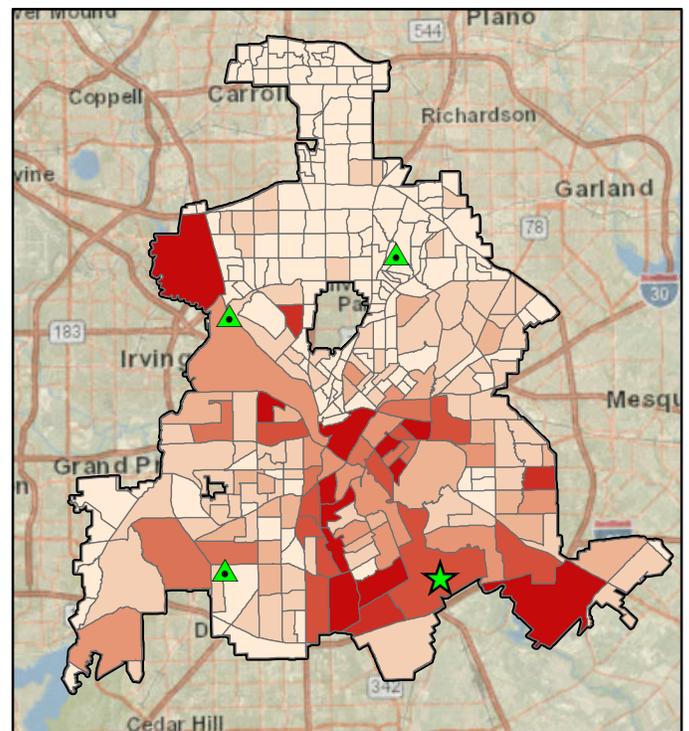
Illegal Dumping - 2014



Illegal Dumping - 2015



Illegal Dumping - 2016



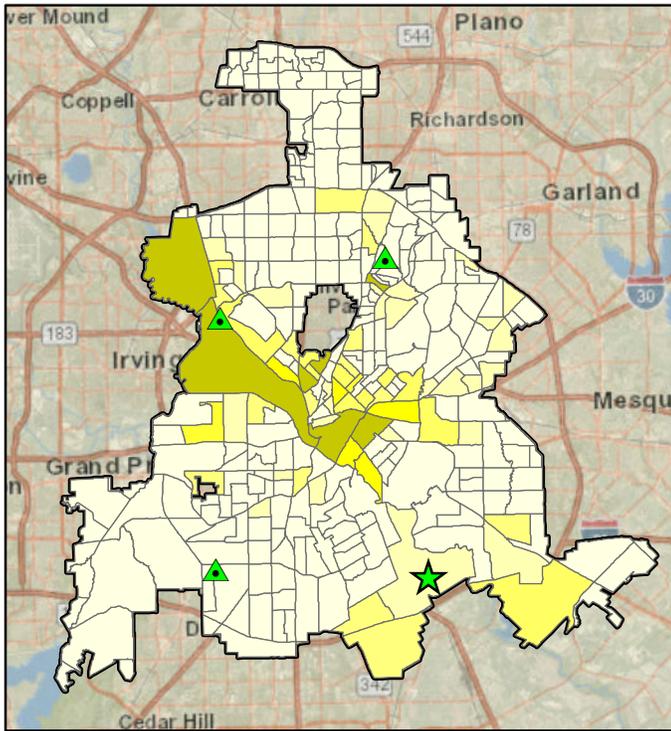
Illegal Dumping - 2017

Legend: ▲ Transfer Station ★ Landfill

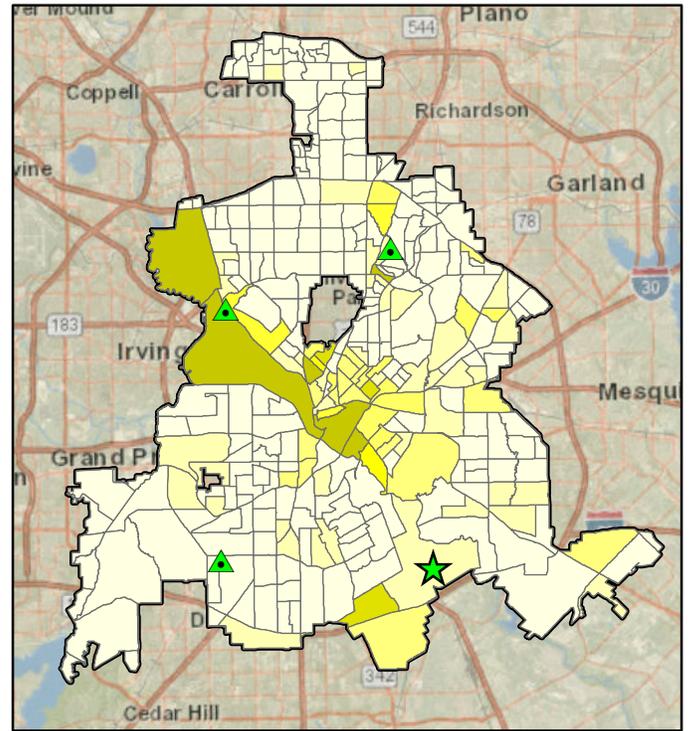
Symbol Levels presented as Standard Deviations from the mean:



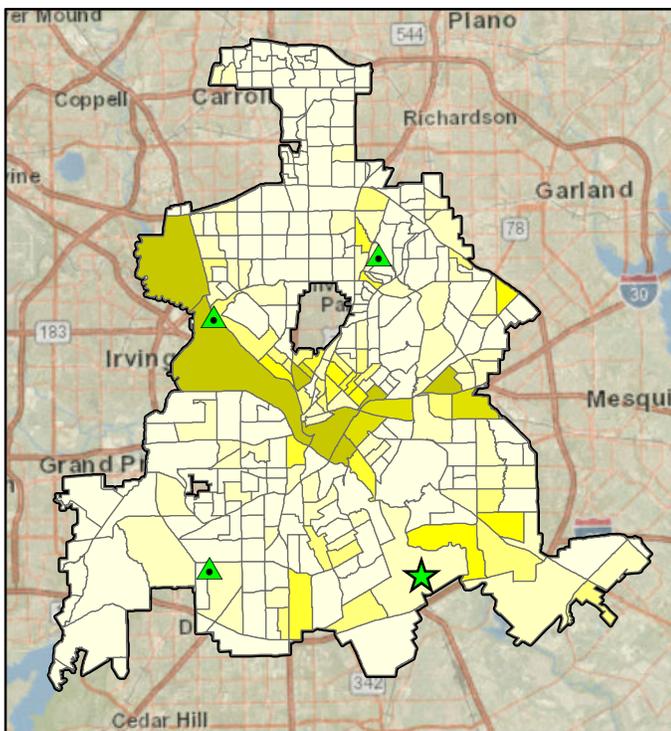
Figure B-5: City of Dallas Homeless Encampments Analysis (2014-2017)



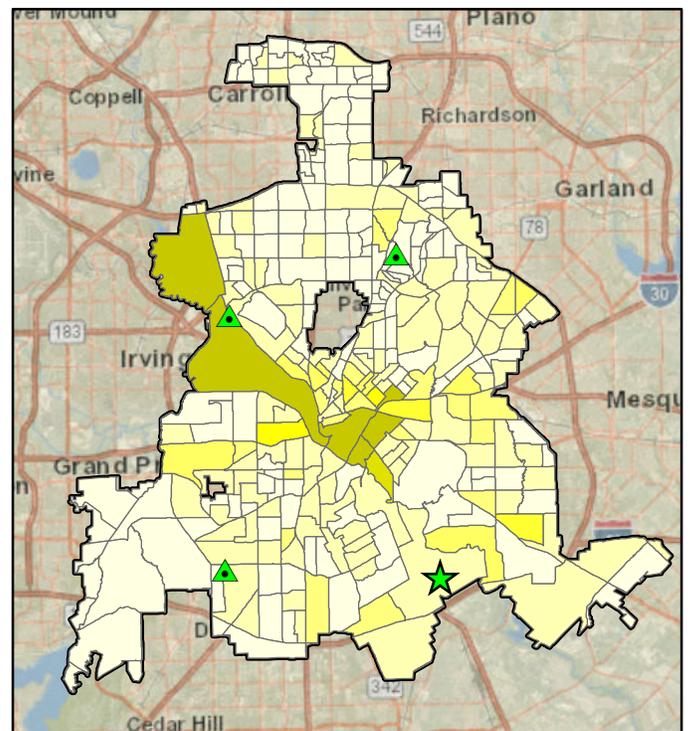
Homeless Encampments - 2014



Homeless Encampments - 2015



Homeless Encampments - 2016



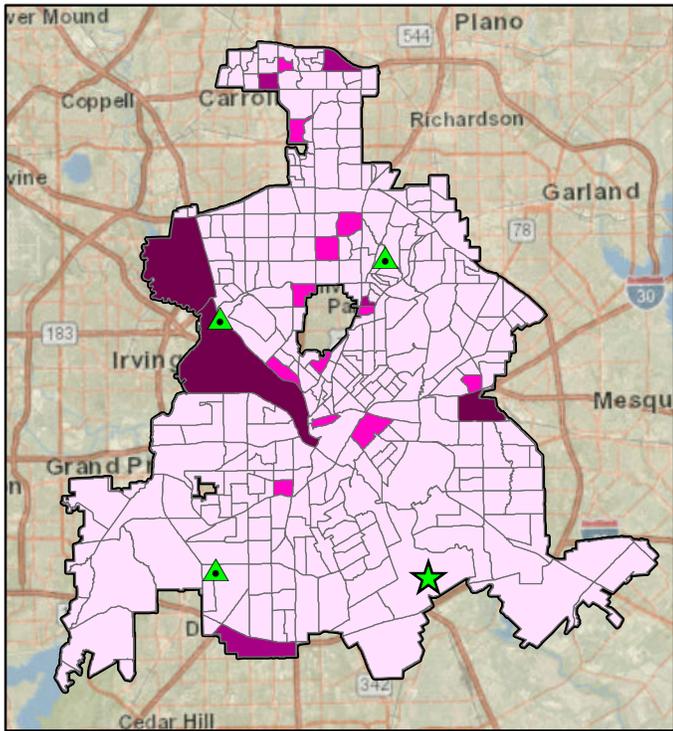
Homeless Encampments - 2017

Legend: ▲ Transfer Station ★ Landfill

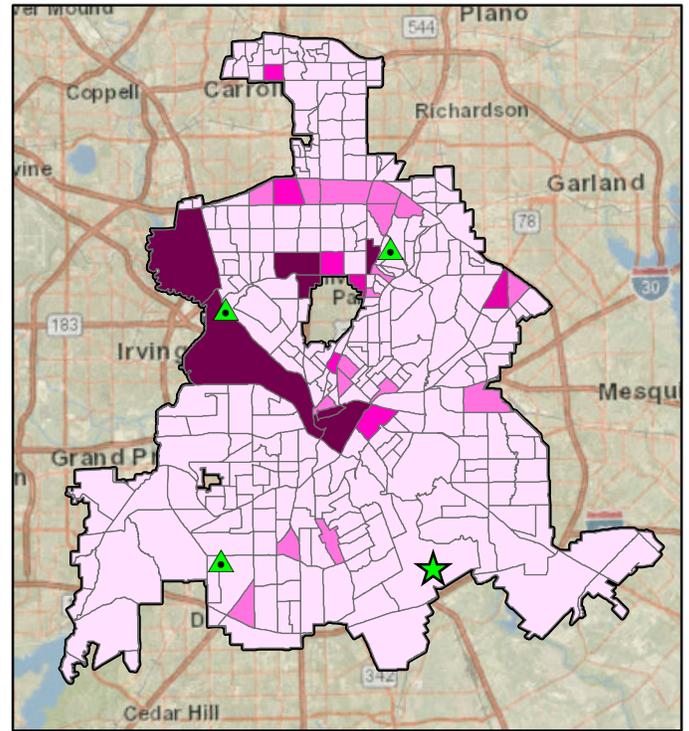
Symbol Levels presented as Standard Deviations from the mean:



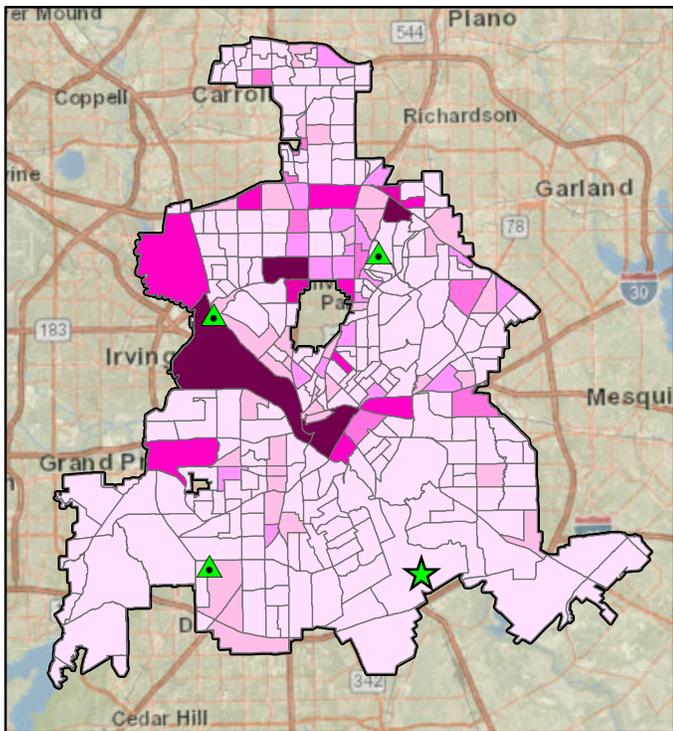
Figure B-6: City of Dallas Panhandling Analysis (2014-2017)



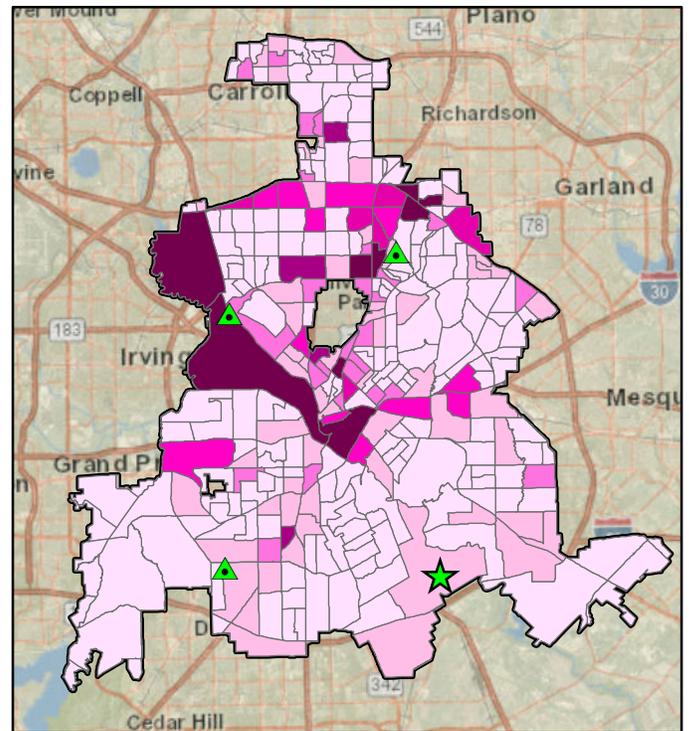
Panhandling - 2014



Panhandling - 2015



Panhandling - 2016



Panhandling - 2017

Legend: ▲ Transfer Station ★ Landfill

Symbol Levels presented as Standard Deviations from the mean:

