BURNS McDONNELL

CITY OF McKINNEY: SOLID WASTE MANAGEMENT STRATEGY

June 10, 2022

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
AD	Anaerobic Digestion
AI	Artificial Intelligence
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
C&D	Construction And Demolition
CAA	Clean Air Act of 1976
City	City Of McKinney
COGs	Councils Of Governments
DFW	Dallas-Fort Worth
ECC	Environmental Collection Center
EPP	Environmental Preferred Purchasing
EPR	Extended Producer Responsibility
EPS	Expanded Polystyrene
EREF	Environmental Research and Education Foundation
FEMA	Federal Emergency Management Agency
FOG	Fats, Oils, and Greases
FTEs	Full Time Employees
FY	Fiscal Year
HHW	Household Hazardous Waste
LEED	Leadership in Energy and Environmental Design
MRF	Materials Recovery Facilities
MRO	Multifamily Recycling Ordinance
MSW	Municipal Solid Waste
NCTCOG	North Central Texas Council of Governments

NHIW	Non-Hazardous Industrial Waste
NTMWD	North Texas Municipal Water District
P3	Public-Private Partnerships
PA	Public Assistance
PID	Public Improvement District
PSA	Processing Service Agreement
RAP	Rubberized Asphalt Paving
RCRA	Resource Conservation and Recovery Act
RFID	Radio-Frequency Identification
RMDP	Recycling Market Development Plan
SARA	Superfund Amendments and Reauthorization Act Of 1986
SMM	Sustainable Materials Management
SWDA	Solid Waste Disposal Act
SWMS	Solid Waste Management Strategy
SWOT	Strengths, Weaknesses, Opportunities, And Threats
TASWA	Texoma Area Solid Waste Authority
TCEQ	Texas Commission on Environmental Quality
TPY	Tons Per Year
U.S. EPA	The United States Environmental Protection Agency
URO	Universal Recycling Ordinance

EXECUTIVE SUMMARY

Purpose

Developing a Solid Waste Management Strategy (SWMS) is a critical step in purposefully shaping the future of the City of McKinney's (City) material management system as economic and population growth continue and market factors continue to evolve. Planning and implementing an integrated solid waste management strategy is a complex and challenging endeavor encompassing a host of issues: technological, institutional, legal, social, economic, and environmental. Furthermore, as cities throughout the U.S. pursue solutions to their solid waste management challenges, it is increasingly apparent that no single method, technology, or program offers a complete solution; rather, a combination of methods is required to provide for appropriate and cost-effective management of all material types, while continuing to build an integrated management system. The City and its consultant (Burns & McDonnell) developed this SWMS to guide the City's MSW management through the next 20 years.

Guiding Principles

The SWMS established Guiding Principles to direct the specific strategies and recommendations presented throughout. The five Guiding Principles are:

1. Develop innovative municipal solid waste (MSW) management methods consistent with the waste management hierarchy to achieve MSW reduction, reuse, and diversion from landfill.

2. Provide MSW services that are convenient, environmentally conscious, and cost-effective for customers and the City.

3. Enhance aesthetics, services, and pricing equity for Downtown businesses.

4. Strategically utilize program data and technology for informed decision-making.

5. Leverage existing partnerships and explore new partnership opportunities to effectively implement MSW management services.

Overview, Priorities and Objectives

In addition to describing the purpose of the SWMS and detailing the guiding principles, Section 1.0 describes the stakeholder engagement process, defines key terms, and provides a guide on how to best understand the strategies and implementations plan included in Sections 4.0 through 15.0 of the SWMS.

Planning Studies, Regulatory, and Trends Review

Section 2.0 provides a broad perspective of the historic and current state of the MSW management environment in which the City is developing this SWMS. It provides a review of relevant existing planning studies, a summary of relevant laws and regulations, and summarizes recent key trends in MSW management. The key trends provide insight on how the industry is changing, as well as efforts being implemented by communities to address associated challenges.

Planning Area Characteristics

To properly plan for the City's future MSW management needs, an understanding of the factors that will impact those needs is important. Section 3.0 describes the City's demographic and economic characteristics as well as how these characteristics were applied to develop the City's current MSW generation profile and future MSW generation projections. With the City's population and employment projected to double over the next 20 years, this information reinforces the importance for the City to develop and implement this SWMS that will guide MSW management efforts over that time.

Facilities and Infrastructure

Consideration of MSW processing facilities and infrastructure on both a regional and local level is essential for the future of MSW management for the City. The availability of local processing facilities will impact many of the decisions the City makes regarding MSW management and services provided to City customers and the timing (near-term, mid-term, or long-term) for implementation of various strategies. Section 4.0 provides an overview of existing MSW processing facilities and infrastructure located within the North Central Texas Council of Governments (NCTCOG) region, including landfills, materials recovery facilities (MRFs), transfer stations, and organics processing facilities.

Single-Family

As discussed in Section 5.0, the services and support the City provides to the single-family sector are particularly important in shaping the City's overall MSW management culture. Most residents' primary experiences with MSW are in their own homes, every day. About 85 percent of the City's population lives in single-family homes. Therefore, the City is able to reach a large portion of its residents through single-family residential services and outreach.

Core residential services include curbside collection of landfill trash, single-stream recyclables, bulky items, yard trimmings, HHW, and electronics. Key strategies to increase the single stream recycling participation will focus on targeted education and outreach initiatives.

Household Hazardous Waste

The purpose of a household hazardous waste (HHW) program is to provide residents with access to safe and proper disposal options for household materials that are not suitable for disposal in a landfill or for collection with other curbside residential programs. Section 6.0 focuses on the City's current offering of on-request curbside HHW and e-waste recycling services, which represents a high level of service. Incremental improvements are planned or can be made to the program, such as the planned implementation of the ReCollect app to streamline electronic service request and tracking.

Multifamily

For the purposes of this SWMS, multifamily refers to residential properties within the City having three or more individual housing units as well as assisted living and long-term residential care facilities. Section 7.0 focuses on the multifamily sector.

Since multi-family customers are currently tracked as commercial customers, there is a limited understanding of the multifamily MSW stream and composition. Currently, only a fraction of apartment properties offer recycling to residents. Ultimately, the City's goal is to ensure multifamily residents have access to equal recycling, diversion, and disposal services as other McKinney residents. As a part of the SWMS, the City will strive to increase single-stream recycling participation and material generation rates by collaborating with property owners to provide technical assistance and to assist with resident education and communication. The City may also consider policies to encourage or ordinances to compel property owners to provide recycling service.

Commercial and Institutional

The commercial and institutional sector consists of non-residential customers, including commercial businesses and non-City institutional facilities, including schools. Section 8.0 is focused on commercial and institutional customers within the City limits.

Through the City's contractor, McKinney businesses can receive landfill trash and recycling collection services. Similar to the multifamily sector, the City will consider a variety of options to help increase recycling participation and material generation rates such as by providing technical support, recognition programs, education and best practices guides for commercial entities and institutions. The City may also consider policies to encourage or ordinances to compel property owners to provide recycling service.

Disaster and Storm Debris

Section 9.0 discusses the City's Disaster Debris Management Plan, which is managed by the City's Office of Emergency Management. Disaster and storm debris management involves two key components: debris removal (hauling) and debris monitoring. The City is well prepared to execute the Disaster Debris Management Plan, if needed, and has pre-positioned contracts in place for both removal and monitoring. The City will continue to take efforts to review, update, and maintain the plan in preparation for a disaster emergency, and should consider establishing a reserve fund earmarked specific to disaster and storm debris management.

Public Spaces and Special Events

Recycling opportunities are limited at the City's parks, public spaces, and special events; and Section 10.0 describes opportunities for the Public Works and Parks and Recreation Departments to expand recycling opportunities (such as at parks, sports fields, special events) and coordinate outreach, engagement, and public education efforts.

Outreach, Engagement and Public Education

Providing effective outreach, engagement and public education to residential and commercial customers is critical for the ongoing and future success of the City's solid waste and recycling programs. Guidance and support from the City can shape proper participation and positive program engagement experiences for customers, which increases customer satisfaction and enables progress toward the City's goals. Section 11.0 provides an evaluation of the City's outreach, engagement, and public education efforts and identifies a variety of available tools and resources for the City to leverage as it resets the outreach, engagement and public education program, such as the regional Know What To Throw campaign and the campaign builder from The Recycling Partnership.

Downtown

The City's Downtown is central to its identity. Preserving historic assets and the small-town character of the Downtown area, while also improving the quality, efficiency, and aesthetics of MSW management services is of critical importance in maintaining the City's vision for the future of Downtown and the City's economic growth. Section 12.0 focuses on the Historic Downtown district, encompassing the core of the City's cultural, dining, and entertainment activities.

Based on analysis completed during the planning process and input previously gathered by the City during multiple focus group discussions held with Downtown property owners and businesses, the current MSW management system in the Downtown area is likely not sustainable for the long-term. This is due

to challenges such as space constraints, lack of public property for placing and storing containers, and negative aesthetics for visitors. Multiple Downtown collection system options are available to the City, to determine the preferred approach to providing waste and recycling services in an effective way and using an equitable rate structure.

Ordinance, Regulation & Code Compliance

Chapter 86 of the City of McKinney Ordinances relates to solid waste management, with additional sets of code and ordinances affecting the City's ability to safely and effectively provide solid waste management services. Section 13.0 describes the City's current ordinances and code compliance efforts. This section discusses program and policy options to recover more of the recyclable material in the multifamily, commercial, and C&D sectors, including examples that have been implemented in other cities. The options and case studies presented represent a range of options that have been implemented across the U.S., with most of these changes enacted through city ordinance. In addition to routine review and update to the Chapter 86 ordinances to reflect current responsibilities and needs, the City should explore ordinance-based approaches to provide all residents (not just single-family customers) the option to conveniently recycle.

City-wide Strategies

There are several MSW management strategies the City will implement that have applicability across multiple sectors. While the specifics for implementation of these City-wide and multi-sector strategies are tailored to each sector, the over-arching objective is to provide a convenient and consistent approach to MSW management for all customers in all sectors and geographic areas of the City. An overview of each City-wide and multi-sector strategy is addressed in Section 14.0. Key strategies included in this section include:

- **Upcoming procurement process for solid waste services.** While the current License Agreement has a renewal option, this agreement has been in place for more than 20 years and terms should be updated to be more consistent with industry best management practices. The City will initiate the procurement process in mid-2022 in order to provide a level playing field for haulers to develop any necessary facilities and obtain equipment prior to an October 1, 2024 service start date. Current supply chain and labor challenges have increased the necessary lead time.

- **Development trends that reduce serviceability.** Shifting development trends can impact solid waste and recycling collection vehicle accessibility. As the City's growth continues, especially in

multifamily and mixed-use development, permit review and code updates will become increasingly important to prevent the creation of challenging collection environments.

- **Standardized MSW collection containers and signage.** Consistency in containers and signage allows for the highest opportunity for proper, consistent, and convenient participation in MSW services. Currently there is no consistent bin signage or labeling City-wide. The City should consider developing standards for the MSW collection containers and signage utilized for each sector, so that customers can expect a consistent, predictable MSW management experience regardless of the sector or geographic location within the City.

1.0 OVERVIEW, PRIORITIES, AND OBJECTIVES

1.1 Purpose

Developing a Solid Waste Management Strategy (SWMS) is a critical step in purposefully shaping the future of the City of McKinney's (City) material management system as economic and population growth continue and market factors continue to evolve. Planning and implementing an integrated solid waste management strategy is a complex and challenging endeavor encompassing a host of issues: technological, institutional, legal, social, economic, and environmental. Furthermore, as cities throughout the U.S. pursue solutions to their solid waste management challenges, it is increasingly apparent that no single method, technology, or program offers a complete solution; rather, a combination of methods is required to provide for appropriate and cost-effective management of all material types, while continuing to build an integrated management system. The purpose of the SWMS is to provide a framework to guide the City's future materials management system and to develop infrastructure, programs, and policies necessary to manage materials in alignment with the Guiding Principles of the SWMS (Section 1.2).

1.2 Guiding Principles

City staff including the Public Works Department established the Guiding Principles to direct the development of specific strategies presented throughout the SWMS (refer to Section 1.5). The five Guiding Principles are:

1. **Develop innovative municipal solid waste (MSW) management methods consistent with the waste management hierarchy to achieve MSW reduction, reuse, and diversion from landfill.** The materials management hierarchy (see Section 2.3 for further detail) describes the environmentally preferred methods for managing materials, ranking the various methods of diversion, with disposal (landfilling or incineration) as the least preferred. The SWMS is focused on increasing the effectiveness of traditional recycling and exploring options for increased organics diversion where these options can be feasibly implemented based on economic, social, environmental, community and regulatory constraints.

2. **Provide MSW services that are convenient, environmentally conscious, and cost-effective for customers and the City.** There are many approaches the City could implement in working toward its goals of increased diversion and sustainable materials management, and all have inherent costs. The strategies included in the SWMS are intended to strike a balance between

maintaining a cost-effective management system for both the City and its customers, while taking meaningful steps toward a sustainable and environmentally responsible future.

3. **Enhance aesthetics, services, and pricing equity for Downtown businesses.** The City's historic Downtown area is an important part of the community and its identity. Due to shared containers and past agreements, current MSW customer rates in Downtown are inequitable and irregular among Downtown commercial customers. Preserving historic assets and the "small-town" character of the Downtown area, while also improving the quality, efficiency, and aesthetics of MSW management services is of critical importance in maintaining the City's vision for the future of Downtown and the City's economic growth.

4. **Strategically utilize program data and technology for informed decision-making.** Strengthening the City's mechanisms for consistent data tracking and increasing diversion activities within the commercial and institutional sector is a key objective of the SWMS. In the past, the primary focus has been on the single-family residential sector, resulting in an effective program. Enhancing the City's ability to obtain commercial and institutional generation and recycling data, and integrating key generation, recycling, and contamination data into outreach and engagement, is an essential step in developing and implementing targeted and effective strategies for future materials management.

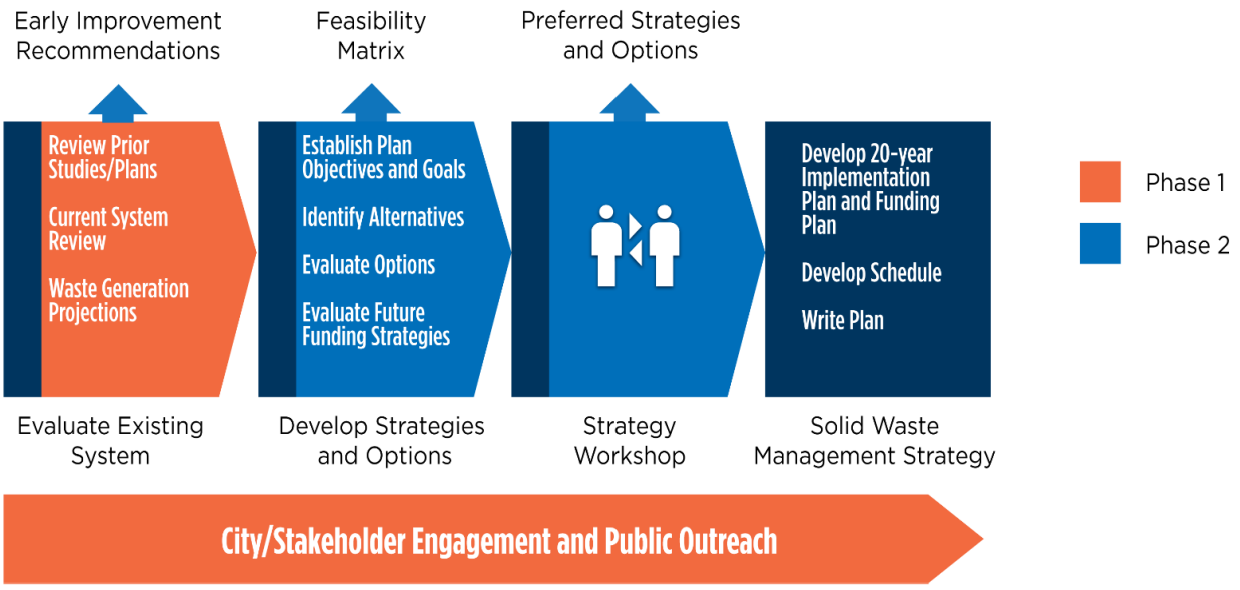
5. **Leverage existing partnerships and explore new partnership opportunities to effectively implement MSW management services.** The City maintains a number of partnerships to effectively provide MSW management services, including as a Member City of the North Texas Municipal Water District (NTMWD) system. Maintaining and developing effective partnerships with entities including NTMWD, local non-profits, schools, and businesses is important to implement and advance the City's MSW goals.

1.3 Project Approach

During the SWMS planning process, the Burns & McDonnell worked with the City to evaluate current systems and programs to identify potential strategies and options for key solid waste and resource recovery issues, as presented in subsequent sections of the SWMS. The SWMS was developed to evaluate current programs and identify key near- and long-term trends influencing recycling and solid waste management in the City. The SWMS process included external stakeholder engagement (including a community Think Tank process described in more detail in Section 1.3.1), City Council communications, detailed evaluation of strategies, and development of a detailed implementation plan.

Figure 1-1 presents the planning process the City and its consultant, Burns & McDonnell, utilized in developing the SWMS.

Figure 1-1: City of McKinney SWMS Development Process



The SWMS development process engaged select stakeholders within the City's departments and included meetings and workshops between the Public Works Department, Burns & McDonnell, and other relevant City Departments and programs.

1.3.1 Goals and SWOT Analysis

As part of the SWMS project approach, City Staff participated in a project kick-off workshop to identify goals (e.g., cost-effective, convenient services) and conduct a SWOT (strengths, weaknesses, opportunities, and threats) analysis. Findings from the kick-off workshop were used as background information to guide the SWMS development, including setting the guiding principles (see Section 1.2). The full results of the goalsetting and SWOT analysis are provided in Appendix A.

1.3.2 Stakeholder Engagement

The stakeholder engagement approach for the SWMS was comprised of two components, a survey of McKinney residents and other community members (e.g., business owners) and a resident Think Tank group. The stakeholder engagement process included 562 responses to the community survey, and a series of three Think Tank workshop meetings. Responses from the survey and visioning results from Think Tank group provided a data-driven approach used to understand the key emergent trends and vision for the City of McKinney, specifically:

- There was a strong Think Tank vision for the "Hopeful" scenario indicating a clear direction of change toward sustainability and the integration of policy and technology to achieve increased diversion.
- The Think Tank and survey responses show community support for near-term action for recycling and solid waste management.
- The community survey responses identified three top trends/needs: population growth and increased waste; diminished landfill capacity; and desire for additional recycling opportunities.
- Community feedback indicated residents are not aware of existing outreach, engagement, and public education resources.

The full results of the stakeholder engagement process are presented in the *Vision for McKinney Think-Tank Report* (Appendix B).

1.4 Key Terms

This section presents definitions of a selection of key terms utilized throughout the SWMS that are necessary for a comprehensive understanding of the current MSW management system and strategies that will be implemented in the future.

Sectors. This section defines the terminology utilized throughout this SWMS to discuss the five distinct generation sectors or MSW customer types (as well as other MSW management topics) that the City engages through its solid waste and recycling systems and programs.

- **Single-family residential.** The single-family residential sector is defined as single-family households and the materials generated by these households. In McKinney, the single-family residential sector is defined as residential properties having two or fewer housing units.
- **Multifamily residential.** The multifamily residential sector is defined as residential properties having greater than two individual housing units (e.g., apartment complexes, condominiums, etc.) and the material generated by these households. Multifamily MSW is collected, processed, and reported in combination with commercial material. Generally, MSW data specific to the multifamily sector was not available. Some estimates regarding multifamily generation were developed, as described in Section 3.3.2.
- **Commercial and institutional.** The commercial and institutional sector refers to commercial (offices, retail and wholesale establishments, restaurants, etc.) and institutional (schools, libraries, hospitals, local government, etc.) entities and the material generated by these entities. Distinction

between the commercial and institutional sector and the multifamily sector is made throughout this SWMS where applicable.

- **Construction and demolition (C&D) material.** C&D material is defined as materials that are generated by construction, demolition, or renovation projects and includes, but is not limited to, materials such as brick, roofing materials, wood, flooring, drywall, insulation, concrete, and asphalt. C&D material is not included in the category of MSW as defined below, and was included in this SWMS as a distinct sector because it is generated by multiple customer types, including single-family, multifamily, commercial, and the public sector (e.g., municipal, state, or federal).
- **Events and public spaces.** The events and public spaces sector is defined as materials that are generated through activities and special events taking place in various public locations throughout the City, such as parks, sports facilities, pedestrian areas, and various events held by the City each year.

Material types. This section defines the terminology utilized throughout this SWMS to discuss the varying material types that the City manages through its solid waste and recycling systems and programs.

- **Municipal solid waste (MSW).** MSW refers to the entirety of the material stream (refuse and recycling) that is generated by everyday activities in homes, commercial businesses, institutions, and public spaces. MSW can be further categorized by material types including refuse, recyclables, bulky items, organics, and household hazardous waste (HHW) and other special wastes, as defined below. MSW does not include commercial hazardous waste or industrial, agricultural, or mining wastes.
- **Refuse.** Refuse is the portion of MSW that cannot practically be recycled, reused, or otherwise diverted from disposal. True refuse has no viable handling methods other than disposal. However, in most communities, a portion of the material disposed as refuse has the potential to be recycled or otherwise diverted.
- **Recyclables.** Recyclables, or single-stream recyclables, refers to materials that are typically accepted through municipal curbside recycling programs or at drop-off locations, processed through materials recovery facilities (MRF), and sold as commodities to markets where the material is then repurposed. Recyclables typically include, but are not limited to, items such as plastic and glass containers, aluminum and steel cans, cardboard, and other various paper products. The full range of materials accepted through a municipal recycling program varies by community or hauler.

- **Bulky items.** Bulky items generated by households or commercial customers that are too large to be placed inside a customer's regular collection container. Bulky items include items such as furniture, mattresses, metal, cardboard, and limited quantities of carpet and fencing.
- **Organics.** Organics include plant or animal-based materials. Organics have the potential to be diverted from landfill disposal through composting or mulching processes. Within the category of organics there are many sub-categories of materials including:
    - **Yard trimmings.** Vegetative material generated from property maintenance or landscaping is categorized as yard trimmings and includes grass clippings, leaves, plants, small cuttings, brush, and tree limbs.
    - **Food scraps.** Food scraps are materials such as fruit, vegetables, meat and dairy products. Often, processing of food scraps also includes food-soiled biodegradable items such as napkins, paper plates, and compostable food containers.
    - **Biosolids.** Solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in treatment works (sewage sludge that has been treated or processed to meet Class A, Class AB, or Class B pathogen standards for beneficial use).
    - **Wood waste**. Non-C&D items such as pallets.
    - **Other.** Items such as natural textiles, material pumped from septic tanks (septage), water treatment plant residuals, fats, oils, and greases (FOG), dead animals, and manure.
- **Household hazardous waste (HHW) and other special wastes.** HHW programs include common household chemicals or other household materials that should not be disposed of in MSW landfills due to their potential for adverse environmental and human health impacts. They require special disposal by an entity that is permitted by the Texas Commission on Environmental Quality (TCEQ). HHW program materials include, but are not limited to, materials such as paints, fertilizers, pesticides and poisons, pool chemicals, household cleaners, and automotive products. HHW does not include chemicals or other materials generated by commercial or industrial entities.
- **Construction & demolition (C&D) debris.** C&D debris is defined as solid waste resulting from the construction, remodeling, repair, and demolition of structures, roads, sidewalks, and utilities. Material is generated from residential, commercial, and public sector (e.g., municipal, state, or federal) projects. It includes, but is not limited to, materials such as brick, roofing materials, wood, flooring, drywall, non-asbestos insulation, concrete, and asphalt. Most C&D debris is disposed in separate C&D permitted landfills. Smaller amounts may be recycled or reused.

Material management. This section provides definitions regarding the total amount of materials generated within the City and the material disposal or processing streams that comprise total generation quantities.

- **Generation.** Total material generated is the quantity of material that the City must manage through its various disposal and recycling programs and services. Generation is the total quantity of material disposed plus the total quantity of material recycled or otherwise diverted from disposal.
- **Diversion.** Within this SWMS, diversion refers to the proportion of generated material that is collected and diverted from landfill disposal. Diversion methods include single-stream recycling, organics diversion though composting or mulching, HHW recycling, reuse, and other diversion methods. Currently, single-stream recycling accounts for most of the City's diverted material. For McKinney, single-family residential diversion quantities of single-stream, HHW, and yard trimmings materials through City services (curbside and drop-off collection) are tracked and the City currently has a residential diversion rate of approximately 29 percent. Commercial and C&D diversion rates for the City are not available. Some cities also include reuse materials in landfill diversion rates; however, reuse materials are not currently included in the City's diversion rates discussed in this SWMS because reuse material quantities are small and difficult to quantify. There are various methods for measuring diversion (as discussed in Section 2.3).
- **Disposal.** Disposal refers to all remaining material placed in landfills that has not been recycled, composted, or otherwise diverted. Disposed materials include some quantities of materials that were not recovered prior to disposal but could potentially be recovered through improvement of recycling and other diversion programs, infrastructure, or education.

1.5 Guide to the SWMS Sections

Sections 2.0 and 3.0 provide perspective on solid waste trends, policies and regulatory review, as well as an evaluation of the City's current demographic and economic characteristics as well as anticipated future growth. Sections 4.0 through 14.0 of the SWMS each presents discussion of a specific sector or component of the City's MSW management system. Each sector and system component have unique characteristics requiring a customized approach to management for its customers and material types, while working toward an integrated management system across the City and for the future. These sections include a summary of the City's current services and state of materials management, current system findings, benchmarking and case studies (as applicable) and identified strategies for implementation.

The final section of Sections 4.0 through 14.0, titled Listing of Alternative Strategies and Options, presents recommended strategies and service options developed through the planning process. Description of each strategy is followed by a high-level implementation plan identifying the City's priority and timeline for implementation. The discussion below presents guidance for understanding key components of each Listing of Alternative Strategies and Options section. Section 15.0 presents the overall implementation plan, compiling the strategies presented in Sections 4.0 through 14.0.

- **Strategy.** A strategy is presented a high-level approach to the City's future materials management. The strategies were developed to align with the Guiding Principles. Each section has between two and four strategies. The City will develop and evaluate specific tactics, activities, and actions to implement each strategy.
- **Priority.** Each strategy has been assigned a high, medium, or low implementation priority to each strategy presented in the SWMS. The City will first implement critically important activities (high priority) and then implement activities assigned medium and low implementation priority as resources are available.
- **Timing.** Timing gives a general indication of when the City proposes to implement each strategy. Each strategy was given an implementation timing of near-, mid-, or long-term. For purposes of this SWMS, near-term is defined as the next 5 years, mid-term is 6-10 years, and long-term is 11-20 years. Timing designations were determined by considering multiple factors, including resources required, current market conditions, and the length of time required for implementation.
- **Programs.** Programs communicates the related and affected programs for each strategy, so that the City can identify and assign responsibility for strategy implementation.
- **Operational impact.** Describes the operational impacts of implementing the option and indicates any increased demand for staffing and equipment on a low, medium or high basis.
- **Financial impact.** Describes the financial impacts of implementing the option and if it would increase operational/capital costs to the City, franchise hauler, or customers on a low, medium or high basis.
- **Environmental impact.** Indicates if the option would increase emissions or result in other environmental consequences on a low, medium or high basis.
- **Policy impact.** Indicates the amount of effort related to regulatory requirements or adjustments to the City Code related to the option on a low, medium or high basis.
- **Public "buy-in".** Describes the anticipated public buy-in related to the option based on the outreach efforts conducted as part of the SWMS on a high, medium or low basis.

- **Sustainability of operations.** Describes if the option has a low, medium, or high compatibility with existing programs, where low compatibility would require significant changes and high compatibility would require few to none for sustained operations.

2.0 SOLID WASTE TRENDS, POLICIES AND REGULATORY REIVEW

This section provides a broad perspective of the historic and current state of the MSW management environment in which the City is developing this SWMS. It provides a review of relevant existing planning studies, a summary of relevant laws and regulations, and information on key trends in MSW management.

2.1 Review of Relevant Planning Studies

Understanding prior MSW and community planning projects completed at the local, regional, and state levels is a critical step in effectively and efficiently developing a SWMS for the City. To inform development of this strategy, Burns & McDonnell reviewed the following studies and plans.

1. **ONE McKinney 2040 Comprehensive Plan**. The City's Comprehensive Plan guides the growth and development of the City, and the priorities identified in the plan will influence where new homes, businesses, and amenities are built in McKinney. The plan establishes a vision of growth for the City and the area surrounding the incorporated city. The plan vision states that ONE McKinney is a united community that supports the diversity of its economy and people; celebrates its natural & cultural assets and invites private developments that create places of lasting value. Smart public & private investments ensure that McKinney remains a top choice for people to live, work, play & visit through 2040 & beyond.
2. **North Central Texas Council of Governments (NCTCOG) Regional Solid Waste Management Plan 2015 - 2040.** This plan was approved in 2015 and covers a 25-year planning period for the NCTCOG, the 16-county regional planning area in the North Central Texas region. The primary purposes of this plan are to inventory closed landfills, quantify regional landfill capacity in relation to projected future growth in waste generation, identify the region's most prominent needs and problems, and outline activities and priorities to be initiated throughout the planning period.[1] NCTCOG is currently in the process of updating this regional planning effort.
3. **TCEQ Study on the Economic Impacts of Recycling.** This 2017 study, completed by the Texas Commission on Environmental Quality (TCEQ) as outlined in House Bill 2763, documented the quantities of MSW recycled and landfilled in Texas. The report provides a state-

[1] North Central Texas Council of Governments (NCTCOG). 2015. "Planning for Sustainable Materials Management in North Central Texas 2015-2040." Available online: https://www.nctcog.org/envir/materials-management/materials-management-plan

level understanding of 2015 recycling and landfill disposal quantities and composition and provides key economic and market trend data.[2]

4. **TCEQ Recycling Market Development Plan.** The TCEQ recently published the *Recycling Market Development Plan* (RMDP) to promote the use of recyclable materials as feedstock in processing and manufacturing. Similar to the Study on the Economic Impacts of Recycling, the RMDP will provide state-level estimates of recycling and landfill disposal quantities statewide and estimates the resulting economic benefits of recycling. The RMDP will also provide a plan to increase recycling, developed based on the key barriers and opportunities identified across the State. Plan development began in February 2020, and a final report was published in September 2021.[3]

2.2 Regulatory and Policy Review

Prior regulations and policies related to material management, as well as trends and the current regulatory climate, have largely shaped the state of material management and defined the environment in which this SWMS was developed. This section provides a summary of federal, state, and local regulations, policies, and trends.

2.2.1 Role of the Federal Government in Regulating Solid Waste

The federal government sets basic requirements for regulations that protect public health and the environment, which helps to provide consistency among states. The United States Environmental Protection Agency (U.S. EPA) is responsible for hazardous and non-hazardous solid waste management through the Office for Solid Waste and Emergency Response. There are three major pieces federal legislation pertaining to solid waste management:[4]

1. Prior to 1965, solid waste management was entirely dependent on the judgement and decisions of individuals or local departments of health and sanitation. In 1965, Congress made its first attempt to define the scope of the nation's waste disposal problems by enacting the Federal Solid Waste Disposal Act (SWDA), which financed statewide surveys of landfills and illegal dumps.
2. The first significant federal legislation governing the disposal of non-hazardous and hazardous waste was passed in 1976 under the Resource Conservation and Recovery Act (RCRA). RCRA

[2] Texas Commission on Environmental Quality (TCEQ). July 2017. "Study on the Economic Impacts of Recycling." Available online: https://www.tceq.texas.gov/p2/recycle/study-on-the-economic-impacts-of-recycling.
[3] TCEQ. August 2021. "Recycling Market Development Plan." Available online: https://www.tceq.texas.gov/assets/public/assistance/P2Recycle/Recyclable-Materials/2021%20Recycling%20Market%20Development%20Plan.pdf
[4] Texas Center for Policy Studies. 1995. "Texas Environmental Almanac." Available online: http://www.texascenter.org/almanac/

established landfill construction, management, and closure guidelines. It also regulates hazardous waste management facilities that treat, store, or dispose of hazardous waste. RCRA has been amended three times since its inception:[5]

- 1984 Hazardous and Solid Waste Amendments, requiring the phasing out of land disposal of hazardous wastes and granting the U. S. EPA regulatory authority over landfills (Subtitle C Hazardous Waste and Subtitle D Non-hazardous waste)
- 1992 Federal Facility Compliance Act, strengthening enforcement of RCRA at federal facilities
- 1996 Land Disposal Program Flexibility Act, providing regulatory flexibility for land disposal of certain wastes

3. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, known as Superfund, was enacted by Congress to address abandoned hazardous waste sites in the United States. CERCLA was subsequently amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) to stress the importance of permanent remedies, provide for increased state involvement, and increase federal funding.[6] The Office of Air and Radiation regulates solid waste-related air emissions, enforcing the Clean Air Act of 1976 (CAA) and its subsequent amendments.[7]

In addition to federal legislation, there are national policies in place and under development to guide lawmakers to develop and implement future legislation. On November 17, 2020 the U.S. EPA established the National Recycling Goal of 50 percent by 2030 to provide the benchmarks needed to evaluate the success of the collective efforts to significantly improve the nation's recycling system. The metrics identified in the National Recycling Goal are based on the broad objectives of the draft National Recycling Strategy and are divided into four categories: assessing recycling performance, reducing contamination, increasing processing efficiency and strengthening recycled material markets. The National Recycling Goal aims to create standardized definitions for the recycling industry to keep pace with today's diverse and changing waste system. The following lists the measures that will be used to track the progress toward the National Recycling Goal.

[5] U.S. Environmental Protection Agency (U.S. EPA). 2017. "History of the Resource Conservation and Recovery Act (RCRA)." Available online: https://www.epa.gov/rcra/history-resource-conservation-and-recovery-act-rcra
[6] U.S. EPA. 2017. "Superfund: CERCLA Overview." Available online: https://www.epa.gov/superfund/superfund-cercla-overview
[7] U.S. EPA. 2020. "Summary of the Clean Air Act 42 U.S.C. §7401 et seq. (1970)." Available online: https://www.epa.gov/laws-regulations/summary-clean-air-act

1. Measure 1: Reduce contamination in recycling. This will be calculated by examining the percentage of contaminants in the recycling stream.
2. Measure 2: Make the national recycling processing system more efficient. This will be measured by tracking the percentage of materials successfully recycled through recycling facilities compared to the inbound material.
3. Measure 3: Strengthen the economic markets for recycled materials. This will be measured by tracking the average price per ton of recycled material on the secondary materials commodity market.

The related National Recycling Strategy identifies objectives and actions needed to create a more resilient and cost-effective recycling system nationwide. The draft National Recycling Strategy was open for public comment until December 4, 2020 and is expected to be finalized in late 2021. The National Recycling Strategy will be aligned with and support implementation of the National Recycling Goals.

To address food loss and waste nationwide, the U.S. EPA established a national goal on September 16, 2015 to reduce food loss and waste by 50 percent by 2030. The Food Loss and Waste Reduction Goal was a joint effort with the U.S. Department of Agriculture to address food insecurity and reduce landfill methane emissions. The goal aims to reduce the amount of food waste generated and subsequently managed (e.g., through landfilling, composting, anaerobic digestion, etc.), and was updated in September 2021 to align with the United Nations' Sustainable Development Goals. Achieving the target 50 percent reduction is equivalent to reaching a total generation rate of 164 pounds of food waste per person per year (including food waste recycled through composting or anaerobic digestion).

2.2.2 Role of the State Government in Regulating Solid Waste

Texas has a long-standing solid waste material management regulatory program, initiated with the Texas Solid Waste Disposal Act and passed by the state legislature in 1969. This Act required the Texas Health Department to adopt regulations pertaining to the design, construction, and operation of landfills and other processing facilities. Today, the TCEQ holds jurisdiction over solid waste material management. Several other major pieces of state legislation from the state Senate and House of Representatives have been enacted:

1. The 1983 Comprehensive Municipal Solid Waste Management, Resource Recovery, and Conservation Act, which established the Municipal Solid Waste Management and Resource Recovery Advisory Council, prescribed criteria and procedures for regional planning agencies and local governments that wanted to develop solid waste management plans.

2. The 1987 House Bill 2051 established a preferred hierarchy via state policy for the management of hazardous waste, municipal waste, and municipal sludge.
3. The 1989 Senate Bill 1519 established a solid waste disposal fee program to fund the state's MSW regulatory programs. It required the state's regional planning agencies (Councils of Governments, COG) to develop regional solid waste management plans and to provide grand funding to support development of local plans.
4. The 1991 Omnibus Recycling Act (Senate Bill 1340), set a statewide recycling goal of 40 percent of its MSW by January 1, 1994 and directed several state agencies to develop a joint market study and strategies to stimulate markets for recycled goods.
5. The 1993 Senate Bill 1051 expanded state recycling programs and amended the state's 40 percent recycling goal. The goal became a 40 percent waste reduction goal, aimed at reducing the total amount of material disposed of in the state through recycling as well as source reduction.
6. The 1993 House Bill 2537 addressed the risks associated with methane gas release from closed landfills by establishing a process for the TCEQ to review proposals and issue permits to build atop closed MSW landfills.[8]
7. The 2007 Texas Computer Equipment Recycling Law required manufacturers to establish and implement a recovery plan for collection, recycling, and reuse of computer products.[9]
8. The 2013 House Bill 7 reduced the disposal fees that landfills are required to pay to TCEQ from $1.25 per ton to $0.94 per ton and reduced the percentage allocated to Councils of Governments (COGs) to 33.3 percent.
9. The 2015 House Bill 2736 required the TCEQ to conduct a study to quantify the amount of materials being recycled in the state, assess the economic impacts of recycling, and identify ways to develop new markets to increase recycling. The TCEQ completed Study on the Economic Impacts of Recycling in 2017.
10. The 2019 House Bill 61 was the "Slow Down to Get Around" legislation that established a misdemeanor violation for vehicles that do not adhere to the Transportation Code's requirements of slowing and moving 2 lanes away from a solid waste collection vehicle.
11. The 2019 Senate Bill 649 required the TCEQ to produce a plan to stimulate the use of recyclable material as feedstock in manufacturing. The bill also requires the TCEQ to develop an education program outlining all the ways that recycling provides economic benefits to the state.

[8] Texas Center for Policy Studies. 1995. "Texas Environmental Almanac." Available online: http://www.texascenter.org/almanac/

[9] Texas Commission on Environmental Quality. "Guidance for the Texas Recycles Computers Program" Available online: https://www.tceq.texas.gov/p2/recycle/electronics/computer-recycling.html

12. The 2019 House Bill 1435 authorized the TCEQ to inspect the facility or site before a permit for a proposed MSW management facility is issued, amended, extended, or renewed.
13. The 2019 House Bill 1953 prohibited TCEQ from treating post-use polymers or recoverable feedstocks as solid waste if the substances are converted (by pyrolysis or gasification) into other valuable products.

The state procurement office requires that state agencies give preference to specific types of products known as "first choice purchasing options." These preferred products have a 10 percent price preferential (meaning they should be preferred even if they cost up to 10 percent more than products that do not contain recycled content) and must suit the needs of the purchasing agency. Preferred products include:

1. Re-refined oils and lubricants (to be 25 percent recycled content, if quality similar)
2. Certain paper products, including paper towels, toilet paper, toilet seat covers, printing, computer and copier paper, and business envelopes (a state agency is to procure the highest recycled content that meets their needs and is offered by the Comptroller)
3. Certain plastic products including trash bags, binders, and recycling containers
4. Steel products

Additionally, the state comptroller may give priority to Rubberized Asphalt Paving (RAP) material made from scrap tires by a facility in this state if the cost, as determined by life-cycle cost-benefit analysis, does not exceed the bid cost of alternative paving materials by more than 15 percent. (Texas Government Code §2155.443).

In addition to state legislation, the Governmental Entity Recycling Program became effective July 2, 2020 and requires local government entities in Texas to create and maintain a recycling program for their operations, as well as create a preference in purchasing for products made of recycled materials when the cost difference is less than 10 percent.

- As part of the Governmental Entity Recycling Program, entities must give preference to products made with recycled materials, so long as the products meet applicable specifications as to quantity and quality and the average price of the product is not more than 10 percent greater than the price of comparable non-recycled products. The TCEQ rules require municipalities to:

    a. Separate and collect all recyclable materials
    b. Provide procedures for collecting and storing recyclable material and making contractual or other arrangements with buyers of recyclable materials

c. Evaluate the amount of recyclable material recycled and modify the recycling program as necessary to ensure that all recyclable materials are effectively and practicably recycled
d. Establish educational and incentive programs to encourage maximum employee participation

To establish a Governmental Entity Recycling Program, municipalities should review purchasing procedures, prioritize purchasing products that are recyclable or contain recycled content, encourage the community buy recycled, and leverage the Texas Smart Buy Membership program (State of Texas Cooperative Purchasing program).

2.2.3 Recent State Legislative Trends

The Texas Legislature meets on a biennium, or every other year. When the Texas Legislature is in session, a variety of Senate and House bill proposals relating to solid waste material management are introduced. During the recent 2021 legislative sessions, the Texas Legislature passed the following bills that could have an impact on the solid waste industry:

1. House Bill 1322 requires agencies such as TCEQ to provide plain-language summaries of any proposed rules.
2. House Bull 1869 amends the definition debt in the Tax Code to include debt for "designated infrastructure" including landfills.
3. House Bill 1118 increases cybersecurity requirements for state and local entities, including compliance with cybersecurity training.
4. House Bill 2708 provides some municipalities access to certain hazardous waste remediation fees for reimbursement related to environmental cleanup at used battery recycling facilities.
5. House Bill 3516 requires TCEQ to adopt rules for the treatment and beneficial use of oil and gas waste, including permitting standards for commercial recycling.
6. House Bill 4110 increases recordkeeping requirements and documentation needed when a person attempts to sell a catalytic converter to a metal recycling facility.
7. Senate Bill 211 creates a 30-day deadline to file a petition on a TCEQ ruling, such as a permit issuance or other decision under the Solid Waste Disposal Act.
8. Senate Bill 1818 defines liability and reasonable care criteria for scrap metal recycling transactions with an end user/manufacturing facility.

Throughout the recent 2021 session and subsequent special sessions, additional topics of interest to state legislators based on proposed bills include[10]:

- Regulations related to restricting local government ability to enact prohibitions on the sale or use of a container or package
- Regulations that for any product listed as recycled, remanufactured, environmentally sensitive be certified as accurate
- Regulations relating to municipal solid waste management services that cap the fee of gross receipts of a collection service provider to two percent[11]
- Regulations relating to the authority of certain municipal employees to request the removal and storage of certain abandoned or illegal parked or operated vehicles
- Creation of an eight-member council that advises state agencies and local governments on environmental justice issues (15-member review board advises the council) and the creation of an Office of Environmental Justice within the TCEQ
- Development of the Texas Clean and Healthy program, a rebate system for recyclable materials with verified end markets and direct economic relief[12]
- Amendment of the water code to restrict direct discharge or waste or pollutants into a classified stream segments that has had low phosphorus level at or below 0.06 mg/L in 90% or more of water quality samples for 10 years
- Regulation to allow a county to regulate solid waste services and ability to establish a mandatory program to collect a fee for solid waste services through the county tax assessor-collector's office
- Stricter regulations for locations of new landfills or the horizontal expansion of existing landfills in environmentally sensitive areas, such as over sole source aquifers or within special flood hazard areas
- Regulation related to the discharge of preproduction plastic, including prompt and environmentally responsible containment and cleanup, additional stormwater permit requirements, monitoring and implementation of best management practices

[10] North Central Texas Council of Governments. 2021. "87th Session Legislative Matrix." Available online: https://nctcog.org/nctcg/media/Environment-and-Development/Documents/Materials%20Management/87th-Legislative-Matrix_Solid-Waste.pdf
[11] North Central Texas Council of Governments. 2021. "House Bill 753 One-Pager." Available online: https://www.nctcog.org/nctcg/media/Environment-and-Development/Committee%20Documents/RCC/FY2021/HB-753-One-Pager.pdf
[12] North Central Texas Council of Governments. 2021. "Texas Clean and Healthy Initiative." Available online: https://www.nctcog.org/nctcg/media/Environment-and-Development/Committee%20Documents/RCC/FY2021/Texas-Clean-and-Healthy-Initiative_Summary.pdf?ext=.pdf

2.2.4 Role of the City of McKinney in Regulating Solid Waste

Chapter 86 of the City of McKinney Ordinances relates to solid waste management and requires that owners and tenants of private residences, private commercial buildings and businesses, and the occupants of all private noncommercial buildings which accumulate refuse, deposit their garbage, rubbish, brush, and other refuse for removal by the agent designated by the City. All waste materials shall be disposed of in a place and by methods deemed appropriate by the City. The City's designated contractor is not the exclusive provider of special waste and recycling services; Chapter 86 also outlines the annual permit requirements for recyclables and special waste haulers. Section 13.0 provides additional detail on Chapter 86 as part of the evaluation of ordinance, regulation, and code compliance efforts.

2.3 Solid Waste Management Industry Trends

This section provides perspective on key MSW management trends that may influence the development of the SWMS and the industry moving forward.

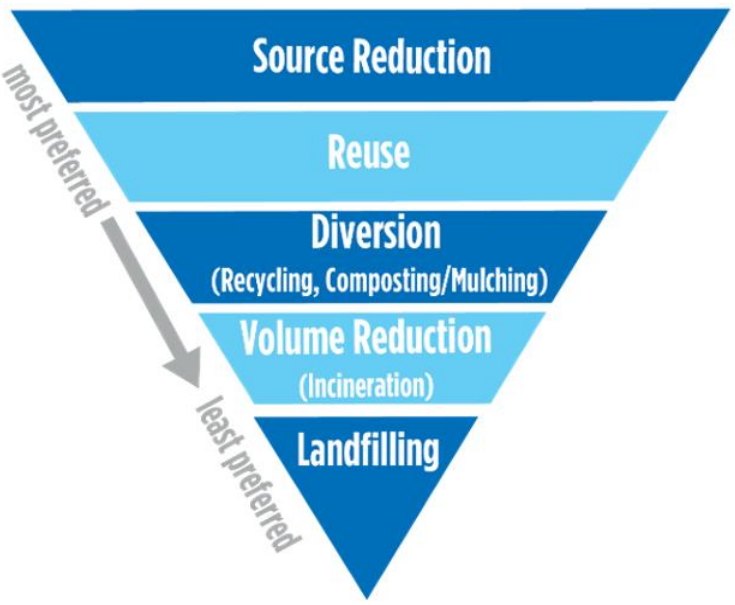
Sustainable materials management (SMM). SMM is a systematic approach to using and reusing materials more productively over their entire life cycles.[13] SMM encourages changes in how communities think about the use of natural resources and environmental protection, and goes beyond traditional thinking about waste reduction, reuse, recycling, and disposal. SMM emphasizes the consideration of a product's life from manufacturing to disposal and the need to make sustainable choices throughout that life cycle. An SMM approach seeks to:

- Use materials in the most productive way with an emphasis on using less,
- Reduce toxic chemicals and environmental impacts throughout a material's life cycle, and
- Provide sufficient resources to meet the material needs of today and the future.

It has been a trend in the MSW management industry for MSW management plans to apply the broad view of SMM to more effectively make an impact on their community's social, economic and environmental future. For example, as discussed in Table 2-1, several cities in Texas have adopted plans with high diversion goals, which typically include addressing SMM concepts.

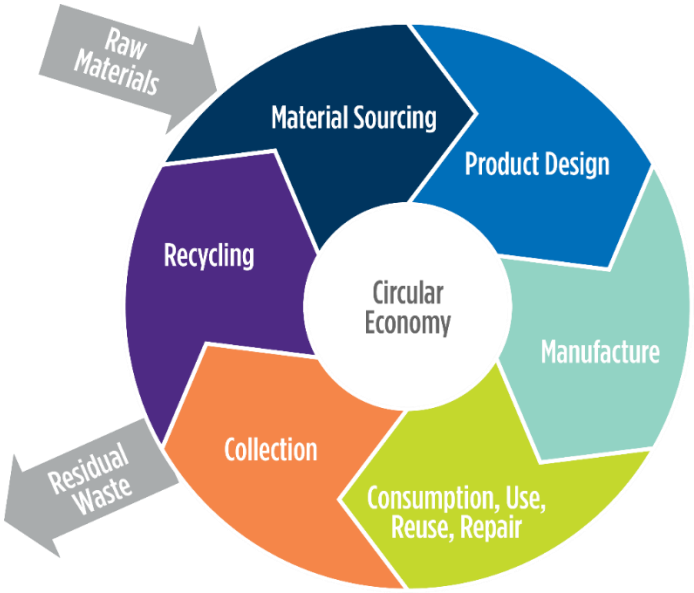
[13] U.S. Environmental Protection Agency (U.S. EPA). 2017. "Sustainable Materials Management Basics." Available online: https://www.epa.gov/smm/sustainable-materials-management-basics

Figure 2-1: U.S. EPA's Waste Management Hierarchy



Waste management hierarchy. The waste management hierarchy, developed by the U.S. EPA, has been adopted by many communities as a guide to managing MSW. This hierarchy is used as a tool in implementing an SMM approach to waste management. It was developed in recognition that no single waste management approach is suitable for managing all materials and all waste streams in all circumstances. The hierarchy ranks various management strategies from most to least environmentally preferred. It places emphasis on reducing, reusing, and recycling as key to SMM.[14]

Figure 2-2: Circular Economy



Circular economy. Like an SMM approach to planning for a community's future, the concept of a circular economy considers environmentally and economically sustainable decision-making throughout a material's life cycle. It offers a shift from the traditional linear manufacture-use-dispose concept of materials to a circular economy model that keeps resources in use for as long as possible, maximizes life and extracted value, and emphasizes that used materials are recovered and regenerated for other uses. This economic approach allows the cycle to begin again while minimizing material disposal.

[14] U.S. Environmental Protection Agency. 2017. "Sustainable Materials Management: Non-Hazardous Materials and Waste Management Hierarchy." Available online: https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy

Zero Waste. Zero waste is a philosophy that encourages the redesign of resource life cycles so that all products are reused. Zero waste is not a static, defined benchmark of eliminating landfill disposal of waste, but is rather a vision or philosophy around which communities and society should develop and adapt their materials management systems and culture. A number of industry organizations, states, and cities have begun setting zero waste goals. While diversion rate is a common metric used to evaluate zero waste progress, 100 percent diversion is not the ultimate goal of zero waste principles. Rather, the focus is on continuous improvement and progressively working toward maximizing use of resources, and minimizing adverse environmental impacts and material disposal.

A comparison of the accepted municipal and industry definitions of zero waste shows that there are a number of prominent or key concepts across zero waste philosophies:

- Zero Waste as a guiding vision, philosophy, or set of principles (rather than a numeric goal); Zero Waste as striving for continuous improvement, not an absolute term or goal
- System and material life cycle approach
- Minimize waste generation and promote waste prevention
- Circular economy
- Supporting economic value, stimulation, and job creation
- Minimization of environmental and health impacts (e.g., greenhouse gas emissions, landfill burial, water pollution)
- View used materials as resources, not waste and maximize recovery of materials
- Extended producer responsibility (EPR)
- Adherence to the materials management hierarchy

Zero waste or high diversion goals by other Texas cities. Over the last 10 years, several cities in Texas have developed MSW management plans that include goals to recycle or divert a high percentage of material from being landfilled. Some of these cities have specifically developed "zero waste" plans, while others have preferred to use terminology such as "high diversion." Zero waste is a philosophy that encourages the redesign of resource life cycles so that all products are reused. The goal for zero waste is that no MSW be sent to landfills or waste-to-energy facilities. Zero waste is more a goal or ideal rather than a hard target, as multiple cities with zero waste plans set maximum goals that still include some MSW going to landfills (e.g., 80% landfill diversion).

It has become common for cities to set short-, mid-, and long-term goals for recycling and diversion and to develop progressive programs and strategy implementation plans to meet those benchmarks. Texas

cities that have established high diversion or zero waste goals include but are not limited to those presented in Table 2-1. Recently published diversion rates for these cities range from 20-42 percent. The City's recent single-family diversion rate was approximately 30 percent in 2018 and 2019.

Table 2-1: Texas Cities with High Diversion or Recycling Goals

City	Goal	Recently Published Diversion Rate	
		Percent	Year
Dallas[1]	40% recycling rate by 2020 60% recycling rate by 2040 Zero Waste by 2060	20%	2020
Austin[2]	20% reduction in per capita solid waste disposal by 2012 75% diversion by 2020 90% diversion by 2040	42%	2015
Fort Worth[3]	30% residential recycling rate by 2021 40% total City recycling rate by 2023 50% total City recycling rate by 2030 60% landfill diversion by 2037 80% landfill diversion by 2045	30%	2018
San Antonio[4]	60% single family residential recycling rate by 2025	36%	2019

1. City of Dallas, 2011-2060 Local Solid Waste Management Plan. City is currently in the process of updating the LSWMP.
2. City of Austin, Zero Waste Strategic Plan. The city of Austin is currently in the process of updating their plan. While these figures may not change, the metrics to evaluate progress toward them may be adjusted as part of the plan update.
3. City of Fort Worth, 2017-2037 Comprehensive Solid Waste Management Plan.
4. City of San Antonio, Recycling and Resource Recovery Plan, 2013 Update.

While diversion rate is commonly used in zero waste goals, there is growing recognition that diversion rate may not be an ideal measure of SMM or zero waste progress. For example, San Francisco is a zero waste leader and has recently discontinued use of diversion rates as a means of measuring diversion and progress towards zero waste. Instead, San Francisco tracks total waste generated and the proportion landfilled and incinerated with the goal of 15 percent reduction in generation and 50 percent reduction in disposal by 2030.

As described above, incorporating additional metrics such as capture rate and disposal rate allows for additional program evaluation aligning with SMM and zero waste principles. Table 2-2 presents the calculation method for three metrics associated with zero waste principles.

Table 2-2: Alignment of Metrics to Zero Waste Principles

Zero Waste Principle	Metric for Evaluation	Calculation Method[1]	Indicators of Progress
Reducing the generation of wasted materials at the source	Per-capita waste generation rate	$\frac{(Total\ Diverted + Total\ Disposed)}{Population\ Served}$	Decreasing trend in per-capita generation
Maximizing diversion methods	Capture rate	For each recyclable material (e.g., aluminum cans): $\frac{Amount\ Recovered}{(Amount\ Recovered + Amount\ Disposed\ )}$	Capture rate approaching 90 – 100 percent[2] suggesting recycling is **maximized**
Avoiding landfill and incinerators	Per-capita waste disposal rate	$\frac{Total\ Disposed}{Population\ Served}$	Decreasing per-capita disposal rate

1. For population-based calculations, the population served should be equivalent to the population represented by the tonnage of material in the numerator (e.g., tons disposed, tons diverted).
2. In current practice, capture rates of 100 percent are likely unattainable due to contamination and inefficiencies during product use and within the recovery system (e.g., incorrect sorting by residents, limits to equipment, food-soiled materials).

Recycling Measurement. Traditionally, a recycling rate has been calculated as a means to measure recycling efforts. A recycling rate indicates the percentage of MSW generated that is recycled. In support of the use of transparent and consistent methods to measure materials recycled, SWANA's technical policy for Measuring Recycling (T-6.4), published in 2018, defines recycling rate as the proportion of generated MSW that is recycled and is typically calculated utilizing the following formula, where totals are measured by weight in tons[15].

$$\frac{total\ recycled}{total\ recycled + total\ disposed} \times 100\% = recycling\ rate\ percentage$$

Over the past decade, the weights and composition of materials in MSW streams have changed. For example, there is now typically less newspaper but more cardboard, and individual plastic bottles and aluminum cans weigh less. Some consumer packaging contains multiple materials, making recycling

[15] Solid Waste Association of North America Technical Policy T-6.4, Measuring Recycling, available at https://swana.org/TechnicalandManagementPolicies.aspx

more challenging. Due to these factors, some communities are considering alternative methods to recycling measurement, other than recycling rates as described above:

- **Single-stream recycling collected.** The amount of residential recyclables collected annually on a pounds per household basis.
- **Capture rate.** Percentage of recyclable material that is recycled versus disposed
- **Disposal rate.** Based on per capita/employee disposal quantities
- **Contamination rate.** The amount of contamination (i.e., material that is not accepted by the City's contract recycling processing facility) present in the residential recycling program on a percentage basis. Contamination rate includes both non-recyclable contaminants and MRF process residue.
- **Participation rate.** Based on how frequently a resident or business recycles over a defined time period (e.g., monthly)
- **Life cycle analysis.** Analysis of the total environmental impacts associated with a product or process and evaluation of opportunities to reduce impacts throughout its life cycle, using methods such as replacing virgin material inputs with recycled material
- **Carbon footprint.** Quantification of greenhouse gas reductions through increased use of recycled materials as product inputs (life cycle analysis) and reduction of material landfilled, which reduces the generation of greenhouse gases due to decomposition

Waste-to-energy and emerging technologies. While recycling and disposal have been considered traditional MSW management methods in Texas, some components of the MSW stream can be converted into energy or further processed. Over the past several years, many local governments in the United States have considered various technologies (e.g., mass burn combustion, mixed waste processing, gasification, etc.) to manage their disposed MSW stream. Anaerobic digestion (AD) of organic wastes is a growing trend for managing diverted pre- and post-consumer organics. Options for anaerobic digestion include stand-alone facilities designed to manage MSW and co-digestion of organic MSW streams at wastewater treatment plants or agricultural AD units. An estimated 209 AD facilities manage organic MSW in the U.S., including 68 stand-alone and 141 co-digesters.[16]

From a SMM perspective, waste-to-energy incineration is considered distinct from diversion in the waste management hierarchy (Figure 2-2), and is less preferred than activities such as recycling, composting,

[16] US EPA. Jan 2021. Anaerobic Digestion Facilities Processing Food Waste in the United States (2017 & 2018). Available online at: https://www.epa.gov/sites/default/files/2021-02/documents/2021_final_ad_report_feb_2_with_links.pdf

and mulching. However, some states have defined waste-to-energy to be a form of recycling. Based on the U.S. EPA's Food Recovery Hierarchy, AD of food scraps is considered to be more preferred than diversion through composting. It is unclear where emerging chemical conversion technologies such as gasification and pyrolysis belong on the established hierarchy, though multiple states, including Texas, have passed legislation to define the pyrolysis of plastic wastes to be a form of recycling.[17]

The cities included in Table 2-3 have considered and evaluated various technologies for their communities, but none have implemented any waste-to-energy or other conversion technology. Key reasons for deciding against implementation of these technologies included preferring to focus on more traditional recycling (e.g. single-stream) and organics diversion programs and the relatively low cost of landfill disposal.

Table 2-3: Summary of Texas Cities' Efforts to Evaluate Conversion Technologies

City	Year	Summary
San Antonio	2011	Evaluated the feasibility of waste-to-energy and concluded that those technologies are not economically feasible "at this time or in the foreseeable future." City decided to focus zero waste implementation efforts on traditional recycling strategies.
Waco	2013	Issued request for proposals for waste-to-energy and received five responses. City declined to further pursue proposals as none of the companies were in commercial operation in the U.S. at the time.
Killeen	2013	While the City entered into negotiations for a gasification facility, the private company did not secure financing and the project was terminated.
Dallas	2014	Following adoption of its zero waste plan, City evaluated the feasibility of technologies such as single-stream processing, mixed-waste processing, anaerobic digestion and gasification. Elected to focus on the more proven single-stream recycling.
Fort Worth	2016	City's request for proposals for recycling processing included consideration of alternative technologies. However, City decided to continue contracting for recycling via single-stream processing.
Houston	2017	Evaluated "One Bin for All" approach, where all MSW would be collected together (i.e. mixed waste), but City declined to enter into contract for "One Bin for All" concept.

[17] The Texas Solid Waste Disposal Act was updated in 2019 to consider gasification or pyrolysis of recovered plastics as recycling. HB 1953 (2019) expanded the definition of recycling in Section 361.421 of the Solid Waste Disposal Act to include post-use polymers and recoverable feedstocks (e.g., plastics) that are converted through gasification or pyrolysis into valuable raw, intermediate, or final products such as new plastics, chemicals, wax, lubricant, fuels, and other products.

The implementation of conversion technologies that process unprocessed MSW waste stream has encountered technical and financial challenges developing and implementing commercially proven systems.

Landfill trends. As regulations become more restrictive and it becomes increasingly more challenging to obtain permits for new landfills, the MSW industry is seeing an increase in the vertical and horizontal expansion of established landfills. Owners are seeking to extend the useful life of their landfill by expanding the landfill footprint, improving operations, or implementing additional technologies such as enhanced leachate recirculation (a process in which liquids or air are added into a landfill to accelerate degradation of the waste and prolonging its useful life).

Landfill tipping fees. The Environmental Research and Education Foundation (EREF) has conducted annual studies comparing landfill tipping fees across the country since 2016. In 2019, average per-ton landfill tipping fees in Texas are lower than both the national average and the South Central Region (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas) average. In 2020, the average landfill tipping fees in Texas remained below the national average but rose slightly higher than the regional average. The average tipping fees in Texas increased while both the regional and national averages decreased slightly in the year from 2019-2020.[18] This increase could be attributed to differences in economic growth across regions and landfill capacity, as well as that EREF received responses from a slightly different set of landfills from one year to the next. The multi-year trends developed by EREF show increasing tip fees nationally and in all regions over the period from 2016-2020.

The tipping fees shown in Table 2-4 reflect the average of posted tipping fees at surveyed landfills. Negotiated tipping fees between a landfill and individual haulers may be lower.

Table 2-4: Average Per-ton Landfill Tipping Fees

	2019	2020	Difference	Percent Increase
Texas	$40.18	$42.22	+$2.04	+5.1%
South Central Region	$40.92	$39.66	($1.26)	-3.1%
United States	$55.36	$53.72	($1.64)	-2.9%

Source: Environmental Research & Education Foundation (EREF)

On a local level, there are shifting dynamics in the wasteshed that may cause increased price pressure in the North Central Texas region. As discussed in Section 4.1.1.3, tonnage flows among regional disposal

[18] Environmental Research & Education Foundation (EREF). March 2020 and January 2021. "Analysis of MSW Landfill Tipping Fees." Available online from EREF: https://erefdn.org/bibliography/datapolicy-projects/

facilities are changing, where displaced tonnage from closing landfills are going to be disposed at other facilities that are not currently utilized as frequently by cash customers and third-party haulers. This may cause an upward price pressure of disposal facilities in the region that are seeking to protect future airspace.

Recycling processing fees. The per-ton fees that a municipality pays for the processing of recyclable and organic materials collected from its customers are impacted by various factors including, but not limited to, the market value of recovered materials and the level of contamination present. Over the past 10 years, the changing market value of recovered materials has had a significant impact on single-stream material (commingled collection of paper, plastics, metal, and glass) processing costs.

MRFs typically charge per ton for processing a municipality's recyclable materials and offer a share of the revenue generated through sale of the material back to the municipality. In 2008, at the beginning of the recession, the market value of recyclable materials fell from record highs to record lows. Some MRFs experienced negative cash flows because they were no longer able to cover the entirety of their processing costs through processing fees (average of $30-$40 per ton prior to 2008) charged to municipalities and material revenues. Due to the dramatically reduced market values of recovered materials, many MRFs changed their cost recovery structure by charging higher processing fees that would fully recover all processing costs rather than relying on material revenues. As a result, MRFs were then typically willing to offer municipalities a greater share of material revenues. Table 2-5 compares the average single-stream materials processing fees and recyclable materials revenue shares in Texas before and after the 2008 recession.

Table 2-5: Average Single-Stream Recyclables Processing Fees and Municipal Revenue Shares

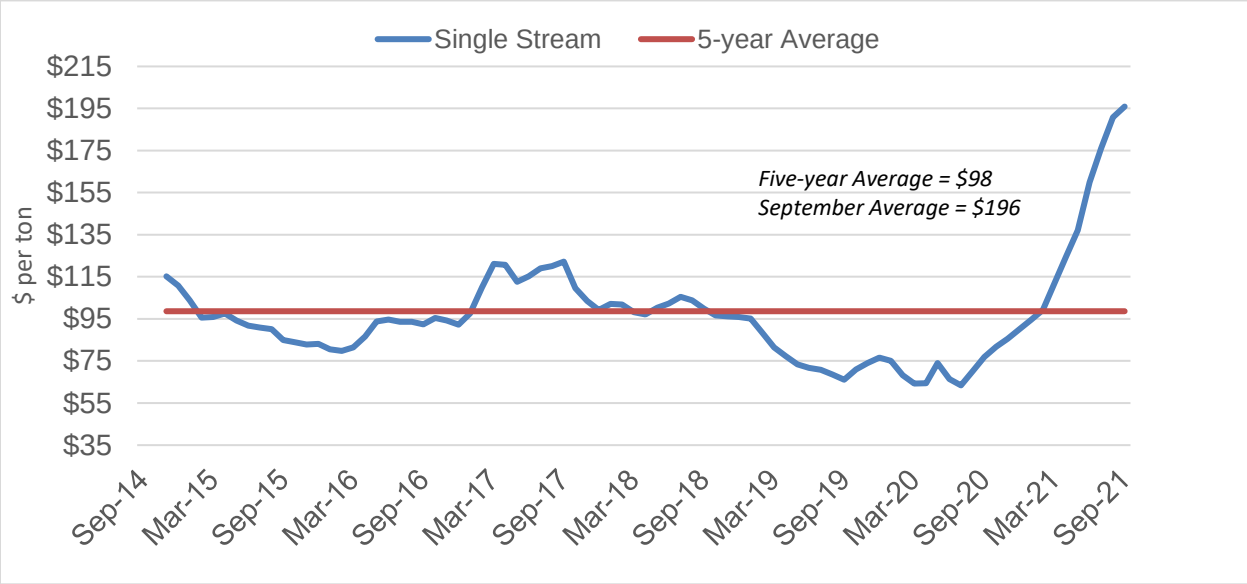
Fee/Revenue	Prior to 2008	After 2008
Processing fee per ton	$30 - 40	$60 - 100
Recyclables revenue share to municipality	40 - 70%	50 - 90%

The average value of single-stream materials varies based on the composition of the materials (i.e., quantity of paper, plastics, metal, and glass) and the quality of the materials. The average blended market value of processed recyclable materials collected single-stream (paper, plastics, metal, and glass) from municipal collection programs in Texas over the five-year period from 2016 to 2021 was $98 per ton. Figure 2-3 illustrates the changes in the average value of single-stream materials in Texas over this period.[19] Figure 2-3 also communicates a substantial increase in material values during 2021. While it is

[19] Source: RecyclingMarkets.net

important to emphasize that recyclables are commodities and their values are subject to change, there are some key trends impacting commodity pricing. First, one of the key reasons for the decrease in material value in preceding years was due to China restricting the import of recyclable materials. In response to this issue, the United States is in the process of enhancing its recycling end markets for materials like paper and plastic. Second, there is a trend for manufacturing and packaging companies to increase their use of recycled content material in their products, which increases the demand for recycled materials. While it is likely that there will be fluctuations in future commodity pricing, these additional factors may provide enhanced stability in the future.

Figure 2-3: Single-Stream Material Revenue (Dollars per Ton)



Contracting for services versus municipalization. In Texas, many cities provide MSW services either with City resources or through a single private hauler contracted to provide those services. A small number of cities have an open market system in which several private haulers are permitted to operate within the city; however, open market systems are much more common for commercial, rather than residential, services. Generally, cities of smaller size in Texas may choose to contract for MSW services, likely due to limited resources available for operation of a municipal system. Among some smaller cities and many cities with higher populations, there is a split between those that have municipally and privately provided services. The City has chosen to contract with one company as its exclusive provider for both residential and commercial refuse collection services within City limits. This approach is consistent with cities of comparable size in Texas.

Importance of transfer stations. Transfer stations are facilities that are used to consolidate MSW from multiple collection vehicles into larger, high-volume transfer vehicles for economical shipment to distant

disposal or processing facilities. Transfer stations can be used for material destined for landfilling, recycling, or composting. With a nationwide trend toward larger disposal and processing facilities, there has been an enhanced need for transfer stations. When transport distances are longer, transfer stations allow collection vehicles to be more productive by maximizing the amount of time spent collecting material rather than driving to a distant facility. Key factors that affect the financial feasibility of transfer stations include:

- Collection cost
- Disposal cost
- Distance/travel time to landfill
- Fuel costs
- Annual tonnage hauled
- Payload of transfer trailers versus collection vehicles

Section 4.0 provides further perspective on specific aspects of current and future North Texas Municipal Water District (NTMUD) transfer stations used to manage MSW generated by residential and commercial entities in the City and other NTMUD Member Cities. The close proximity of McKinney to the 121 Regional Disposal Facility precludes the near-term need for an additional transfer station to manage landfilled refuse.

3.0 PLANNING AREA CHARACTERISTICS

To effectively plan for the City's future materials management needs, an understanding of the factors that will impact those needs is important. This section describes the City's current demographic and economic characteristics as well as anticipated future growth. To the extent that data is available, the material generation in the City is presented, including material disposed and recycled or diverted. As the population of the City and region continue to grow, the volume of materials generated will increase accordingly. Anticipated growth of residential population, businesses and continued development in the City is one of the primary factors the City and North Central Texas region must consider in planning for future materials management. Following the description of the demographic and economic characteristics of the City, this section summarizes waste characterization information for statewide estimates and samples from the North Central Texas region.

3.1 Demographic Characteristics

The population and economic growth the City experiences in the coming years will be the primary factor impacting the quantities of material generated in the City. Anticipated material generation quantities will influence future materials management approaches addressed throughout this SWMS, including infrastructure development, public-private partnership opportunities, and appropriate timing of continued system and program development. This section presents a selection of existing population data and projections and economic development information to provide an understanding of the planning area considerations under which this SWMS has been developed.

3.1.1 Historical and Current Populations

The City of McKinney is the 20th most populous city in Texas, and is the county seat of the sixth most populous county in the state. Historically, McKinney has seen high levels of growth in recent decades (Figure 3-1). Over the past two decades, the City's population has grown substantially, from a population of approximately 54,700 in 2000 to 195,300 in 2020 – more than a 3.5-fold increase.[20] Table 3-1 presents population growth of the City, Collin County, and the State of Texas from 2010 to 2020 and compares the average annual growth rate of each entity during that period. Both the City and Collin County are growing at a faster rate than the State of Texas overall for the last decade. As shown in Figure 3-2, the City's annual population growth rate has been near or above 4.0% every year since 2014, and the growth rate for

[20] Source: City of McKinney Demographics, Census & Reports: Historical Population Estimates; available online at https://www.mckinneytexas.org/294/Demographics-Census-Reports

Collin County has been sustained between 3.0-3.6% during the same period. In contrast, population growth statewide is less than 2.0% annually has been generally slowing since 2015.

Figure 3-1: Historical City Population Growth, 1970 – 2020

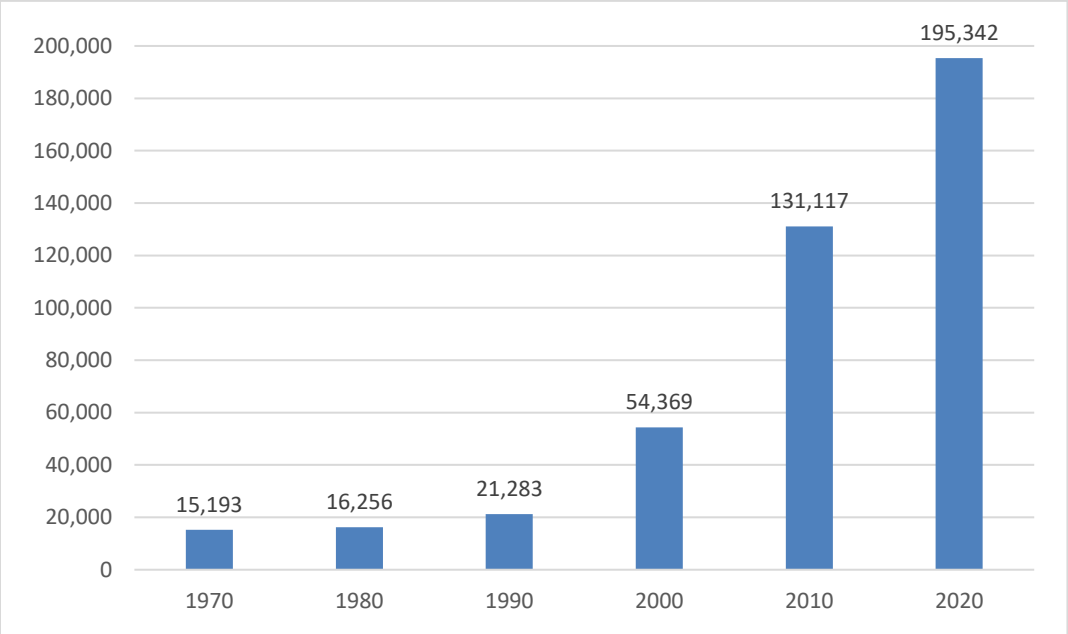
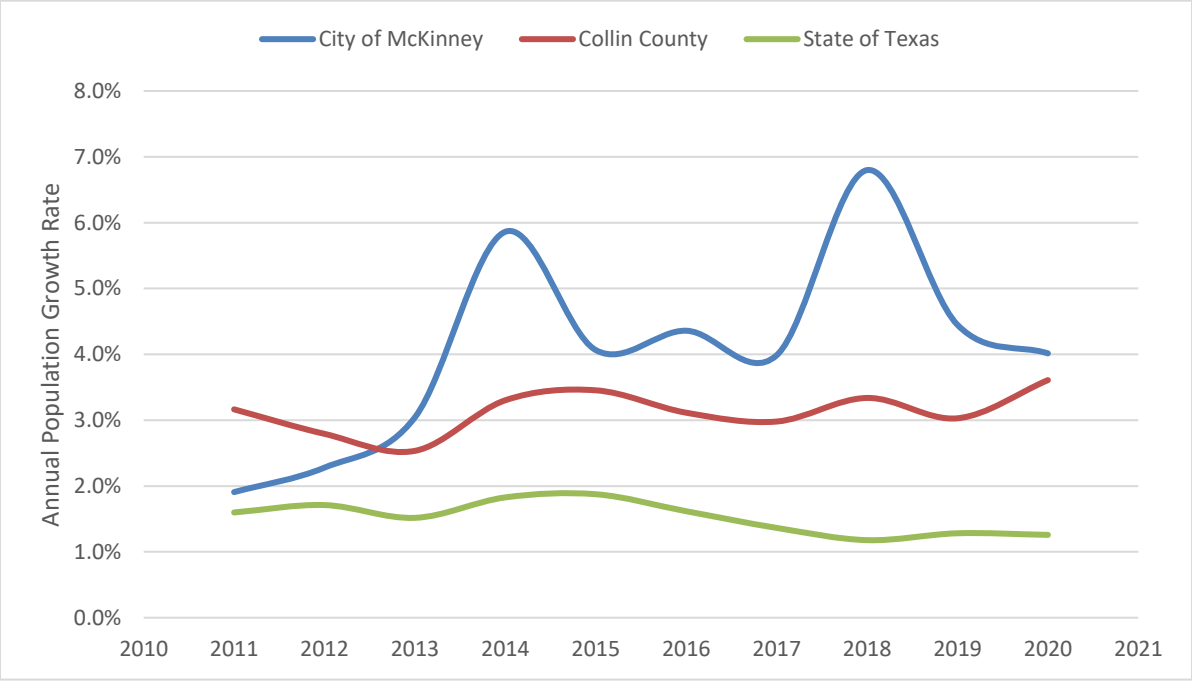


Table 3-1: City, County, and State Historical Population & Growth, 2010-2020

	2010	2015	2020 [4]	Annual Growth Rate
City of McKinney[1]				
Population	131,117	155,142	195,342	**4.07%**
Collin County[2]				
Population	787,614	915,243	1,072,069	**3.13%**
State of Texas[3]				
Population	25,241,971	27,470,056	29,360,759	**1.52%**

1. City of McKinney Demographics, Census & Reports: Historical Population Estimates; available online at https://www.mckinneytexas.org/294/Demographics-Census-Reports
2. Collin County population estimates 2010-2019: U.S. Census Bureau. Annual Estimates of the Resident Population for Counties in Texas: April 1, 2010 to July 1, 2019 (CO-EST2019-ANNRES-48), U.S. Census Bureau, Population Division, Release date March 2020; available online at https://www.census.gov/data/datasets/time-series/demo/popest/2010s-counties-total.html
3. State of Texas population estimates 2010-2019: U.S. Census Bureau. Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2019 (NST-EST2019-01), U.S. Census Bureau, Population Division, Release date December 2019; available online at https://www.census.gov/data/tables/time-series/demo/popest/2010s-state-total.html
4. All 2020 population estimates: U.S. Census Bureau, Evaluation Estimates: Vintage 2020 Population Estimates for the United States and States, available online at https://www.census.gov/programs-surveys/popest/technical-documentation/research/evaluation-estimates.html

Figure 3-2: Historical City, County and State Population Growth Rates, 2010-2020[1]



1. Annual growth rates based on data sources identified in Table 3-1.

Historical population growth trends over the past decade illustrate the elevated growth rate of the City and county populations. Considering the growth trends of not only the City but other surrounding entities that are part of the North Texas Municipal Water District (NTMWD), this trend highlights the essential nature of future landfill capacity planning. The area and entities served by the NTMWD landfill and landfill capacity planning are discussed further in Section 4.0.

3.1.2 Single-Family and Multifamily Household Distribution

Many municipal planning efforts, including materials management, categorize residential populations into two general categories – single-family and multifamily. The City's total residential population is distributed between these two categories. In McKinney, residential refuse and recycling collection services are provided to residents residing in a single-family home or duplex structure. All other housing units are categorized as multifamily (e.g., structures with three or more housing units, apartment complexes, dormitories) and receive services through the commercial collection system. These definitions of single-family and multifamily are used throughout the SWMS.

The distinction between household categories is important because generation, disposal, and diversion patterns differ between single-family and multifamily and each category requires different planning considerations and management strategies. Multifamily-generated material is generally collected and managed in combination with commercially-generated material, and services and information are often

provided directly to multifamily property owners and managers, rather than directly to multifamily residents. While the City's contractor collects refuse from single- and multifamily generators, multifamily residents typically interact with property owners and managers rather than directly with collection service provider(s).

In 2021, nearly 75 percent of the City's total residential population lived in single-family housing units and the remaining quarter of the population lived in multifamily housing units. Table 3-2 presents the 2021 estimated single-family and multifamily populations and household distributions for the City. It should be noted that the average persons per household is typically higher for single-family households than for multifamily households. Therefore, the total population is not proportionately spilt between the two household types.

Table 3-2: Estimated Household and Population Distributions by Household Type, 2021 [1,2]

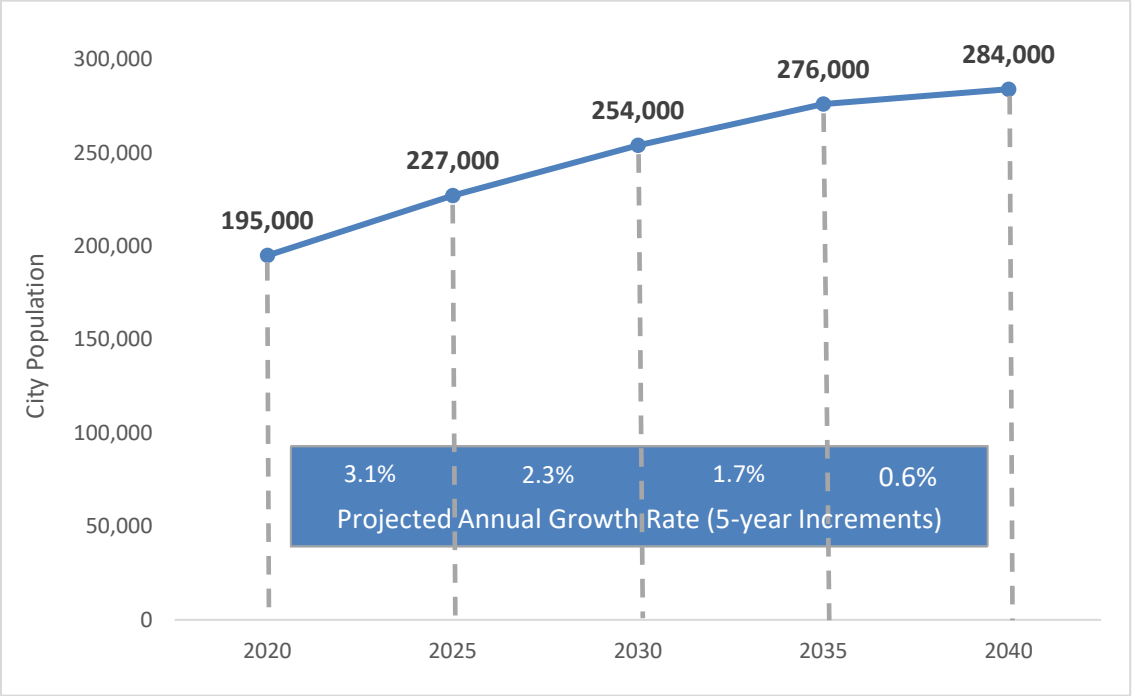
	Single-Family	Multifamily	Total
Occupied Households[1]			
Number	51,461	17,336	68,797
Distribution	74.8%	25.2%	
Population[2]			
Number	158,778	39,729	198,507
Distribution	80.0%	20.0%	

1. Source: City of McKinney Memorandum dated January 8, 2021, City of McKinney Population Estimate (as of January 1, 2021). Single-family occupied household and population estimates include a small number of mobile homes and multifamily estimates include a small number of residents residing in group quarters. The memorandum is available online at https://www.mckinneytexas.org/294/Demographics-Census-Reports.
2. Data is as of January 1, 2021.

3.1.3 Population Projections

The City expects significant continued population growth through the planning horizon, to a total population of approximately 284,000 in 2040, a net increase of 89,000 residents over the next 20 years. However, as shown in Figure 3-3, the rate of population increase is projected to slow as the City nears ultimate build-out. The average annual population growth rate of the prior 10 years (2010 to 2020) was 4.07%, as shown in Table 3-1. The City anticipates that the average annual growth rate will decrease to 3.1% for the five-year period from 2020 to 2025, and further decrease from 2025 to 2040.

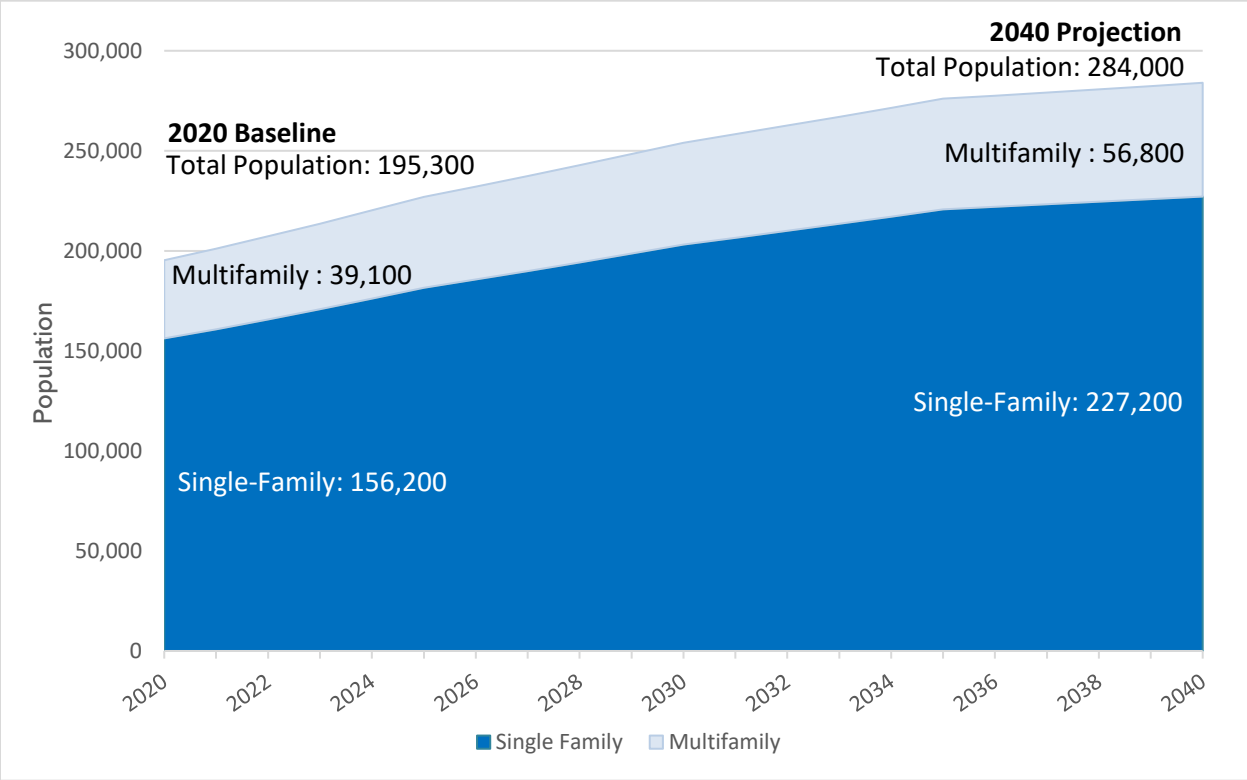
Figure 3-3: City Projected Population Growth, 2020-2040[1]



1. Source: City of McKinney 2020 Annual Development Report, available online at https://www.mckinneytexas.org/1046/Development-Reports

Figure 3-4 shows the projected single-family and multifamily population growth for the City through 2040. The population distribution between single- and multifamily households was held constant through the projection, based on current data, as presented in Figure 3-3.

Figure 3-4: City of McKinney Population Projection, 2020-2040 [1]



1. 2021 single-family and multifamily distribution data (as shown in Table 3-2) provided by the City was applied to the City's 2040 total population projection to develop estimates for single-family and multifamily population distribution from 2020 to 2040. Sources include City of McKinney Memorandum dated January 8, 2021, City of McKinney Population Estimate (as of January 1, 2021), available online at https://www.mckinneytexas.org/294/Demographics-Census-Reports and City of McKinney 2020 Annual Development Report, available online at https://www.mckinneytexas.org/1046/Development-Reports.

3.2 Economic Characteristics

The City of McKinney is part of the larger Dallas-Fort Worth (DFW) metroplex, the largest metropolitan area in Texas and the fourth largest is the country.[21] A primary driver of the population growth the City has experienced (refer to Section 3.1) is the economic development that has taken place.

3.2.1 Current Employment and Industry Characteristics

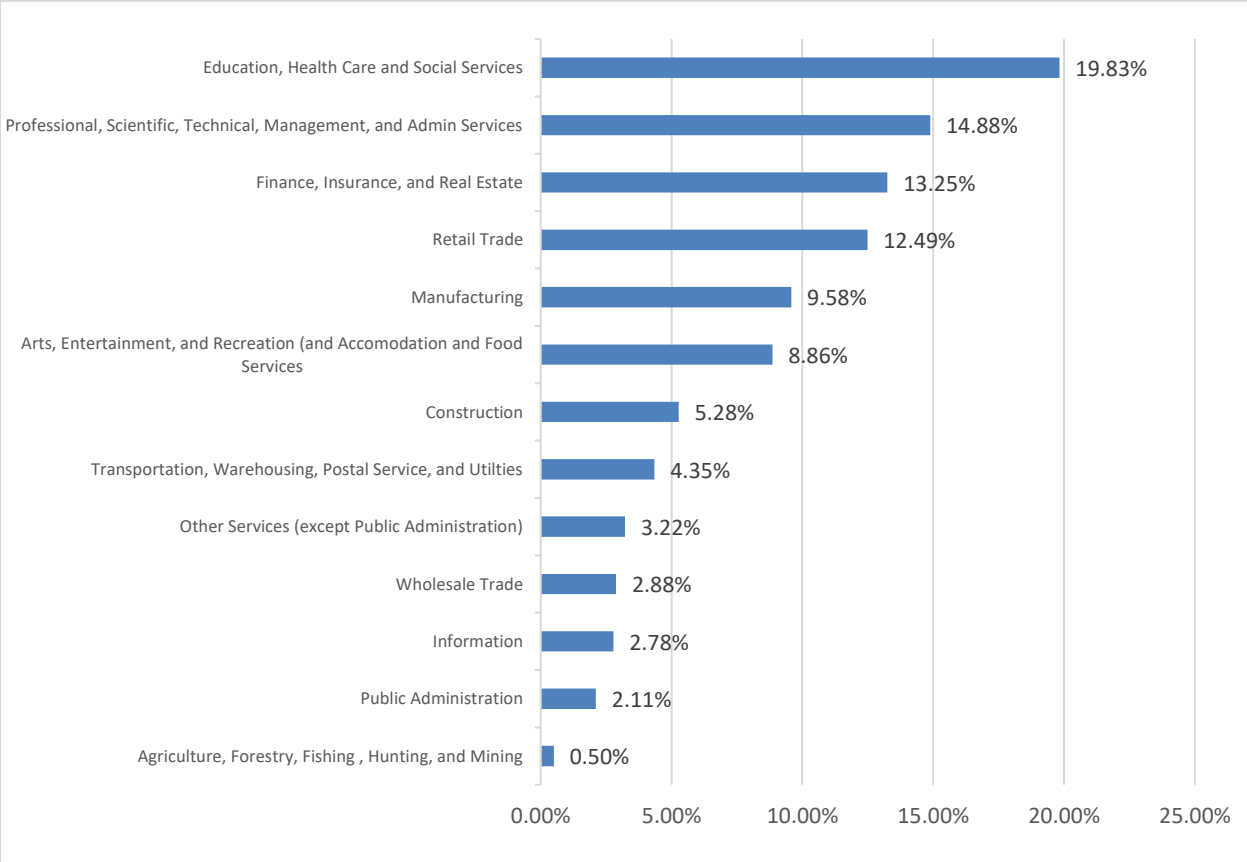
Based on U.S. Census Bureau data,[22] there were approximately 101,680 people employed within the City in 2019, an increase of 27.5 percent in the five-year period since 2014. Figure 3-5 presents the City's

[21] Source: U.S. Census Bureau Annual Estimates of the Resident Population for Metropolitan Statistical Areas in the United States and Puerto Rico: April 1, 2010 to July 1, 2019 (CBSA-MET-EST2019-ANNRES). Retrieved November 2021 from https://www.census.gov/data/tables/time-series/demo/popest/2010s-total-metro-and-micro-statistical-areas.html

[22] Source: U.S. Census Bureau, 2019 ACS 1-Year Estimates. Retrieved November 2021 from https://data.census.gov/cedsci/table?q=mckinney%20city%20employment&tid=ACSDP1Y2019.DP03

2019 employment by industry. The largest four industries account for approximately 60 percent of total employment, each with 12 percent or greater of the total employees within the City.

Figure 3-5: City of McKinney Employment by Industry, 2019



3.3 Solid Waste Generation, Recycling, and Disposal

Understanding current and projected future MSW generation allows for appropriate planning for solid waste and recycling system needs, including services, programs, and infrastructure. This section presents available data for the City's material generation on a sector basis (residential, commercial, and C&D) and by material type. Refer to the Key Terms in Section 1.0 for definitions of sectors addressed in this SWMS, material types, and material generation, recycling, and disposal. All annual tonnage and material generation data included in this SWMS refers to the fiscal year (FY) in which it was generated (October through September), unless otherwise specified.

As described in the following sections, the data currently available for each sector varies. The City has a near-complete understanding of residential materials generated, disposed, and recycled because most residential materials are managed directly by the City, its exclusive residential services contractor, or flows through North Texas Municipal Water District (NTMWD) processing and disposal facilities. A

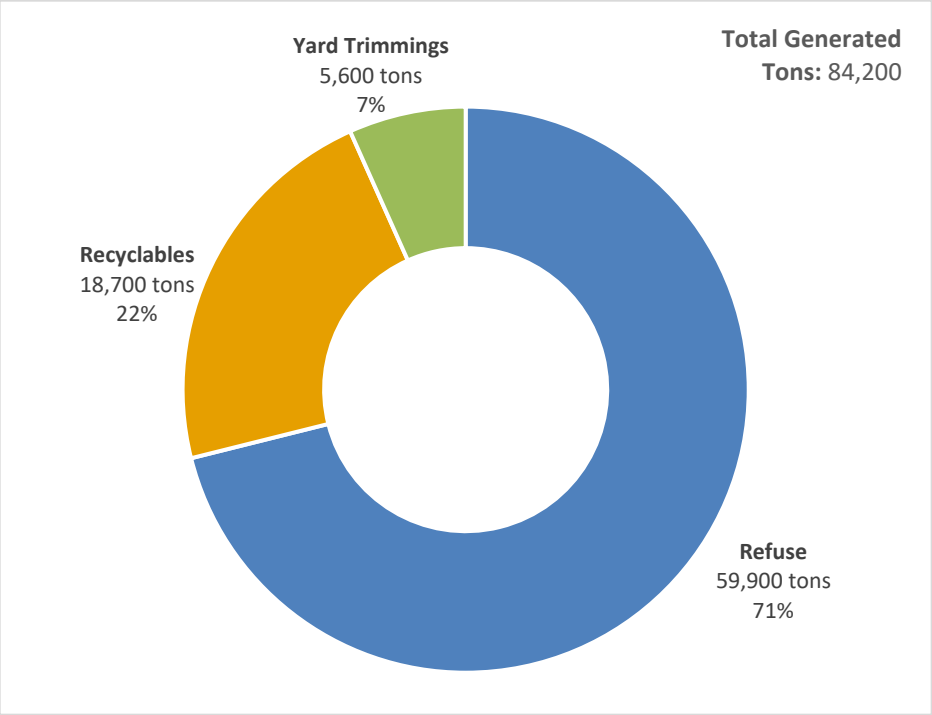
less comprehensive picture of commercial and C&D material generation and management is currently available. For these sectors, disposal data is readily available because collection for commercial refuse and C&D waste is provided by the City's exclusive contractor. Recycling quantities for the commercial and C&D sectors are not fully known as recycling collection services are provided within the City via an open-market system.

3.3.1 Residential Generation, Recycling, and Disposal

Residential materials refer to materials generated by the City's single-family residential customers. Multifamily-generated material quantities are addressed along with commercial material generation presented in Section 3.3.2.

In 2020, a total of approximately 84,200 tons of single-family residential materials were collected and managed through City and NTMWD services and facilities, equating to a total of 1.6 tons of material per household annually. Approximately 71 percent of residential material was collected and disposed as refuse in the NTMWD Landfill. Approximately 22 percent was recycled through curbside and drop-off recycling services, and approximately seven percent was diverted through the City's yard trimmings collection programs. Figure 3-6 shows residential generation by material type for the residential section in 2020.

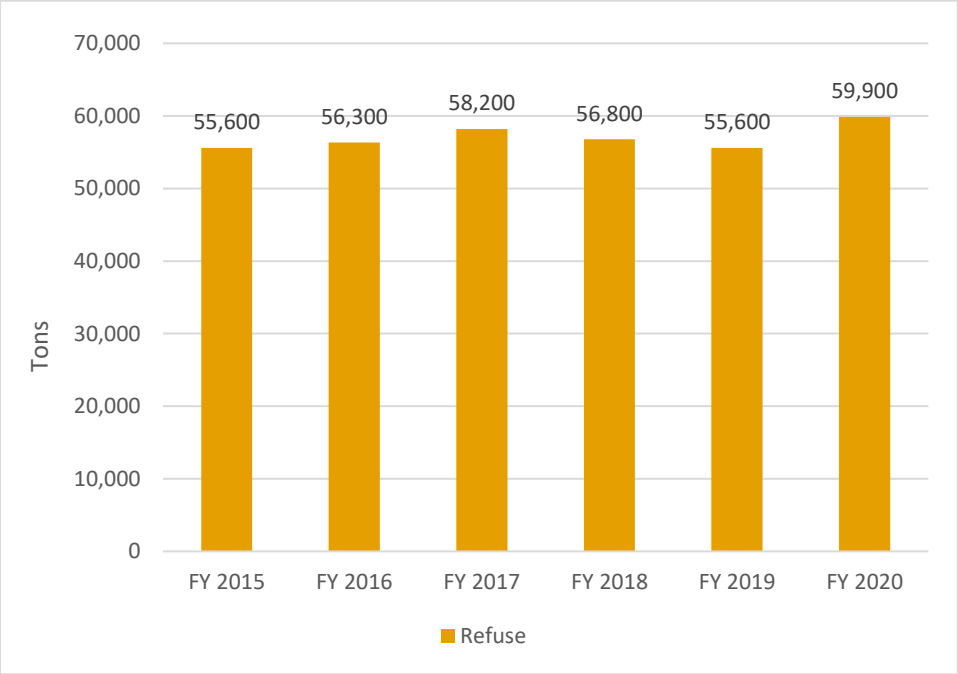
Figure 3-6: Single-Family Residential Generation by Material FY 2020 (Tons) [1]



1. Residential generation tonnage data was sourced from monthly and annual reports for the NTMWD landfill and transfer stations, the Plano composting facility, and the City's recycling processor.

Figure 3-7 shows how the City's residential refuse generation has varied from 2015 to 2020. Residential generation, recycling, and disposal are discussed in further detail in Section 5.0, including data presented by material type and on a per-household basis. Complete residential recycling and diversion data was unavailable for prior years.

Figure 3-7: Single-Family Residential Refuse Disposal Trends, FY 2015-2020 (Tons)[1]



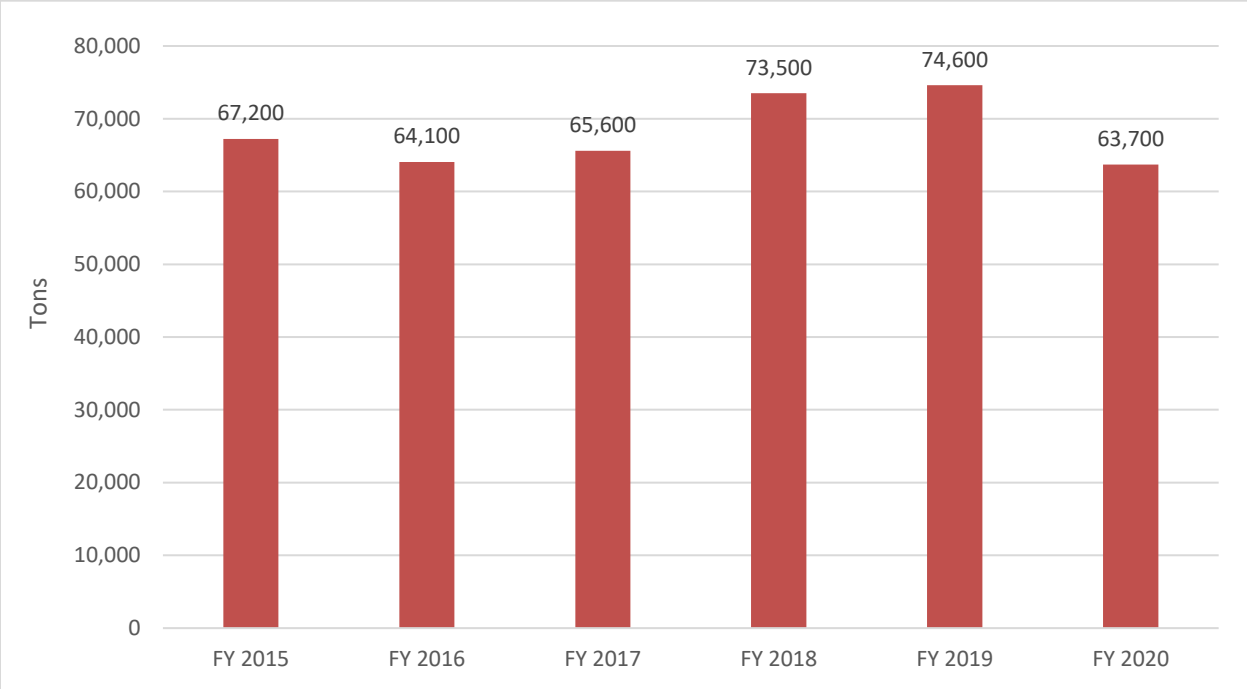
1. Residential refuse disposal data was sourced from monthly and annual reports for the NTMWD landfill and transfer stations

3.3.2 Commercial Generation, Recycling, and Disposal

The NTMWD tracks commercial refuse collection and disposal quantities for all member cities on an individual basis. The City's recycling processor (Waste Connections) also provides recycling service to some commercial and multifamily entities in the City. However, because commercial recycling services within the City are provided via an open-market system, total quantities of commercially generated recyclables are not available. Refer to Section 8.0 for further discussion of commercial services.

In 2020, at least 66,900 tons of material were generated by the commercial sector in McKinney, of which approximately 63,700 tons were landfilled refuse and approximately 3,200 tons were recyclables reported by Waste Connections. Figure 3-8 shows commercial refuse disposal from 2015 to 2020. Disposal quantity decreases for FY 2020 were likely attributable to the coronavirus pandemic, as many commercial entities in the City and throughout the country experienced less businesses and decreases in the quantities of waste generated. As in many other Texas cities, multifamily residential customers in McKinney receive services in a manner similar to the commercial sector. Commercial refuse quantities presented in this SWMS include material generated from both commercial entities and multifamily residents because these waste streams are collected together by commercial haulers and quantities are not tracked separately.

Figure 3-8: Commercial Refuse Disposal Trends, City of McKinney FY 2015-2020 (Tons)[1, 2]

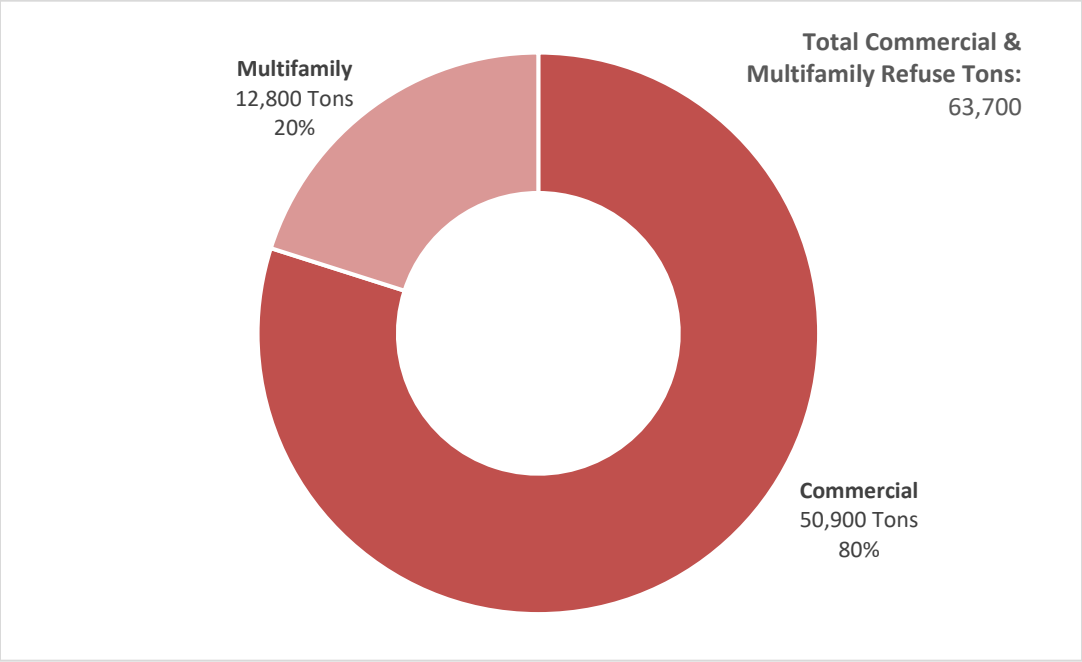


1. Commercial refuse tonnage data was sourced from monthly and annual NTMWD system-wide tonnage reports.
2. An estimated 20 percent (approximately 12,800 tons) of commercial refuse generated in 2020 was generated by multifamily households.

The City's multifamily refuse generation is not tracked separately from total commercial refuse generation. Burns & McDonnell developed a planning level estimate of multifamily refuse quantities generated in McKinney by calculating single-family per-household refuse generation and applying a reduction factor to estimate multifamily per-household refuse generation. The per-household multifamily refuse generation estimate was then multiplied by the total number of multifamily households to estimate the City's total annual multifamily refuse quantities. This estimated multifamily refuse generation figure was subtracted from total commercial generation to estimate refuse generated by commercial businesses.[23] Figure 3-9 shows the estimated total commercial refuse generation in McKinney in 2020 and the distribution between commercial businesses and multifamily households.

[23] Section 5.0 presents single-family per-household generation data. Based on 2019 data from the U.S. Census Bureau, it was estimated that, on average, multifamily households have 0.70 persons per household per every 1.0 persons per single-family household. To estimate total multifamily annual refuse generation, Burns & McDonnell multiplied single-family refuse generation rates by 0.70, multiplied by the total multifamily households in the City. An estimated 12,800 tons of refuse per year may be generated by the multifamily sector, or approximately 20 percent of total commercial refuse generation. Refer to Section 7.0 and Section 8.0 for further discussion of the Multifamily and Commercial and Institutional sectors, respectively.

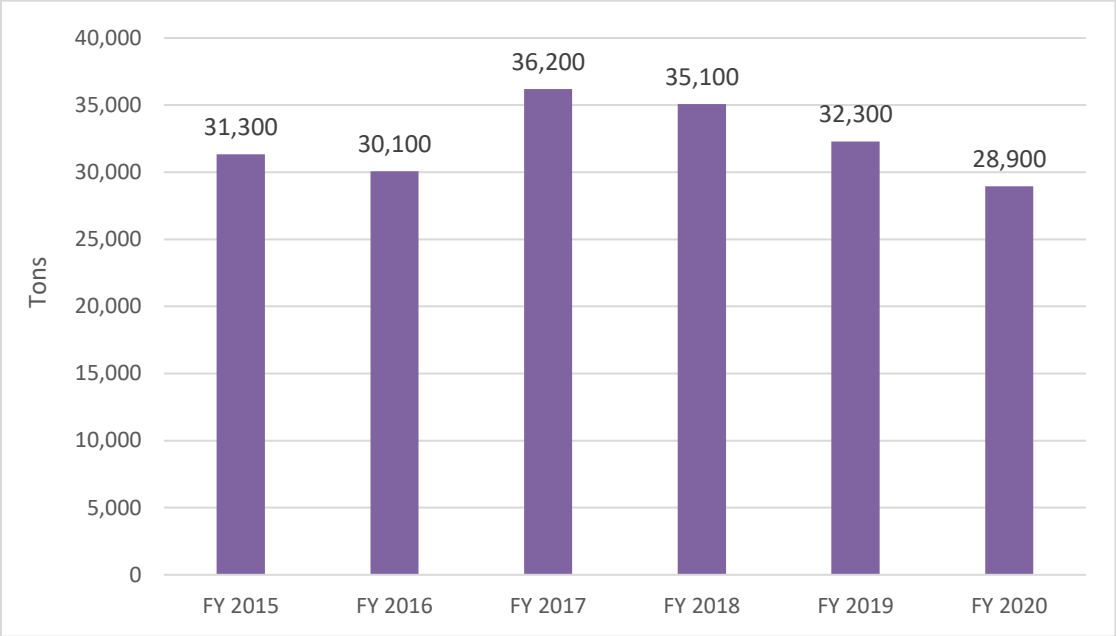
Figure 3-9: Commercial and Multifamily Refuse Distribution, FY 2020 (Tons)



3.3.3 C&D Generation, Recycling, and Disposal

McKinney's C&D debris management services are similar to those of the commercial sector. C&D debris intended for disposal in the landfill is collected and hauled exclusively by the City's solid waste contractor via roll-off containers. C&D recycling services are provided via an open market system and C&D generators that choose to recycle must contract independently with a hauler. Under this current system, the NTMWD tracks and provides data for C&D debris disposed but the C&D diversion rate is not known. Figure 3-10 shows how C&D debris disposal has varied from 2015 to 2020. Similar to the commercial sector, C&D quantities may have declined in FY 2020 due to the coronavirus pandemic.

Figure 3-10: C&D Debris Disposal Trends, City of McKinney FY 2015-2020 (Tons) [1]



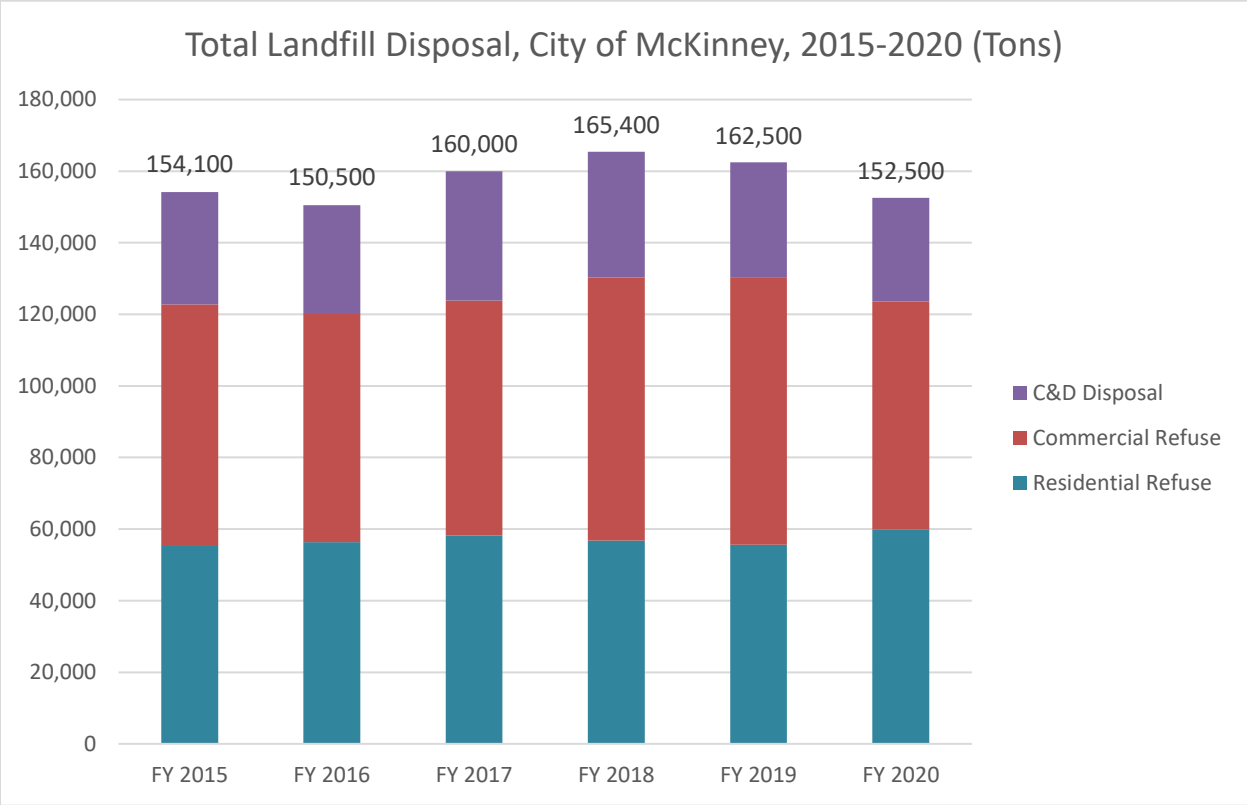
1. C&D debris disposal tonnage data was sourced from monthly and annual NTMWD system-wide tonnage reports.

3.3.4 Total Generation, Recycling, and Disposal

In 2020, the City's total landfill disposal was approximately 152,500 tons, with 59,900 tons (39 percent) generated by the residential sector, 63,700 tons (42 percent) generated by the commercial sector (including multifamily households), and 28,900 tons (19 percent) coming from C&D debris. The City's total landfill disposal has varied during the past six years, but has shown a slight downward trend in the most recent few years, with a decrease of 7.8 percent from 2018 to 2020.[24] Figure 3-11 shows the City's total landfill disposal and distribution by sector (residential, commercial, and C&D debris) from 2015 to 2020.

[24] Decreased total material generation in FY 2020 may reflect short-term, temporary shifts in material generation rates due to the coronavirus pandemic.

Figure 3-11: Total Landfill Disposal, City of McKinney, FY 2015-2020 (Tons)[1]



1. Data was sourced from monthly and annual NTMWD system-wide tonnage reports.

3.3.5 Material Generation Forecast

To facilitate long-term strategy development, Burns & McDonnell developed material generation projections for the City through 2040 for the residential, commercial, and C&D sectors.[25] Material projections are based on current tonnages for each sector and material type, as presented throughout Section 3.0, and projected population and employment growth. The impact of projected regional disposal quantities and landfill life projections for the City of NTMWD Landfill are presented separately in Section 4.0.

As with any long-term planning activity, the development of the material generation projections requires a number of assumptions to be made. Figure 3-12 presents the projected tons of material generated and managed by the City for the residential, commercial (including multifamily), and C&D sectors on an annual basis using a 2020 baseline. The developed projections conservatively assume constant per-capita

[25] Material projections include total tons disposed for all sectors and total tons diverted for the residential sector. Projections include a portion of tons diverted for the commercial sector and do not include tons diverted for C&D debris. Complete data for diverted tons of commercial materials and C&D debris were not available and were therefore excluded from projections.

and per-employee waste generation rates, based on a 2020 baseline.[26] The City may be able to drive decreased waste generation and/or increased recycling rates through its continued programs and initiatives such as waste reduction and diversion education and policies implemented by cities and entities within the region.

Figure 3-12: Projected Waste Generation Forecast for City of McKinney Residential, Commercial, & C&D Materials, 2020-2040

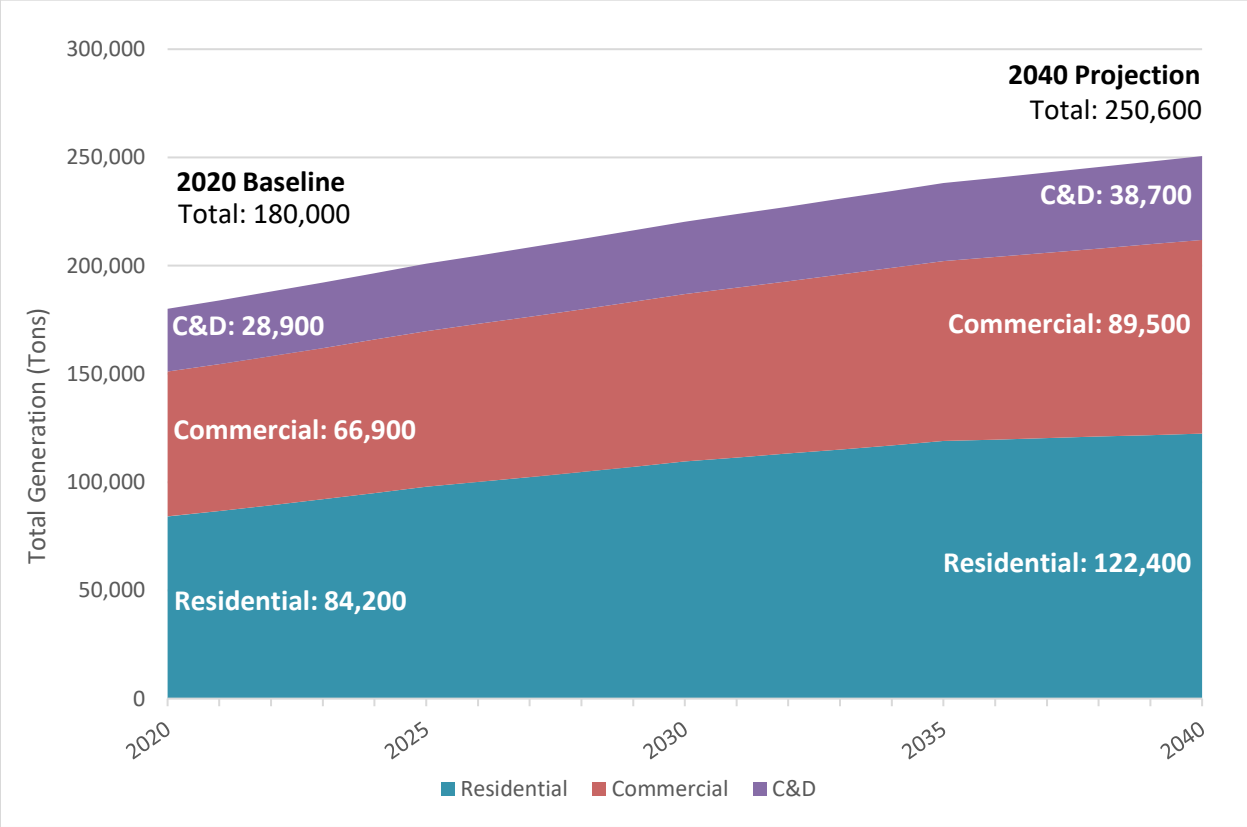
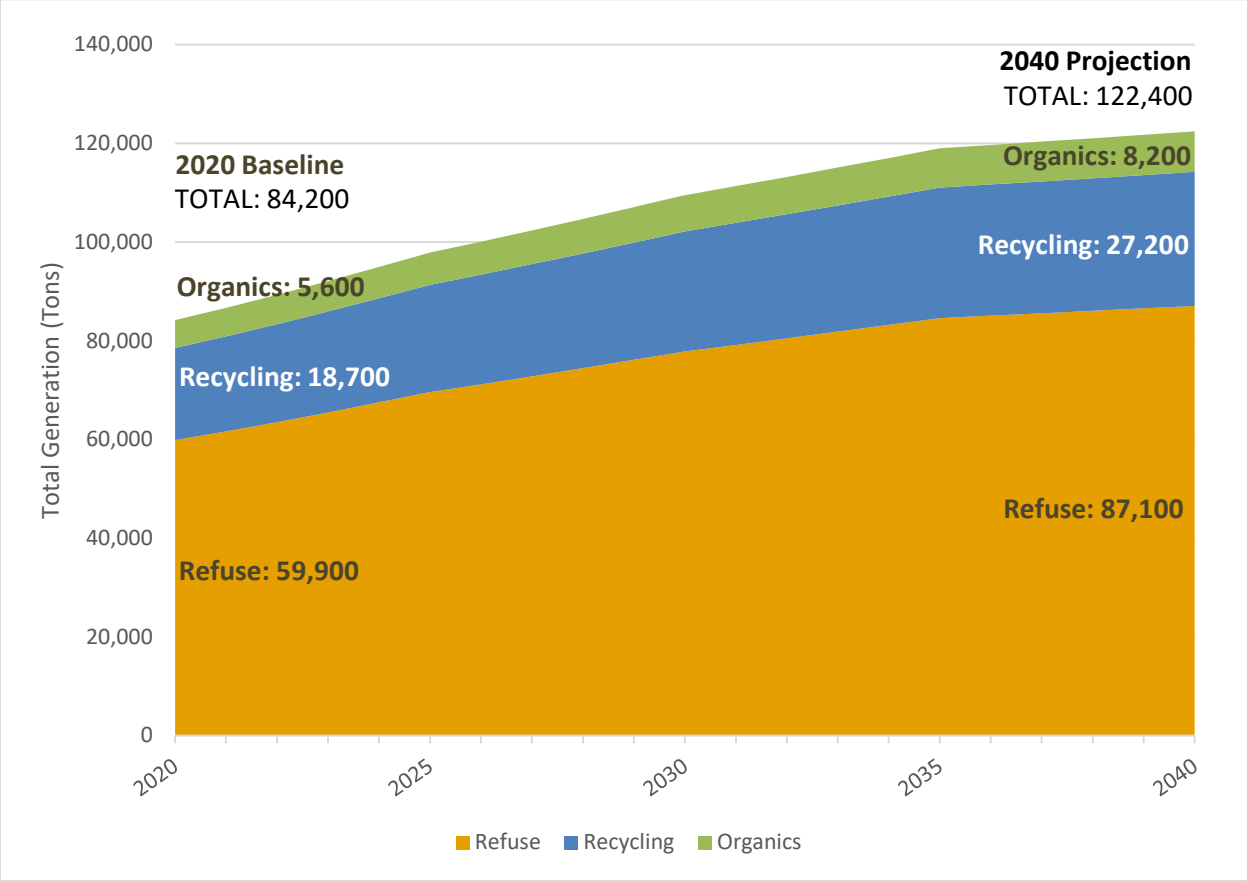


Figure 3-14 presents projected material generation for the City's single-family residential sector, by material type, through 2040. Projections reflect future generation, disposal, and diversion quantities if recycling and composting rates are unchanged through 2040. Efforts to increase material diversion will increase quantities of recycling and organics and decrease refuse.

[26] 2020 baseline data was selected as a baseline for long-term planning based on the availability of detailed waste and recycling and demographic data; however, this baseline reflects short-term shifts in solid waste generation and disposal due to the coronavirus pandemic that are likely temporary.

Figure 3-13: Projected Single-Family Waste Generation by Material Type for City of McKinney, 2020-2040



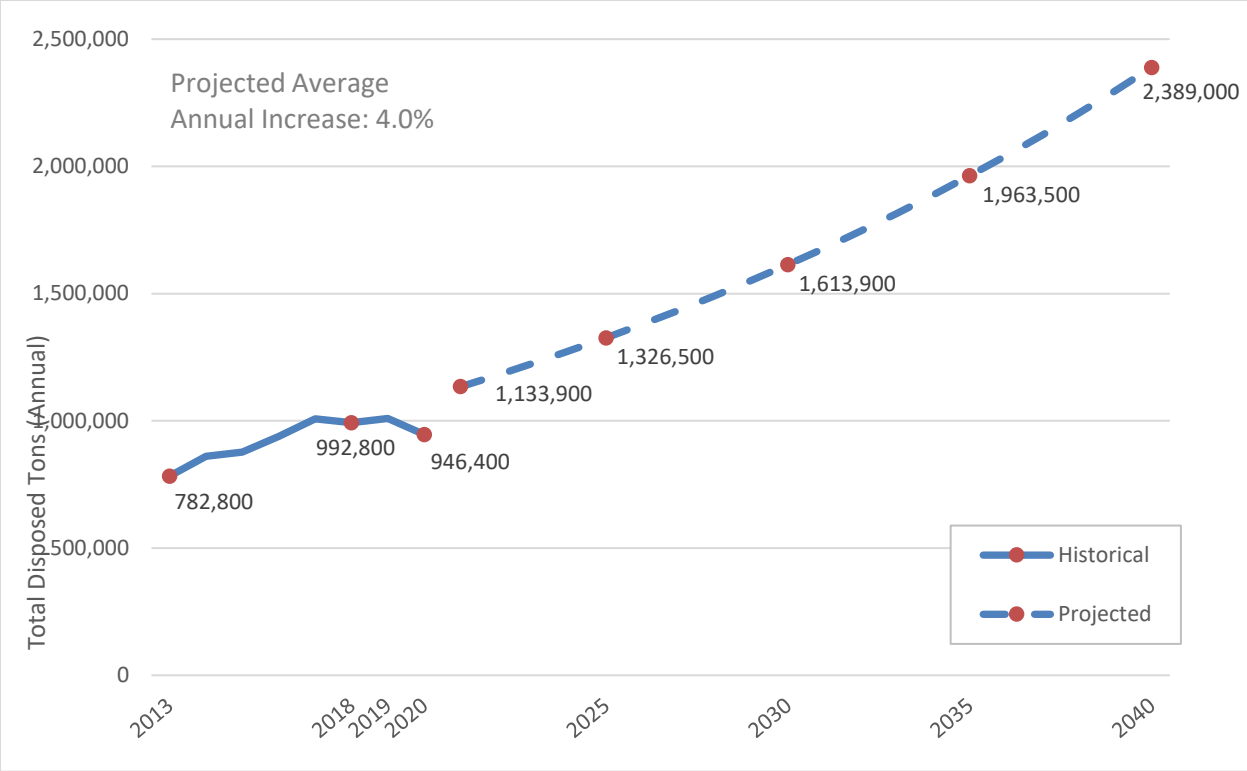
3.4 Regional Material Generation

The City of McKinney is a member of the NTMWD, which operates several solid waste processing and disposal facilities in Collin County. A majority of the materials generated by the City are processed or disposed at NTMWD facilities. Other NTMWD Member Cities whose solid waste is managed primarily within the NTMWD system include cities of Frisco, Plano, Richardson and Allen. Section 4.1 further describes the City's partnership with the NTMWD and the regional facilities utilized to manage the City's solid waste, recycling, and diverted materials.

The NTMWD tracks all material to be disposed (rather than recycled or diverted) that is delivered to its transfer station and landfill facilities. This data is reported annually to the TCEQ. NTMWD has utilized historical material disposal quantities and growth rates to project future material disposal quantities that the regional solid waste disposal system may need to manage. Figure 3-12 presents the tons of material disposed in the NTMWD Landfill on an annual basis from 2013 to 2020, and projected annual disposal tonnages based on an average four percent increase year over year. Annual disposal tonnages include

solid waste disposed from all sectors (residential, commercial, and C&D) as well as sludge disposed in the NTMWD Landfill (historically 13 to 14 percent of total NTMWD disposed tonnage). This data represents historical and projected disposal quantities and does not represent total generation as it does not include data for recycled or diverted materials.

Figure 3-14: NTMWD Disposal Quantities, Historical and Projected (2013-2040)[1]



1. NTMWD Landfill remaining life projections developed by NTMWD in 2018. Historical tonnage data updated through 2020 based on annual landfill reporting data provided by the TCEQ.

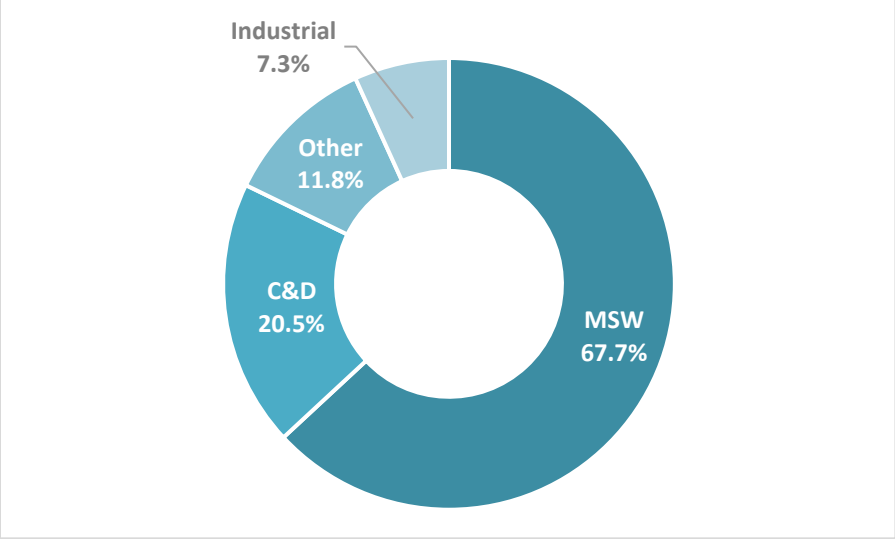
The regional disposal quantity projections are based on historical material growth rates. The actual growth in the amounts of material disposed within the NTMWD system will be based on the population and economic growth of the region as a whole and on other market factors and regional initiatives. These other factors include, but are not limited to, factors such as the development of local and regional recyclables and compost markets, infrastructure developed over the planning period, and the effectiveness of waste reduction and diversion education and policies implemented by cities and entities within the region. The impact of projected regional disposal quantities on the region's landfill capacity and remaining life are discussed in Section 4.1.1.

3.5 Waste Characterization

Waste characterization is the analysis of the composition of a waste stream. This section presents statewide waste characterization data from the 2021 TCEQ Recycling Market Development Plan (RMDP)[27] as well as regional waste characterization data developed through studies conducted by the NCTCOG.[28]

Of the estimated 36.5 million tons of material disposed of in landfills in Texas in 2019, approximately two thirds were MSW[29] and the remaining third was comprised of C&D material and other materials (e.g., sludge, septage, tires, and medical waste). All three categories include both recyclable and non-recyclable materials that end up in landfills across the state. Figure 3-15 presents the high-level distribution of material disposed of in Texas landfills in 2019.

Figure 3-15: 2019 Composition of Material Disposed in Texas Landfills[1]



1. Other includes solid waste other than MSW and C&D materials such as brush, sludge, septage, contaminated soil, regulated and non-regulated asbestos-containing material, tires, and medical waste. Does not include Class 1, Class 2, or Class 3 non-hazardous industrial waste (NHIW).
2. Industrial includes Class 1, Class 2, and Class 3 materials disposed in landfills. NHIW waste is also disposed in industrial landfills in the State.

[27] Texas Commission on Environmental Quality (TCEQ). September 2021. "Recycling Market Development Plan." Available online here: https://www.tceq.texas.gov/assets/public/assistance/P2Recycle/Recyclable-Materials/2021%20Recycling%20Market%20Development%20Plan.pdf

[28] North Central Texas Council of Governments (NCTCOG). Regional Recycling Survey and Campaign. https://www.nctcog.org/envir/materials-management/regional-recycling-survey-and-campaign

[29] The TCEQ defines municipal solid waste (MSW) as "solid waste resulting from, or incidental to, municipal, community, commercial, institutional, and recreational activities; it includes garbage, rubbish, ashes, street cleanings, dead animals, medical waste, and all other nonindustrial waste (30 TAC 330.3)."

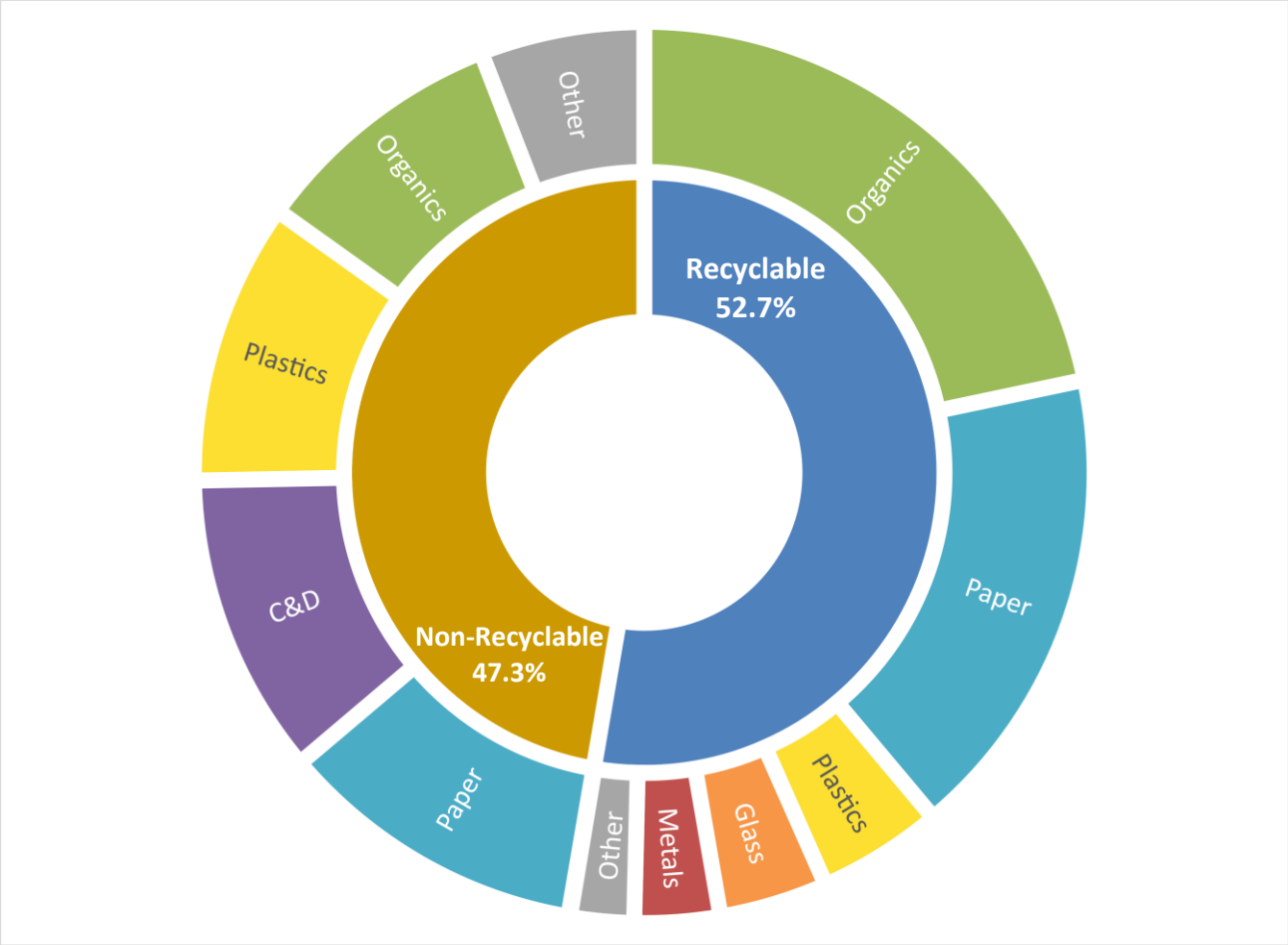
MSW composition varies from region to region based on various factors, such as percentages of residential versus commercial sectors, access to recycling programs, and vegetative growth. Multiple large cities in Texas and regional planning agencies, including, but not limited to San Antonio and El Paso and the North Central Texas Council of Governments (NCTCOG), have completed solid waste characterization studies over the past five years. Burns & McDonnell reviewed these studies to develop an estimate of MSW composition as part of the RMDP[30]. For commercial MSW, Burns & McDonnell estimated the composition based on the El Paso and Dallas waste characterization studies, since those were the only identified recent studies to separately evaluate the composition of commercial MSW.[31]

Figure 3-16 presents the estimated composition of MSW disposed in Texas landfills and whether it was recyclable or non-recyclable. Recyclable and non-recyclable materials are further broken down by material categories, including paper, plastics, metals, glass, organics, C&D materials, and other materials. Some material types such as paper, organics and plastic appear in both the recyclable and non-recyclable categories. Non-recyclable paper, plastics and organics are typically materials that are too contaminated to be recycled.

[30] Composition based on waste characterization studies for other cities and regional planning agencies in Texas, including, but not limited to, San Antonio, El Paso, and NCTCOG.

[31] Data from the City of Dallas waste characterization study was included in the 2015 Study on the Economic Impacts of Recycling. This data was also used for the Recycling Market Development Plan since additional commercial composition data (other than from the City of El Paso) was unavailable.

Figure 3-16: 2019 Statewide Composition of MSW Disposed in Landfills by Material Type



3.5.1 Regional Waste Characterization

Burns & McDonnell assessed the regional waste composition profile of residential refuse material disposed in the region in a series of regional waste characterizations conducted in 2018, 2019 and 2020. The 2019 and 2020 evaluations included sorting waste and recycling samples to generate the composition profile of both disposal and recycled material streams.

The composition profile represents the wider North Central Texas region based on samples from participating cities in the NCTCOG. Although the City did not participate in the study, the regional results provide an understanding of the composition of refuse disposed among all the cities in the region and is used to generate a capture rate figure on a material-by-material basis as shown in Figure 3-17 and Figure 3-18.

Figure 3-17: 2020 Regional Waste Composition of Residential Refuse, North Central Texas

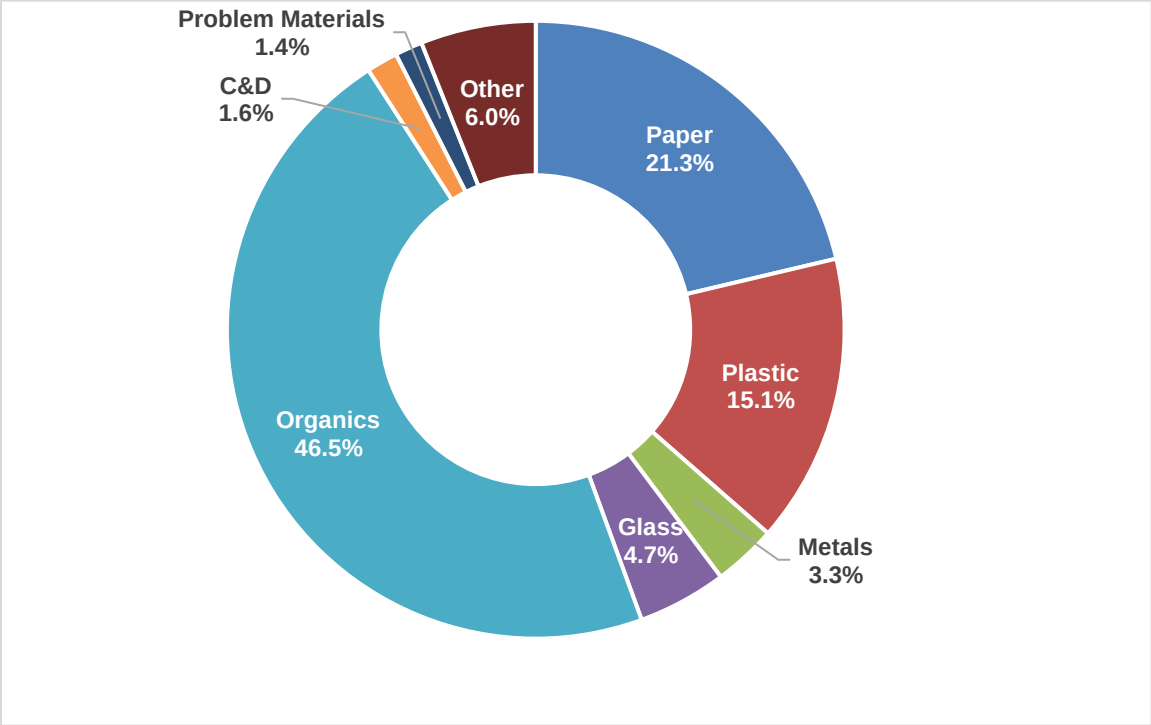
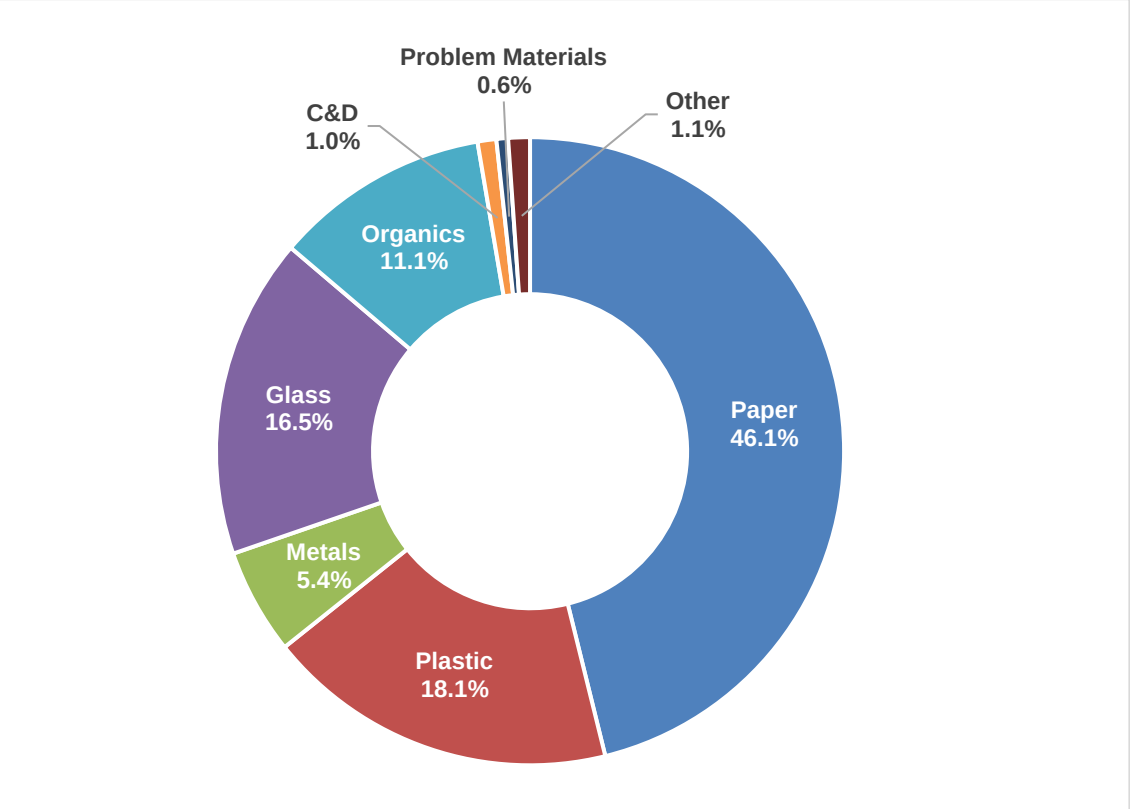


Figure 3-18: 2020 Regional Recycling Composition of Residential Recycling, North Central Texas



3.5.2 Regional Capture Rate

As part of the NCTCOG Regional Recycling Survey and Campaign, the capture rate was a key metric of the data collection and analysis, rather than the traditional recycling rate, to generate a more impactful education and outreach campaign. A capture rate provides insight on individual types of recyclable materials to target for increased recovery and supports the development of focused education/outreach campaign materials. Capture rate is calculated using the following formula:

$$\frac{Pounds\ of\ Recyclable\ Materials\ in\ Recycling}{(Pounds\ of\ Recyclable\ Material\ in\ Recycling + Pounds\ of\ Recyclable\ Material\ in\ Garbage\ )}$$

The capture rates from the NCTCOG waste characterization study were derived by using the composition profile of hand sorted refuse and recycling to calculate the capture rate of between four and 12 samples delivered by each city, where each recycling sample represented about 100 pounds of material and each refuse sample represented about 250 pounds of material.

Low capture rate indicates where opportunities exist to increase material recovery through single-stream recycling and provides an understanding of how effectively a curbside recycling program operates. Table 3-3 compares the capture rate on a material-by-material basis for recyclables among the North Central Texas region for 2019 and 2020 on a region-wide basis.

Table 3-3: Regional Capture Rate by Individual Recyclable Materials

	2019 Regional Capture Rate	2020 Regional Capture Rate	Year-over-Year Change
Recyclable OCC	58.8%	62.4%	3.6%
Mixed Paper	34.1%	27.7%	(6.3%)
Paper Subtotal	**41.1%**	**38.0%**	**(3.2%)**
PET Containers	24.9%	26.5%	1.6%
HDPE Containers - Natural	28.0%	34.2%	6.1%
HDPE Containers - Colored	25.8%	26.1%	0.4%
#3-#7 Containers	11.3%	12.7%	1.4%
Plastic Subtotal	**22.2%**	**23.7%**	**1.5%**
Aluminum Used Beverage Containers	26.1%	31.0%	4.8%
Ferrous Metal Food Containers	14.2%	18.4%	4.2%
Metals Subtotal	**19.5%**	**24.4%**	**4.8%**
Recyclable Glass	34.4%	33.9%	(0.5%)
Glass Subtotal	**34.4%**	**33.9%**	**(0.5%)**
Regional Capture Rate	**29.8%**	**28.7%**	**(1.3%)**

Approximately 435,000 tons of recyclables are sold to market annually in the North Central Texas region and among all of these material categories the recycling system is operating at a capture rate of less than 30 percent.

4.0 FACILITIES AND INFRASTRUCTURE

This section provides an overview of existing MSW processing facilities and infrastructure in the City and North Central Texas region including landfills, transfer stations, MRFs, C&D facilities, and organics processing facilities.

4.1 Current System Review

Figure 4-1 shows the solid waste facilities in close proximity to the City. The City is engaged in a partnership with the NTMWD along with the Cities of Frisco, Plano, Richardson, and Allen (Member Cities) for the management and operation of several solid waste processing facilities including the 121 Regional Disposal Facility (NTMWD Landfill) and three transfer stations (Custer Transfer Station, Lookout Transfer Station, and Parkway Transfer Station). The partnership with NTMWD is based on the Regional Solid Waste System Contract (NTMWD Contract), which was renewed in October 2015. The NTMWD Contract has proven very effective for disposal and transfer services at a reliably stable rate among the Member Cities. Figure 4-2 shows the facilities used by the City in relationship to the landfills, transfer stations, MRFs, and organics processing facilities in the broader North Central Texas region.

Figure 4-1: MSW Facility Locations in Collin County

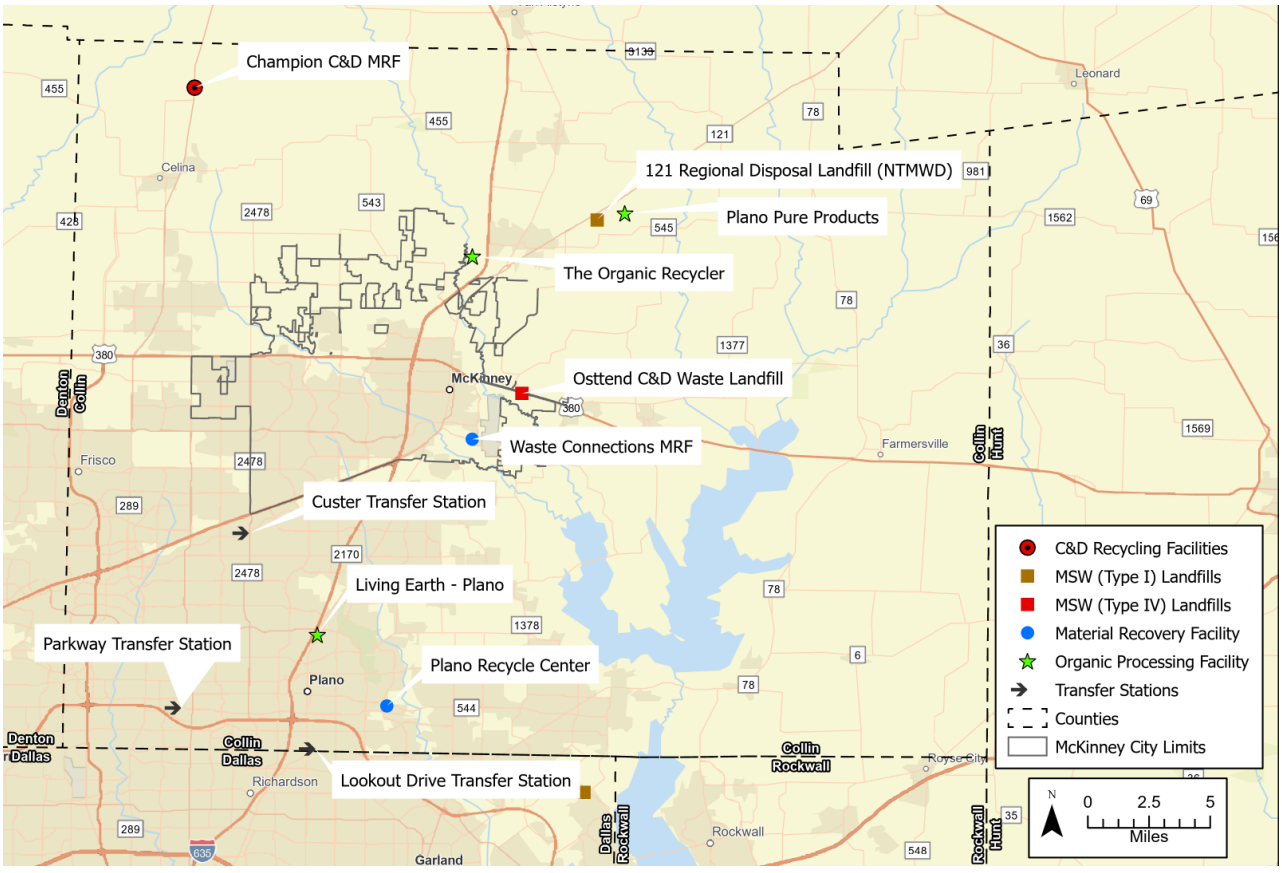
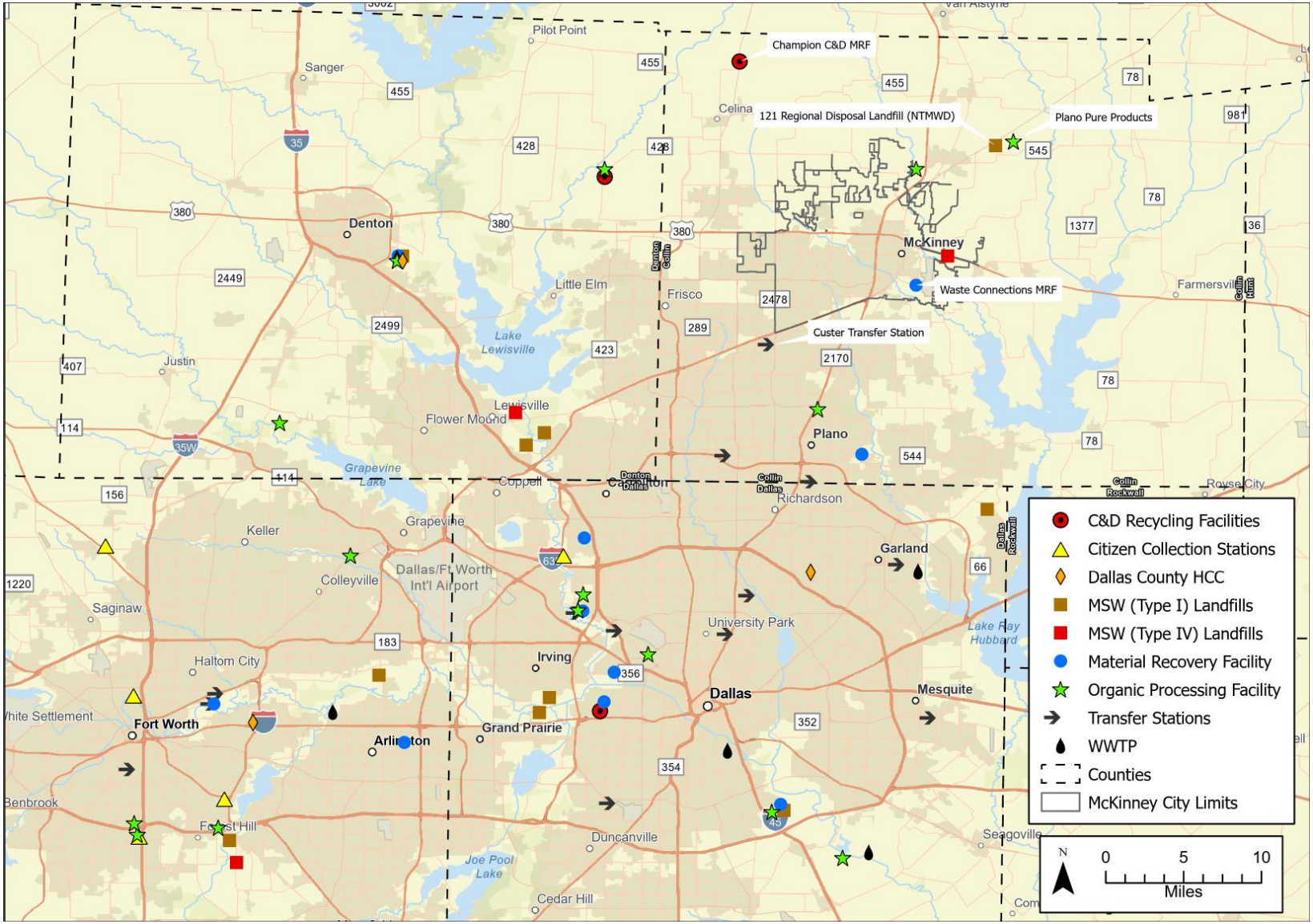


Figure 4-2: Regional MSW Facility Locations within the North Central Texas Area[1]



[1] Labeled facilities are those facilities currently receiving materials generated within the City

The following sections detail the MSW processing facilities in the region to provide an understanding of the current MSW system.

4.1.1 Landfills

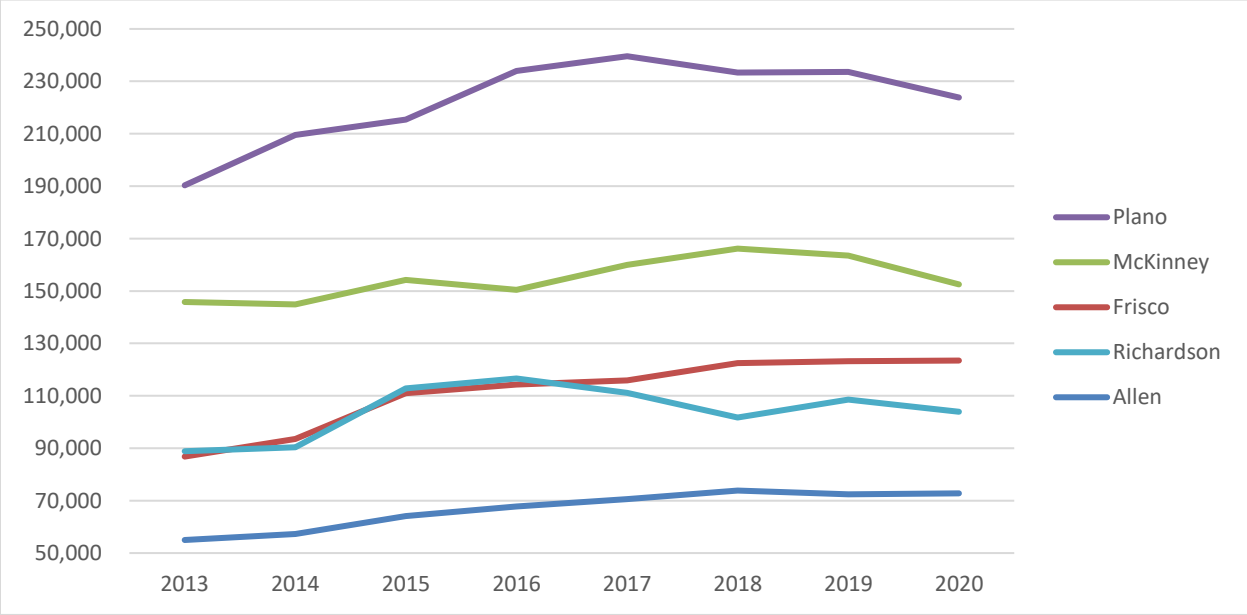
This section provides an overview of the NTMWD Landfill, discussion of NTMWD landfill capacity and an assessment of the region's shifting wasteshed.

4.1.1.1 NTMWD Landfill Overview

NTMWD currently provides solid waste disposal services to Member Cities as well as Collin County and the surrounding area. While a portion of material from Member Cities is collected and hauled directly to the NTMWD Landfill in Melissa, Texas, the majority of material is managed through transfer stations operated by the NTMWD.

The NTMWD Landfill started accepting refuse in 2004. Figure 4-3 shows total tonnage delivered by each of the five cities to the NTMWD Landfill since 2012. A breakdown of disposal on a pounds per household per year basis can be found in Section 5.0.

Figure 4-3: Annual Disposal by Member City, 2013-2020 (Tons) [1]



1. Includes refuse, C&D and self-haul tonnage

The majority of the tonnage that is disposed at NTMWD Landfill is delivered by Member Cities, but the facility does accept third party tons. The NTMWD Landfill benefits from additional revenue from tip fees

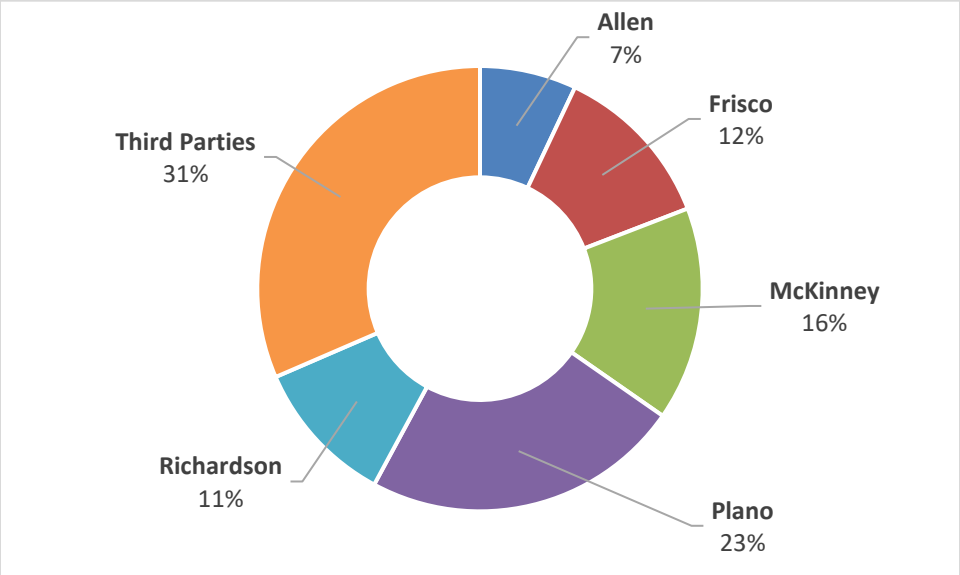
from third party haulers, but also considers protecting future airspace for the needs of the Member Cities an important operational goal.

The NTMWD Landfill is not permitted for expansion based on the land currently designated for landfill operations. However, NTMWD does own parcels of land adjacent to the landfill that could be developed for expansion in the future. Figure 4-4 shows the current landfill.

Figure 4-4: NTMWD Landfill

Each Member City contributes financially to NTMWD based on a payment methodology included in the NTMWD Contract. Payment is based on a percentage of the total waste that is disposed among the Member Cities. Refuse material delivered directly to the NTMWD Landfill by the City's contractor is charged at half the rate of refuse delivered to a transfer station and transferred to the NTMWD Landfill. Figure 4-5 estimates the percentage of annual total tons among the Member Cities and third-party haulers disposed at the NTMWD Landfill based on the total annual tons disposed in 2020.

Figure 4-5: Percentage of Material Entering NTMWD Landfill



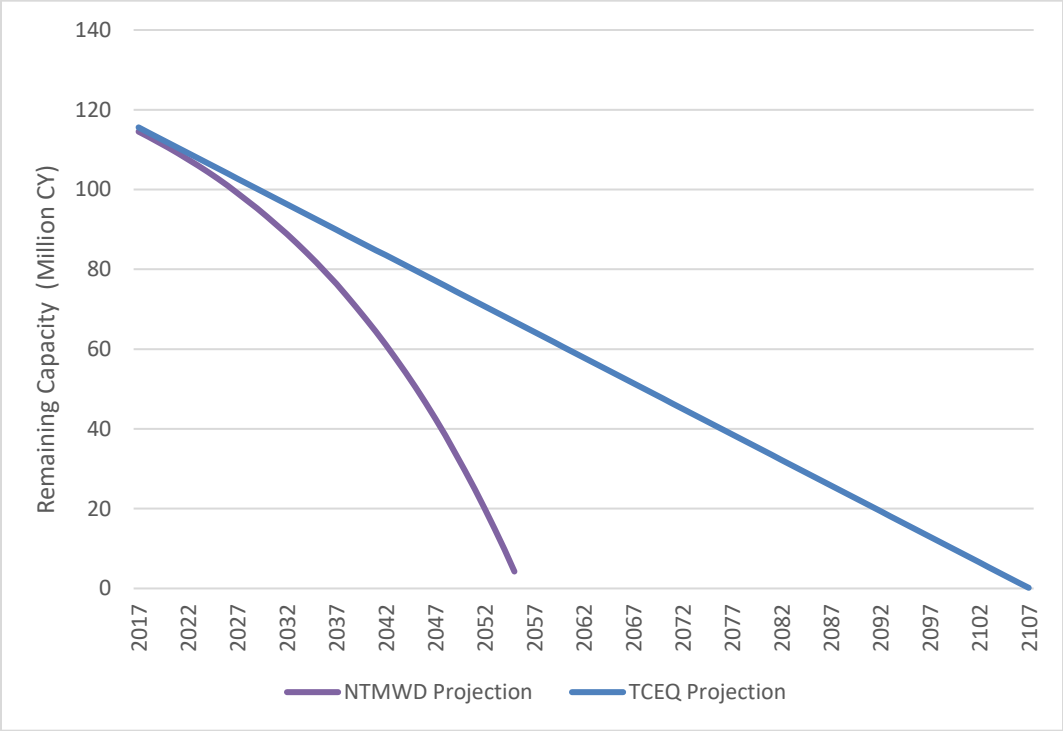
4.1.1.2 NTMWD Landfill Capacity

Landfill capacity is a finite resource in the region and permitting new landfills is becoming increasingly difficult. The TCEQ provides an annual estimate of the site life of facilities using projections based on historical tonnages. Based on the TCEQ's Municipal Solid Waste in Texas Year in Review based on 2020 data, the TCEQ estimates the NTMWD Landfill has 76 years remaining. TCEQ estimates do not account for potential increases in the annual quantity of material to be disposed.

NTMWD prepares its own internal estimates that account for some of the more dynamic changes in the regional wasteshed such as local population and tonnage increases, shifting tonnage flows within the North Central Texas region, and site-specific operational assumptions[32]. As of July 2019, NTMWD estimates the landfill has a site life of 38 years, reaching capacity in 2057. Figure 4-6 compares the estimated capacity based on the NTMWD site life calculations and TCEQ's projections.

[32] Site specific operational data includes the most up-to-date Airspace Utilization Factor, an estimate of site density.

Figure 4-6: NTMWD Landfill Site Life Projections



4.1.1.3 Regional Landfill Capacities

Tonnage flows among regional disposal facilities are changing, where displaced tonnage from closing landfills are going to be disposed at other facilities. Landfills located in the North Central Texas region and their estimated site lives are listed in Table 4-1[33].

Table 4-1: NCTCOG Region Type I Landfill Disposal and Remaining Capacity FY 2020

Permit	Permit Holder/Site Name	Owner	County	Tons Disposed[1]	Remaining Capacity (Tons)	Remaining Site Life (Years)[2]
1590B	City of Denton Landfill[3]	City of Denton	Denton	388,067	27,677,394	72
1025B	DFW Recycling and Disposal Facility	Waste Management	Denton	915,892	2,139,153	2
1312B	Camelot Landfill	Republic/Farmer's Branch	Denton	716,332	32,006,486	45
2294	121 Regional Disposal Landfill	North Texas Municipal Water District	Collin	946,399	72,081,975	76

[33] Information provided is sourced from TCEQ's Municipal Solid Waste in Texas: *A Year in Review* 2020 Data Summary and Analysis published October 2021.

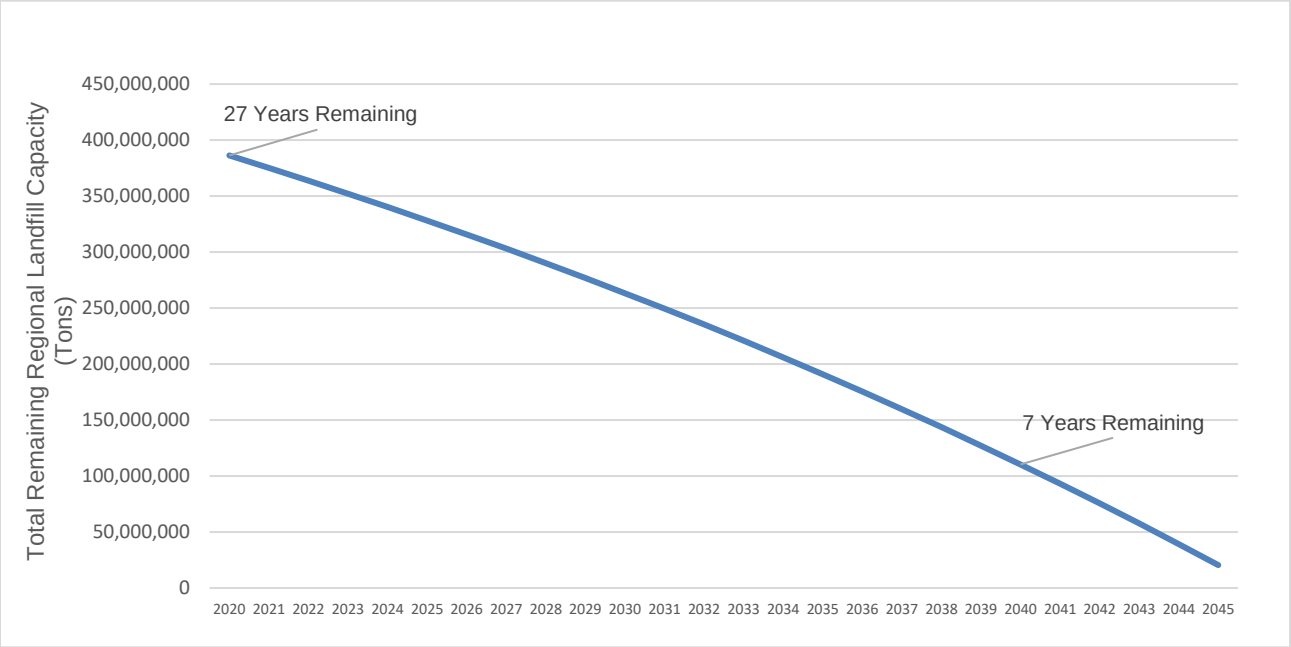
Permit	Permit Holder/Site Name	Owner	County	Tons Disposed[1]	Remaining Capacity (Tons)	Remaining Site Life (Years)[2]
62	McCommas Bluff Landfill	City of Dallas	Dallas	1,617,121	59,891,574	35
996C	City of Grand Prairie Landfill	City of Grand Prairie	Dallas	244,567	4,940,267	32
1394B	Hunter Ferrell Landfill	City of Irving	Dallas	192,161	3,114,830	33
1895A	Charles M Hinton Jr Regional Landfill	City of Garland	Dallas	586,097	17,707,706	30
42D	Skyline Landfill & Recycling Facility	Waste Management	Ellis	1,772,283	21,205,467	15
1209B	CSC Disposal and Landfill	Republic	Ellis	20	17,184,946	100
1745B	ECD Landfill	Republic	Ellis	154,599	29,260,015	160
1195B	Republic Maloy Landfill[3]	Republic	Hunt	139,346	19,559,746	100
534	City of Cleburne Landfill	City of Cleburne	Johnson	525	7,143	14
1417C	Turkey Creek Landfill[3]	Waste Connections	Johnson	663,541	8,247,586	5
2190	City of Corsicana Landfill	City of Corsicana	Navarro	101,539	11,121,239	110
47A	Weatherford Landfill	City of Weatherford	Parker	125,686	112,811	2
218C	South East Landfill	City of Fort Worth	Tarrant	732,522	16,244,574	22
358B	City of Arlington Landfill	City of Arlington	Tarrant	933,193	34,493,232	37
Total[4]				**10,229,890**	**376,996,143**	**37**

1. Tons disposed in the region does not reflect total MSW generation, as a certain amount of MSW is recycled and diverted as well as imported and exported from the region each year.
2. Remaining years are calculated based on the annual airspace utilization factors reported to TCEQ for each landfill in pounds per cubic yard. The remaining years reported by TCEQ shown in this table do not take population growth into account. Discussion about the remaining landfill capacity taking population growth into account is provided in Figure 4-7.
3. Reflects landfill expansions approved by TCEQ during 2020 and 2021.
4. Total may not sum exactly due to rounding.

Based on data from the TCEQ's 2020 annual review of MSW generation and facilities in Texas, the region has approximately 37 years of total Type I Landfill capacity remaining at current reported annual disposal rates. However, this estimate does not account for future population and economic growth.

Actual total remaining landfill life, given current remaining capacities, is likely to be lower.[34] Based on population projections from the NCTCOG,[35] the population of the region is projected to grow at an annual rate of 2.2 percent from 2020–2045. Figure 4-7 shows the projected remaining NCTCOG region landfill capacity through 2045, taking into account future population and economic growth and assuming no landfill capacity is added through existing landfill expansion or new permitted landfills.

Figure 4-7: Projected NCTCOG Remaining Regional Types I and IV Landfill Capacity, 2021-2045



As of 2020 the estimated the remaining landfill capacity of the region is approximately 386.3 million tons. If annual disposal quantities, totaling approximately 10.8 million tons in 2020, were to increase at the same rate as regional population projections, the remaining NCTCOG regional landfill capacity would be fully depleted in the year 2047. This equates to total remaining landfill life of 27 years for the region, from the year 2020 or seven years remaining in 2040.

As facilities close, tonnage flows may shift among facilities in the region. As a result, cash customers and third-party haulers may increasingly seek to use the NTMWD Landfill. The site life projections provided by NTMWD account for historical tonnage growth rates and anticipated market reactions to the shifting

[34] Data from the TCEQ's 2020 MSW annual report, presented in Table 4-1 and discussed in this section, is reflective of the way data has traditionally been presented by TCEQ in its MSW annual reports. TCEQ data provides an understanding of facilities and capacities at a given point in time and does not incorporate population and economic growth projections.

[35] 2040 NCTCOG Demographic Forecast. NCTCOG Regional Data Center. Accessed February 2021. https://data-nctcoggis.opendata.arcgis.com/datasets/6e99f37880d845758788c18f5a2c36f2_10

wasteshed as a basis for its four percent annual increase. Given these estimates, NTMWD is preparing to protect airspace for the Member Cities among anticipated annual tonnage increases by adjusting its tipping fee to regulate the annual disposal.

4.1.2 Transfer Stations

This section provides an overview of transfer stations, including a description of the current facilities used by the City. Transfer stations are facilities that are used to consolidate MSW from multiple collection vehicles into larger, high-volume transfer vehicles for economical shipment to distant disposal or processing facilities. Transfer stations can be used for material destined for landfilling, recycling, or composting. With a nationwide trend toward larger disposal and processing facilities, there has been an enhanced need for transfer stations. When transport distances are longer, transfer stations allow collection vehicles to be more productive by maximizing the amount of time spent collecting material rather than driving to a distant facility.

Landfill trash, recycling, and yard trimmings collection vehicles may either haul material directly to one of these facilities (referred to as "direct haul") or utilize a transfer station, which aggregates material into larger transfer trailers for more efficient transportation (referred to as "long haul"). There are presently 17 active transfer stations in the NCTCOG region, located among Collin, Dallas, Denton, Ellis, Johnson, Somervell, and Tarrant Counties. Table 4-2 identifies the transfer stations currently in operation in the region as reported by the TCEQ in 2020.[36]

Table 4-2: NCTCOG Transfer Stations and Tonnage Handled, FY 2020

Permit	Permit Holder/Site Name	Owner/Operator	County	2020 Tons[1]
2045A	Custer Solid Waste Transfer Station	North Texas Municipal Water District	Collin	315,048
53A	Lookout Drive Transfer Station	North Texas Municipal Water District	Collin	178,639
1494	Parkway Transfer Station	North Texas Municipal Water District	Collin	109,414
40284	Town and Country Recycling Facility	Champion Waste & Recycling Services	Collin	48,110
1145	Bachman Transfer Station	City of Dallas	Dallas	160,177
60	Fair Oaks Transfer Station	City of Dallas	Dallas	84,100
1453	Southwest Transfer Station	City of Dallas	Dallas	75,804

[36] Texas Commission on Environmental Quality (TCEQ). September 2021. "Municipal Solid Waste in Texas: A Year in Review; FY 2019 Data Summary and Analysis." https://www.tceq.texas.gov/downloads/permitting/waste-permits/waste-planning/docs/187-21.pdf

Permit	Permit Holder/Site Name	Owner/Operator	County	2020 Tons[1]
12	Garland Transfer Station Facility	City of Garland	Dallas	117,078
1263	Mesquite Transfer Station Facility	City of Mesquite	Dallas	64,159
227	University Park Transfer Station	City of University Park	Dallas	13,059
40196	Community Waste Disposal Transfer Station	Community Waste Disposal	Dallas	119,120
2275	North Texas Recycling Complex Transfer Station	Republic Services	Tarrant	4,728
2306A	WC Minnis Drive Transfer Station	Waste Connections	Tarrant	193,327
40052	Southwest Paper Stock Transfer Station	Southwest Paper Stock	Tarrant	24,954
40186	Westside Transfer Station	Waste Management of Texas	Tarrant	215,181
40168	City of Cleburne Transfer Station Facility	City of Cleburne	Johnson	77,395
40181	Somervell County Transfer Station	Somervell County	Somervell	12,169

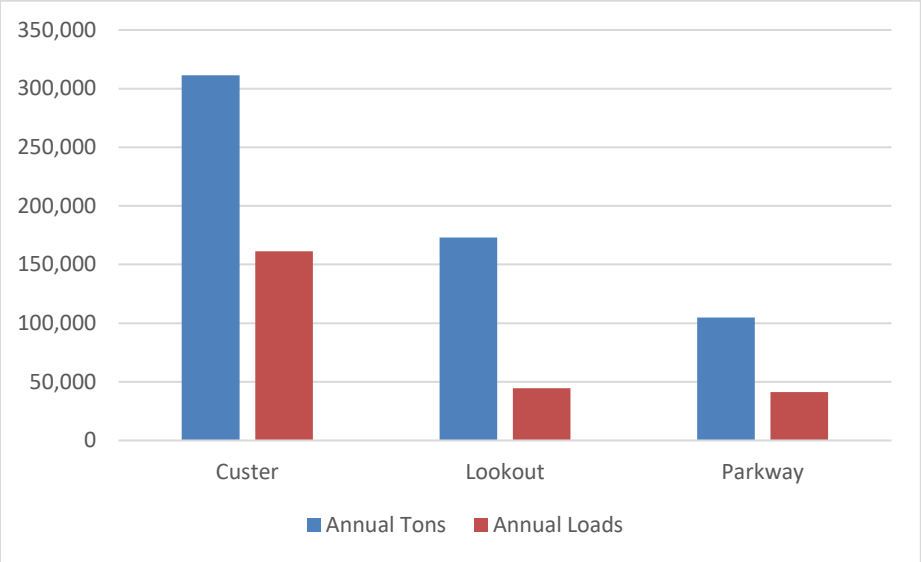
1. Tons represent all material processed at the facility on an annual basis and may include refuse, recycling, and organic waste. Tons presented are based on TCEQ annual reporting data, except for the City of Dallas transfer stations which are based on values provided to Burns & McDonnell directly by the City of Dallas for FY 19-20.

4.1.2.2 NTMWD Transfer Stations

NTMWD utilizes three transfer stations to aggregate material into larger transfer trailers for more efficient transportation to the NTMWD Landfill. The system of transfer stations used to service the Member Cities allows for efficient collection operations and residential drop off services. The transfer process reduces by ensuring that smaller waste collection vehicles do not have to travel additional distances to the landfill, reduces traffic, and limits vehicle emissions associated with waste and recycling collection.

There are three transfer stations currently active and operated by NTMWD including Custer, Lookout, and Parkway Transfer Stations that process and transfer residential and commercial waste. Figure 4-8 shows the 2020 annual refuse tons and number of loads disposed at each transfer station.

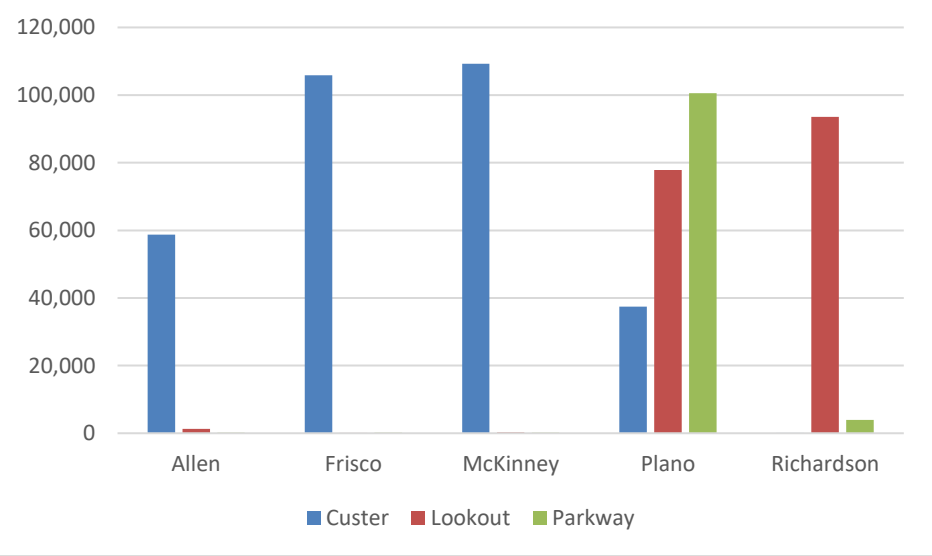
Figure 4-8: Annual Refuse Tons and Loads Processed at Transfer Stations[1]



1. MSW material processed at these facilities includes residential and commercial refuse material, C&D material, and citizen drop off.

The Custer Transfer Station receives significantly more tonnage than the other facilities in the system. Figure 4-9 shows the 2020 annual tonnage disposed by each Member City on a facility-by-facility basis.

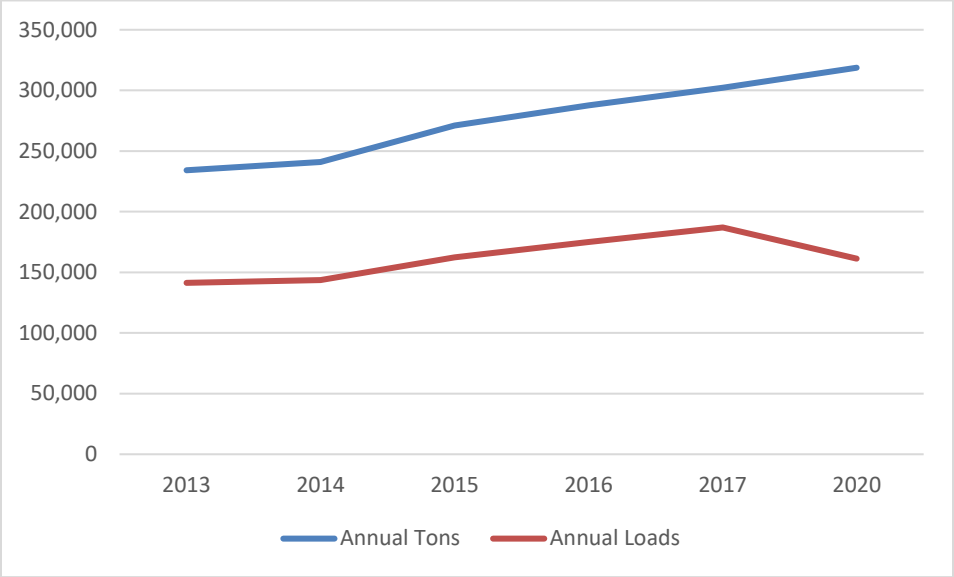
Figure 4-9: Annual Refuse Processed at Transfer Stations by Member City[1]



1. Each city utilizes all three transfer stations. Any bar in this figure representing less than 500 tons is not visible due to the scale of the figure. Residents from Allen, Frisco, and McKinney drop off refuse tonnage ranging from 49-1,341 tons at the Lookout and Parkway Transfer Stations. Richardson residents dropped off 15 tons of material at the Custer Transfer Station.

The population growth among the cities of McKinney and Frisco have contributed to the increase of tonnage and loads processed at the Custer Transfer Station. Figure 4-10 shows the growth in material that has been delivered to the Custer Transfer Station between 2013 and 2020.

Figure 4-10: Custer Transfer Station Annual Tons and Load Growth



Co-located at the Custer Transfer Station is the Custer Road Grind site where Member City residents and third-party commercial generators can drop off tree trimmings and brush to be ground for composting at the NTMWD Landfill. In 2020, over 7,200 tons of organics were collected at the Custer Road Grind site through citizen drop-off.

The permitted daily capacity of the Custer Transfer Station is 1,900 tons, therefore, the facility is required to decline inbound tonnage in the event the facility receives more than this permitted daily capacity. As the demand for disposal service at the Custer Transfer Station grows, NTMWD may face challenges operating at or near capacity including the following:

- Collection vehicles may wait longer to unload, impacting collection routes.
- Collection operations may have to shift to earlier in the day or later in the day.
- The site will become more congested, reducing the space for self-haulers, and increasing interaction between collection vehicles and self-haulers.
- Operations at the co-located Custer Road Grind site may be impacted and limit opportunities to increase organics diversion.

NTMWD must turn away material if the maximum daily permitted capacity is reached. NTMWD is working to develop a new transfer station to optimize the system of transfer stations among the Member Cities. The new facility will primarily serve material generated by Frisco due to the expected transfer station location to the south of Route 380 between the Tollway and Preston Street. Managing material from Frisco at the new transfer station will help alleviate capacity challenges and yield additional capacity to manage material generated by McKinney through the Custer Transfer Station. Currently, Frisco and McKinney each generate one-third of the tonnage managed at Custer Transfer Station; the remaining third is primarily generated in Allen and Plano.

4.1.3 Material Recovery Facilities (MRFs)

This section provides an overview of Materials Recovery Facilities (MRFs) in the region and provides a high-level overview of the Waste Connections MRF located in, and utilized by, the City.

MRFs are designed to receive, process, segregate and bale various recyclable materials and prepare them for sale on the secondary material commodity market. There are presently 11 active MRFs in the NCTCOG region, located among Collin, Denton, Dallas, and Tarrant Counties. Table 4-3 identifies the MRFs currently in operation in the region and provides the owner and/or operator and location.

Table 4-3: NCTCOG Materials Recovery Facilities and Accepted Residential Materials

Permit Holder/Site Name	Owner/Operator	County	Residential Materials Accepted[1]
Waste Connections MRF – McKinney	Waste Connections	Collin	Gen 1
Plano Recycle Center	Republic Services	Collin	Gen 2
Pratt – Denton	Pratt Industries	Denton	Gen 1
CWD Recycling Facility	CWD	Dallas	Gen 2
FCC – Dallas	FCC Environmental Services	Dallas	Gen 2
Balcones – Dallas[2]	Balcones	Dallas	-
Waste Management Dallas Metroplex[2]	Waste Management	Dallas	-
Champion MRF[2]	Champion Waste Services	Dallas	-
Dallas Recycling Facility	Dallas Waste & Recycling Inc	Dallas	-
North Texas Recycling Complex	Republic Services	Tarrant	Gen 2
Waste Management – Arlington	Waste Management	Tarrant	Gen 2

Permit Holder/Site Name	Owner/Operator	County	Residential Materials Accepted[1]

1. Based on 2018 interviews with the respective residential MRF operators. First generation MRFs (Gen 1) report accepted materials as: cardboard, mixed paper, kraft bags, paperboard, office paper, glass bottles and jars, aluminum cans, steel cans, PET bottles and HDPE bottles and jugs. Upgraded or second generation MRFs (Gen 2) report accepting all Gen 1 materials plus cartons, clean pizza boxes, aerosol cans, aluminum foil, PP #5 containers, and bulky plastics.
2. Commercial MRF processing little to no residential recycling.

Across the NCTCOG region, there is a reported total of nearly 600,000 tons per year (TPY) of MRF processing capacity currently installed. There is approximately 65,600 TPY of installed processing capacity at the two MRFs in the Denton-Frisco-McKinney corridor (Waste Connections MRF in McKinney and Pratt MRF in Denton), with the Waste Connections MRF operating at or near current installed capacity. Compared to other MRFs in the region, the Pratt and Waste Connections facilities also accept a more limited set of materials; while other MRFs in the region accept items such as cartons, pizza boxes, and aluminum foil, these facilities do not. As a result, recycling processing opportunity in the northern portion of the North Central Texas region is more limited.

4.1.3.2 City-Contracted Materials Recovery Facility

The City has a collection contract with Waste Connections which includes residential recycling materials. Recyclable materials are processed at the Waste Connections MRF located in McKinney. The facility uses a combination of processing equipment and manual labor to sort and process recyclable materials. As noted in Table 4-4, the Waste Connections MRF accepts a more limited set of residential recyclable materials, and processes the following items from the City:

- Aluminum and steel cans
- Cardboard
- Catalogs
- Cereal and dry food boxes
- Envelops
- Glass bottles and jars
- Greeting cards
- Junk mail
- Magazines
- Newspapers
- Phone books

- Plastic bottles and containers
- Shredded paper
- Waxed cartons

There are other MRFs in the region that could potentially accept the City's recyclable material when the initial term of the contract with Waste Connections expires in 2024[37]. Table 4-4 shows the MRFs in the region that may have the capacity to accept the City's material at a future time. In addition to those facilities listed in Table 4-6, there is at least one other recycling processor looking to build MRF capacity in the Denton-Frisco-McKinney corridor to provided needed capacity and accept additional material types.

Table 4-4: MRFs in Region with Potential Additional Capacity

Owner	Operator	Location
FCC	FCC	Dallas, TX
Pratt	Pratt	Denton, TX
Republic	Republic	Plano, TX

Each of the Member Cities under the waste disposal contract with NTMWD have individual hauling, processing and education programs that support the diversion of single-stream and other recyclables. As recycling commodity end markets fluctuate and processing facility operators are reassessing their existing contracts, the Member Cities may seek to work together to identify cost effective ways to manage their recycling going forward.

4.1.4 Construction & Demolition (C&D) Facilities

This section provides an overview of regional construction and demolition (C&D) processing facilities in the region including Type IV landfills and processing facilities.

4.1.4.1 Type IV Landfill Regional Overview

A Type IV landfill only accepts brush, construction or demolition waste, and other similar non-household or non-putrescible waste (organic waste that decomposes without causing odors or attracting pests). There are four Type IV Landfills in the NCTCOG region as indicated in Table 4-5, including one privately-operated facility located in east McKinney along US 380.

[37] There is an option for the city to extend the contract with Waste Connections for one 5-year term.

Table 4-5: NCTCOG Type IV Landfill Disposal and Remaining Site Lite, FY 2020

Permit	Permit Holder/Site Name	County	2020 Tons	Remaining Site Life[1] (years)
2278	Osttend C&D Waste Landfill/380 McKinney	Collin	222,212	24
1749B	Lewisville Landfill	Denton	10	100
1983C	Fort Worth C&D Landfill[2]	Tarrant	403,606	11
664	City of Stephenville Landfill	Erath	16,290	27

1. Remaining years are calculated based on the annual airspace utilization factors reported to TCEQ for each landfill in pounds per cubic yard.
2. Reflects landfill expansion approved by TCEQ during 2021.

4.1.4.2 C&D Processing Facilities

Champion Waste & Recycling's (Champion) Town & Country Environmental Services in Celina, TX opened in 2015 as a single-stream construction MRF in North Texas. The facility separates construction material using a combination of processing equipment and sorting labor. Materials recycled throughout the process include cardboard, wood, concrete, metal, plastics, wall board, paper, and aluminum. Figure 4-11 shows the type of equipment and labor required as part of Champion's operation.

Figure 4-11: Champion Construction MRF Materials Processing Line

Source: https://www.championwaste.com/

Champion staff assists contractors with generating waste diversion reports that qualify towards a project's Leadership in Energy and Environmental Design (LEED) certification. However, without a regulatory obligation to provide recycled C&D tonnage or diversion metrics, Champion does not generate regular reports regarding the diversion of material from projects in the City. For further discussion on challenges associated with tracking C&D recycling data, refer to Section 9.0.

In addition to Champion's mixed C&D processing capability, there are a number of material-specific processors throughout the region processing materials such as concrete/aggregate and scrap metal and

disposal facilities in the region may manually sort mixed C&D loads to divert high-value materials such as scrap metal.

4.1.5 Organics Processing Facilities

This section provides an overview of organics processing facilities in the region and describes the City's organics processing facility.

TCEQ regulation and oversight of organics processing regulations vary depending on the types of materials a facility accepts and therefore TCEQ does not actively regulate all organics processing facilities. Burns & McDonnell has compiled an inventory of known active organics processing facilities, although there may be additional organics processing operations in the region that are small scale or do not generate a compost product that is marketed commercially.

Table 4-6 identifies major organics processing facilities within the Collin, Denton, Dallas, and Tarrant County areas that accept materials such as yard trimmings and food scraps.

Table 4-6: NCTCOG Organics Processing Facilities and Accepted Materials

Site Name	County	Accepted Materials[1]
Plano Pure Products	Collin	Vegetative materials only
Living Earth	Collin	Vegetative materials only
Sustainable Soil Solutions	Collin	Vegetative materials only
The Organic Recycler of Texas	Collin	Vegetative materials only
City of Denton Yard Waste Facility	Denton	Putrescible and vegetative materials
Living Earth	Denton	Putrescible and vegetative materials
Living Earth	Dallas	Putrescible and vegetative materials
Soil Building Systems	Dallas	Vegetative materials only
The Organic Recycler of Texas	Dallas	Putrescible and vegetative materials
City of Grand Prairie Landfill	Dallas	Vegetative materials only
Hunter Ferrell Landfill	Dallas	Vegetative materials only
Charles M. Hinton Jr Regional Landfill	Dallas	Vegetative materials only
City of Mesquite Municipal Compost	Dallas	Vegetative materials only
Alpine Materials LLC	Tarrant	Vegetative materials only
Living Earth	Tarrant	Putrescible and vegetative materials
Living Earth – Fort Worth SE Landfill	Tarrant	Putrescible and vegetative materials
Living Earth – City of Arlington Landfill	Tarrant	Putrescible and vegetative materials
Silver Creek Materials Recovery Facility	Tarrant	Vegetative materials only
The Organic Recycler of Texas	Tarrant	Putrescible and vegetative materials
Thelin Recycling	Tarrant	Vegetative materials only

1. Accepted materials are categorized as putrescible or vegetative. Putrescible materials have high moisture content and include, but are not limited to, pre- and post-consumer food waste, biosolids, sludge, or liquid waste. Vegetative materials

are cellulosic with low moisture content and include, but are not limited to, tree branches and limbs, grass, shrubs, yard waste, lumber, dry animal bedding, or floral trimmings.

There are two private-sector organics processing facilities near the City, operated by The Organic Recycler and Living Earth. While there are facilities with available capacity, private-sector processors have indicated there are challenges accepting source-separated food waste or yard waste from municipalities directly at their existing facilities due to high levels of contamination.

4.1.5.2 City of Plano NTMWD Composting Facility

The City of Plano operates the Plano Pure Products composting facility at the NTMWD Landfill as a contractor to NTMWD. Yard waste collected by the Member Cities is brought to two composting pads spanning 22 acres based on a memorandum of understanding.

Material generated from the Member Cities contribute to the majority of the 55,000 tons of green waste brought to the site each year, although third-party material is accepted. The pad will need to be relocated in 20-25 years as the location of the operation is on a planned cell of the landfill. Organic material that is processed at the NTMWD Landfill is sold and marketed as Texas Pure Products. Texas Pure Products provides compost, topdressing, potting mix, and mulch to customers via pickup or delivery. Processed material can also be purchased at hardware stores or through partnering landscaping companies throughout North Texas. The products do not typically generate profit, but in the event it does, a profit-sharing agreement is in place among the Member Cities.

Although the City of Plano is able to manage the current amount of material that is delivered to the site, a significant increase in tonnage or type of material may be challenging without infrastructure upgrades and additional staffing (i.e., introduction of wet organic waste such as food waste or sewage).

If there is a growth of organic wastes (i.e., large volume food surplus or food scrap producers) associated with the expected population growth of the City, there may be opportunities to consider the feasibility of alternative collection and disposal at facilities with processing capacity for organics such as anaerobic digesters and other local wastewater infrastructure.

4.2 Current System Findings

The following presents findings regarding key components of facilities in the City's current solid waste management system.

Landfills. The NTMWD Landfill currently has adequate capacity to dispose of material generated by the Member Cities until 2057. However, when the landfill begins approaching the end of its useful life there

will be a need to consider where another facility can be located for the cities to continue receiving services under the current relationship structure. NTMWD has parcels of land adjacent to the current permitted landfill that may be permitted in the future if there is a need to expand the facility. As future tonnage flows shift in the regional wasteshed due to facility closures, there may be an increased volume of material that is brought to the NTMWD Landfill for disposal by third-party haulers and cash customers. NTMWD may need to consider adopting increased fees in an effort to protect airspace for the Member Cities.

Transfer stations. The Custer Transfer Station, the facility most used by the City, has experienced substantial tonnage increases over the past several years. The increasing volume of refuse material delivered and transferred from the facility may cause it to stop operations on days when its maximum daily capacity is exceeded. Additionally, the increasing number of residential drop off customers may become a safety hazard going forward. For these reasons, a new transfer station is being developed to alleviate the strain on the Custer Transfer Station, freeing additional capacity for the City. The new transfer station is expected to be planned, designed, developed and constructed in the next several years.

MRFs. The current contract with Waste Connections for processing recycling materials generated by the City has been sufficient to meet the City's needs, but there may be opportunities to increase diversion. There are other existing and potential new facilities in the region where the City's material could be transported to that could potentially increase the tonnage of material sold to market based on operational efficiencies. Given the limited recycling processing capacity in Collin and Denton Counties and anticipated growth in the region, it is important for the City to plan appropriately for any efforts to increase recycling to identify options for new capacity and/or facilities. Options to consider for developing additional recycling processing capacity include through partnerships with other cities in the area (e.g., Denton, Plano) and exploring the feasibility of NTMWD accepting responsibility for the processing of recycling materials among the Member Cities. Although there is already an agreement among the Member Cities for disposal at the NTMWD Landfill, including recycling may be challenging because each of the Member Cities have individual contracts and systems for recycling collection and processing.

C&D processing facilities. Champion collects and processes C&D material generated in the City through its own contracts. Although there may be other C&D processing facilities in the region, it is unclear how effectively they divert recyclable C&D material. There is an opportunity to track the processing and diversion of this material more effectively by collecting data from construction general

contractors or processing facilities. This may require the City to implement a mechanism for this data collection.

Organics processing facilities. The composting facility operated by the City of Plano as a contractor to NTMWD is sufficient for the current processing needs of the City. If there is a growth in material delivered to this facility, the current operations may not be able manage without increasing the capacity of the facility. Additionally, the composting operation site is within the permitted footprint of the NTMWD Landfill. As a result, the composting pad will eventually need to be relocated to allow landfill operations in those cells. Capacity challenges at the Custer Transfer Station may limit the feasibility of increasing organics diversion through the co-located drop-off and grinding site.

If there is a growth of solid organic wastes (i.e., large volume food surplus or food scrap producers) associated with the expected population growth of the City, there may be an opportunity to consider the feasibility of alternative collection sites and/or facilities with processing capacity for organics such as anaerobic digesters and other local wastewater infrastructure.

4.3 Public-Private and Regional Partnerships

Based on the current system findings, the City will need to rely on a combination of facilities going forward to meet needs for landfilling trash and processing recyclables and organics. There are a variety of approaches that the City can consider to address operational needs, as shown in Table 4-7. This section describes various public-private and regional partnerships that the City could consider going forward to achieve the optimal solid waste management system for landfills, transfer stations, MRFs and organics processing facilities.

Table 4-7: Examples of Public-Private Partnership Options for Recycling Operations

Responsibility	City-Owned and Operated	City-Owned with Private Operations[1]	Privately Owned and Operated on City Land	Processing Services Agreement
Land Ownership	City	City	City	Private
Capital Investment	City	City	Private	Private
Operations	City	Private	Private	Private

1. True public-private partnership

Public-private partnerships. Public-private partnerships (P3) can be an effective model to provide needed infrastructure without the full financial risk falling on either the local government or the private business. Effective public-private partnerships exist when both local governments and the private industry collaborate to share resources, capital investment, risk, and revenue. When considering a public-private partnership, a local government should consider the degree to which it wants to be involved in the operations and capital investment of a facility.

Processing service agreements. An alternative approach is to secure material processing capacity through a processing service agreement (PSA). Under a PSA, the City contracts with a private recycling company that owns and operates a facility at a location owned or leased by the company. Local governments that do not directly provide municipal collection may procure MRF processing services though contracted hauler(s).

There are advantages and disadvantages to the different types of arrangements and which entity takes ownership of the land, capital investment, and operations. While the processing services agreement is the most common option in, public-private partnerships are gaining more appeal as a means to share risk given recent market volatility. Table 4-8 provides an overview of the different public-private partnership options available to local governments and private businesses.

Table 4-8: Advantages and Disadvantages of Approaches to Finance and Operate Processing Facilities

Approach		Advantages	Disadvantages
Land Ownership	**Local Government as Landowner**	• Flexibility with public-private partnership structures. • Local government may already own land. • Potential to co-locate with existing permitted facility with infrastructure (e.g., scale house). • Can retain facility for long-term period. • High control of facility and overall site (e.g. potential future expansion).	• Increased level of effort. • Higher risk to the local government.
	Private as Landowner	• Lower level of effort for local government. • Lower risk to the local government.	• No local government involvement. • Local government will not retain facility in the long term. • Low control of facility and site.
Capital Investment	**Local Government MRF Investment**	• Municipal cost of capital is lower. • Local government may not have to earn a return on capital investment. • Potentially longer depreciation period. • High local control of facility and overall site.	• Large capital outlay for local government. • Potentially longer project schedule. • Higher risk to community. • Potential for limited control over equipment maintenance and upkeep depending on P3 arrangements.
	Private MRF Investment	• No capital outlay required by local government. • Potential for some cost and/or schedule savings due to private-led procurement processes. • Lower risk to local government. • Possible quicker adoption of new technology.	• Higher cost of capital. • Compressed depreciation period to match contract term. • Private company must earn a return on capital investment. • Lower local control over facility and site.
Operations	**Local Government as Processor**	• Local government receives 100% of revenue. • Local control over operations.	• Local government may have limited recycling processing experience. • Community would have sole responsibility for sourcing material. • Local government may have limited in materials marketing capabilities & experience. • Hiring and other aspects of facility staffing may be constrained by public hiring and Human Resources processes.
	Private Company as Processor	• Private company experience with recycling processing. • Local government and private company work together to source material. • Potential to market a large volume of material from multiple facilities to achieve economies of scale. • Sophisticated materials marketing (e.g., hedging, derivatives).	• Local government must manage contractor and provide oversight. • Local government likely to incur processing fee and must share revenue. • Limited local control over operations.

1. Adapted from the 2020 Guide to Community MRF Contracts. More information is available at: https://recyclingpartnership.org/mrf-contracts/

In Texas, many cities provide MSW services either with City resources or through a single private hauler contracted to provide those services. A small number of cities have an open market system in which several private haulers are permitted to operate within the city; however, open market systems are much more common for commercial, rather than residential, services. Generally, cities of smaller size in Texas may choose to contract for MSW services, likely due to limited resources available for operation of a municipal system. Among some smaller cities and many cities with higher populations, there is a split between those that have municipally and privately provided services. This approach is consistent with cities of comparable size in Texas. Table 4-9 shows McKinney and the top 10 largest cities in Texas and how solid waste collection, processing and disposal are managed.

Table 4-9: Comparison Matrix of McKinney and Largest 10 Texas Cities Service Provision[1]

City	Population	Residential Collection			Recycling Processing	Landfill		Transfer Station	
		Refuse	Recycling	Brush & Bulk		Ownership	Operations	Ownership	Operations
McKinney	**195,342**	**P**	**P**	**P**	**P**	**M**	**M**	**M**	**M**
Houston	2,310,000	M	M	M	P	P	P	M	P
San Antonio	1,508,000	M	M	M	P	P	P	M	P
Dallas	1,331,000	M	M	M	P3	M	M	M	M
Austin	950,807	M	M	M	P	P	P	N/A	N/A
Fort Worth	874,401	P	P	P	P	M	P	N/A	N/A
El Paso	679,813	M	M	M	P	M	M	N/A	N/A
Arlington	395,477	P	P	P	P	M	P	N/A	N/A
Corpus Christi	325,780	M	M	M	P	M	P	M	M
Plano	287,064	M	M	M	P	M	M	M	M

1. M = Municipalized, P = Private, P3 = Public-Private Partnership, N/A = Not Applicable

Other regional partnerships. In addition to the P3 options for the development of facilities, there are opportunities for the City to partner with other municipalities in the region to expand material processing capacity or expand services to underserved surrounding communities (e.g., regionalization of HHW services). There are multiple ways in which local governments can successfully partner, including:

- **Special law districts.** The Texas Legislature can establish special law districts with solid waste management authority to handle all aspects of solid waste management within the district's boundaries (e.g., collection, processing, disposal, recycling, composting). Special law districts

can include multiple counties and municipalities, and do not need to be geographically contiguous. An advantage of special law districts is that boundaries, structure, purpose, and authority can all be specifically tailored legislatively. Disadvantages of special law districts include the time and expense involved in establishing such districts, and the political risks. For example, voter disapproval of a regional solid waste authority could substantially delay or derail efforts to develop and implement a long-term solid waste strategy for the region.

The North Texas Municipal Water District (NTMWD), of which the City is a member, is an example of a legislatively created special law district responsible for solid waste management. The NTMWD manages and operates three transfer stations, four citizen convenience drop-off centers, and the 121 Regional Disposal Facility landfill.

- **Interlocal cooperation agreements or joint-use ownership.** Interlocal agreements are contracts that can be used by local government entities to perform or provide government services including to establish solid waste agencies or authorities. The creation of a solid waste agency through interlocal agreement is more flexible than legislatively developed special law districts, as details such as the structure and management of the agency are determined by the contract itself; however, these agencies may lack powers typically associated with special law districts such as the ability to issue bonds or levy taxes.

  The Texoma Area Solid Waste Authority (TASWA) was created from a cooperative agreement between Cities of Gainesville, Denison, and Sherman and Grayson and Cooke Counties to provide a solid waste disposal facility (and a recycling facility until 2009). Interlocal agreements are also commonly used to provide a specific solid waste service (e.g., an interlocal agreement to allow county residents to participate in a city's home chemical collection program). For example, Dallas County facilitates a regional HHW program for 16 member cities through its interlocal agreement, with each member city paying a portion of the program's disposal, operations, and capital costs.

Based on the current system findings, the following paragraphs provide perspective on current and/or potential partnerships for the City:

Landfill and transfer stations. Members Cities flow all refuse material under their control to the NTMWD Landfill as part of the existing partnership with NTMWD. The NTMWD partnership is advantageous for the City and provides some of the same benefits of a traditional public-private partnership such as having the capital improvements and operations be the responsibility of NTMWD.

MRFs. The current agreement with Waste Connections has been sufficient to meet the City's recycling processing needs. The current agreement and future needs are discussed in more detail in the discussion of Single Family Residential materials (Section 5.0). There are opportunities to expand processing through partnerships with surrounding communities through intergovernmental approaches. A more coordinated approach to managing recycling material would allow participating cities to realize increased economies of scale and other system-wide efficiencies.

Organics processing facilities. The current composting pad at the NTMWD Landfill is operated by the City of Plano. The City of Plano is a contractor that operates as a private sector company would in a typical public-private partnership. If the type or volume of organic material at this facility increases over time, it would benefit the Member Cities to explore the potential of a more robust operation including alternatives to the drop-off and grinding operation at the Custer Transfer Station. Additionally, the NTMWD Landfill is expected to expand to the site where the composting pad is located, so eventually the composting operation will need to be relocated.

Household hazardous waste (HHW) management. The City currently manages HHW through a call-in collection program, and does not have a facility permitted for drop-off. As neighboring communities look to expand HHW facilities and programs that include additional hard-to-recycle materials (e.g., film plastic, expanded polystyrene) and reuse opportunities, there is potential opportunity for the City to partner with these communities through interlocal agreements to provide additional diversion opportunities to residents and realize financial benefits of economies of scale. The City's approach to HHW management, strategies, and options are discussed in more detail in a dedicated Household Hazardous Waste section (Section 6.0).

4.4 Listing of Strategies and Options

This section provides the strategies and options developed regarding the MSW management facilities and infrastructure utilized by the City. Strategies and options have been developed to align with the established Guiding Principles of the SWMS (refer to Section 1.0).

1. **Explore options for an alternative MRF processor.** In anticipation of the expiration of the existing contract for collection and processing of residential recycling in 2024, the City would benefit from exploring future options by maintaining open dialogue with private processors that may be able to provide these services or regional entities (e.g., NTMWD) that could help multiple cities collaborate on processing options. [**Priority:** High; **Timing:** Near-term]

2. **Ensure future MSW disposal capacity**. Although the NTMWD Landfill has sufficient disposal capacity in the near term, over time the City should coordinate with NTMWD to secure long-term disposal by supporting long-term capital planning for future landfill facilities. Additionally, the City should continue work with NTMWD to determine contingency plans if the transfer station under development if the timeline is delayed. [**Priority:** High; **Timing:** Long-term]

3. **Identify opportunities for increased organics diversion.** The City should continue to support the development of expanded organic diversion programs (e.g., yard waste, food surplus). To effectively develop an expanded organics diversion program, this could include partnership between NTMWD and the City to develop and finance additional drop-off and grinding capacity located in McKinney to alleviate capacity and space challenges at Custer Transfer Station. [**Priority:** Medium; **Timing:** Long-term]

Table 4-10 provides a summary of the impact of each strategy or option based on the following criteria, with brief descriptions.

Table 4-10: Evaluation of Options for Facilities and Infrastructure

Description	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "buy-in"	Sustainability of Operations
Explore Options for an Alternative MRF Processor						
Description: In anticipation of the expiration of the existing contract for collection and processing of residential recycling in 2024, the City would benefit from exploring future options by maintaining open dialogue with private processors that may be able to provide these services	Low	Low	N/A	N/A	Medium	High
Ensure Future MSW Disposal Capacity						
Description: Coordinate with NTMWD to secure long-term disposal by supporting long-term capital planning for future landfill facilities	Low	Low	N/A	N/A	Medium	High
Identify Opportunities for Increased Organics Diversion.						
Description: The City should continue to support the development of expanded organic diversion programs (e.g., yard waste, food surplus).	Varies	Varies	Medium	Varies	High	Medium

5.0 SINGLE-FAMILY RESIDENTIAL

The services and support the City provides to the single-family sector are particularly important in shaping the City's overall MSW management culture. Many residents' primary experiences and awareness of solid waste and recycling management are in their own homes, every day, and the majority of the City's population lives in single-family homes. Therefore, the City is able to reach a large portion of its residents through single-family residential services, outreach, engagement and education. These are the channels by which the City can most directly communicate with and effectively shape a positive experience for individuals and families. This section provides an overview of single-family residential services, current system findings, and identifies potential strategies and options for future management.

5.1 Single-Family Overview

The City provides a high level of base MSW services to single-family households, with various additional disposal and diversion opportunities for residents who need to manage larger volumes of materials or special and hard-to-manage material types. Curbside services include weekly cart-based collection of refuse and single stream recyclables, weekly yard trimmings collection, and bulky item collection upon request, provided by the City's exclusive residential services contractor, Waste Connections. The City provides curbside HHW and electronics recycling collection service to residents upon request. Drop-off opportunities are provided for residential customers through the NTMWD at the Custer Road, Lookout, and Parkway Transfer Stations, and the 121 RDF Landfill (NTMWD Landfill) for material types including household refuse, recyclables, bulky items, and yard trimmings. Some drop-off opportunities are available to residents at no additional cost and some are available for additional fees.

5.1.1 Current Services

Curbside residential services are summarized in Table 5-1. Additional information is provided following Table 5-1, as well as a summary of drop-off services and additional materials management opportunities available to residents.

Table 5-1: Franchised Single-Family Residential Services

	Refuse	Recyclables	Bulky Items	Yard Trimmings
Base Rate and Fees	Monthly rate: $16.96 + tax; $6.60 per additional cart; extra collections provided for additional fees	Service included in base rate; $1.52 per additional cart; extra collections provided for additional fees	Service included in base rate; Residents may request bulky item collection up to 12 times per year at no additional cost	Service included in base rate
Collection Frequency	Weekly	Weekly	Upon request	Weekly
Material Types	Household refuse (non-recyclable, non-hazardous)	Single stream: metal, plastic and glass food, beverage, and other containers; paper, paper products, cardboard, waxed cartons	Items too large for refuse cart; large household pieces such as mattresses, furniture, washers and dryers, water heaters[1]	Grass clippings, leaves, plants, small cuttings, brush and tree limbs
Collection Container/ Method	95-gallon cart	95-gallon cart; some legacy 65-gallon carts are still in use	Items set out at curb, no container	Compostable paper bags, bundles
Setout Limits/ Requirements	Bagged refuse in cart; out-of-cart materials are not accepted	Bagged recyclables in cart; out-of-cart materials are not accepted	Items must fit in an area 3.5 feet tall by 3 feet deep by 9 feet wide; limit of two large household pieces	Limit 10 bags/bundles per collection, each not exceeding 50 pounds or four feet in length
Disposal or Diversion Method	Landfilled	Diverted; processed at MRF and recovered materials are marketed	Landfilled	Diverted; mulched or composted
Additional Information			Refrigerators, freezers, and air conditioners without proof of freon evacuation can be brought directly to the NTMWD Landfill	Mulched and/or composted material can be purchased through Texas Pure Products

1. Bulky item collection does not include C&D, treated wood or fencing, dead animals, HHW, automotive parts, ammunition, tires, yard waste, or out-of-cart bagged refuse. Refrigerators, freezers, and air conditioners will not be collected unless proof of freon evacuation is submitted and verified prior to collection date.

Refuse. Refuse collection service is provided once per week to single-family residential customers using 95-gallon carts. Weekly residential refuse collection frequency is standard in the MSW industry. Refuse is disposed at the NTMWD Landfill in Melissa, Texas.

Recycling. The weekly cart-based single stream recycling service provided to residents is highly utilized and yields a strong recycling rate for the residential sector (refer to Section 5.1.2). However, there have been challenges for the program, primarily including recycling contamination (including "wish-cycling") and overfilled carts due to the large number of boxes. While the curbside recycling program started with 65-gallon carts, the program has increased to 95-gallon carts (which the majority of residents now have). Despite the increase in cart size, residents still face challenges with overfilled carts especially due to the increasing portion of boxes in the recycling stream. Boxes or other recyclables that do not fit into the cart are collected through the bulky item program and sent to landfill. Based on data provided by the City for a random sample of bulk routes in 2021, boxes were included in 23 to 43 percent of bulk setouts.

Contamination is a challenge as a result of many factors, including wish-cycling by residents who place non-recyclable items in the carts hoping that the items can be recycled now or in the future. Contamination and wish-cycling can be targeted through the City's public outreach, engagement and education efforts, as described in Section 13. The City's recycling processor (Waste Connections MRF) has noted high residual rates (i.e., the amount of material, both recyclable and non-recyclable) that is not recovered through the MRF) which is influenced by a number of factors including incoming contamination rate, MRF design and equipment age, operating speed, etc. Waste Connections MRF reported recent and planned upgrades to infeed and sorting equipment, including installation of optical sorters, to improve plastics and glass recovery at the facility.

Yard trimmings. The City provides weekly curbside yard trimmings collection service for smaller amounts of yard trimmings generated by residential customers. Yard trimmings material collected through curbside services is composted or mulched at the Regional Composting Facility at the NTMWD Landfill. Collection of yard trimmings is not a "routed" service, and as a result it can be easy to miss setouts. Missed collections may be collected the next week or taken to a NTMWD transfer station.

Quantities of yard trimmings material collected through residential programs also varies widely based on seasonal variations, climate, abundance of vegetation, and the maturity of a City's neighborhoods. As the City's vegetation matures in new development (e.g., larger trees) and the single-family population continues to grow (e.g., more yard maintenance activities), the City expects that yard trimmings quantities collected through City services will increase over time.

Bulky items. The City provides curbside bulky item collection at no additional cost to residents for up to 12 collections per calendar year at no additional cost. Service is provided by appointment only upon the resident's request made via a form on the City's website. The request is sent to the City's contractor for scheduling and service. The City is currently in the process of transitioning to using the ReCollect app for service requests. As described above, recyclable cardboard boxes are included in a large portion of bulk pickup requests. These are often too large (or too many) to fit in the recycling cart, and are instead disposed through the bulk program.

Frequency of service for bulky collection programs varies greatly among cities, from weekly to annually, and set-out limits (i.e., number of items or cubic yards allowed per collection) vary from restrictive to unlimited material quantities. The City provides a convenient, frequent bulky item collection service with large set-out limits. Bulky material can also be self-hauled by residents and dropped off at NTMWD transfer stations.

City-provided curbside collection. Curbside collections of additional materials are provided by City staff, including a curbside HHW program (discussed in more detail in Section 6) and electronics recycling. Upon request, the City provides curbside collection of these materials to residents, up to 12 times per year for each program at no additional cost. On-request curbside HHW and electronic waste programs represent a high level of convenience and service offered by the City.

Drop-off opportunities. In addition to the comprehensive curbside collection services provided by the City, McKinney residents also have ample opportunity to dispose of or recycle a wide array of materials at several locations.

NTMWD Landfill and transfer stations. Residents of NTMWD Member Cities receive two free drop-offs per month at the four NTMWD citizen convenience centers and must provide proof of residency to utilize drop-off services. Drop-off locations provide additional opportunities for disposal (e.g., household trash, furniture, fencing, grills, lawn mowers, bicycles, etc.) and hard-to-recycle materials (e.g., large metal appliances, used oil and oil filters, tires, and brush). Of the three transfer stations operated by the NTMWD, the Custer Road Transfer Station is the location most highly utilized by McKinney residents. In 2020, Custer Road received approximately 20,400 individual visits from McKinney residents and 105,500 visits from all NTMWD Member Cities. This equates to an average of 67 McKinney residents per day of operation, and 344 total visits per day. This extensive utilization of the transfer station highlights the potential need for development of another regional transfer station facility, as discussed in Section 4.1.2.

Material recovery facility (MRF). The Waste Connections MRF in McKinney offers drop-off of single stream recycling during operating hours from 8 a.m. – 4 p.m. Monday through Friday and 8 a.m. – 12 p.m. on Saturday. Acceptable items are: glass bottles and jars, plastic bottles and jugs, beverage cartons (e.g., milk), aluminum cans, newspapers and magazines; cardboard boxes (flattened), paperboard boxes (e.g., cereal boxes), mail and paper, shredded paper in bags, and food cans.

5.1.2 Comparison to Benchmark Cities

This section provides an overview of MSW services provided for the single-family sector for the benchmark cities of Frisco, Allen, Rowlett, Coppell, Colleyville, and The Colony. Table 5-2 provides a summary of the single-family services each benchmark city provides with monthly base rates and the frequency of collection for each service.

Generally, the City provides comparable service types as each of the benchmark cities. The City's monthly residential base service rate falls in the middle of the six cities. Four of the six cities' residential monthly base rates fall within ten percent of the City's current rate of $16.96. Allen's rate is approximately ten percent lower than McKinney; however, recycling services are provided on an every other week basis.

Two of the benchmark cities provide twice weekly refuse collection, including one with a bag-based program (i.e., carts are not provided). All but one of the benchmark cities provide weekly curbside single-stream recycling collection. Service frequencies provided by the benchmark cities for brush/bulky item collection and yard trimmings collection are more variable than refuse and recycling services.

All benchmark cities provide HHW service to residential customers in some capacity, though service details vary. Two provide curbside service to residents, similar to McKinney; however, services are provided by the benchmark cities' contractors and not by the cities directly. HHW services are discussed in more detail in Section 6.0.

Table 5-2: Single-Family Residential Services Benchmark Comparisons

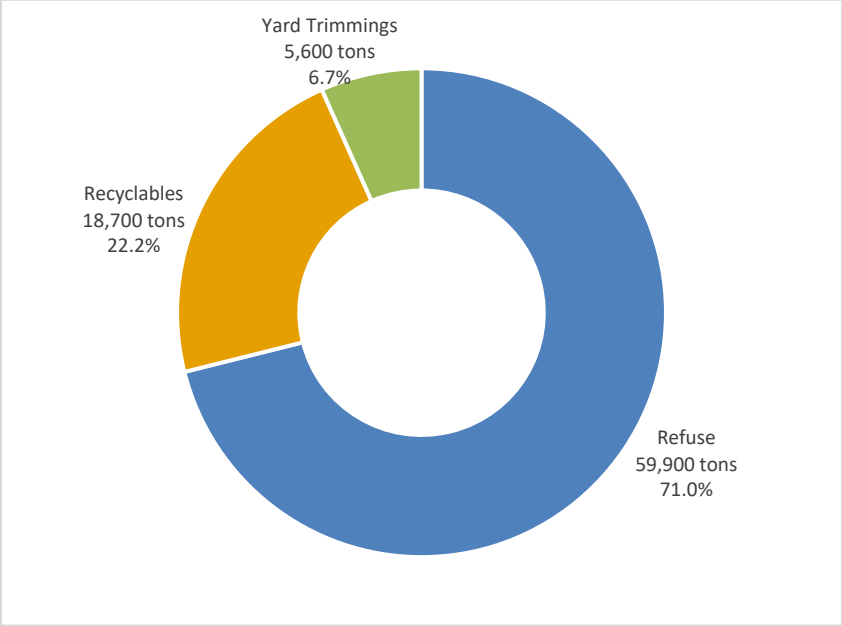
	McKinney	Allen	Frisco	Colleyville	Coppell	The Colony	Rowlett
Base Rate[1]	$16.96	$15.59	$17.00	$16.76	$17.80	$19.29	$19.01
Refuse							
Provided with base rate	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Collection frequency	Weekly	Weekly	Weekly	Twice per week	Twice per week[2]	Weekly	Weekly
Recyclables							
Provided with base rate	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Collection frequency	Weekly	Every other week	Weekly	Weekly	Weekly	Weekly	Weekly
Bulky Items							
Provided with base rate	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Collection frequency	Up to 12 per year	Monthly	Monthly	Twice per week	Twice per week	Twice per month	Weekly
Yard Trimmings							
Provided with base rate	Yes	Yes	Yes	Yes	Yes	Yes	Not provided
Collection frequency	Weekly	Weekly	Weekly	Seasonally[3]	Weekly	Weekly	N/A[4]
HHW							
Provided with base rate	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Collection frequency	Curbside; up to 12 per year	Drop-off[5]	Drop-off	Curbside; once per month	Curbside; once per month	Drop Off	Drop-off[5]

1. Base rates do not include sales tax paid by customers.
2. Bagged (non-cart) service where residents are allowed up to 10 bags of solid waste per service day.
3. Seasonal leaf pick-up is provided on six dates from November through January. Tree limbs are collected twice per week as part of the bulk program.
4. Brush is collected once per week as part of the bulk program.
5. HHW drop-off service provided as part of an interlocal agreement with City of Plano (for the City of Allen) and Dallas County (for Rowlett)

5.1.3 Material Generation, Recycling, and Disposal

The single-family residential sector is the sector for which the City has the most comprehensive understanding of current material generation, recycling, and disposal activity. This is because the large majority of residential material is collected and processed through City-contracted and NTMWD services and facilities, and data tracking is consistent and more comprehensive. Figure 5-1 presents the City's tonnage and percentage of single-family residential material by type for 2020.

Figure 5-1: 2020 Single-Family Residential Material Distribution[1]



1. HHW materials were small components of single-family residential generation and are not reflected in this chart. Refer to Table 5-3 for detailed single-family generation by material type.

In 2020, the single-family sector generated approximately 84,300 tons of material. Of total residential generation, approximately 59,900 tons (or 71 percent) were disposed in the landfill. Residential disposal accounts for approximately 39 percent of the City's total landfill disposal.

Single stream recyclables comprise most of the residential material diverted from landfill disposal, with approximately 18,700 tons recycled in 2020.[38] Approximately 5,600 tons of yard trimmings were diverted for composting in 2020. The City's current overall single-family residential recycling rate (including composting) is approximately 28.9 percent. An estimated 48 tons of HHW were collected by

[38] Single stream recycling quantities included in the SWMP represent tons of City residential-generated material delivered to the MRF. These quantities include some percentage of recycling contamination. The City has not conducted a recent recycling audit and does not currently have data regarding recycling contamination rates. The MRF owner-operator (Waste Connections) reported an estimated 58.8 percent residual rate for 2020.

the City from single family residential. Table 5-3 provides a summary of residential generation, recycling, and disposal, including distribution on a per-household basis.

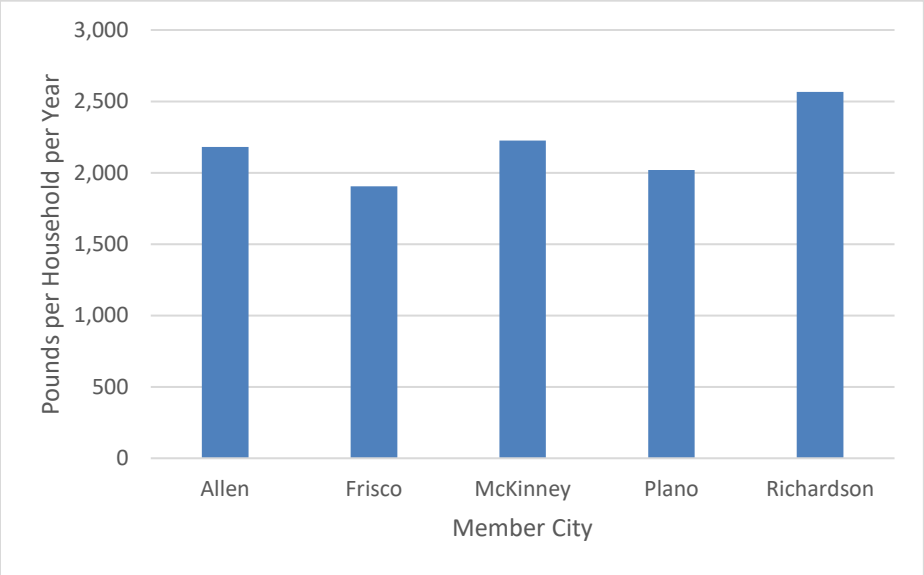
Table 5-3: 2020 Detailed Single-Family Residential Material Distribution

Material Type	Total Tons	Pounds per Household[1]	Percent of Total Generation
Refuse (Landfilled)	59,881	2,225	71.0%
Recyclables (Diverted)[2]	18,697	695	22.2%
Yard Trimmings (Diverted)[3]	5,635	209	6.7%
HHW (Diverted)[4]	100	3.7	0.1%
Total Generation	**84,313**	**3,133**	

1. Annual pounds per household was calculated by dividing the total annual amount of material by the number of active residential customers serviced by the City's contractor (53,836) in 2020.
2. Recyclables tonnage reflects the quantity of material collected through the City's curbside recycling collection service and includes contamination delivered to the MRF.
3. Yard trimmings tonnage reflects the quantity of material collected through the City's curbside yard trimmings collection service and data provided by the NTMWD. A portion of yard trimmings material generated is collected by private residential landscaping contractors. The total generation, diversion, and disposal quantities of yard trimmings are not currently available.
4. Estimated based on available data for the number and type of items collected by the City. Most HHW material collected by the City is recycled or otherwise diverted, though a portion is collected for safe disposal.

Figure 5-2 shows the pounds per household per year landfilled by the member cities in 2020 to compare the generation trends among Member Cities disposing refuse at the NTMWD Landfill. Frisco, which has the lowest disposal rate of the Member Cities, has developed multiple successful programs to divert materials from the residential stream including hard-to-recycle materials through the Environmental Collection Center (ECC).

Figure 5-2: Disposal Among Member Cities in 2020 (Pounds per Household per Year)



The number of pounds of recyclable material collected per household per year is often used as a performance metric for curbside recycling programs. Based on a 2019 study conducted by The Recycling Partnership surveying 436 cities across the country, the national average for the amount of single stream recyclables collected curbside is 440 pounds per household per year.[39] **At 695 pounds per household per year, the City's residential curbside single stream recycling program generates quantities of recyclables higher than the national average.**

Figure 5-3 compares the yard waste diversion rates (pounds per household per year) for each of the NTMWD Member Cities. Based on composting reports from the Regional Composting Facility, McKinney has the lowest yard waste diversion at 209 pounds per household per year. Many factors can contribute to a lower diversion rate through City services, including that households may receive landscaping and yard maintenance services from private contractors who haul material from their home. This is the case in Frisco, which estimates that 70-80 percent of households receive landscaping services and therefore manage materials outside of the City of Frisco yard waste program.

[39] The Recycling Partnership. February 13, 2020. "2020 State of Curbside Report." https://recyclingpartnership.org/wp-content/uploads/dlm_uploads/2020/02/2020-State-of-Curbside-Recycling.pdf

Figure 5-3: Yard Waste Diversion Among Member Cities in 2020 (Pounds per Household per Year)

Food waste diversion is of growing interest nationally, and some Texas cities (i.e., Austin, Plano) currently offer or are considering implementing residential food waste diversion programs. Within the North Central Texas region, there are private companies (e.g., Turn Compost, Compost Carpool, Champion Waste & Recycling Services) offering or planning to offer subscription-based food waste composting services. McKinney residents may participate in these subscription-based third-party programs through drop-off collection; however, currently the closest drop-off locations for these providers are in Frisco and Carrollton. It is not known if any McKinney residents currently participate in these programs.

5.1.4 Current System Findings

Robust service offerings. The City offers a robust set of curbside residential MSW services and has an effective delivery system in place that provides a 'one day total service plan.' The City's agreement with its Contractor (Waste Connections) provides curbside collection services for a wide range of MSW materials for disposal and diversion, which are included in residents' monthly service rate. In addition, the City and NTMWD provide many opportunities for drop-off collection of MSW, including hard-to-recycle materials that are not accepted through traditional curbside programs. Section 14.1 provides an evaluation of the City's current collection contract and recommendations to maintain the City's robust single family service offerings for the upcoming RPF process.

Effective single stream residential recycling program. With an average of 695 pounds per household collected annually for recycling, the City has an effective single stream recycling program that generates

quantities of recyclables higher than the national average. This quantity reflects the material that is collected and is not adjusted for contamination.

Low yard trimmings diversion rates through City services. The City offers separate weekly yard trimmings collection and diversion, which is a high frequency compared to many other Texas cities. However, yard trimmings diversion rates through City services are low when compared to other cities with well-established programs. The Regional Composting Facility at the NTMWD Landfill has limited capacity to accept and process additional quantities of yard trimmings from City services.

5.2 Listing of Strategies and Options

This section presents strategies and options developed for the single-family residential sector that the City will further consider for implementation. Recommendations specific to the contracting of single-family residential services are provided in Section 14. The recommended strategies and options were developed to align with the established Guiding Principles of this SWMP (refer to Section 1.0).

1. **Encourage recycling and reuse of bulky materials.** The City provides opportunities to dispose of bulky items through its franchised curbside collection program and drop-off opportunities at the transfer station at no additional cost to customers. City staff also provide recycling opportunities for electronics recycling and HHW at no additional cost for up to 12 requests for each service. The City should incorporate additional efforts to educate customers and facilitate recycling and reuse opportunities for bulky items. This could include a one-time "new resident" collection option for boxes and packing paper to recycle these materials, rather than these materials being disposed through the bulk program. [**Priority:** Medium; **Timing:** Near-term; [**Program(s):** Waste Reduction/Diversion; Outreach, Engagement & Education]

2. **Maintain customer participation in the curbside residential yard trimmings program and privately-provided services.** Residential yard trimmings materials are currently managed through a combination of privately-provided landscaping services and City-provided curbside collection. The current City-provided service is non-routed, and effectiveness could potentially be improved by transitioning to a routed service or otherwise address missed collections resulting from the current approach. The yard trimmings processing facility currently utilized by the City faces some challenges managing incoming material but generally has adequate capacity to process current City-collected quantities. The facility would have limited capacity for additional quantities. Given McKinney's proximity to the Regional Composting Facility, the City could consider regional collaboration to provide a potential site for a new organics grinding facility.

[**Priority:** Low; **Timing:** Mid-term; **Program(s):** Waste Reduction/Diversion; Outreach, Engagement & Education]

3. **Consider long-term options for food scraps diversion, including ways to support third-party subscription programs to expand into McKinney.** Food scraps are a major component of the waste stream and therefore present significant opportunity for increased landfill diversion. However, efficient and cost-effective food scrap collection and composting programs typically require large quantities of material and large processing capacities. Establishing a food scraps collection program would likely require regional collaboration, as the current permit and operations of the Custer Road grinding operation and Regional Composting Facility prevent residents from being able to comingle vegetative food scraps in their yard trimmings bags sent to Custer Road. Subscription-based third-party compost services currently operate in the North Central Texas region, but not currently within McKinney or nearby areas of Collin County. The City could consider ways to plan for and support expansion of these services to the McKinney area (e.g., awareness/outreach of service options, ordinance revisions, franchise agreement(s)) such that the desires of residents interested in food waste diversion can be met in an safe manner consistent with ordinance, code, and permit requirements. [**Priority:** Low; **Timing:** Long-term; **Programs(s):** Waste Reduction/Diversion]

Table 5-4 provides a summary of the impact of each strategy or option based on the following criteria, with brief descriptions.

Table 5-4: Evaluation of Options for Single-Family Residential

Description	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "buy-in"	Sustainability of Operations
Encourage Recycling and Reuse of Bulky Materials						
Description: Facilitate recycling and reuse opportunities for bulky items, including a one-time "new resident" collection option for boxes and packing paper to recycle these materials, rather than these materials being disposed through the bulk program.	Medium	Medium	Medium	Low	High	Medium
Maintain Customer Participation in the Curbside Residential Yard Trimmings Program						
Description: Maintain customer participation in the curbside residential yard trimmings program and privately-provided services.	Low	Low	Medium	N/A	High	Medium
Consider Long-Term Options for Food Scraps Diversion						
Description: Consider long-term options for food scraps diversion including third-party subscription options for residents	Varies	Varies	Medium	Varies	High	Medium

6.0 HOUSEHOLD HAZARDOUS WASTE

This section provides an overview of the City's programs to manage household hazardous wastes and other hard-to-recycle materials such as electronic wastes and identifies potential strategies and options for future management.

6.1 Household Hazardous Waste Overview

The purpose of a household hazardous waste (HHW) program is to provide residents with access to safe and proper disposal options for household materials that are not suitable for disposal in a landfill or for collection with other curbside residential programs (refer to Section 6.1.1 for materials accepted under the program). Local provision of convenient HHW disposal options decreases the potential for improper disposal with other MSW or illegal dumping of environmentally harmful materials.

6.1.1 Current Services

Curbside collection of HHW and electronic materials are provided by City staff. Upon request, the City provides curbside collection of these materials to residents, up to 12 times per year for each program at no additional cost. Residents submit a service request using the online HHW pick-up and e-waste pickup forms the City's website or by phone. HHW and e-waste collection follows trash routes, and residents receive a scheduled HHW or e-waste pick-up appointment on same service day as their other solid waste and recycling services. In 2020, residents submitted approximately 5,400 requests for service.

The City collects HHW and e-waste using pickup trucks, and are able to service approximately 25-30 households daily. Collections occur in the morning (7:00 a.m. – 11:00 a.m.) and collected materials are sorted and processed in the afternoon by City staff at the City's HHW storage building. Allowable HHW quantities are tied to the size of the processing and storage area. The new public works building provides additional space for the HHW program. The City partners with private companies to properly recycle or dispose of collected materials through contracts for HHW (Green Planet), electronic recycling (United Electronic Recycling), and fats, oils and grease (American Bio Resource).

HHW. The City contracts with Green Planet Inc. for transportation, handling, recycling and safe disposal of HHW materials. The range of HHW materials accepted through the HHW program includes:

- Acid-based cleaners
- Acid-based, lithium and rechargeable batteries
- Aerosol cans
- Ammonia-based cleaners
- Antifreeze
- Automobile batteries and battery acid
- Car wax and cleaners
- Cleaning solvents
- Drain and oven cleaners
- Emergency flares
- Fats, oils and grease
- Filters and power steering fluid
- Fire extinguishers
- Floor care products
- Fluorescent bulbs
- Kerosene and lighter fluid
- Paint (latex and oil-based) stains, remover and thinners
- Mercury thermometers and thermostats
- Metal polishes
- Motor oil and oil filters
- Pesticides, insecticide, herbicides and fertilizers
- Pet care products
- Pool chlorine, muriatic acid and shock treatment
- Printer and ink cartridges
- Propane cylinders (BBQ / Camping)
- Smoke detectors
- Transmission and brake fluid
- Window cleaner
- Wood preservatives
- Furniture polish and varnish
- Gasoline and diesel fuel

Electronic materials. The City contracts with United Electronics Recycling for transportation, inventorying, and recycling of e-waste materials. The range of electronics accepted through the e-waste program includes:

- Home computers
- Printers
- Scanners
- Keyboards
- Mice
- Fax machines
- Televisions
- Receivers
- Projectors
- DVD / Game Consoles

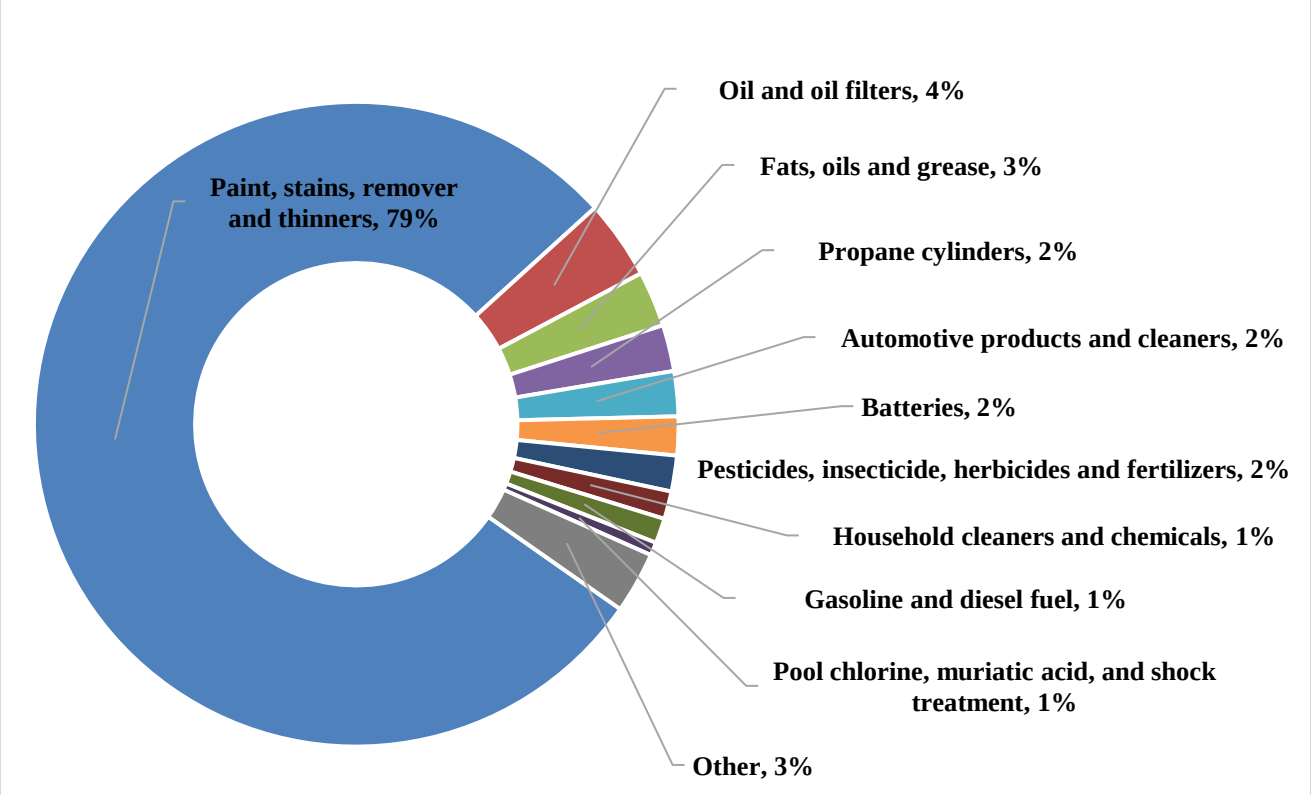
Other hard-to-recycle materials. Other hard-to-recycle materials can include items such as tires, expanded polystyrene (EPS, Styrofoam), plastic film/bags, and textiles. Residents can drop off certain hard-to-recycle materials (e.g., large metal appliances, used oil and oil filters, tires) at NTMWD transfer

stations. The City of Frisco's Environmental Collections Center (ECC) EPS self-service drop-off is open to non-Frisco residents and is therefore an option for McKinney residents who wish to recycle EPS. Retail drop-off is available for some hard-to-recycle items, commonly plastic film/bags (e.g., at many grocery stores) and batteries/small electronics (e.g., at some hardware or electronics stores). Medication is not accepted through the City's HHW program; however, the City's Police Department participates hosts free and anonymous drug take-back events where residents and non-residents can safety dispose of prescription and non-prescription medications.

6.1.2 Material Generation, Recycling, and Disposal

In 2020, the City received 5,400 service requests for HHW or e-waste collection, equivalent to approximately 10 percent of single-family households. While the number of service requests can include non-participating events (e.g., "missed collections" where residents did not have items at the curb at the necessary time), a participation rate of 10 percent represents a high level of participation for HHW programs and likely reflects the high level of service and convenience of a curbside program compared to more common program types. Other HHW program implementation types are described in Section 6.1.3.

Figure 6-1: HHW Materials Collected in 2020, by Weight



Based on information provided by the City, an estimated 48 tons of HHW were collected in 2020, of which the majority by weight was paint, stains, remover and thinners (as shown in Figure 6-1). Other common items were oil and oil filters, fats, oils and grease (FOG), propane cylinders, and automotive products and cleaners. Additionally, the e-waste program collected 3,324 items in 2020, the most common of which were televisions (657 items), power cords (430 items), computer parts (378 items), computers and laptops (315 items) and printers (226 items).

6.1.3 Benchmarking and Case Studies

The City's on-call curbside programs represent a high level of convenience and service offered by the City. Other program types can be lower cost (on a per household or per ton basis), but due to the decreased convenience can experience lower participation rates than curbside HHW programs. The existing HHW program options available to municipalities are listed in Table 6-1.

Table 6-1: Household Hazardous Waste (HHW) Program Options

HHW Program Option	Operational Service Frequency
Permanent HHW Facility	Six days per week
Curbside Collection (regular or on-call)	Once per month to unlimited
Mobile HHW Collection Trailer	Multiple times per week
Collection Events	One or more times per year

- **Permanent HHW facilities** are sites where items can be dropped off by the public on a regular basis. Permanent facilities generally operate with a set schedule and often include weekend or evening hours to allow residents to visit outside of standard business hours. On days when permanent facilities are not open to the public, facility staff is often on-site to process collected materials for hauling and proper disposal.

    - **Case Study:** The City of Fort Worth owns and operates a permanent facility providing HHW and hard-to-recycle material drop-off to residents of Fort Worth and 50 neighboring cities. The Environmental Collection Center (ECC) is open Thursday through Saturday, providing evening and weekend hours for convenience. Facility staff work three additional days each week to sort, process, and package materials to be picked up by the contracted disposal company. The permanent facility drop-off program is supplemented by mobile collection events, with around 75 events held throughout Fort Worth and neighboring areas. ECC program costs are $47.43 per customer.

- **Curbside collection (regular or on-call)** reflects a high level of convenience and service for residents and may be provided as a special service for residents with limited mobility or as an on-request service city-wide (with or without additional fee).

- **Mobile HHW collection trailers** are used to hold regular collection events at determined intervals (e.g., monthly, quarterly, bi-annually) at varying locations throughout a service area. Mobile collection events may be an alternative to building a permanent facility or can be used to supplement permanent drop-off facilities. Typically, a mobile vehicle or trailer with appropriate safety features (e.g., ventilation, explosion-proof, and material separation) is owned by a city and staffed full- or part-time by trained personnel. In addition to use for mobile collection, trailers can be used as part of a door-to-door collection program to increase vehicle capacity along a route. Traditionally, mobile HHW collection is focused on HHW program materials to maximize space available for potentially hazardous materials.

- **Collection events** are single-day drop-off opportunities held at designated intervals (e.g., seasonal, annual). Cities may experience challenges with periodic collection events due to factors such as limited site options, higher-than-anticipated participation, and challenges with traffic control due to overall volume and foot traffic. Generally, collection events are a common option to provide HHW service without having a permanent facility. As a result, costs may be higher than city-operated facilities since all material handling and disposal is contracted with a private company. For example, a recent HHW event in Cedar Park, Texas served approximately 1,000 residents at a cost of $89 per customer, which is higher per customer than other HHW program types.

6.1.4 Current System Findings

The following presents findings regarding key components of the City's HHW and e-waste programs.

The City provides a high level of service and convenience with curbside HHW and e-waste recycling programs. The City's high participation rate reflects this high level of service compared to other program types (i.e., permanent drop-off facility, collection events). Depending on the volume and locations of requests for a given week, there can be challenges to get across town and service all requests; during peak volumes, there are more requests than can be serviced and residents must wait multiple weeks between the service request and the pick-up appointment.

Collection or drop-off opportunities are available for some hard-to-recycle materials. City residents can access opportunities to recycle (or safely manage) some hard-to-recycle materials through City

services (e.g., e-waste collection, NTMWD transfer station drop-off, medication collection events). These services have varying levels of convenience and participation, and may be city-operated, result from interlocal partnership (i.e., NTMWD) or be dependent on programs/services of nearby cities (i.e., EPS self-serve drop-off at the City of Frisco's ECC).

6.2 Listing of Strategies and Options

This section presents strategies and options developed for HHW, e-waste, and other hard-to-recycle materials that the City will further consider for implementation. The recommendations and strategies were developed to align with the established Guiding Principles of the SWMS (refer to Section 1.0).

1. **Continue providing curbside HHW and e-waste recycling services.** The City's current offering of on-request curbside HHW and e-waste recycling services represents a high level of service. Incremental improvements are planned or can be made to the program, such as the planned implementation of the ReCollect app to streamline electronic service request and tracking. The City should also continue to periodically review and re-bid HHW, e-waste, and FOG management contracts to ensure services remain cost-competitive and provide any developments in best management practices. [**Priority:** Medium; **Timing:** Long-term; **Program(s):** Waste Reduction/Diversion; Procurement; Code Compliance]

2. **Explore opportunities to expand diversion opportunities for hard-to-recycle materials.** The City offers collection or drop-off opportunities for a variety of hard-to-recycle material. For some materials where the City does not offer recycling, residents may use programs operated by the private sector (e.g., grocery store drop-off) or other cities (e.g., City of Frisco EPS recycling drop-off). There are potential opportunities for the City to expand diversion of hard-to-recycle materials, including:

    - The City of Frisco is looking to develop a new HHW facility in North Frisco and is exploring opportunities for regional coordination. The City could potentially coordinate with Frisco to provide McKinney residents with access to expanded opportunities for hard-to-recycle materials.

    - The NCTCOG provides grants to support program expansion to support the effort to for planning and implementation of increased diversion efforts. The City could prepare and submit grant applications to expand its capacity for diverting hard-to-recycle material through new or existing City-operated programs.

[**Priority:** Medium; **Timing:** Long-term; **Program(s):** Waste Reduction/Diversion]

3. **Consider additional monitoring of illegal dumping.** The services provided through the HHW and e-waste programs provide an outlet for residents to dispose of materials that might otherwise be illegally dumped and result in potential environmental contamination. Currently, illegal dumping is handed outside of Public Works by the City's Police Department. If challenges with illegal dumping become more pronounced, the City should consider if additional efforts are needed to monitor and mitigate illegal dumping. For example, the City could establish a crew that monitors and mitigates illegal dumping (e.g., two full time employees (FTEs) and a vehicle) to develop survey studies to analyze where more collection equipment should be added or moved in the field. [**Priority:** Low; **Timing:** Mid-term; **Program(s):** Police Department; Code Compliance]

Table 6-1 provides a summary of the impact of each strategy or option based on the criteria identified and described in Section 1.

Table 6-2: Evaluation of Options for HHW, E-Waste, and Hard-to-Recycle Materials

Description	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "buy-in"	Sustainability of Operations
Continue Providing Curbside HHW and E-Waste Recycling Services						
Description: The City's current offering of on-request curbside HHW and e-waste recycling services represents a high level of service. Incremental improvements are planned or can be made to the program, such as the planned implementation of the ReCollect app to streamline electronic service request and tracking.	Low	Low	Medium	N/A	High	High
Explore Opportunities to Expand Diversion Opportunities for Hard-to-Recycle Materials						
Description: For some materials where the City does not offer recycling, residents may use programs operated by the private sector (e.g., grocery store drop-off) or other cities (e.g., City of Frisco ESP recycling drop-off). There are potential opportunities for the City to expand diversion of hard-to-recycle materials such as through partnerships and grant funding.	Varies	Varies	Varies	Varies	High	Medium
Consider Additional Monitoring of Illegal Dumping						
Description: The City should consider if additional efforts are needed to monitor and mitigate illegal dumping. For example, the City could establish a crew that monitors and mitigates illegal dumping	Low	Low	Low	Low	High	High

7.0 MULTIFAMILY RESIDENTIAL

For purposes of this SWMS, the multifamily sector refers to residential properties within the City having greater than four individual housing units (e.g., apartment complexes, condominiums, etc.) and which do not receive curbside cart collection service under the City's residential solid waste and recycling program. Similar to the commercial and institutional sector (discussed in Section 8.0), the City's contractor provides exclusive refuse collection services for multifamily properties and recycling collection services are provided through an open market system on a voluntary basis.

In 2021, an estimated 25 percent of the City's total households were multifamily households.[40] As presented in Section 3.1.2, the City expects its population to continue significant growth. As this population growth continues, it is likely that the percentage of the City's population living in multifamily households may increase, compared to single-family households. As the City's population density increases and current urban development trends of more walkable, mixed-use, and higher-density residential developments are implemented, the City may need to consider the impacts it may have to multifamily MSW services.

This section provides an overview of MSW services provided to multifamily residents, current system findings, and identifies the City's priorities for the sector and potential strategies for future management.

7.1 Multifamily Overview

From an MSW services perspective, the multifamily sector is distinct from the single-family and commercial sectors, though it shares characteristics with both. Material generation profiles are similar to the single-family sector, with the exception of yard trimmings, which are not generated by multifamily households. Material collection needs for the multifamily sector are significant due to the aggregation of residents at a single location (multifamily property), but the direct customers are property owners and managers rather than households or residents. Service is typically provided via dumpsters and roll-off containers or compactors, similar to commercial collections. Multifamily material is comingled with commercial material upon collection. Therefore, a thorough understanding of material capacity requirements is not available for the multifamily sector.

[40] Based on the 2021 estimates provided in the City of McKinney Population Estimate memorandum, and as shown in Section 3 (Table 3-2).

7.1.1 Current Services

Generally, most multifamily properties are serviced with front load dumpsters, which can provide landfill trash and recyclables collection services. Some multifamily properties in the City choose to provide residents with at-your-door valet service in addition to on-site dumpster access. This is a growing trend both within the City and for the broader multifamily sector across the country. Multifamily properties may choose to receive roll-off service as well. Other single-family residential services, including bulky item collection and yard trimmings collection, are not provided to residents living in multifamily properties.

Property managers or owners are billed by the City's contractor (Waste Connections) for MSW services based on the commercial MSW services rates and rate structure (discussed in Section 8.0).

Refuse and disposal services. Generally, most multifamily properties are serviced with front load dumpsters for refuse services and receive service through the City's contractor. Some properties are serviced regularly with compactor or roll-off containers. Use of compactors is often more efficient and effective for property owners to provide centralized service at a convenient location for residents. Some multifamily properties choose to provide their residents with at-your-door valet collection service in addition to on-site refuse container access (i.e., centralized dumpster, compactor, or roll-off). Valet service is a growing trend for the broader multifamily sector across the country.

Tonnage generated by the multifamily and commercial sectors are combined during collection and at the Custer Transfer Station, and reported together. Therefore, it is difficult to determine the proportion of the City's overall refuse that is generated by multifamily residents. However, an estimated 17-18 percent of refuse tracked as commercial refuse may be generated by multifamily households, indicating that there may be significant opportunity for increased recycling through efforts focused on the multifamily sector (refer to Section 7.1.2).

Separate collection of bulky items is not provided to multifamily properties through City services and properties do not typically provide separate collection to residents through independently contracted services. The generation rate of bulky waste by multifamily households is unknown, and all collected material is disposed as refuse in the multifamily property's regular refuse collection containers (dumpsters or roll-off).

Recycling insight. While there are currently no requirements for the provision of recycling services by multifamily properties, some properties choose to offer recycling collection services. For those that do, there is no requirement for multifamily properties to use the City's contractor; however, the City is not aware of any multifamily customers that use a non-franchise provider for recycling service. Only a portion of the City's multifamily properties provide recyclables collection in addition to landfill trash collection. Further, most multifamily properties that provide recycling in addition to landfill trash collection have a significantly lower weekly recycling capacity than landfill trash capacity. This leaves a significant portion of the multifamily population that must either dispose of recyclables with landfill trash or find recycling options on their own. Residents have the option to self-haul recyclables to the recycling drop-off facility located at the Waste Connections MRF; however, service ease and convenience are important factors that impact participation in any program.

By law, the City cannot require recycling participation due to the intrinsic value of the material; however, the City has taken approaches to encourage multifamily recycling. The minimum service level for commercial collection fees is one garbage and one recycling container (McKinney Code of Ordinances, Chapter 86 -30). Additional development standards could be used to encourage new builds to designate space on the site plan for recycling enclosures (refer to Section 7.1.3 for City of Frisco case study).

7.1.2 Material Generation, Recycling, and Disposal

Because multifamily material is comingled with commercial material upon collection, insight into multifamily solid waste and recycling generation is limited. Burns & McDonnell developed an estimate for the proportion of commercial refuse that may actually be generated by multifamily households, based on single-family per household refuse generation, number of multifamily households within the City, and a reduction factor (refer to Section 3.3.2 for further detailed description of methodology). It is estimated that 20 percent of commercial refuse, or approximately 12,800 tons, was generated by multifamily households in 2020. This would equate to 8.4 percent of the City's total refuse tonnage.

Because multifamily material is co-collected with commercial material, specific landfill trash and recyclables tonnage data for the multifamily sector is limited and the actual multifamily recycling quantities are unavailable.

7.1.3 Comparison to Benchmark Cities

This section provides an overview of MSW services provided for the multifamily sector for the benchmark cities in the North and Central Texas regions.

Like McKinney, most cities provide landfill trash and recycling collection services to multifamily properties and residents in the same way they provide commercial services. Typically, multifamily properties are subject to the same MSW services rate structure as commercial customers; however, in New Braunfels most multifamily residents pay the same monthly base rate as single-family residents directly to the city. Section 8.0 Commercial and Institutional provides further information regarding commercial rates and services.

Cities typically do not provide bulky waste or organics collection services for multifamily customers. If a multifamily property chooses to provide these services to their residents, they would contract directly with the service provider of their choice authorized to operate with their city.

Most of the benchmark cities reported challenges increasing multifamily recycling participation. Cities reported that many multifamily residents have inquired about or requested to be provided with recycling services. The primary issues noted are that multifamily properties are not required to provide recycling services in most cities and a general lack of space for recycling containers at multifamily properties.

Cities can address challenges with multifamily recycling through a variety of options and approaches, including:

- Expanded drop-off service
- Recycling-related development requirements
- Mandatory multifamily recycling ordinances
- Mandatory hauler-provided recycling services

These options, most of which require city ordinance to be enacted, are described in more detail in Section 12.0.

7.1.4 Current System Findings

Nature of multifamily services. The multifamily sector is similar to the commercial sector in terms of billing and provision of services; however, service needs and MSW generation of individual multifamily households are more similar to the single-family sector with the exception of yard trimmings and bulky waste. Yard trimmings are not generated by individual multifamily households but may be generated through property landscaping. Generation rates of bulky waste by multifamily households are unknown but are likely generated at lower rates than for single-family households.

Recycling participation and rates. Currently, a relatively low percentage of multifamily properties provide on-site recycling access to multifamily residents. Therefore, it is likely that there is a significant potential for increasing recycling rates for multifamily households. Specific data for multifamily single-stream recycling rates is not available because material is collected with the same equipment and services as commercial material.

Property owner engagement. Multifamily property owners and managers are not generally interested in providing recycling services to residents. Some may offer recycling because of both resident demand and corporate sustainability initiatives. Multifamily properties may generally be interested in collaborating with and receiving support from the City to provide MSW services in a cost-effective and convenient manner for residents.

Multifamily resident motivation. Convenient access and sufficient capacity are the primary determining factors in whether multifamily residents participate in a recycling program. While a property may have a recycling dumpster, if it is not easily accessible or if containers are regularly overflowing, residents may still dispose of recyclables in landfill trash containers.

Planning for recycling infrastructure and future needs. Limited space, inconvenient configuration, or lack of infrastructure is often prohibitive to providing increased recycling collection as a city experiences growth. As part of the New Code McKinney Initiative, the City has been updating development code. Although the City cannot require multifamily or commercial entities to recycle, development code has been used in other areas to require planning for recycling infrastructure including designating space for recycling enclosures.

Urban development trends impact multifamily services. With current urban planning and development trends, the City is likely to have more high-density residential developments and mixed-use developments as growth continues. These types of properties may present additional challenges for cities to provide MSW services and may require new and innovative programs and services in the future to maximize MSW diversion. The impact of development trends (e.g., SmartCode) is discussed in more detail in Section 14.0.

7.2 Listing of Strategies and Options

This section presents strategies and options developed for the multifamily residential sector that the City will further consider for implementation. Some strategies and options developed for the commercial and institutional sector (refer to Section 8.3) may also be applicable for the multifamily residential sector.

The recommended strategies and options were developed to align with the established Guiding Principles of this SWMP (refer to Section 1.0).

1. **Explore options for tracking multifamily materials separately from commercial materials.** While the multifamily residential sector has similarities to both the commercial and single-family residential sectors, it also has unique characteristics which require specialized programs and outreach for effective solid waste and recycling management. Currently, multifamily data is tracked combined with commercial. Developing a comprehensive understanding of multifamily material streams and quantities is an essential step to developing and implementing effective multifamily strategies for future materials management. [**Priority:** High; **Timing:** Mid-term; **Program(s):** Waste Reduction/Diversion, Franchise Agent]

2. **Explore options to ensure multifamily properties provide adequate and effective recycling service capacity.** The City can consider options such as implementing guidelines or requirements for the inclusion of recycling enclosures in new multifamily development, and minimum service frequency or capacity (e.g., on a per-unit basis, comparable to single-family capacities) may help ensure effective multifamily recycling services and maximize diversion potential. [**Priority:** Low; **Timing:** Long-term; **Program(s):** Environmental Code Compliance, Franchise Agent]

3. **Increase engagement and support for multifamily property owners.** The City should identify methods to incentivize and support multifamily property owners and managers to participate in educational efforts for their residents and provide tools for them to more effectively engage with residents around topics of solid waste and recycling. The City should also directly support property owners and managers in procuring and utilizing recycling services and equipment onsite. **Priority:** Low; **Timing:** Long-term; **Program(s):** Outreach, Engagement & Education]

Table 7-1 provides a summary of the impact of each strategy or option based on the criteria identified and described in Section 1.

Table 7-1: Evaluation of Options for Multifamily Residential

Description	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "buy-in"	Sustainability of Operations
Track Multifamily Materials Separately from Commercial Materials						
Description: Explore options for tracking multifamily materials separately from commercial materials, such as through hauler permitting.	Low	Low	N/A	Medium	Medium	Medium
Ensure Multifamily Properties Provide Adequate and Effective Recycling Service Capacity						
Description: The City can consider options such as implementing guidelines or requirements for the inclusion of recycling enclosures in new multifamily development, and minimum service frequency or capacity (e.g., on a per-unit basis, comparable to single-family capacities) may help.	Medium	Medium	Medium	High	Varies	Medium
Increase Engagement and Support for Multifamily Property Owners						
Description: Incentivize and support multifamily property owners and managers to participate in educational efforts for their residents and provide tool for them to more effectively engage with residents around topics of solid waste and recycling.	Low	Low	N/A	Low	High	Medium

8.0 COMMERCIAL AND INSTITUTIONAL

The commercial and institutional sector consists of non-residential customers, including commercial businesses and institutional entities such as schools, hospitals, and local government facilities. In 2021, there were approximately 1,300 individual commercial and institutional accounts receiving services from the City's contractor.[41] Most refuse customers are serviced with front load dumpsters (with capacity ranging from 2-10 cubic yards), and smaller numbers are serviced with commercial carts, or other service (e.g., bagged or customer-owned carts).[42] In this sector, the type, size, and number of containers and collection frequency each customer receives is based on the unique needs of the business or institution. MSW service needs of commercial and institutional customers vary widely across the sector, ranging from small offices or retail businesses, to busy restaurants, to large campuses with hundreds of employees and hospitals or schools with large cafeterias serving many patients, students, and staff. This section provides an overview of commercial and institutional services, current system findings, and identifies the City's priorities for the sector and potential strategies for future management.

8.1 Commercial and Institutional Overview

The City's contracted service provider exclusively provides commercial refuse collection via front load dumpsters, commercial carts, compacting dumpsters, and roll-off containers to commercial and institutional customers within the City limits. Commercial recycling collection and processing services are provided via an open-market system of private recyclable material haulers permitted by the City. Yard trimmings and brush collection is not provided to commercial customers under the City's current contract and many entities contract independently with landscape contractors for maintenance and material removal.

8.1.1 Current Services

Refuse services. Commercial refuse services are available utilizing front load, roll-off, or compacted containers and are included in the City's current exclusive solid waste services contract with Waste Connections. Commercial customers choose the size of refuse container, number of containers, and collection frequency that fits their needs. The commercial rate structure is based on the level of service the customer receives (container and collection frequency). A small number of commercial customers

[41] Based on data provided by the City's contractor. Commercial and institutional recycling services are provided via an open market system and are not contracted through the City. As detailed in Section 14, a significant portion of Downtown commercial customers participate in shared dumpster service without having an active customer account.
[42] Based on data provided by the City's contractor, in 2021 there were 1,151 refuse dumpster accounts, 80 commercial refuse carts, 18 compactor accounts, and 6 commercial accounts serviced by bagged or customer-owned refuse containers.

requiring less disposal capacity choose to receive refuse service via 95-gallon carts and are serviced and billed as part of the residential refuse collection program.

- **Service Initiation.** To establish service, each new commercial and institutional customer must contact the City's contractor (Waste Connections) directly to initiate solid waste services at their property. Waste Connections also manages billing and account services for all commercial and institutional customers.
- **Roll-off services.** Temporary roll-off service is also provided by the City's contractor for commercial and institutional customers requiring large amounts of disposal capacity for purposes such as construction, remodeling, or demolition projects. C&D recycling services are provided through the City's licensed hauler and independent contractors and the City actively works to encourage customers to seek disposal alternatives. C&D debris material and services are discussed in further detail in Section 9.0. of this SWMS.
- **Other services.** Commercial waste services do not include free bulky item or HHW, or the use of the public landfill.

Recycling services. The City does not contract for commercial recycling services. Commercial businesses and institutional entities that elect to provide recycling services at their properties and facilities can contract independently through the City's contractor or a private hauler permitted by the City to collected and transport commercial and/or construction recyclable materials.[43]

Due to the current open market system, the City has limited insight into commercial recycling activities within the City and has limited means by which to effectively engage commercial businesses to encourage recycling and increase landfill diversion. While non-license-agreement private haulers are required to obtain a permit from the City to collect and transport commercial and/or construction recycling materials, comprehensive data is not available for quantifying commercial recycling participation rates or material quantities.

By law, the City cannot require recycling participation due to the intrinsic value of the material; however, the City has taken approaches to encourage commercial recycling. The minimum service level for commercial collection fees is one garbage container (McKinney Code of Ordinances, Chapter 86 -30). The City could consider options for increasing formal involvement in commercial recycling in order to support customers and the City's goals of sustainable materials management. Additional development

[43] As of 2021, 207 commercial or institutional customers had recycling services through the City's contractor, including a total of 52 commercial recycling carts in service.

standards could be used to encourage new builds to designate space on the site plan for recycling enclosures (refer to Section 8.1.3 for City of Frisco case study).

Organics. Similar to commercial recycling activities, commercial organics collection is not provided by the City and data for the material stream is limited. Customers that elect to divert organic materials must contract independently with a service provider. Organics materials generated by commercial and institutional entities generally consists of landscaping debris, brush, and food scraps.

- **Landscaping debris and brush**. Most commercial and institutional entities contract with private landscaping service providers for property maintenance. These contractors haul material from the property and commercial landscaping material quantity data is not available to the City.
- **Food scraps.** Commercial and institutional entities may contract separately (directly with a service provider) to receive separate collection of food scraps. Within the City, there are several large commercial and institutional generators of food scraps who have set internal food scraps diversion goals. A number of these large entities are actively working to further develop food scraps diversion programs. Successful development by the private sector of such programs would support increased local and regional organics processing capacity. This would, in turn, provide opportunity for the City to expand its food scraps diversion and overall city-wide diversion rate.

8.1.2 Material Generation, Recycling, and Disposal

In 2020, the commercial sector generated approximately 42 percent, or 63,700 tons, of the disposed material collected under the City's contract with Waste Connections. This includes an estimated 12,800 tons of refuse generated by multifamily households, because commercial and multifamily material is often comingled upon collection. Commercial recycling services within the City are provided via an open-market system and therefore quantities of commercially generated recyclables are not available.[44]

Material streams generated by individual commercial and institutional entities vary widely and are highly dependent on the nature and size of the operation. An entity's waste characterization largely determines the types of services, service capacity, and service frequency required. For example, a restaurant, school, hospital, or other entity with cafeteria services may generate large quantities of food scraps which require frequent, potentially daily collection. A small retail establishment or small office may generate a small

[44] In 2020, Waste Connections reported 3,200 tons of recycling from commercial customers in the City of McKinney

amount of refuse and primarily require management of paper, cardboard and other packaging materials, which requires less frequent collection.

Because the commercial and institutional sector typically encompasses a wide range of customer types and material management needs, implementing strategies for this sector will require a varied approach by the City. Some potential strategies may be effective for the majority of commercial customer, and some customers will require flexible or different strategies to effectively manage material and increase landfill diversion. The City currently has limited insight into commercial and institutional material streams, and additional analysis would be required to better understand material generation. Developing a thorough understanding of the commercial and institutional solid waste and recycling needs would allow the City to develop and implement more targeted strategies for effective material management moving forward.

8.1.3 Comparison to Benchmark Cities

This section provides an overview of commercial refuse and recyclables collection services provided for the commercial and institutional sector the benchmark cities in the North and Central Texas regions.

Table 8-1 provides a comparison of current commercial refuse service rates, on the basis of monthly cost per cubic yard of collection capacity. Average monthly rate (based on six and eight cubic yard front load dumpsters) ranged from $3.41-$8.03 per cubic yard for benchmarked cities with the City having a higher rate than half of these cities at $4.50 per cubic yard. There may be multiple factors impacting the City's relatively higher rate, such as collection efficiencies, distance to disposal facilities and the cost of disposal.

Table 8-1: Comparison of Commercial Refuse Services Rates

Benchmark City	Average Monthly Rate per CY[1]
McKinney	$4.50
Allen	$3.78
Frisco	$3.41
Colleyville	$3.89
Coppell	$4.60
The Colony	$4.17
Rowlett	$8.03
Denton	$6.18

1. Rates include cost of collection and cost of disposal and are based on average monthly rate per cubic yard for six and eight cubic yard front load dumpsters.

Most services provided to the commercial and institutional sectors for benchmark cities are provided by private haulers. This includes a combination of exclusive service contracts and open franchise systems. Franchising of commercial recycling haulers is a common approach for municipalities and may be further evaluated by the City for future implementation, as discussed further in Section 8.2. For example, the City of Denton provides all commercial refuse services with city crews, with commercial recycling service available through the City or from licensed haulers.

Cities can address challenges with commercial recycling through a variety of options and approaches, including:

- Recycling rewards and recognition programs.
- Recycling-related development requirements.
- Mandatory commercial recycling ordinances.
- Mandatory hauler-provided recycling services.
- Material disposal bans.

These options, most of which require city ordinance to be enacted, are described in more detail in Section 13.

8.1.4 Current System Findings

Commercial customers and MSW management needs are diverse. This sector encompasses businesses and institutions of widely varying sizes and MSW streams, which have varying needs for MSW management. Effective management of commercial MSW and enhanced recycling rates for this sector will require a mix of widely applicable programs and services, and specialized support or education for different customer types.

Limited data available for commercial recycling. The City has access to reliable and regular refuse generation and disposal data from its contractor and the NTMWD. Recycling data, including the number of commercial customers receiving recycling services and the quantities of recyclables collected within the City, is limited. Commercial recycling services are provided through an open market system of permitted haulers, and the City does not currently have a mechanism to comprehensively track recycling quantities. The City could require data to be provided by haulers as part of the private hauler permitting process described in Chapter 86 of the City of McKinney Ordinances. Hauler reporting requirements are described in more detail in Section 13.

Opportunity for increased recycling. The number of commercial establishments that currently receive recycling services is unknown, but the City estimates that a large percentage do not currently recycle or recycle only limited materials. Nearly half of the City's landfill disposal tonnage is generated by the commercial sector. Based on the statewide waste characterization and regional capture rate data presented in Section 3.5, there is likely significant opportunity for increasing the City's diversion through commercial recycling services.

Opportunity for increased organics diversion in the future. A portion of commercial and institutional customers are large generators of organic material, such as food scraps, including restaurants, schools, hospitals, and other entities with cafeteria services. While a small portion of these customers currently separates food scraps for composting and diversion, most organic material is collected and disposed with refuse. Similar to recyclable material, statewide and local waste characterization data show a significant opportunity for diversion through separate organics collection and processing. As local organics processing infrastructure and markets develop, organics diversion services and programs may become more viable in the future.

8.2 Listing of Strategies and Options

This section presents strategies and options developed for the commercial and institutional sector that the City will further consider for implementation. The recommended strategies and options were developed to align with the established Guiding Principles of this SWMP (refer to Section 1.0).

1. **Explore options to enhance data tracking and understanding of commercial and institutional material streams.** Developing a comprehensive understanding of material streams and quantities of material generated by the commercial and institutional sector is an essential step to developing and implementing effective strategies for current and future materials management. Options that the City should consider include, but are not limited to:

    - Establish mechanisms incentivizing or requiring commercial recycling collection and data transmittal to the City; this may be facilitated as improvements to the existing hauler permitting requirements, or by incentive programs or other ordinances (e.g., as part of a recycling enclosure ordinance, as a component of a future franchise system)
    - Develop commercial waste characterization and recycling studies, including at the MRF, to better understand the amount of material generated and recovered from the commercial sector

    [**Priority:** High; **Timing:** Mid-term; **Program(s):** Waste Reduction/Diversion, Franchise Agent]

2. **Explore options to ensure commercial and institutional properties provide adequate and effective recycling service capacity.** The City currently has limited ability to establish consistent services throughout the commercial sector, to oversee commercial operations, promote program participation, or obtain consistent and reliable data from the commercial and institutional sector. Current policy prevents the City from requiring recycling due to the intrinsic value of materials; however, there are other available policy approaches which may provide additional opportunities to encourage or incentivize diversion activities. The City should consider a phased approach of implementing policy tools. In the near- to mid-term, the City could implement options such as guidelines or requirements for the inclusion of recycling enclosures in new commercial development, and minimum service frequency or capacity to help ensure effective commercial recycling services and maximize diversion potential. In the long-term the City could consider options such as a commercial recycling ordinance and/or a franchise system for commercial recycling. [**Priority:** Medium; **Timing:** Long-term; **Program(s):** Environmental Code Compliance, Franchise Agent]

3. **Consider providing technical assistance programs for new and existing commercial customers.** Currently, commercial accounts including new customers are managed directly by Waste Connections. The City could provide informal guidance to new commercial establishments at the time customers initiate their solid waste services account with the City, and upon request by existing customers, such as right-sizing services. Right-sizing supports customers in determining the optimal service configuration for the size and nature of their business and is also an opportunity for the City to provide recycling education to the commercial sector. This has the potential to increase awareness of diversion opportunities and increase engagement and participation. [**Priority:** Low; **Timing:** Long-term; **Program(s):** Waste Reduction/Diversion; Outreach, Engagement & Education]

Table 8-2 provides a summary of the impact of each strategy or option based on the criteria identified and described in Section 1.

Table 8-2: Evaluation of Options for Commercial and Institutional Residential

Description	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "buy-in"	Sustainability of Operations
Enhance Data Tracking of Commercial and Institutional Material Streams						
Description: Explore options for tracking commercial and institutional materials separately, such as through hauler permitting and/or composition studies.	Low	Low	N/A	Medium	Medium	Medium
Ensure Commercial Properties Provide Adequate and Effective Recycling Service Capacity						
Description: Consider options such as guidelines or requirements for the inclusion of recycling enclosures in new commercial development, and minimum service frequency or capacity to help ensure effective commercial recycling services and maximize diversion potential.	Medium	Medium	Medium	High	Varies	Medium
Consider Providing Technical Assistance Programs for Commercial Customers						
Description: The City could provide informal guidance to new commercial establishments at the time customers initiate their solid waste services account with the City, and upon request by existing customers, such as right-sizing services.	Low	Low	N/A	Low	Medium	Medium

9.0 DISTASTER AND STORM DEBRIS

The City provides services in the event of disasters or other declared emergency events (e.g., storms) to manage the large amounts of debris such as brush and C&D materials that can be generated. This section provides an overview of disaster and storm debris management, current system findings, and identifies potential strategies and options for future management.

9.1 Disaster and Storm Debris Overview

Disaster and storm debris management involves two key components: debris removal (hauling) and debris monitoring. An effective debris removal program is responsible for safe and efficient hauling of debris materials to monitoring and/or disposal sites. An effective debris monitoring program is responsible for accurate documentation of debris removal and disposal quantities and associated costs.

The Federal Emergency Management Agency (FEMA) provides financial assistance to local governments through its Public Assistance (PA) program for costs associated with debris removal and debris monitoring. It is important for the City to perform these activities consistent with FEMA guidance to be eligible for cost reimbursement through FEMA.

9.1.1 Current System Findings

Debris management plan is in place. The City developed its most recent Disaster Debris Management Plan in 2019. Since the publication of the City's plan in 2019, new FEMA guidance has been released (March 2021).

Pre-positioned contracts are in place. The City recently renewed its pre-positioned contracts for debris hauling and monitoring, which enable the City to activate these services as needed in an expedited manner. These contracts each include a primary and alternate for redundancy. Monitoring contracts are with distinct companies that are separate from hauling contracts to avoid any conflict-of-interest potential.

The current debris management plan has not been triggered or undergone a tabletop exercise. To ensure staff are familiar with their roles and have the necessary training to be successful if the plan is triggered, the City should consider performing a tabletop exercise of the Disaster Debris Management Plan.

9.2 Listing of Strategies and Options

The recommended City-wide strategies and options were developed for the City's consideration to align with the established Guiding Principles of this SWMP (refer to Section 1.0).

1. **Perform tabletop exercise of the Disaster Debris Management Plan.** Performing a tabletop exercise for the debris management plan will increase staff familiarity with the plan, identify any training gaps or confusion, and set the City up for success in the event that the plan is triggered. The City initiated an effort in 2022 to perform tabletop exercises of all emergency plans on a three-year cycle, to be completed in 2025. [**Priority:** Medium**; Timing:** Mid-term; **Program(s):** Planning; Office of Emergency Management]

2. **Establish a schedule to review and maintain the Disaster Debris Management Plan.** FEMA updates guidance periodically. The City should consider establishing a schedule to periodically review and make any updates to reflect any updates in FEMA guidance and lessons learned through tabletop exercise. Activities to maintain the plan could include periodically researching best practices in storm debris management, undertaken by City staff. [**Priority:** Medium**; Timing:** Mid-term; **Program(s):** Office of Emergency Management]

3. **Consider establishing a reserve fund earmarked for disaster and storm debris management.** While FEMA will reimburse the City for approved costs associated with managing disaster and storm debris from declared emergency events, the City must have sufficient funds available to activate these services when needed. The City should consider establishing a reserve fund earmarked for disaster and storm debris management costs. [**Priority:** Medium**; Timing:** Mid-term; **Program(s):** Office of Emergency Management]

Table 9-1 provides a summary of the impact of each strategy or option based on the criteria identified and described in Section 1.

Table 9-1: Evaluation of Disaster and Storm Debris Options

Description	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "buy-in"	Sustainability of Operations
Maintain a Current and Effective Management Plan						
Description: Establish a schedule to review and maintain the Disaster Debris Management Plan. Review and update (as necessary) for consistency with new FEMA guidance	Low	Low	N/A	N/A	N/A	High
Description: Perform tabletop exercise of Disaster Debris Management Plan	Low	Low	N/A	N/A	N/A	High
Establish a Reserve Fund Earmarked to Include Disaster Debris Management Costs						
Description: Establish reserve fund earmarked to include disaster debris management costs	Low	Low	N/A	Medium	N/A	High

10.0 PUBLIC SPACES AND SPECIAL EVENTS

10.1 Public Spaces and Special Events Overview

This section includes activities and special events taking place in various public locations throughout the City. Current MSW services, challenges, and strategies are addressed for the day-to-day operations, as well as events held in City-maintained facilities such as parks, trails, and the Downtown area.

The Parks and Recreation Department maintains 48 parks, including parks, trails, recreation areas and multi-use soccer and practice fields. Several parks have pavilions and open areas that can be rented for residents and organizations to hold gatherings and events. Special events addressed in this section include large City-sponsored events held in Downtown.

10.1.1 Current Services

Day-to-day MSW operations for public spaces. Parks and Recreation crews are responsible for the City's landfill refuse cans (typically large, cylindrical metal containers) distributed throughout the parks, sports complexes, trails, and the Downtown area. Most containers are landfill trash containers, with some Big Belly containers located in the Downtown area. The frequency of collection in public spaces varies depending on the needs of the space and day of the week.

Special events. Special events refers to City-sponsored events such as Art in Bloom and other large events, which are held Downtown. These festivals showcase the City's character in the Downtown Square, providing free entertainment for families. At special events, service is provided primarily through additional, temporary carts for public use. For weekend special events, the City and its contractor currently provide 50 additional landfill trash containers which are serviced Saturday and Sunday mornings, and then removed on Monday morning. The City services these containers using golf carts to transport the containers to a designated location accessible by a waste collection vehicle. All material is sent to the landfill and the City does not currently have official policies or guidelines in place for recycling, organics diversion, or other materials management at special events.

10.1.2 Current System Findings

Limited day-to-day recycling opportunities. The City provides separate recycling collection containers (Big Belly containers) in the Downtown area. However, there are limited recycling opportunities in other public spaces and parks. While actual recycling rates and quantities are not currently measured for public spaces, it is likely that rates are relatively low. Because most spaces do not have separate recycling containers accessible by the public, a significant amount of recyclables are likely disposed. This may be

especially true due to the nature of activities in these areas that are likely to generate high amounts of beverage containers that could be recycled: sports games, hiking, exercising, gatherings, and children playing, among many others.

Varied container types throughout City. There is not an established standard for the types of MSW collection containers provided in public spaces. Consistency in container types, colors, and signage would allow residents and visitors to become accustomed to one system that they can expect and use in the same manner throughout the City, increasing proper participation rates and therefore increasing recycling rates. If implemented, containers in public spaces should correspond with a larger effort in providing container and service consistency across sectors (discussed in Section 14).

Potential for recycling contamination. Contamination of recyclables is a common concern for communities in their public spaces, due in large part to a lack of proper recycling education among the general public, visitors who may not be familiar with the system, and limited opportunities for enforcement of proper participation. To minimize this concern, expanded recycling opportunities in public spaces should be paired with a robust outreach, engagement, and public education campaign, which may be part of a larger education program encompassing all sectors (discussed in Section 11).

10.2 Listing of Strategies and Options

The recommended public space and special event strategies and options were developed for the City's consideration to align with the established Guiding Principles of this SWMP (refer to Section 1.0).

1. **Provide recycling service at City-sponsored Downtown festivals.** There are a variety of options for providing recycling opportunities during Downtown festivals. Given concerns with contamination, the City should consider piloting clear-bagged options (e.g., Clear Stream) to provide cost-effective, clear, temporary recycling containers during its Downtown festivals. Over time, as City-wide and outreach, engagement, and public education efforts are successful at reducing contamination, the City should consider a more permanent solution such as providing well-labeled carts of a specific color for recycling and paired with refuse carts. [**Priority:** Medium**; Timing:** Near-term; **Program(s):** Waste Reduction/Diversion; Environmental Code Compliance; Outreach, Engagement, & Education; Parks and Recreation]

2. **Explore opportunities to provide recycling opportunities in the City's parks.** Activities at parks and sports complexes generate recyclables (e.g., water bottles) by the nature of public activity. The City should explore opportunities to provide recycling in parks, which could be implemented in a phrased approach such as initially providing service at sports complexes where

higher volumes of recyclables are generated (e.g., water and sports drink bottles). [**Priority:** Low**; Timing:** Mid-term; **Program(s):** Waste Reduction/Diversion; Outreach, Engagement, & Education; Parks and Recreation]

3. **Coordinate with Parks & Recreation to consistently roll out Public Works waste and recycling strategies and education content.** Consistency in containers and signage allows for the highest opportunity for proper, consistent, and convenient participation in MSW services. People flow from place to place and from sector to sector (e.g., from home to work to Downtown or public spaces, back to home) every day. It is important that the Parks & Recreation and Public Works coordinate to provide consistency as new programs and messaging are developed and deployed by Public Works. [**Priority:** Medium**; Timing:** Ongoing; **Program(s):** Waste Reduction/Diversion; Outreach, Engagement, & Education; Parks and Recreation]

Table 10-1 provides a summary of the impact of each strategy or option based on the criteria identified and described in Section 1.

Table 10-1: Evaluation of Public Spaces and Special Events Options

Description	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "buy-in"	Sustainability of Operations
Provide Recycling Service at City-sponsored Downtown Festivals						
Description: Pilot clear-bagged options (e.g., Clear Stream) to provide cost-effective, clear, temporary recycling containers during Downtown festivals. Over time, as City-wide and outreach, engagement, and public education efforts are successful at reducing contamination, the City should consider a more permanent solution such as providing well-labeled carts of a specific color for recycling and paired with refuse carts.	Low	Low	Low	Medium	High	Medium
Explore Opportunities to Provide Recycling Opportunities in the City's Parks						
Description: Explore opportunities to provide recycling in parks, which could be implemented in a phrased approach such as initially providing service at sports complexes where higher volumes of recyclables are generated (e.g., water and sports drink bottles).	Medium	Medium	Medium	Low	High	Medium
Coordinate to Consistently Roll Out Public Works Waste and Recycling Strategies and Education Content						
Description: Parks & Recreation and Public Works should coordinate to provide consistency as new programs and messaging are developed and deployed by Public Works.	Low	Low	N/A	Low	Medium	Medium

11.0 OUTREACH, ENGAGEMENT & PUBLIC EDUCATION

Providing effective outreach, engagement and public education to residential and commercial customers is critical for the ongoing and future success of the City's solid waste and recycling programs. Guidance and support from the City can shape proper participation and positive program engagement experiences for customers, which increases customer satisfaction and enables progress toward the City's goals.

This section includes a description of the components of a successful outreach, engagement and public education program, an evaluation of the City's programs among these components, case studies highlighting key considerations, current system findings, and recommendations.

11.1 Outreach, Engagement and Public Education Evaluation

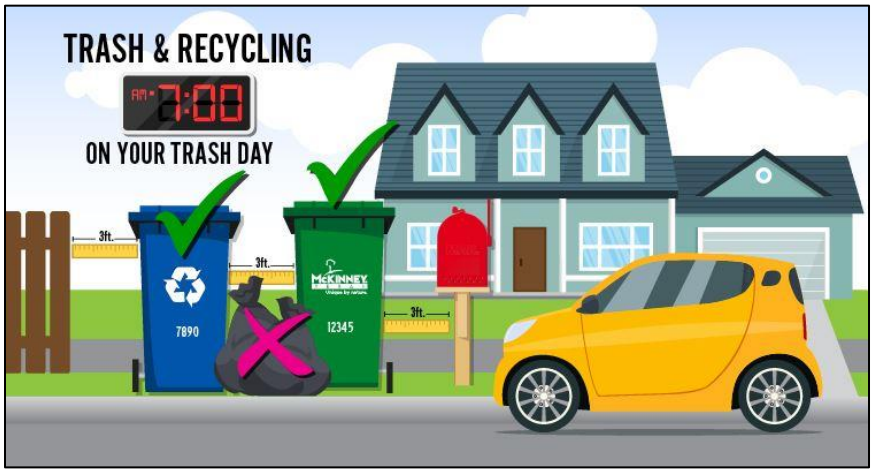
This section provides a detailed description of key components of a successful outreach, engagement and public education program then compares the City's current efforts to those key components to evaluate the programs and support further discussion about components of the program that should be kept, added, or changed.

11.1.1 Overview the City's Program

The City is in the process of hiring a staff member to execute its outreach, engagement and public education efforts related to solid waste and other public works services (e.g., water conservation, wastewater, fats oils and grease (FOG), stormwater). The following overview summarizes the City's current efforts.

The City focuses its outreach, engagement and public education program on residential customers. Information is provided through the City's Public Works website as well as the City of McKinney social media profiles. The City's messaging is focused on service information, including information about holidays, potential service disruption, set out requirements, service requests for bulky and HHW, and other supporting information for customers. Figure 11-1 shows an example of messaging content that communicates service information.

Figure 11-1: Example of Messaging Communicating Service Information



Information provided through the City's waste and recycling outreach, engagement and public education includes:

- Set out requirements (e.g., when carts should be set out, distance between carts, set out limits)
- Material-specific collection/management offerings (e.g., leaf collection, e-waste, FOG, Christmas trees)
- Missed pick-up reporting
- HHW and bulky collection service requests
- Service rates and container requests

The City's outreach, engagement and public education does not include general environmental information. When programs include this type of information, it generally includes facts about the benefits of recycling, tips to encourage source reduction and other facts and figures that would encourage customers to participate in the recycling program and otherwise support program goals.

The City distributes messaging and engages with its audience through a diverse set of channels and communication mechanisms. The following lists the distribution channels, with brief descriptions:

- **Website.** Provides program and service information about solid waste and recycling. Residential customers can access detailed information on residential trash services, recycling, and HHW. Commercial customers can access contact information for the City's contractor (Waste Connections) to establish service, information on services provided (and excluded) as part of the commercial program, and hauler licensing information.
- **Social media.** The City leverages several social media platforms including NextDoor, Facebook, Instagram and Twitter. Each platform has a different userbase and the content that is pushed out

through each one is tailored to the type of audience that engages with the content. For example, NextDoor is very useful for providing service information to the residential community, Facebook can be used to host events and engage businesses, and Instagram is more conducive to posting easily digestible facts and figures. Solid waste and recycling related messaging is pushed out through the general City of McKinney social media platforms (Figure 11-2 and Figure 11-3)

Figure 11-2: Recycling Information Included on the City's Instagram (with Engagement Statistics)

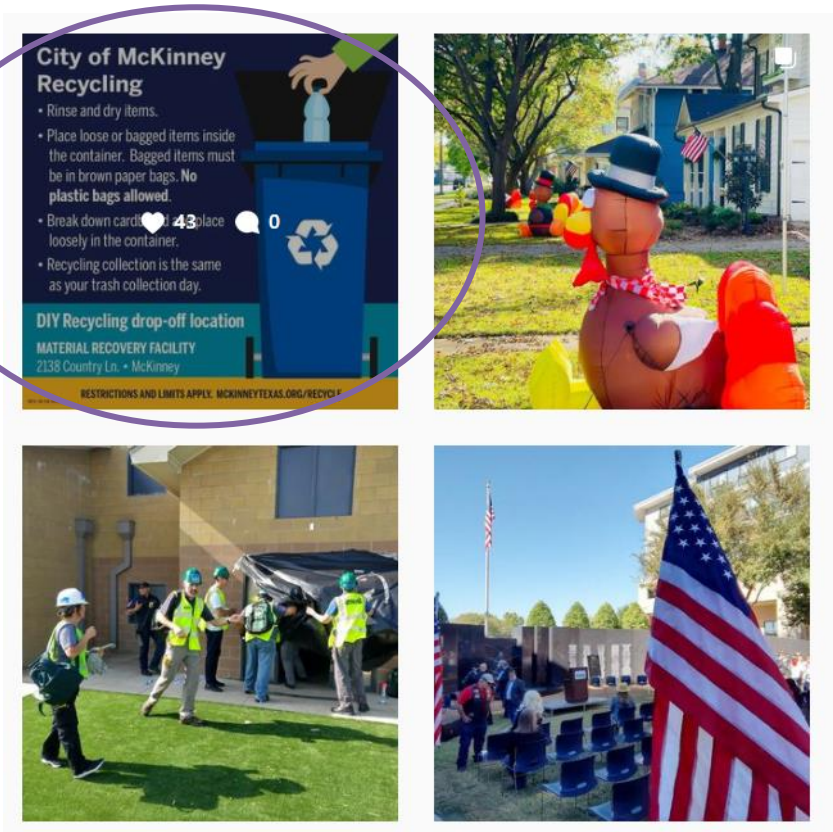


Figure 11-3: Service Information Disseminated Through NextDoor

11.1.2 Components of a Successful Outreach, Engagement and Public Education Program

Burns & McDonnell has developed the key components of a robust solid waste and recycling outreach, engagement and public education program as follows, with brief descriptions.

- **Establish program goals.** This is a critical first step for any successful outreach, engagement and public education program that dictates how the program will be evaluated over time and the intended outcomes of the program. Specific quantitative metrics, programmatic improvements, and definitions of success should be determined to ensure that targeted action is taken to work toward the established program goals.
- **Determine financial commitment.** Determining the ability to support the program financially will ultimately dictate the long-term success of any outreach, engagement and public education program. Target annual costs, dedicated staffing, and funding sources should be established before content is generated and distributed to ensure that a sustained effort is possible.
- **Identify target audience(s).** Depending on the program goals and financial commitment, the next component of a successful outreach, engagement and public education program is identifying the target audiences. Audiences may include broader categories of customers including residential customers, multi-family, and commercial customers or focus on more targeted audiences such as specific housing types, collection routes, businesses, or home-owner associations.
- **Develop messaging content.** Generally there are two types of communication that are deployed as part of outreach, engagement and public education programs: specific program information (e.g., dates of service, acceptable materials, set out instructions) and general environmental services information (e.g., why recycling is beneficial, impacts of contamination). The messaging content should be determined based on data-driven analysis and crafted with simple and easily understood language and graphics to communicate information in a succinct and effective manner.
- **Content distribution and public outreach.** The distribution channels of content as part of any successful outreach, engagement and public education program should be based on the target audience and the type of content. The most effective approach to reaching the target audience and impacting behavior change is distribute the content where the audience already consumes information. This may require many diverse forms of content distribution, including traditional bill stuffers, traditional advertising (e.g., billboards, bus stops, radio advertising), in-person meetings or events, social media platforms (e.g., Facebook, Instagram, NextDoor) or other publications such as newsletters or other local print media.

- **Evaluate program effectiveness.** This is a critical step to having a successful long-term program that is able to maintain consistent messaging to the target audience over a sustained duration of time, even as members of the selected target audience change. Evaluation of program effectiveness may include activities such as tracking data (e.g., program costs over time, engagement from target audience), establishing a meaningful feedback loop, and consistently evaluating progress toward goals.
- **Deploy compliance.** Holding material generators accountable is a component of having a successful long-term outreach, engagement and public education program. Compliance activities may include cart tagging, skipping service or removing carts from consistently bad actors, implementing service fees, and/or otherwise enforcing local regulations or ordinances.
- **Regional collaboration.** Approaching solid waste and recycling from a regional perspective is the final component of having a successful long-term outreach, engagement and public education program. Regional collaboration activities include coordinating with other municipalities on the consistency of messaging, timing of content deployment and channel(s) of distribution. The North Central Texas Council of Governments (NCTCOG) has developed and deployed a regional education campaign intended to support regional collaboration among communities in North Central Texas, and is described in further detail as part of Section 11.2.

11.1.3 Evaluation of the City's Outreach, Engagement and Public Education Efforts

This section evaluates the City's current efforts against the components of a successful outreach, engagement and public education program. Table 11-1 provides an evaluation matrix indicating the City's current status and describes identified opportunities associated with each of the program components of the City's current system.

Table 11-1: Evaluation Matrix of City's Outreach, Engagement and Public Education Efforts

Program Component	Current Status	Opportunities	Benchmark or Best Practices
Establish Program Goals	Previously, success was measured based on macros such as "clicks." New program goals have not yet been established.	The City can set quantitative goals and track ongoing progress toward them including recycling/diversion rate, contamination rate, capture rate, pounds per household disposal rate, and community engagement with distributed content.	Goals should be realistic rather than aspirational. Comparison to historical data (e.g., participation rate, tonnage, contamination) can be more effective measures of progress rather than external benchmarks (e.g., regional or state averages).
Determine Financial Commitment	The City's staffing commitment to outreach, engagement and public education are one Education & Outreach Coordinator position and one Staff Assistant position. No financial commitment for single-family outreach, engagement and education is included in the City's agreement with its contractor (Waste Connections). The contractor is responsible for promoting the recycling program for commercial, industrial, and multifamily customers. Annual contractor expenditures on promotion of its recycling program(s) is not known.	The City can establish program needs and financial commitment in conjunction with more granular goals and target metrics. As the program matures, the appropriateness of the staffing level will become clear. The City can also consider supplemental financial support for outreach, engagement and public education as part of its upcoming RFP process. Both the City and the recycling processor benefit from the impacts of an effective outreach, engagement and public education program, such as lower contamination, safer conditions, and lower operating costs.	**Staffing:** A typical benchmark for outreach, engagement and public education programming is $3-5 per household, including of staffing and other costs. Staffing levels for mature outreach, engagement and public education programs in peer cities are generally higher than the City's, including additional program-specific staff that contribute to outreach efforts (e.g., waste reduction specialist, sustainability specialist). **Contractor commitment:** Recycling processing agreements can include directed financial support restricted to residential outreach, engagement and education activities. Financial support provided to peer cities as part of recycling processing agreements range from $0.80 to $2.00 per ton of collected recyclable materials.
Identify Target Audience(s)	The City generally targets single-family audiences through its outreach, engagement and public education.	Social media can be used to reach a more targeted audience, for example providing customized messaging to specific areas of the City through NextDoor (e.g., sending additional messaging about contamination through NextDoor to neighborhoods with high contamination).	Target audiences can be segmented by groups for both residential (e.g., age, gender, demographics) and non-residential customers (e.g., specific business types, City departments, types of residents) and to specific concerns (e.g., high contamination areas, low participation areas).
Develop Messaging Content	The City's messaging focus is on programmatic elements, which provides information to residents on program requirements and any changes.	As the City implements the ReCollect app to streamline service requests, it can use the service's WasteWizard tool. WasteWizard search trends can then be used to develop targeted messaging based on frequently-searched materials. The City can incorporate general/environmental messaging into its content to communicate why residents should participate in programs or behaviors (e.g., don't place tanglers or batteries in recycling carts due to safety risks to recycling workers).	Messaging should be consistent, predictable, visually appealing and easy to understand. For example, pair images with words when listing acceptable materials.
Messaging Distribution and Public Outreach	City has access to a diverse selection of distribution channels, and distributes content through the City's general social media accounts to reach a broad audience.	The City can standardize signage, which allows for the highest opportunity for proper, consistent, and convenient participation in MSW services for those living and/or working in the City.	It takes 7-10 times of seeing a message for a resident to change behavior. Best practices include the "seven touches" rule—aim for seven touchpoints of varied types.
Evaluate Program Effectiveness	The City directly collects data for some programs (e.g., HHW) that can be used to evaluate effectiveness and tailor messaging. Waste Connection and NTMWD are able to provide tonnage information for refuse, recycling, and yard waste programs. The implementation of ReCollect and WasteWizard will enhance the information available to the City. Some metrics of interest (e.g., recycling contamination) are not available to the City, and require additional effort to obtain (e.g., cart audits).	City can track key performance metric data (e.g., program costs over time, engagement from target audience, levels of contamination) to establish a more impactful feedback loop and more consistently evaluate progress toward interim milestones/goals.	It's important to compare engagement metrics (e.g., "clicks") to completed behaviors (e.g., recycling bin set out) and performance metric data (e.g., participation rate, contamination rate) to understand messaging effectiveness. These metrics should also be aligned to program goals (e.g., increase recycling participation, decrease contamination) for overall outreach, engagement, and public education program effectiveness. Options to integrate technology to evaluate program effectiveness is described in Section 11.2.4.

Program Component	Current Status	Opportunities	Benchmark or Best Practices
Deploy Compliance	Compliance efforts include strong focus on the downtown central business district. The City's code compliance efforts are described in more detail in Section 16.0.	The City can consider compliance options such as deploying "oops" tags, removing the recycling cart for repeat high contamination residential set outs, or implementing a penalty may result in positive behavior change. Similarly, implementing financial penalties for contaminated commercial set outs may result in positive behavior change.	Compliance options are described in detail through the case studies are provided in Sections 11.2.3 and 11.2.6.
Regional Collaboration	The existing regional campaign content does not appear as part of the City's outreach, engagement and public education.	City can incorporate content developed for the NCTCOG in its messaging and outreach, as well as coordinate timing and content of messaging with peer municipalities and drive further engagement in its distributed material by amplifying unified messaging.	The regional education and outreach campaign is described in detail in Section 11.2.2.

11.2 Resources and Case Studies

This section provides overviews of available resources and practices that have been incorporated by municipalities in the region for the City's consideration as it develops its outreach, engagement and public education program. The resources and case studies are presented by topic and organized as follows:

- Messaging and resources for behavior change
- Regional education and outreach campaign
- Interactive online learning modules
- Technology integration for program feedback
- Cart auditing programs
- Compliance incentive policies
- Commercial recycling support
- Strategically allocate resources

11.2.1 Messaging and Resources for Behavior Change

The Recycling Partnership has developed free resources to support cities in developing recycling program messaging. These tools and resources are based on identified best practices including:[45]

- Pair images with words.
- Provide an appropriate amount of detail of what can and cannot be recycled.
- Use recognizable categories and common terms.
- Make consistent information accessible in convenient locations (e.g., website, bin sticker, postcards, etc.).
- Aim for at least seven touches to change behavior.

As the City develops its new Outreach, Engagement, and Public Education program, resources such as the sign builder (https://recyclingpartnership.org/diysigns/) can be leveraged in addition to the NCTCOG regional education and outreach campaign (described in Section 12.2.2) to incorporate these messaging best practices.

11.2.2 Regional Education and Outreach Campaign

The NCTCOG regional "Know What to Throw" Campaign is highlighted to provide information and context about how the City can continue to actively participate in the regional campaign and incorporate

[45] The Recycling Partnership "What Helps People Better Understand Recycling Instructions?" https://recyclingpartnership.org/blog-what-helps-people-better-understand-recycling-instructions/

its overall approach to campaign development as the City seeks to advance its outreach, engagement and public education programs.

The NCTCOG developed and deployed the "Know What to Throw" campaign in June 2019. NCTCOG worked with Burns & McDonnell and The Recycling Partnership to host a series of surveys, focus groups with stakeholders of the recycling value chain and data analysis to develop clear goals for the campaign including increasing quantities of recycling generated in the region, reducing contamination in the recycling stream and taking steps to proactively minimize the cost of recycling processing in the region.

The campaign's target audience included residents that lived, worked and played in the North Central Texas region and to increase collaboration among municipalities, streamline messaging and minimize confusion for residents that may live in a different municipality than they work. Messaging content was developed based on the results of a regional waste characterization, focus groups, and individual interviews with the Material Recovery Facility (MRF) operators in the region including graphics, blogs, pre-written social media posts, and videos that municipalities could easily download, edit, and incorporate into their existing outreach, engagement and public education programs. Based on the financial commitment established at the start of the campaign development, NCTCOG determined that the most cost-effective use of resources would be to distribute content through a blend of traditional advertising (e.g., billboard, radio spots), social media (e.g., Facebook, Instagram, Youtube), and local publications (e.g., community impact). Additionally, a quiz was developed to help drive engagement and teach residents in the region the most valuable and detrimental recyclable materials based on waste characterization data analysis and feedback from MRF operators.

Figure 11-4: Social Media and Example Bill Insert from the NCTCOG Regional Campaign

Social media content (top) and example bill insert (bottom).

After the campaign was launched in 2019, NCTCOG staff have actively collected engagement data, incorporated feedback from municipalities and residents, and hosted recycling roundtable events to support further coordination and collaboration among municipalities in the region, amplify the collective messaging being distributed, and discuss next steps to continue working to achieve the goals of the campaign. During the initial development of the campaign, NCTCOG identified social media as the most cost-effective medium to distribute content to the largest target audience (e.g., residential generators) in the region. For this reason, social media is the primary distribution channel for the ongoing campaign that is supplemented by traditional advertising and local publications.

11.2.3 Interactive Online Learning Modules

Interactive online components, such as learning modules or quizzes, can drive engagement with a program's website and other information. The City of Plano provides multiple online learning modules to

residents through its Live Green in Plano initiative. These online learning modules include content on a variety of topics (e.g., water conservation, stormwater, green building, solid waste and recycling), including three related to waste and recycling: "Taking Care of the Trash" about how to correctly participate the city's curbside and HHW programs, "Backyard Composting" about how to start composting yard trimmings, and "Composting Food Waste" about options to compost food waste at home. These innovative modules provide information through photos, behind-the-scenes videos (e.g., MRF processing), how-to instructions, interactive games, and quizzes. The modules also connect residents to additional resources to learn more (e.g., recommended books available at the public library). To incentivize participation, Plano ran a six-month drawing in which residents were could enter to win a $50 gift card by completing the "Taking Care of the Trash" module and submitting the certificate of completion.

11.2.4 Technology Integration for Program Feedback

Increasingly, cities and haulers are incorporating artificial intelligence (AI) into waste and recycling collection through on-board technology such as radio-frequency identification (RFID) enabled carts, on-board cameras and hopper cameras, and in-cab driver assistance.

Integration of on-board technology allows for software assisted program and fleet management such as route optimization and service verification. These systems and software can also provide valuable information and feedback. For example, by identifying areas of low participation (based on set outs or RFID data) or high contamination (using hopper cameras and AI), cities can target campaigns and track changes in these metrics to understand the success of outreach, engagement, and public education campaigns. The City of Denton has integrated data from its on-board technology provider (Rubicon) as part of its recycling contamination cart tagging campaign. The technology assists with the identification and tracking of contaminated residential recycling carts, allowing the City to hold customers accountable while also streamlining the process for its drivers. The City has seen a decrease in contamination which has been associated with the integration of the Rubicon system into the City's outreach and compliance efforts.

11.2.5 Cart Auditing Programs

Cart auditing programs are intended to provide information about material set out for collection including where carts are placed and the level of contamination in them. The cities of Dallas and Fort Worth have cart auditing programs in place.

The City of Dallas' "Take a Peek" program was established to better understand contamination levels, where staff inspect recycling carts for contamination to identify areas and specific routes with high contamination levels. With limited staff resources to inspect recycling carts, the goal was to "peek" into the carts of 100 households per district each year (500 total). Given COVID-19 concerns, the program has been suspended and will be re-established and eventually expand to a route-based approach, with a goal to check every household along a specific route (about 1,500 total households) in four phases. However, vacancies in staff positions and labor shortages have caused challenges in scaling the program to collect more comprehensive and consistent route-based data.

The City of Fort Worth's "Blue Crew" checks the contents of residential set outs each day and leaves tags to inform the resident of any contamination that are found in recycling carts. The Blue Crew removes bags that are identified as contaminated and attach a tag to the bag or cart explaining the situation to the customer. The Blue Crew staffing level of 6 to 7.5 full time employees (FTEs) allows Fort Worth to effectively educate customers at the point of generation collaboratively with its contracted recycling collection provider. Those who repeatedly are found to have put non-recyclable goods in the recycling carts can be charged additional garbage fees, and have their recycling carts taken away. Additionally, Fort Worth has found that by informing the community of the importance of reduction contamination, there are few complaints about the auditing of set outs from residents.

11.2.6 Compliance Incentive Policies

The cities of San Antonio and Garland have policies that incentivize compliance with their solid waste and recycling programs. These policy approaches have been summarized to provide context as the City considers enhancing program compliance.

The City of San Antonio's Solid Waste Management Department (SWMD) issues violations and collects fees for cart contamination that are added to residents' monthly utility bills from CPS Energy. SWMD staff conducts cart audits and customers whose set outs are identified as contaminated are issued an initial warning tag on the cart and a letter sent in the mail that informs residents of the problem. SWMD staff members conducting the audit collect data including a picture of the cart, the serial number on the cart, a picture of the home and pictures of the contaminated items to ensure that violations are sent to the correct customer and information regarding the cart audit can be tracked. The second time that a cart is identified as contaminated, SWMD staff leave a contamination fee tag to indicate that a fee will be placed on the resident's next utility bill.

Generally, contamination fees are $25 but increases to $50 for diaper contamination. Increased fees for diaper contamination were added in 2018 because this specific contaminant represented a major problem for San Antonio's MRF. Another addition to the program has been the ability to wave a contamination fee. If a resident is assessed a fee, they can have it removed from the upcoming monthly utility bill by participating in an online educational activity within 10 days of the date of the fee notice letter. SWMD allocates the revenue collected through contamination fees to fund the dispatch of a collection truck to haul contaminated material for disposal rather than recycling.

Garland residents receive recycling service and are able to opt out of their program, meaning they can ask the city not to provide recycling service. For this reason, only about 42,500 of the 63,000 total refuse collection customers receive recycling collection service. Garland collection vehicle operators identify and track customers that set out consistently contaminated carts by visually inspecting the carts and recycling material as it is tipped into the collection vehicle from the cab.
Garland employs a "three-strike" rule to incentivize compliance with the recycling program. If the driver encounters a contaminated recycling set out, the cart is tagged. If that same household has a second unacceptable set out, the resident is sent a letter in the mail providing an official warning. Upon the third unacceptable set out, the resident receives a call from the recycling outreach coordinator and their cart is removed.

Although cart removal provides an incentive to remain in compliance with the program requirements for minimizing contamination and proper set outs, if a resident's cart is removed they are able to get it back upon request from the City and there are no further penalties, financial or otherwise, to further enforce compliance.

11.2.7 Commercial Recycling Support

The cities of Dallas and San Antonio provide support to commercial entities through business recognition and technical assistance. The programs these cities have in place are described to provide context about how the City may support increased diversion from commercial generators.
The City of Dallas Green Business Certification is a free service offered to recognize businesses that prevent waste, incorporate recycling, and promote reuse, reduce, and composting in their operations. Any business in Dallas that incorporates green practices and conserves resources can apply to become green business certified including: multifamily properties, hotels, manufacturing companies, distribution centers, warehouses, restaurants, bars, barbershops, office buildings, data centers, hospitals, and other businesses.

Businesses applying for the Green Business Certification submit a complete scorecard to city staff that identifies the types of programs that their business has implemented related to recycling, equipment placement, zero waste policies, transportation, water conservation, and energy efficiency. The scorecard also requires applicants to provide other data related to their solid waste management including their contracted hauler and average monthly tonnage of garbage, recycling and organics generated. More information related to the Green Business Certification program is available here: https://dallascityhall.com/departments/sanitation/Pages/greenbusiness.aspx

The City of San Antonio has established a business certification and technical assistance program called ReWorksSA to provide the local business community with consultancy, resources, materials, and training at no cost. This program is a joint endeavor between the Solid Waste Management Department (SWMD) and the Office of Sustainability (OS) that also serves as a promotion and recognition tool for organizations that successfully complete the program and receive certification as a sustainable business. ReWorksSA helps local businesses either start or improve recycling programs in the workplace and supports the City of San Antonio's climate initiatives by improving the environmental and economic profile of the business community.

The certification process evaluates the number of programs and policies a business has in the areas of recycling, energy conservation, water conservation, travel & transportation and a reduction in multiple types of consumption. Points are awarded for both the number and the effectiveness of the best practices.

Applicants can create an account on a dedicated web portal and review the best practices that are available. City staff conduct an initial assessment with the business before they submit a formal application for certification. After the application is reviewed, business are awarded bronze, silver, gold or pinnacle status and certifications are valid for two years. More information related to ReWorksSA is available here: https://www.reworkssa.org/

11.2.8 Strategically Allocate Resources

The cities of Dallas and Frisco have adjusted their internal department roles and responsibilities related to outreach, engagement and public education. The changes these cities made to staffing, workflows, and overall satisfaction with the resulting changes are highlighted to provide context about considerations that may support the City to scale its public outreach, engagement and public education program in the future.

The City of Dallas effectively develops, deploys and distributes messaging through multi-departmental coordination. Responsibilities for public education and public outreach for solid waste and recycling issues are shared between the City of Dallas' Sanitation Department and the Office of Environmental

Quality and Sustainability (OEQS). When OEQS was established in the past few years City reorganized its education and outreach program by moving staff from multiple departments to OEQS. The purpose of the change was to consolidate resources to develop a more comprehensive education and outreach program and to more efficiently leverage staff resources (e.g., ability to develop messaging for multiple public education and outreach topics using a single graphics designer).

Initially, OEQS took the role of providing all public education and outreach related to solid waste and recycling; however, the Sanitation Department has since taken back the role of developing and deploying content regarding collection scheduling, program compliance, and other service-related messaging. The Sanitation Department and OEQS work closely together to coordinate content development and messaging distribution to meet the objectives of its outreach, engagement and public education program. Although the City of Dallas has encountered challenges during COVID-19 with maintaining consistent staffing levels to execute all programming (e.g., scaling cart audit program city-wide, increasing community-based marketing efforts, etc.), the strategic allocation of resources between OEQS and the Sanitation Department position Dallas to work more effectively to fully implement its education and outreach program over time.

In 2019 the City of Frisco consolidated its education and outreach effort across multiple departments with environment or sustainability-related messaging under the Parks Department to qualify for additional grant funding to expand its programming. As such, staff that previously worked with the Environmental Services Department have transitioned to the Parks Department under the newly established Natural Resources Division. Although the programs and content related to solid waste and recycling remained the same, the communication and preparation required to develop and deploy the material under the new consolidated organization structure required an adjustment in the Environmental Services Department workflow.

There may be challenges associated with a consolidated organization given the increase in scope of outreach, engagement and public education content that would be deployed. For example, if a central group were developing and deploying outreach, engagement and public education content, there may be less information pushed out specific to solid waste since the overall number of environmental topics that need to be covered would increase.

Additionally, there is potential for a more centralized approach to minimize the number of staff that have a depth of knowledge of solid waste concepts. Any strategic allocation of resources must take into account the knowledge, capabilities and capacity of resources that manage a consolidated program to effectively receive feedback specific to solid waste programs and incorporate that information into the content developed and deployed.

11.3 Listing of Strategies and Options

This section presents strategies and options developed for the outreach, engagement and education program that the City will further consider for implementation. The recommended strategies and options were developed to align with the established Guiding Principles of this SWMP (refer to Section 1.0).

1. **Strategically allocate resources to support solid waste specific program activities and growth.** The City's staffing commitment to outreach, engagement and public education are one Education & Outreach Coordinator position and one Staff Assistant position, responsible for all public works outreach, engagement, and public education. Staffing levels of mature programs in peer cities are generally higher than the City's, and are structured to include additional program-specific staff that contribute to outreach efforts (e.g., waste reduction specialist, sustainability specialist) and support other programs and efforts that achieve program goals (e.g., reduced contamination). As the City's rebuilds its outreach, engagement, and public education efforts, the effectiveness may be limited if the program goals and metrics and not in alignment with the level of financial and staffing commitment. The City should consider strategically allocating additional staffing resources (i.e., knowledge, capabilities and capacity) specific to solid waste programs and the implementation of new waste reduction or diversion opportunities. [**Priority:** High; **Timing:** Near-term; **Program(s):** Outreach, Engagement & Education; Waste Reduction/Diversion]
2. **Incorporate content and resources provided by NCTCOG and The Recycling Partnership to develop outreach, engagement and public education materials.** As the City resets its outreach, engagement and public education program, the City should incorporate the content of the successful NCTCOG regional campaign so residents are exposed to similar messaging regarding recycling anywhere they are in the North Central Texas region. Additional resources from The Recycling Partnership can be used to develop additional program materials (e.g., bin signage) based on behavior change research and field-tested templates. [**Priority:** High; **Timing:** Near-term; **Program(s):** Outreach, Engagement & Education; Waste Reduction/Diversion]
3. **Integrate ReCollect technology into messaging and outreach.** As the City implements the ReCollect app to streamline service requests, it can use the service's WasteWizard tool on the recycling webpage to allow residents to search for recycling information by material (e.g., "what do I do with…?"). WasteWizard search trends can then be used to identify the materials or services where residents have the most questions and develop targeted messaging based on these programs. [**Priority:** High; **Timing:** Near-term; **Program(s):** Outreach, Engagement & Education; Waste Reduction/Diversion]

4. **Update and implement program metrics.** The prior metrics for the City's outreach, engagement, and public education program did not translate to a clear and measurable definition of success. The City should develop and implement program metrics (e.g., level of engagement on social media platforms, number of compliance actions taken, participation rate, material capture rate) that are driven by program goals, are suitable based on available funding, and allow the City to better assess program effectiveness at translating messaging into results (e.g., increased recycling participation). [**Priority:** High; **Timing:** Near-term; **Program(s):** Outreach, Engagement & Education; Waste Reduction/Diversion; Environmental Code Compliance]
5. **Advance data collection efforts that support future content development.** The City should consider including requirements such as on-board technology, periodic cart audits or MRF audits into the upcoming RFP to allow the City to assess key metrics such as participation rates and recycling contamination. This information should be tracked systematically and strategically to evaluate the effectiveness and impact of the outreach, engagement and public education program over time. [**Priority:** Medium; **Timing:** Mid-term; **Program(s):** Outreach, Engagement & Education; Waste Reduction/Diversion; Environmental Code Compliance]

Table 11-2 provides a summary of the impact of each strategy or option based on the criteria identified and described in Section 1.

Table 11-2: Evaluation of Options for Outreach, Engagement & Public Education

Description	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "buy-in"	Sustainability of Operations
Strategically Allocate Resources to Support Solid Waste Specific Programs Activities and Growth						
Description: Strategically allocate resources to support solid waste specific program activities and growth.	Low	Low	N/A	N/A	N/A	Medium
Incorporate Content and Resources from NCTCOG and The Recycling Partnership						
Description: Incorporate content and resources provided by NCTCOG and The Recycling Partnership to develop outreach, engagement and public education materials.	Low	Low	N/A	N/A	High	Medium
Integrate ReCollect Technology into Messaging and Outreach						
Description: ReCollect's WasteWizard can be used to identify the materials or services where residents have the most questions and develop targeted messaging based on these programs.	Low	Low	N/A	N/A	High	Medium
Update and Implement Program Metrics						
Description: Implement program metrics that are driven by program goals, are suitable based on available funding, and allow the City to better assess program effectiveness at translating messaging into results.	Low	Low	N/A	N/A	Medium	Medium
Advance Data Collection Efforts That Support Future Content Development						
Description: The City should consider including requirements such as on-board technology, periodic cart audits or MRF audits.	Low	Medium	N/A	Low	Medium	Medium

12.0 DOWNTOWN CENTRAL BUSINESS DISTRICT

12.1 Downtown Overview

The City's Downtown is central to its identity. Preserving historic assets and the small-town character of the Downtown area, while also improving the quality, efficiency, and aesthetics of MSW management services is of critical importance in maintaining the City's vision for the future of Downtown and the City's economic growth. This section focuses on the area of the historic Downtown Business District, which includes the historic McKinney Square and the core of the City's cultural, dining, and entertainment activities. Based on Exhibit A Performance Standards in the License Agreement with the City's Contractor, the Downtown Business District is the area bound by McDonald Street, Church Street, David Street and Hunt Street (shown in Figure 12-1). For purposes of the SWMP, this 28-block core area is referred to as Downtown from this point forward. Downtown is highlighted separately from the larger commercial sector discussed in Section 8.0 because of the unique MSW management planning considerations and challenges the area faces.

This section addresses MSW services for commercial entities within Downtown. MSW generation by the public in Downtown is addressed in Section 10.0.

Figure 12-1: Twenty-Eight Block Downtown Core Area

12.1.1 Current System

MSW services. As of November 2021, businesses in the Downtown area receive MSW services, including landfill trash and recyclables collection, from the City's contractor through a combination of carts and dumpsters. While Downtown customers have the same service options as commercial customers elsewhere in the City, the proportion of customers with cart service is higher due primarily to limited space for dumpsters. Some businesses utilize shared dumpsters due to space constraints.

Collection container configuration. Some of the businesses in Downtown utilize alleys or sidewalks for cart collection, as not all cart-serviced businesses have back-door alley access. Many of the businesses that use carts for landfill trash and recyclables store the carts in public rights-of-way due to a lack of

alternative storage locations. This creates additional challenges for public-use areas, including impeded accessibility for walkways and unsightly aesthetics. Businesses disposing of bags containing food (or other organics) are instructed to take this refuse to the shared dumpsters rather than carts in an effort to control vectors and/or odors.

Businesses that do have back-door alley access face their own set of challenges. Typically, a business that abuts an alley has back-door access, but property lines are not uniform, and a business's property may not be large enough to accommodate a dumpster, or they may have to cross property lines in order to access dumpsters. Operation of this system is highly dependent on shared space and collaboration, which is not a dependable, long-term solution.

Figure 12-2: Current Downtown Collection System

Enclosures for trash and recycling dumpsters (top left) and vertical compactors (top right). Cart service along N. Johnson Street (bottom left). "Festival carts" in public right-of-way (bottom right).

Organics management. Consistent with current services in other sectors throughout the City, separate organics collection including food scraps is not provided Downtown. There is high concentration of restaurant establishments, which are large generators of food scraps and other materials (such as napkins and paper dinnerware) with the potential to be composted and diverted from landfill disposal.

Recycling participation. There are five shared recycling dumpsters within the Downtown area. Some customers receive recycling service via carts, where space allows. The Downtown area includes many businesses that generate significant quantities of recyclables (e.g., glass bottles, OCC packaging). The limited availability of space for recycling containers likely leads some businesses that would otherwise be motivated to recycle to forego recycling service, instead disposing of recyclables with landfill trash.

12.1.2 Stakeholder Engagement Overview

The City works with Downtown business owners through the Main Street Commission to understand the perspectives, concerns, and opportunities to improve trash and recycling service in Downtown. Key concerns related to service changes include convenience and pricing.

12.1.3 Current System Findings

Limited alley access. One of the primary factors contributing to multiple challenges in provision of trash and recycling services in Downtown is the lack of direct access to a back alley for many businesses. As a result, cart-based service is provided in public rights-of-way along McKinney Square. There is also limited space for collection containers in some areas. This issue will only become more challenging as Downtown growth continues and it is therefore critical that the City develop an effective solution in the near-term.

Real estate ownership. The City owns real estate in Downtown, providing for areas to locate shared dumpsters (e.g., co-located with the municipal court building and the police department storefront). However, one of the dumpster enclosure locations is private property leased by the City (230 N. Johnson St.) and continued use of this property is not guaranteed. This location (housing two recycling and two trash dumpsters) provides the only shared dumpsters located north of Virginia Street. To establish permanent, guaranteed future availability of space, the City would need to identify City-owned property in the northern portion of the Downtown area that could be designated for dumpster enclosures. If the use of MSW collection containers is continued in the Downtown area, the City should prioritize establishing permanent space for these trash and recycling collection needs.

Rate equity. Due to shared containers and past agreements, current MSW customer rates in Downtown are inequitable and irregular among Downtown commercial customers. The City's contracted service provider is responsible for commercial account maintenance and billing, and current accounts in the Downtown area equal approximately 20 percent of the monthly charge for Downtown service. The remaining portion of service charges is billed to the City. As a result of the billing and service structures (carts and shared dumpsters):

- The City heavily subsidizes the Downtown service, by paying 80 percent of the monthly rate
- A significant portion (70-80 percent) of Downtown commercial entities do not have an account with the City's contractor, and are using service without paying any trash or recycling service fee
- Downtown businesses that do have accounts are not necessarily "right sized," and may be paying too much or too little for the service they use

For any Downtown MSW collection system the City chooses to implement moving forward, an equitable rate structure should be developed.

Aesthetics. The City's compliance staff invest time to help maintain the aesthetics of the shared dumpster areas, including depositing bags left outside of the dumpster or enclosure into the proper container. This effort helps to prevent the sight of visible or overflowing containers and the smell from containers in proximity to public spaces, which could become a deterrent to potential patrons and does not maintain the aesthetics and atmosphere the City works to preserve in Downtown. Overflowing containers also lead to litter being windblown and scattered. Maintaining a clean, welcoming Downtown promotes economic growth of the City. Bins located on the main square for commercial customers are a dark brown color in an effort to blend in with surroundings and be more aesthetically pleasing.

Illegal dumping. Within the current MSW collection system in Downtown, containers (carts and dumpsters) and alleyways are relatively easily accessible to businesses or individuals that do not pay for trash or recycling services. This leads to illegal placement of material into containers and illegal dumping of materials in the alleyways. Due to the structure of the current system, it is difficult to know where material was generated (within Downtown or elsewhere) and who places it there illegally. Accountability and enforcement of rules is difficult under the current system.

Recycling rates and opportunities. Based on discussions with the City and its contractor, the recycling rate among Downtown commercial customers faces challenges due to high levels of contamination. In instances where contamination of recycling dumpsters or carts is high, these bins are serviced through trash collection and materials are disposed of at the landfill. Downtown includes multiple businesses that generate large quantities of recycling (e.g., restaurants, wineries) and may have a strong interest in recycling.

Organics. Downtown hosts many restaurants and food-oriented businesses that generate food scraps at higher rates than the overall commercial sector. This presents an opportunity for the City to increase diversion rates through separate organics collection in Downtown if a feasible and financially viable

option for service were to be identified or developed in the future by the City or through third-party subscription options.

Continued growth. The City anticipates and promotes the continued growth of the Downtown area. As this growth occurs, the challenges of the current system will be intensified and transition to a new type of system will become more difficult to implement.

12.2 Listing of Strategies and Options

It is evident that the City must take action in the near-term to improve the MSW management system for Downtown and remedy existing challenges. Multiple challenges exist that are likely to become more pronounced and more difficult to resolve as growth continues. Burns & McDonnell recommends that the City's management priorities for Downtown include addressing the collection system and rate structure for Downtown customers. This section presents the available options to address these components, for the City's consideration.

12.2.1 Downtown Collection System Options

This section presents strategies and options developed for Downtown collection service that the City will further consider for implementation. Each system option has unique benefits and challenges to development and implementation. The collection system options considered are identified below and further detailed descriptions of each option follow.

- Carts and shared dumpster collection (current system)
- Shared dumpsters
- Shared compactors
- Concierge service

Carts and shared dumpsters (current system). The City could choose to continue providing Downtown commercial trash and recycling services with a combination of carts and shared dumpsters, as described in Section 12.1.1. Although this option would require no significant investment in the near-term, the City should secure a City-owned property for the dumpsters currently located on N. Johnson Street. While there are concerns with the aesthetics of carts in public rights-of-way, the City maintains clean and sanitary conditions. At a minimum, the City has identified the need to restructure service rates paid by Downtown customers to develop a more equitable, volume-based rate structure.

Shared dumpsters. The City may choose to transition away from cart service, to exclusive use of shared dumpsters for trash and recycling services. This includes removal of all carts and maximizing use of

existing dumpsters, and likely increasing the number of dumpsters located in Downtown. This option would help to improve aesthetics of the area through removal of carts from alleys and public rights-of-way. While transition to a shared dumpster system may increase the total capacity for landfill trash and recycling collection in the short-term, there can be compliance challenges depending on the distance commercial customers must go to transport waste to the dumpsters and customers with limited storage area may lack a suitable location to store tilt-carts or similar assets.

Shared compactors. A shared compactor system is another type of shared container system but has some unique benefits and challenges compared to the shared dumpster system. The City currently has small vertical compacting dumpsters at the southwest enclosure, which can be serviced by typical front-load vehicles. In contrast to the City's current small vertical compactors, a shared compactor system typically uses large (typically 30-40 cubic yard capacity) container with built-in material compaction capabilities serviced by roll-off vehicles. A shared compactor system allows for greater material collection and/or lower collection frequency. While shared compactors could increase total capacity and would allow for removal of carts and dumpsters (on sidewalks, parking spaces, and parking lots), there are other challenges with this type of system.

Similar to a shared dumpster service, business employees would be required to transport material off-site or up to several blocks to dispose of it, creating safety concerns (physical strain, walking extended distances in the dark, etc.) and storage challenges for tilt-carts or similar assets. Additionally, developing an equitable rate structure for this type of system would be more challenging due to the shared nature of containers. Current dumpster locations would likely need to be reconfigured to accommodate roll-off service of large compactors, and space could become a limiting factor as Downtown growth continues.

Concierge service. With a concierge service, Downtown customers would set out their landfill trash and recyclables at designated times and locations (front or back door of each establishment). Customers would set out all MSW, in separate bags by type, at collection locations and the City's contractor would manually collect each MSW stream. The contractor would collect material utilizing smaller, pick-up truck sized collection vehicles that could more easily maneuver in the Downtown area than traditional collection vehicles. The contractor would haul material to the 121 RDF Landfill (NTMWD Landfill), material recovery facility, or a NTMWD transfer station as appropriate.

A concierge system would allow for removal of all commercial collection containers from alleys, sidewalks, parking space and other public rights-of-way, helping to improve aesthetics of the area. Individual businesses may choose to have on-site containers for short-term holding of bagged material prior to collection. Removal of containers would eliminate the concern for container overflow and would reduce instances of illegal dumping by removing the most targeted areas (dumpster sites). A concierge service would also have the flexibility to accommodate projected future growth in Downtown, which is a critical factor for any option the City implements.

12.2.2 Downtown Rate Structure Options

This section summarizes billing options available to the City in developing a new, equitable, and volume-based rate structure for Downtown customers. The billing operations considered are identified below and further detailed descriptions of each option follow.

- Pre-paid bags
- Pay-per-use compactors and/or enclosures
- Pay-per-weight compactors
- Periodic audits

Pre-paid bags. With a pre-paid bag system, the City would sell bags (or bag stickers) that tenants must use when setting out materials for concierge service or when using carts or shared dumpsters. Different bags (or stickers) are needed for trash and recycling. A pre-paid bag system can streamline billing and tracking of material generated by each Downtown customer through purchase of bags directly from the City.

Pay-per-use compactors and/or enclosures. Key cards (such as RFID) or codes could be used to control access to large compactors or dumpster enclosures. Employees of Downtown businesses would use a business-specific key card or code to open the compactors or dumpster enclosure. A pay-per-use system can streamline billing processes and allows for the monitoring of the use of open-top equipment/dumpsters in enclosures; however, there is additional administrative burden to ensure the technology and access system is properly working. Because of the pay-per-use billing model, businesses may attempt to reduce their costs by stockpiling material and disposing of excess material at one time.

Pay-per-weight compactors. Similar to a pay-per-use rate structure, key cards (such as RFID) or codes could be coupled with scales to facilitate a pay-per-weight rate structure. When employees of Downtown businesses use a business-specific key card or code to access the compactor(s), the accounts would be charged based on the weight of materials disposed or recycled. By charging on a weight-based system, a pay-per-weight rate structure can be considered the most equitable. This rate structure can also streamline billing processes and tracking of waste and recycling rates. There is additional administrative burden associated with the scale technology and controlled access system, to ensure the system is working properly and business have compactor access at all hours.

Periodic audits. Unannounced audits can be used as a way to more equitably charge tenants for trash and recycling services based on the amount of materials generated by each business. Periodic audits work best where each business/generator can easily be identified, such as by tracking delivery to a compactor room or where the number of businesses using each enclosure is relatively small. Audit results can then be used to "right size" businesses to the pricing level that most closely matches their needs, resulting in a more equitable rate structure. However, audits can require significant staff time to conduct and require multiple days or weeks to audit all dumpsters in a representative way (e.g., avoiding holidays, downtown festivals).

12.2.3 Summary and Comparison of Collection System Options

Table 12-1 provides a summary of the advantages and challenges of Downtown collection system options.

Table 12-1: Downtown MSW System Options Summary

Option	Advantages	Challenges
Collection System		
Carts and Shared Dumpsters (Current System)	• Current system • Requires no capital investment • Least expensive option	• Does not address current operational, aesthetic, or public health challenges • New rate design for same system could be contentious
Shared Dumpsters	• Removes carts on sidewalks, streets	• Siting of additional required dumpsters is likely required • No impact on container overflow, litter, and illegal dumping • Customers must transport material offsite, up to several blocks (safety, compliance concerns)

Option	Advantages	Challenges
Shared Compactors	• Removes carts on sidewalks, streets, parking spaces • Allows for lower collection frequency	• Siting of compactors may be challenging for roll-off access • Minimal impact on container overflow, litter, and illegal dumping • Customers must transport material offsite, up to several blocks (safety, compliance concerns)
Concierge Service	• All containers removed; eliminates space and property ownership constraints • Prevents illegal dumping and container overflow • Convenient for customers	• Requires close initial and ongoing coordination between customers, City, and contractor • Most expensive option
Rate Structure		
Pre-Paid Bags	• Streamlines billing options through bag or sticker purchase • Facilitates tracking of material generated by each business • Identifies and prevents illegal dumping	• Requires increased enforcement to ensure businesses are utilizing the system appropriately
Pay-Per-Use Compactors and/or Enclosures	• Streamlines billing process through technology • Prevents business from using trash and recycling services without a customer account	• Requires increased administration to ensure businesses do not have challenges accessing containers • Businesses may attempt to stockpile materials to reduce service costs • Would not work with City's current front-load containers
Pay-Per-Weight Compactors	• Streamlines billing process through technology • Prevents business from using trash and recycling services without a customer account • Facilitates detailed tracking of trash and recycling quantities for each business	• Requires increased administration to ensure businesses do not have challenges accessing containers
Periodic Audits	• Allows for "right sizing" businesses to more equitably charge for trash and recycling service	• Requires increased administration and staff time to conduct audits and "right size" customers based on results • Need multiple day audits including week and weekends to develop a representative sample • As businesses and types of businesses change, audits may need to become more frequent

Implementing selected collection system and rate structure approaches could include options for supplemental funding sources to offset cost increases to customers. Supplemental funding source considerations could include, but not be limited to establishing a Public Improvement District (PID). A PID is a legal mechanism for property owners in a defined geographic area to jointly plan and establish a sustainable funding source that can pay for a set of services to improve their area. Maintenance and operations (M&O) PIDs are created to provide additional services or funding for services supplemental to those provided by the City, such as the improved MSW collection services in the City's Downtown. PID implementation would require formal approval by City Council.[46]

12.2.4 Evaluation of Options

The recommended strategies and options were developed for the City's consideration for Downtown to align with the established Guiding Principles of this SWMP (refer to Section 1.0).

1. **Develop near- and long-term solutions to the collection challenges currently facing customers and the City in Downtown**. The current system of carts and shared dumpster collection present challenges for both downtown businesses, the City, and the City's contractor. Options for the City's consideration, including the removal of carts in favor of shared dumpsters or shared compactors or implementation of a concierge service, are summarized in Section 12.2.1. [**Priority**: High; **Timing**: Near-term] [**Program(s):** MPAC/Main Street; Environmental Code Compliance; Franchise Agent]
2. **Develop a more equitable service rate structure**. Currently only a small portion of Downtown businesses have an account with the City's contractor and pay for service. As a result, the City heavily subsidizes the trash and recycling service for Downtown businesses. The City should develop a more equitable service rate structure, including determining the extent to which the City wishes to continue subsidizing Downtown service. Options summarized in Section 12.2.2. [**Priority**: High; **Timing**: Near-term] [**Program(s):** Finance/Utility Billing; Environmental Code Compliance]
3. **Increase diversion rates for Downtown including during events held in the Downtown area.** Options are summarized in Section 12 Public Spaces and Special Events. [**Program(s):** Waste Reduction/Diversion; Outreach, Engagement & Education]

Table 12-1 provides a summary of the impact of each strategy or option based on the criteria identified and described in Section 1.

[46] Public Improvement Districts (PID) are described in the Texas Local Government Code (LGC), Chapter 372, Subchapter A, available online: https://statutes.capitol.texas.gov/Docs/LG/htm/LG.372.htm

Table 12-2: Evaluation of Options for Downtown

Description	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "buy-in"	Sustainability of Operations
Develop Near- and Long-term Solutions to Collection System Challenges						
Description: The current system of carts and shared dumpster collection present challenges for both downtown businesses, the City, and the City's contractor. Options include the removal of carts in favor of shared dumpsters or shared compactors or implementation of a concierge service.	Medium	Varies	N/A	Varies	Varies	High
Develop a More Equitable Service Rate Structure						
Description: The City should develop a more equitable service rate structure, including determining the extent to which the City wishes to continue subsidizing Downtown service. Options include pre-paid bags, pay-per-use compactors/enclosures, pay-per-weight compactors, and periodic audits.	Medium	Varies	N/A	Varies	Varies	High

13.0 ORDINANCE, REGULATION & CODE COMPLIANCE

Chapter 86 of the City of McKinney Ordinances relates to solid waste management. This section provides an overview of the City's ordinance, regulation, and code compliance efforts and current system findings. Additionally, this section presents available options and strategies to increase recycling in the multifamily, commercial and C&D sectors, as these strategies typically require the use of city ordinance.

13.1 Ordinance, Regulation and Code Compliance Overview

Chapter 86 of the City of McKinney Ordinances defines requirements for "collecting and disposing of garbage, recyclable material, rubbish, brush, and other refuse, and to maintain neighborhood quality and aesthetics and maintenance of property values by providing for the general health and welfare (§86-1)." Key provisions include:

- Residential collection requirements and rates (§86-27 and §86-28)
- Commercial collection requirements and rates (§86-29 and §86-30)
- Central Business District collection requirements and rates (§86-31)
- Authority to establish franchised collection (§86-32)
- Private hauler permitting for collection of recyclable materials (§86-34)
- Voluntary diversion of recyclable materials (§86-37)
- Prohibition of illegal dumping and other unsafe or nuisance acts (§86-24, §86-25 and §86-36)
- Enforcement authority, remedies, and penalties (§86-40 and §86-41)

Chapter 86 was last updated in 2011.

Other sets of code and ordinances can affect solid waste management activities. For example, cleanliness of premises (Chapter 70 of the City Ordinances) affects solid waste code compliance activities. Development code can affect solid waste management activities such as by defining space and enclosure requirements for commercial and multifamily recycling and addressing serviceability for large vehicles (e.g., waste collection, fire trucks) and other challenging collection environments (described in Section 14).

13.1.1 Code Compliance

Activities of the code compliance team include the following:

- Investigating and addressing code violations and any complaints related to the City's contractor.
- Responding to on-call service requests for HHW and electronics recycling.

- Providing Downtown service confirmation, enclosure and bin management, and aesthetics.
- Performing vegetation maintenance work orders to allow for safe curbside collection services.

In 2021, the code compliance responded to 5,472 HHW and electronics recycling requests, completed 568 work orders in the Downtown, and performed 1,502 right-of-way work orders. This represents a significant workload for current staffing levels, and as a result code compliance efforts are generally reactive rather than proactive interactions with residents and businesses. Activities related to the Downtown service could be shifted from City staff to the City's contractor through the incorporation of specific performance standards related to the enclosures and dumpsters into the franchise agreement. However, by having Code Compliance staff doing this work the City feels they have a better quality and ownership over the Downtown service and aesthetics.

13.2 Recycling Program and Policy Options to Increase Recycling

As the City's population continues to grow substantially over the next 20 years, there is an anticipated corresponding increase in the amount of waste and recycling generated in the residential and commercial sectors. With new development to support this growth, additional quantities of C&D debris will also be generated. As described in Section 5, the City has a robust program for the single-family residential sector. This section discusses program and policy options to recover more of the recyclable material in the multifamily, commercial, and C&D sectors, including examples that have been implemented in other cities. The options and case studies presented represent a range of options that have been implemented across the U.S., with most of these changes enacted through city ordinance. More information on these options, including model ordinance language and considerations, can be found in the NCTCOG's Recycling Ordinances and Building Design Guidelines report.[47]

13.2.1 Multifamily Recycling Options

An estimated 25.5 percent of the housing units in the City of McKinney are multifamily housing units (Table 3-2), and housing development trends suggest this percentage is increasing. The City is the exclusive provider of multifamily refuse collection and disposal services. The City provides residential curbside recycling services to some multifamily units (i.e., duplexes) through the residential curbside recycling program. For the majority of multifamily units that do not receive residential curbside recycling services from the City, the multifamily properties will contract with a private hauler should the property elect to offer residents recycling services.

[47] Available online at: https://www.nctcog.org/nctcg/media/Environment-and-Development/Documents/Materials%20Management/Final_Report-Ordinances_Guidelines_August_2009.pdf

Approaches to increasing multifamily recycling can include programs provided by the City, private haulers, and/or multifamily property managers. The following programs and policies describe options for the City to enhance participation and improve performance of the multifamily recycling program.

Expanded drop-off service. One challenge for implementing mandatory multifamily (or commercial sector) recycling is lack of space for a recycling dumpster at some properties. Expanding drop-off options within the City can increase recycling access to all users, especially multifamily residents without recycling service. City residents can currently drop-off recycling materials at the McKinney MRF. The City could expand drop-off service through the creation of additional unstaffed location(s); however, due to contamination concerns unstaffed locations are best suited for the collection of a more limited set of materials (e.g., cardboard and single-stream recycling containers). Staffed drop-off stations represent a notable increase in labor costs but would allow the City to collect other materials (e.g., staffed densifier to collect clean expanded polystyrene, metals, textiles, etc.).

Recycling-related development requirements. Development requirements can be leveraged to help ensure effective multifamily (and commercial) recycling services by requiring recycling enclosures be considered and designated for new and renovated properties. While property owners and/or managers may not elect to provide recycling service, this step helps to address challenges from limited space, inconvenient configuration, or lack of infrastructure that can prohibit recycling services in multifamily complexes. The City of Frisco's ordinance requiring designated recycling enclosures be constructed at all new multifamily and commercial properties is described in more detail a case study in Section 13.2.1.1.

Mandatory multifamily recycling. Mandatory recycling ordinances require property owners and/or managers to establish recycling program for residents of multifamily dwellings. Typically, these ordinances do not require that residents use the service, only that a specific recycling service level is made available. By defining a service level (e.g., materials, frequency, capacity per unit), cities are able to provide a more uniform or standardized program to residents independent of which hauler services a multifamily program. The City of Dallas' Multifamily Recycling Ordinance (MRO) went into effect in 2020, and require multifamily properties with eight or more units to have a defined level of recycling service. Dallas' MRO is described in more detail in Section 13.2.1.1. The City of Austin's Universal Recycling Ordinance (URO), described in more detail as a commercial recycling case study (Section 13.2.2.1), also applies to multifamily properties with five or more units.

Mandatory hauler-provided recycling services. Local governments can require haulers, via ordinance, to provide recycling services to certain customers (e.g., type, size) including in the multifamily sector.

This type of ordinance places the burden of compliance on haulers rather than individual businesses. Hauler-provided recycling requirements are structured such that commercial haulers operating in the city to perform actions such as providing recycling carts, providing a specific collection frequency, including specific designated materials in the recycling program, and performing education and outreach to affected customers. Placing the requirement on haulers is much less common than placing the requirement on the businesses. The State of Connecticut's mandatory hauler-provided recycling requirement is described in more detail in Section 13.2.1.1.

13.2.1.1 Case Studies: Multifamily Recycling Options

The following case studies provide examples of the multifamily recycling options presented in Section 13.2.1

Recycling-related development requirements: City of Frisco, Texas. In 2001, the City of Frisco passed an ordinance requiring new commercial and multifamily properties to construct enclosures designed for recycling containers. All new commercial properties and properties undergoing major renovations and seeking site plan approval from the City are required to construct at least one singlewide refuse enclosure and at least one singlewide recycling enclosure onsite. Prior to issuance of certificate of occupancy by the City, commercial establishments must pass inspection by the City ensuring compliance with refuse and recycling enclosure requirements. Enclosures must meet the City's requirements for size, placement, aesthetic, and construction standards. Properties are not required to provide recycling collection to tenants, but enclosures may not be used for any other purpose, including for refuse collection. One objective of this ordinance is to proactively plan and reserve space for recycling activities as local and regional markets and services develop. Limited space or inconvenient configuration is often restrictive for established commercial businesses looking to provide recycling collection. Frisco's ordinance allows businesses to contract with any hauling company and provides assistance and approval of submitted recycling plans.

Multifamily recycling ordinance: City of Dallas, Texas. In 2018, the City of Dallas approved a multifamily recycling ordinance requiring property owners/managers to offer access to either valet, dual stream, or single stream recycling service at multifamily buildings (defined as eight or more units). Some multifamily buildings are eligible for recycling collection service from the city's commercial recycling service. For others, property owners/managers must contract recycling service through a hauler that has received a City of Dallas recycling hauler permit. Materials collected in the multifamily program must be consistent with the city's single-family residential program (i.e., paper, cartons, cardboard, and containers made of glass, metal, or plastics #1-7). Collection frequency must be at least weekly and provided to

residents in a similar method to refuse collection (i.e., if refuse collection is valet, then recycling should also be valet). The ordinance outlines specific education and outreach requirements for both the property owners/mangers (e.g., training staff, providing education to residents) as well as haulers (e.g., bin signage), annual registration and reporting requirements for both property owners/managers and haulers, and multifamily inspections for compliance. The ordinance requirements went into effect January 1, 2020.

Mandatory hauler-provided recycling service: State of Connecticut. As of 2012, all refuse collection contracts between haulers and customers in the State of Connecticut must also include recycling collection for a designated set of recyclable materials. The requirement applies to all commercial and residential refuse customers unless they already have a recycling collection contract in place with another hauler. The designated set of recyclable materials are:

- Plastic containers
- Paper and paperboard (cardboard, boxboard, magazines, office paper, newspapers, etc.)
- Glass food and beverage containers
- Metal food and beverage containers
- Scrap metal
- Waste oil
- Leaves and grass clippings
- Batteries (lead-acid, Ni-Cd rechargeable)
- Residential electronics

13.2.2 Commercial Recycling Options

The City's collection service contractor is the exclusive provider of commercial refuse collection and disposal services in the City. Commercial entities can contract with the City's contractor (or another licensed recycling hauler) for recycling services, including typical recyclables and brush/yard waste.

Approaches to increasing commercial recycling can include programs provided by the City, private hauler, and/or property managers. The following programs and policies describe options for the City to enhance participation and improve performance of the commercial recycling program.

Recycling rewards and recognition programs. Awards and recognition programs for commercial establishments can provide incentive for businesses to recycle. Awards and recognition programs typically provide public recognition for commercial businesses that have developed exceptional or innovative recycling programs. Awards and recognition programs can be accounted for in a community's

recycling ordinances. However, it is also possible to create an awards and recognition program that is not mentioned within a city's ordinances. While awards and recognition programs are typically the easiest for a city to implement, these programs will likely result in the least amount of additional diversion.

Recycling-related development requirements. Development requirements can be leveraged to help ensure effective commercial (and multifamily) recycling services by requiring recycling enclosures be considered and designated for new and renovated properties. The City of Frisco's ordinance requiring designated recycling enclosures in new multifamily properties, described in more detail as a multifamily recycling case study (Section 13.2.1.1), also applies to new and renovated commercial properties.

Mandatory commercial recycling programs. The City may enact an ordinance that requires commercial establishments to develop recycling programs. Many cities that have implemented this type of ordinance have done so in stages, starting with larger businesses and gradually phasing in requirements for smaller businesses. Austin's URO, which applies to both multifamily and commercial properties, is described in more detail in Section 13.2.2.1.

Mandatory hauler-provided recycling services. Local governments can require haulers, via ordinance, to provide recycling services to commercial customers. This type of ordinance places the burden of compliance on haulers rather than individual businesses. Placing the requirement on haulers is much less common than placing the requirement on the businesses. The State of Connecticut's mandatory hauler-provided recycling requirement is described in more detail in Section 13.2.1.1.

Material disposal bans. Disposal ban ordinances prohibit commercial establishments from disposing designated materials. In addition, these ordinances can prohibit disposal facilities in the community, such as landfills and transfer stations, from accepting the prohibited materials for disposal. These ordinances go one step beyond requiring recycling by banning specific materials from being disposed. Disposal ban ordinances are commonly enacted in conjunction with a mandatory recycling ordinance. Prior to implementing a disposal ban, the City would need to ensure the processing capacity is available to handle the increase in material. While material disposal bans prohibit the disposal of a material, they do not limit the generation of the material (e.g., single-use bags, Styrofoam, yard waste). Any bans that attempt to limit the generation of single-use plastic and paper bags cannot be enforced due to the Texas Supreme Court ruling in *City of Laredo, Texas v Laredo Merchants Association*.

13.2.2.1 Case Studies: Commercial Recycling Options

The following case studies provide examples of the commercial recycling options presented in Section 13.2.2.

Mandatory Recycling Ordinance: Austin, Texas. The City of Austin implemented a Universal Recycling Ordinance (URO) that requires commercial, multifamily (defined as five or more units), and food-permitted properties (i.e., those with a food permit) to provide access to diversion services for their employees and/or tenants. The ordinance requires access to recycling of single-stream materials (i.e., paper, plastic, metals, glass) and, if the property is food-permitted, diversion of organics. Property owners may choose the method by which materials are collected and diverted, including:

- Contracting with a city-licensed hauler for recycling and/or organics collection services
- Self-hauling materials to a MRF or composting facility
- Alternative food diversion methods such as donation to food banks, farms, or community gardens

The URO was adopted by the city council in 2010. Implementation began in 2012 and was tiered and based on size (square footage) of a business, with larger businesses becoming subject to the requirements earlier. Currently, approximately 15,000 entities within the city are subject to URO requirements.

For recycling, commercial entities may comply with the ordinance by meeting a 50 percent diversion capacity by volume (measured by service capacity ratios; most entities choose this option) or by meeting an 85 percent diversion rate by weight. Multifamily properties comply with the URO if they provide a minimum capacity of single-stream recycling per unit per week. For organics, food-permitted entities comply by providing one or more organics diversion options (including waste reduction) to employees. URO organics diversion requirements do not address businesses that generate organic materials (e.g., from landscaping activities) but are not food-permitted businesses.

Each URO-subject property must submit an Annual Diversion Plan for recyclables and food-permitted properties must also submit an Organics Diversion Plan. Plans are submitted online through the Re-TRAC Connect platform. Annual Diversion Plans and Organics Diversion Plans allow the city to compile data regarding compliance with the URO service requirements. Generally, business do not report data on material quantities, so the city relies on semi-annual reports for material tonnage data. Haulers are required to provide the city with semi-annual tonnage reports to maintain a hauling license with the city.

13.2.3 C&D Recycling Options

As the City continues to grow, construction and renovation activity will lead to increased generation of C&D debris.

The following programs and policies describe options for the City to increase the diversion of C&D materials from landfills. Since nearby C&D processing capacity exists for materials that cannot be reused

(Champion Waste and Recycling C&D MRF), there is the opportunity for the City to drive recycling of this material through various partnerships, incentives and/or policy mechanisms.

Establishing a building material reuse facility. A large portion of C&D materials can be in reusable condition, such as cabinets, doors, fixtures and equipment, flooring material, windows, and raw materials (e.g., lumber, pipe, sheetrock). Cities can facilitate C&D reuse by establishing reuse warehouses, where a defined set of generators (e.g., contractors, residents) and end users (e.g., residents, non-profits) are eligible to drop off or pick up materials. C&D reuse facilities can play a symbiotic role with existing or future green building and deconstruction programs, by receiving materials from deconstruction projects that can then be used to meet green building requirements for other projects. The City of Houston's C&D reuse program is described as a case study in Section 13.2.2.1.

Municipal green building programs. Municipal green building programs are used to encourage or require sustainable building practices, typically for City-owned buildings. Once established, a municipal green building program may be expanded to the private sector as well. In green building programs, the entity responsible for the project is required to address specific elements of sustainability (e.g., water conservation, energy efficiency, indoor air quality, waste minimization) by implementing specific actions and/or being eligible for a specific certification (e.g., Leadership in Energy and Environmental Design (LEED) Silver, Green Built Texas). As part of these programs, projects typically must develop and implement a construction waste management plan that identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or commingled. Green building programs in the cities of Austin, Texas (a voluntary City-developed rating system), Frisco, Texas (a mandatory program for single-family construction) and Dallas, Texas (a LEED-based requirement for public works) are described as case studies in Section 13.2.2.1.

C&D permit fees or deposits. During the permitting process, cities may incorporate an additional green building fee or deposit. For developers that provide the proper documentation for reusing or recycling a certain percentage of the material from a project site, the C&D permit fee would be waived, or the deposit refunded. The City of Plano's C&D Recycling Deposit Program is described as a case study in Section 13.2.2.1.

Buy-recycled procurement programs. Procurement programs for recycled-content products can apply to C&D debris by mandating that local government agencies buy recycled-content products as their first choice in purchasing supplies. Recycled C&D materials typically must meet all existing building codes, standards, and specifications. The major advantage of a buy-recycled program is its ability to increase the market for recycled C&D material. Environmental preferred purchasing (EPP) strategies, such as

recycled-content requirements are one method to incorporate environmental considerations into public purchasing. As part of the recent Governmental Entity Recycling Program (30 TAC §328 Subchapter K), counties, municipalities, school districts, and certain other public entities not previously subject to the state's procurement policies (described in more detail below) must give purchasing preference to "products made of recycled materials if the products meet applicable specifications as to quantity and quality and the average price of the product is not more than 10 percent greater than the price of comparable nonrecycled products."[48]

Mandatory C&D debris recycling. A mandatory C&D debris recycling ordinance typically requires developers to recycle or reuse C&D debris generated from projects. The ordinance typically will include a list of the materials that are designated as recyclable and reusable. The City of Austin's C&D Recycling Ordinance is described as a case study in Section 13.2.2.1.

13.2.3.1 Case Studies: C&D Recycling Options

The following case studies provide examples of the multifamily recycling options presented in Section 13.2.3.

City-operated C&D reuse facility: Houston, Texas. The City of Houston has operated a building materials Reuse Warehouse since 2009. The site accepts donated construction materials from most entities, including individuals, contractors, suppliers, builders and remodelers. Materials can be picked up for free by any non-profit organization. In turn, non-profits may use these materials directly or make materials available to individuals.

City-developed green building rating system: Austin, Texas. The City of Austin developed the first green building rating system in the early 1990s. The Austin Energy Green Building (AEGB) program assigns a five-level certification (i.e., star rating) for buildings based on a detailed checklist. While the program is voluntary for most properties, AEGB ratings are required for buildings in certain development districts and for some affordable housing incentive programs. Builders have the option to decide which waste minimization actions to incorporate, including using at least one 50 percent recycled-content material, recycling all lumber over two feet in length, and reuse or recycling of specific C&D materials (e.g., stone, metal, OCC).

Public works green building program: Dallas, Texas. As a component of its 2003 Bond Program for capital improvements, the City of Dallas included a requirement that all C&D projects over 10,000 square

[48] 30 TAC §328.203. TCEQ's resources for implementation are available online: https://www.tceq.texas.gov/p2/recycle/governmental-entity-recycling-program

feet must be LEED Silver Certified. In 2006, the Green Building Program policy was updated, increasing the requirement for new public works facilities under the 2006 bond program to achieve LEED Gold Certification.

Commercial green building program: Frisco, Texas. The City of Frisco developed a Commercial Green Building Program. The program addresses multiple sustainability topics (e.g., energy efficiency, water conservation) and includes the requirement that no waste concrete or metal from C&D projects may be landfilled.

C&D deposits or rebates: Plano, Texas. The City of Plano has implemented a C&D Recycling Deposit Program as an incentive to encourage Plano construction contractors to recycle on-site debris and divert it from local landfills. The amount of the deposit required by Plano is based on project type and square footage and is refundable in full or in part based on the project's documented diversion rate. Plano's program began in 2009 and was reinvigorated when Toyota located its Manufacturing Product Innovation Center campus to Plano in 2014 due to the significant increase in construction materials generated. The program was intended to cause behavior change and increased diversion from new construction projects exceeding 10,000 square feet and demolition or renovation projects exceeding 5,000 feet. Revenue generated from unclaimed deposits is used to support sustainability initiatives that benefit the community.

C&D recycling ordinance: Austin, Texas. The City of Austin has a Construction and Demolition Recycling Ordinance intended to increase recycling and reuse of C&D materials. The ordinance sets minimum diversion requirements for building projects (single-family, multifamily and commercial) that exceed 5,000 square feet as well as all multifamily and commercial demolition projects. The ordinance went into effect on October 1, 2016. Contractors demonstrate compliance by achieving a minimum diversion rate of 50 percent or disposing of less than 2.5 pounds of material per square foot.

Affected projects are required to submit a form through the Re-TRAC Connect platform for the city to collect and analyze relevant data. Projects affected by the ordinance between 2016 and 2019 reported diverting 70 - 85 percent of material generated. However, the city has indicated that project reporting has steadily declined since the ordinance was first implemented and therefore the high diversion reported under the C&D Ordinance could be a result of only higher-diversion projects reporting results. The city is currently developing an enforcement program to increase the number of projects that report results.

13.3 Data Needs for Permitted Hauler Reporting

Recycling data is an essential component of developing, implementing, and assessing the impact of any policies or ordinances the City may enact to enhance recycling participation. Chapter 86 established the

City's hauler permitting for the collection of recyclable materials (§86-34). As described in Section 7 and Section 8, there is limited data is available related to recycling activity in the multifamily and commercial sectors. There are continued trends across the North Central Texas region and across the U.S. to improve reporting from permitted haulers, rather than generators or processors, to improve data collection, as demonstrated in the case studies presented in Section 13.3.1.

13.3.1 Case Studies: Hauler Reporting

Dallas, Texas. Collection services for commercial and multifamily entities in the City of Dallas are primarily provided by private haulers that are granted non-exclusive franchises, or the right to operate and conduct business within the City. Over 200 haulers hold franchise agreements with the City. The City adopted an ordinance, effective January 2020, to address the need to obtain consistent and complete recycling data for multifamily customers, that establishes requirements for haulers of multifamily recyclables within the City. Multifamily recyclables haulers must apply for and be granted a permit to operate by the City. Permitted haulers are required to submit an annual report to the City detailing tonnage of recyclable material collected from multifamily sites within the City, the average number of multifamily units served, and total weekly collection capacity provided, recyclables processing facilities utilized, and residue and rejected load information, among other reporting requirements[49]. The City of Dallas also requires, by ordinance, apartment complex owners and/or managers to submit an annual recycling plan and affidavit of compliance to obtain or renew its multi-tenant permit on an annual basis. Apartment complexes are required to use a permitted recycling collector, provide weekly collection service, and educate tenants about program and recycling requirements. The City of Dallas Office of Environmental Quality & Sustainability works closely with the Code Compliance department to enforce the multifamily recycling ordinance requirements as part of the approval and issuance of multi-tenant permits. The City of Dallas consulted with multiple other Texas and national cities, including Austin, regarding their challenges and successes in obtaining quality data from the multifamily and commercial sectors, to inform development of the newly adopted ordinance.

Minneapolis, Minnesota. Collection services for commercial and multifamily entities in the City of Minneapolis are primarily provided by private haulers that obtain a hauling license from the City and does not require private haulers and the City to enter into franchise agreements. The City of Minneapolis has ordinances in place requiring both commercial properties (implemented 2011) and multifamily properties (implemented 1991) to provide recycling opportunities onsite for tenants and residents. Further, the State

[49] https://dallascityhall.com/departments/sanitation/Pages/commercialrecycling.aspx

of Minnesota mandated commercial recycling in 2014.[50] Private haulers servicing commercial and/or multifamily customers within the City of Minneapolis are required to obtain a hauling license from the City. The City has a long-standing ordinance (implemented 1995) requiring commercial recycling haulers, including those servicing multifamily properties, to provide semi-annual reports to the City. Reporting requirements include the address of each commercial and multifamily recycling customer serviced, total tonnage of commercial and multifamily recyclables collected within the City, and the processing facility or end-markets utilized.

Seattle, Washington. Trash collection services for commercial and multifamily entities in the City of Seattle are provided through a zoned franchise system with a limited number of additional haulers providing recycling and organics collection in the City. The City of Seattle has ordinances first implemented in 2003 requiring residential, multifamily, and commercial customers to separate recycling and organics from trash. Commercial recycling and organics haulers and processors submit annual reports to the City to maintain their City of Seattle Recyclers Business License.[51] Reporting requirements include tons recycled or composted, by material, and disposition of processed material. Once reports are received, the City analyzes the reports to ensure tons reported by haulers and processors are not double counted. If a hauler does not report, the City estimates amounts hauled based on historic reporting (if available). Commercial recycling haulers that fail to submit annual reports have received fines. [52]

Los Angeles, California. Collection services for commercial and multifamily entities in the City of Los Angeles are provided through a zoned franchise system. The State of California adopted an ordinance in 2014 that requires businesses and large multifamily properties (five units or more) that generate four or more cubic yards of solid waste per week to arrange for recycling services. In 2017, The City of Los Angeles launched recycLA, a public-private partnership that offers universal recycling services to all commercial and industrial businesses, institutions, and large multifamily buildings. The program divides the city into 11 zones serviced by seven franchised service providers, and all commercial and multifamily buildings in each zone are serviced by a single franchise service provider. The City of Los Angeles provides oversight to each service provider to ensure they comply with the City's reporting requirements

[50] http://www.ci.minneapolis.mn.us/solid-waste/recycling/commercial-recycling
[51] https://www.seattle.gov/Documents/Departments/SPU/Documents/Plans/SW_Plan_015204.pdf
[52] Specific information regarding level of fees and penalties for non-compliance with reporting requirements was not available.

and provide public education to enhance recycling opportunities.[53] Franchise contracts require haulers to report a wide variety of detailed information including but not limited to:[54]

- Customer account, contact, billing, and service inquiry data
- Customer service level data associated with each account and location by collection stream
- Diversion reports and tonnages of materials delivered to certified facilities by collection stream
- Documentation of outreach and education efforts
- Data about field operations, staffing levels, fleets, safety trainings and meetings, and injury and illness prevention

13.4 Current System Findings

Code was last updated prior to enforcement being in the department. The Chapter 86 code was last updated in 2011, and since that date some aspects of solid waste operations have changed including the incorporation of code compliance activities into the Public Works Department.

Code compliance activities are reactive due to staffing levels. In addition to code violations, the code compliance team responds to a significant number of work orders related to HHW and electronic recycling, right-of-way vegetation management, and Downtown solid waste and recycling services. Current staffing levels of two staff require efforts to be primarily reactive.

Multifamily and commercial sector recycling data are not available. While the current hauler permitting requirements include monthly reporting to submit evidence of compliance, tonnage data for multifamily, commercial, and/or C&D recycling from permitted haulers is not available to be leveraged to inform the City's solid waste and recycling decision-making or for City-wide recycling statistics. Hauler-based reporting (rather than reporting requirements for individual multifamily or commercial sector generators) can be more effective as it requires the participation of relatively fewer entities; but for any data collection program to be successful it will require some staff time to obtain, review, and compile hauler reports.

Most approaches to increasing recycling access, especially in multifamily and commercial sectors, focus on increasing (or mandating) access to programs, typically through ordinance. Efforts to increase recycling in multifamily, commercial, and/or C&D sectors generally involve the use of ordinance

[53] https://www.lacitysan.org/san/faces/home/portal/s-lsh-wwd/s-lsh-wwd-s/s-lsh-wwd-s-zwlaf?_adf.ctrl-state=ci5f16vqu_5&_afrLoop=4891411484568428#!
[54] Refer to Table 10-1 in the exclusive franchise contract: https://www.lacitysan.org/cs/groups/public/documents/document/y250/mde0/~edisp/cnt014118.pdf

to enact new programs or requirements. There are a number of considerations to successfully use ordinances to increase multifamily and commercial sector recycling, including stakeholder buy-in, City staffing needs to implement and enforce programs, and data availability to track the impact of new programs. Additionally, it is of crucial importance to reduce contamination prior to implementing policies such as recycling mandates in the multifamily or commercial sectors, so that these programs yield clean recyclable material.

13.5 Listing of Strategies and Options

The following recommended strategies and options were developed for the City's consideration to align with the established Guiding Principles of this SWMP (refer to Section 1.0).

1. **Update Chapter 86 in Code of Ordinances to reflect current departmental activities.** The current Chapter 86 in the Code of Ordinances was revised in 2011 and does not reflect current departmental activities such as code compliance being in the Department. There is value in the City periodically updating Chapter 86 to ensure it reflects the current structure and operations of the Department. [**Priority:** Medium**; Timing:** Ongoing; **Program(s):** Public Works Department; Planning; City Attorney]

2. **Consider additional staffing for code compliance activities.** Current staffing limits the ability to implement proactive code enforcement initiatives, and the implementation of any new programs (e.g., Downtown special event recycling, ordinances to incentivize multifamily or commercial recycling) may increase the responsibilities of the code compliance team. The City should consider additional staffing for code compliance activities in line with the City's growing population and the implementation of this SWMS. [**Priority:** Medium**; Timing:** Mid-term; **Program(s):** Code Compliance]

3. **Explore ordinance-based approaches to increase multifamily recycling.** McKinney continues to experience high levels of growth, including an increasing trend toward multifamily rather than single-family residential development. The City should explore options for diversion incentives & strategies for the multifamily sectors to provide all residents (not just single-family customers) the option to conveniently recycle. [**Priority:** Medium**; Timing:** Mid-term; **Program(s):** Waste Reduction/Diversion; Outreach, Engagement, & Education; Code Compliance; City Attorney]

4. **Further evaluate the existing hauler permitting process and opportunities to improve commercial and multifamily recycling data through modifications of the monthly hauler reports.** Developing a comprehensive understanding of material streams and quantities of

material generated by the multifamily and commercial sectors is an essential step to developing and implementing effective strategies for current and future materials management. The existing hauler permitting process should be further evaluated to understand its potential use to gather high-quality data related to recycling activity in these sectors and any additional needs (e.g., staffing) to incentivize or require multifamily and commercial recycling data collection. [**Priority:** High**; Timing:** Mid-term; **Program(s):** Waste Reduction/Diversion, Franchise Agent Code Compliance]

Table 13-1 provides a summary of the impact of each strategy or option based on the criteria identified and described in Section 1.

Table 13-1: Evaluation of Ordinance, Regulation, and Code Compliance Options

Description	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "buy-in"	Sustainability of Operations
Update Chapter 86 in Code of Ordinances to Reflect Current Departmental Activities						
Description: Update Chapter 86 to reflect changes since 2011, and continue to update periodically as necessary when Department structure and/or responsibility change.	Low	Low	N/A	Low	N/A	Medium
Consider Additional Staffing for Code Compliance Activities						
Description: Consider additional staffing for Code Compliance activities to allow for a proactive approach and to meet additional needs of any new program, policies, or ordinances.	Medium	Low	N/A	Low	Medium	High
Explore Ordinance-Based Approaches to Increase Multifamily and Commercial Recycling						
Description: Explore options to increase access and provide the option for recycling beyond the single-family residential sector.	Medium	Medium	Medium	High	Varies	Medium
Improve Multifamily and Commercial Recycling Data Through Hauler Reporting						
Description: Further evaluate the existing hauler permitting process and opportunities to improve commercial and multifamily recycling data through modifications of the monthly hauler reports	Medium	Low	N/A	Medium	Medium	Medium

14.0 CITY-WIDE STRATEGIES

There are several MSW management strategies the City may implement that have applicability across multiple sectors. While the specifics for implementation of these City-wide and multi-sector strategies are tailored to each sector, the over-arching objective is to provide a convenient and consistent approach to MSW management for all customers in all sectors and geographic areas of the City. An overview of each City-wide and multi-sector strategy is presented below.

14.1 MSW Contract Evaluation and RFP Process Overview

The City has contracted with its current service provider (Waste Connections) since the Original License Agreement dated September 24, 1996. The current agreement has a Primary Term through September 30, 2024. This represents a 28-year working relationship between the City and Waste Connections (and predecessor companies). While the current contract includes a renewal option, the City is looking to move forward with a procurement process for the next agreement as the current agreement has been in place for more than 20 years and there will be a need to update terms to be more consistent with current best management practices for the industry. For example, potential contract term updates could include recycling processing requirements for 95 percent recovery of program materials or periodic recycling audits specific to the City's materials.

The City reviews the terms of each MSW service contract the City holds on an ongoing basis, considering changing market conditions for each sector and progress towards established priorities and strategies. This includes evaluations such as the types of services provided for each sector and methods by which services are provided. Based on the evaluations performed in the development of this SWMS, Burns & McDonnell recommends the following considerations for the upcoming RFP:

- **Maintain single-family program offerings.** The program provides robust service offerings (see Section 5.0 for more details), and the City should maintain the current service offerings.

- **Address service and billing challenges in Downtown.** There are multiple alternative options available for the collection system and rate structure, and the City should determine the desired approach to ensure Downtown businesses have an equitable rate structure and are complying with program requirements. Specific recommendations for Downtown services are presented in Section 14.0.

- **Consider an unbundled structure to contracted services.** Currently, the City's contractor (Waste Connections) provides both collection and recycling processing services through a single

agreement. As the City considers options for future procurement, this could include an unbundled contract structure where the contracted hauler may not be the same company that provides recycling processing services (i.e., does not operate a MRF in the region). Via the RFP process, the City would evaluate whether to award separate contractors for hauling and recycling processing or one contact for both services.

- **Consider City purchase of collection carts.** The City currently uses three types of carts: residential refuse, residential recycling, and festival carts (for downtown service). There are benefits to having City-owned (rather than contractor-owned) carts, including cost savings. There are multiple options for contracting collection service using City-owned carts (as shown in Table 14-1). The City should consider purchasing carts and requiring the contractor to be responsible for delivering, storing, and managing carts during the contract term.

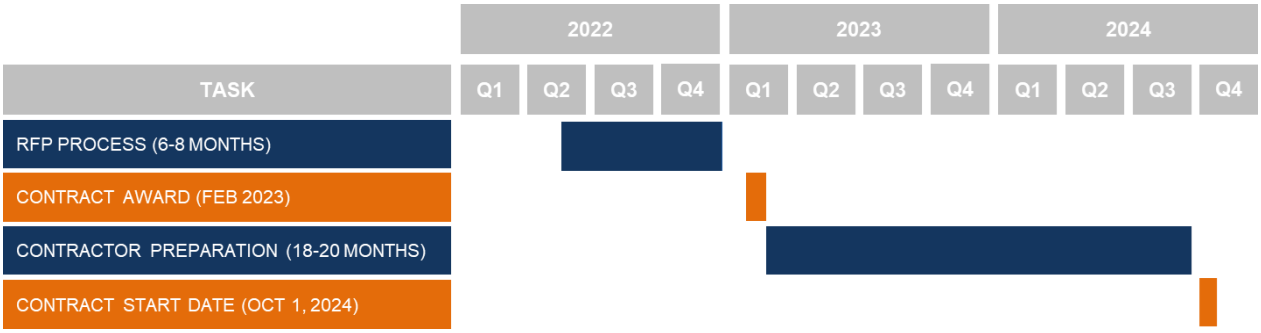
Table 14-1: City-Owned Recycling and Refuse Cart Options

Cart Purchase	Cart Management	Advantages	Challenges
City	**City**	• Cost savings from purchasing rather than including carts in contract pricing • City maintains complete control over containers	• Requires capital, staff, equipment, and space to store, deliver, and repair carts
City	**Contractor**	• Cost savings from purchasing rather than including carts in contract pricing • Contractors has vested interest in the condition of containers	• Requires initial capital outlay for purchase of carts
Contractor[1]	**Contractor**	• Contractor has vested interest in the condition of containers • Does not require initial capital outlay from the City	• Lower potential cost savings from cart ownership

[1] Ownership would transfer to the City at the end of the contract term

As shown in Figure 14-1, the City should begin the RFP process in mid-2022 in order to provide a level playing field for haulers to develop necessary facilities (e.g., MRF, fleet yard, maintenance facilities) and obtain equipment (e.g., waste collection vehicles). Current supply chain and labor challenges have increased the required lead time to obtain collection vehicles and other equipment. Burns & McDonnell recommends allowing at least 18-20 months between contract award and the October 1, 2024 service start date to allow a potential new contractor to prepare.

Figure 14-1: Timeline for Contract Award and Service Commencement



14.2 Development Trends and Collection Environments

Among municipal planning and development groups there has been a movement to incorporate New Urbanism and SmartCode development principles into policy development to increase green spaces, enhance multi-modal transportation, and provide other beneficial environmental impacts. Recent and planned development in McKinney, including zero-lot-line single-family housing, compact mixed-use development and multi-family high density, reflect elements of New Urbanism (i.e., development that creates walkable, mixed-use neighborhoods) and may be designed in accordance with SmartCode to accommodate environmental techniques such as reduced usage of impervious cover (e.g., pavement, asphalt, cement), increased usage of green spaces (e.g., parks, fields, gardens), and more walkable or multi-modal transit (e.g., bicycle lanes, trolley tracks).

These design approaches can cause challenges for solid waste collection activities. If zoning requirements and design codes do not account for the needs of collection vehicles or equipment, it can create challenging collection environments such as:

- **Inaccessible alleys.** Service location in narrow or obstructed alleys.
- **Private drives with limited maneuverability.** Service locations only accessible by private drives.
- **Cul-de-sacs with inaccessible set outs.** Service locations on cul-de-sacs that are too small or contain obstructions.
- **Dead ends.** Service locations on dead-end streets with undersized turn radii, which can create dangerous backing situations.
- **Boulevards.** Service locations on arterial roads that contain obstacles for collection due to multi-modal transportation lanes.

Multiple cities across Texas are experiencing collection challenges associated with the implementation of SmartCode development, including Austin, Fort Worth, and San Antonio. Each of these cities have indicated that applications for new developments are provided to its solid waste and recycling collection group for initial review. It is clear, however, that even though this initial review process may be sufficient for the needs of fire truck equipment, the needs of solid waste and recycling collection vehicles require additional attention in regard to interim applications or amendments. This is due to the fact that solid waste and recycling collection vehicles will visit these locations more frequently than emergency fire vehicles. Additionally:

- Fort Worth noted that even after reviewing initial permits, developments were still being installed that did not meet the needs of solid waste and recycling collection equipment.
- Fort Worth indicated that it is challenging to devote resources to interim reviews. San Antonio shares this challenge and suggested that a potential solution could be to form a dedicated team to manage interim reviews.
- Austin indicated that it has a strategic development team that is dedicated to tracking policy development and reviewing inconsistencies in code that would impact solid waste and recycling collection vehicle accessibility. This team works closely with Austin's Planning and Zoning Department.
- San Antonio has developed a committee that seeks to ensure the safest and most efficient solid waste and recycling collection equipment is able to remain in operation. This committee is tasked to create an informational bulletin that would serve as the policy to determine criteria for SmartCode policy implementation. Recommendations may include variable fee structures, minimums for ASL service and emergency fire equipment, cart set out placement, parking restrictions, and protocols for private haulers.

14.3 Standardized MSW Collection Containers and Signage

It is important to provide standardized containers and guidance so that customers can expect a consistent, predictable MSW management experience regardless of the sector or geographic location within the City they are at any given time. People flow from place to place and from sector to sector (e.g., from home to work to Downtown or public spaces, back to home) every day. Consistency will allow for the highest opportunity for proper, consistent, and convenient participation in MSW management by all customers. Clear and consistent signage can reduce challenges such as recycling contamination.

Currently, there is no consistent bin signage or labeling. The City should develop standards for the MSW collection containers and signage utilized for each sector. Standards should include, but not be limited to:

- Recognizable color of container used for each of the waste streams for all cart-based customers (e.g., green for trash, blue for recycling)
- Expectation that there will be multiple waste streams
- Consistent graphics and signage with guidance on the specific materials that are accepted with each waste stream and key prohibited materials
- Same types of containers for similar uses; for example:
  - Residential containers will all be the same type of carts, through capacity may vary
  - Residents serviced by front-load dumpsters will have the same type of dumpster, though capacity may vary
  - Downtown commercial dumpsters will be clearly labeled with consistent signage to differentiate refuse and recycling dumpsters, though capacity may vary
  - Public collection containers provided in parks, public spaces, and Downtown will be uniform

Once standards have been developed, each subsequent contract renewal or procurement will include terms requiring the contractor to either utilize containers provided by the City or to provide containers for collection that follow the City's established container standards.

14.4 Listing of Strategies and Options

The recommended City-wide strategies and options were developed for the City's consideration to align with the established Guiding Principles of this SWMP (refer to Section 1.0).

1. **Move forward with a procurement process for solid waste services.** While the current License Agreement has a renewal option, this agreement has been in place for more than 20 years and terms should be updated to be more consistent with industry best management practices. The City should initiate the procurement process in mid-2022 in order to provide a level playing field for haulers to develop any necessary facilities and obtain equipment prior to an October 1, 2024 service start date. Current supply chain and labor challenges have increased the necessary lead time. [**Priority:** High**; Timing:** Near-term; **Program(s):** Franchise Agent; Waste Reduction/Diversion; Environmental Code Compliance]

2. **Track and address development trends that reduce serviceability.** Shifting development trends can impact solid waste a recycling collection vehicle accessibility. As the City's growth continues, especially in multifamily and mixed-use development, permit review and code updates will become increasingly important to prevent the creation of challenging collection

environments. [**Priority:** High**; Timing:** Ongoing; **Program(s):** Planning; Environmental Code Compliance]

3. **Standardize MSW collection containers and signage.** Consistency in containers and signage allows for the highest opportunity for proper, consistent, and convenient participation in MSW services. Currently there is no consistent bin signage or labeling City-wide. [**Priority:** Medium**; Timing:** Near-term; **Program(s):** Outreach, Engagement & Education; Waste Reduction/Diversion; Environmental Code Compliance]

Table 14-2 provides a summary of the impact of each strategy or option based on the criteria identified and described in Section 1.

Table 14-2: Evaluation of City-Wide Options

Description	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "buy-in"	Sustainability of Operations
Move Forward with a Procurement Process for Solid Waste Services						
Description: Initiate the procurement process mid-2022 in order to provide a level playing field. Proposal evaluation should include considerations for an unbundled structure to contracted services and City purchase of carts.	Low	Low	N/A	N/A	Medium	High
Track and Address Development Trends That Reduce Serviceability						
Description: Develop a committee or team responsible for tracking policy development and inconsistencies in code, and managing development permit reviews.	Low	Low	N/A	Medium	Medium	High
Standardize MSW Collection Containers and Signage						
Description: Develop standards for MSW collection containers and signage utilized for each sector.	Low	Medium	N/A	Low	Medium	Medium

15.0 IMPLEMENTATION PLAN

The implementation plan presents the following information for each strategy presented in Sections 4.0 through 14.0:

- **Strategy.** A strategy is presented a high-level approach to the City's future materials management. The strategies were developed to align with the Guiding Principles. Each section has between two and four strategies. The City will develop and evaluate specific tactics, activities, and actions to implement each strategy.
- **Priority.** Each strategy has been assigned a high, medium, or low implementation priority to each strategy presented in the SWMS. The City will first implement critically important activities (high priority) and then implement activities assigned medium and low implementation priority as resources are available.
- **Timing.** Timing gives a general indication of when the City proposes to implement each strategy. Each strategy was given an implementation timing of near-, mid-, or long-term. For purposes of this SWMS, near-term is defined as the next 5 years, mid-term is 6-10 years, and long-term is 11-20 years. Timing designations were determined by considering multiple factors, including resources required, current market conditions, and the length of time required for implementation.
- **Programs.** Programs communicates the related and affected programs for each strategy, so that the City can identify and assign responsibility for strategy implementation.
- **Operational impact.** Describes the operational impacts of implementing the option and indicates any increased demand for staffing and equipment on a low, medium or high basis.
- **Financial impact.** Describes the financial impacts of implementing the option and if it would increase operational/capital costs to the City, franchise hauler, or customers a low, medium or high basis.
- **Environmental impact.** Indicates if the option would increase emissions or result in other environmental consequences on a low, medium or high basis.
- **Policy impact.** Indicates the amount of effort related to regulatory requirements or adjustments to the City Code related to the option on a low, medium or high basis.
- **Public "buy-in".** Describes the anticipated public buy-in related to the option based on the outreach efforts conducted as part of the SWMS on a high, medium or low basis.
- **Sustainability of operations.** Describes if the option has a low, medium, or high compatibility with existing programs, where low compatibility would require significant changes and high compatibility would require few to none for sustained operations.

	Priority	Timing	Program(s)	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "Buy-In"	Sustainability of Operations
Facilities and Infrastructure (Section 4)									
Explore options for an alternative MRF processor. In anticipation of the expiration of the existing contract for collection and processing of residential recycling in 2024, the City would benefit from exploring future options by maintaining open dialogue with private processors that may be able to provide these services or regional entities (e.g., NTMWD) that could help multiple cities collaborate on processing options.	High	Near-Term	Franchise Agent Waste Reduction/Diversion	Low	Low	N/A	N/A	Medium	High
Ensure future MSW disposal capacity. Although the NTMWD Landfill has sufficient disposal capacity in the near term, over time the City should coordinate with NTMWD to secure long-term disposal by supporting long-term capital planning for future landfill facilities. Additionally, the City should continue work with NTMWD to determine contingency plans if the transfer station under development if the timeline is delayed.	High	Long-Term	Franchise Agent Waste Reduction/Diversion	Low	Low	N/A	N/A	Medium	High
Identify opportunities for increased organics diversion. The City should continue to support the development of expanded organic diversion programs (e.g., yard waste, food surplus). To effectively develop an expanded organics diversion program, this could include partnership between NTMWD and the City to develop and finance additional drop-off and grinding capacity located in McKinney to alleviate capacity and space challenges at Custer Transfer Station.	Medium	Long-Term	Waste Reduction/Diversion Outreach, Engagement, & Education	Varies	Varies	Medium	Varies	High	Medium
Single-Family Residential (Section 5)									
Encourage recycling and reuse of bulky materials. The City should incorporate additional efforts to educate customers and facilitate recycling and reuse opportunities for bulky items. This could include a one-time "new resident" collection option for boxes and packing paper to recycle these materials, rather than these materials being disposed through the bulk program.	Medium	Near-Term	Waste Reduction/Diversion Outreach, Engagement & Education	Medium	Medium	Medium	Low	High	Medium
Maintain customer participation in the curbside residential yard trimmings program and privately-provided services.	Low	Mid-Term	Waste Reduction/Diversion Outreach, Engagement & Education	Low	Low	Medium	N/A	High	Medium
Consider long-term options for food scraps diversion, including ways to support third-party subscription programs to expand into McKinney.	Low	Long-Term	Waste Reduction/Diversion	Varies	Varies	Medium	Varies	High	Medium
Household Hazardous Waste (Section 6)									
Continue providing curbside HHW and e-waste recycling services. The City's current offering of on-request curbside HHW and e-waste recycling services represents a high level of service. Incremental improvements are planned or can be made to the program, such as the planned implementation of the ReCollect app to streamline electronic service request and tracking. The City should also continue to periodically review and re-bid HHW, e-waste, and FOG management contracts to ensure services remain cost-competitive and provide any developments in best management practices.	Medium	Long-Term	Waste Reduction/Diversion Procurement Code Compliance	Low	Low	Medium	N/A	High	High

	Priority	Timing	Program(s)	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "Buy-In"	Sustainability of Operations
Explore opportunities to expand diversion opportunities for hard-to-recycle materials. The City offers collection or drop-off opportunities for a variety of hard-to-recycle material. For some materials where the City does not offer recycling, residents may use programs operated by the private sector (e.g., grocery store drop-off) or other cities (e.g., City of Frisco ESP recycling drop-off). There are potential opportunities for the City to expand diversion of hard-to-recycle materials such as through partnerships and grant funding.	Medium	Long-Term	Waste Reduction/Diversion	Varies	Varies	Varies	Varies	High	Medium
Consider additional monitoring of illegal dumping. The services provided through the HHW and e-waste programs provide an outlet for residents to dispose of materials that might otherwise be illegally dumped and result in potential environmental contamination. Currently, illegal dumping is handed outside of Public Works by the City's Police Department. If challenges with illegal dumping become more pronounced, the City should consider if additional efforts are needed to monitor and mitigate illegal dumping. For example, the City could establish a crew that monitors and mitigates illegal dumping (e.g., two full time employees (FTEs) and a vehicle) to develop survey studies to analyze where more collection equipment should be added or moved in the field.	Low	Mid-Term	Police Department Code Compliance	Low	Low	Low	Low	High	High
Multifamily Residential (Section 7)									
Explore options for tracking multifamily materials separately from commercial materials. Developing a comprehensive understanding of multifamily material streams and quantities is an essential step to developing and implementing effective multifamily strategies for future materials management.	High	Mid-Term	Waste Reduction/Diversion Franchise Agent	Low	Low	N/A	Medium	Medium	Medium
Explore options to ensure multifamily properties provide adequate and effective recycling service capacity. The City can consider options such as implementing guidelines or requirements for the inclusion of recycling enclosures in new multifamily development, and minimum service frequency or capacity (e.g., on a per-unit basis, comparable to single-family capacities) may help.	Low	Long-Term	Environmental Code Compliance Franchise Agent	Medium	Medium	Medium	High	Varies	Medium
Increase engagement and support for multifamily property owners. The City should identify methods to incentivize and support multifamily property owners and managers to participate in educational efforts for their residents and provide tool for them to more effectively engage with residents around topics of solid waste and recycling. The City should also directly support property owners and managers in procuring and utilizing recycling services and equipment onsite.	Low	Long-Term	Outreach, Engagement & Education	Low	Low	N/A	Low	High	Medium
Commercial & Institutional (Section 8)									

	Priority	Timing	Program(s)	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "Buy-In"	Sustainability of Operations
Explore options to enhance data tracking and understanding of commercial and institutional material streams. Options that the City should consider include, but are not limited to: •Incentivizing or requiring commercial recycling collection and data transmittal to the City (e.g., as improvements to the existing hauler permitting requirements), or by incentive programs or other ordinances (e.g., as part of a recycling enclosure ordinance, as a component of a future franchise system) •Develop commercial waste characterization and recycling studies, including at the MRF, to better understand the amount of material generated and recovered from the commercial sector	High	Mid-Term	Waste Reduction/Diversion Franchise Agent	Low	Low	N/A	Medium	Medium	Medium
Explore options to ensure commercial and institutional properties provide adequate and effective recycling service capacity. The City should consider a phased approach of implementing policy tools. In the near- to mid-term, the City could implement options such as guidelines or requirements for the inclusion of recycling enclosures in new commercial development, and minimum service frequency or capacity to help ensure effective commercial recycling services and maximize diversion potential. In the long-term the City could consider options such as a commercial recycling ordinance and/or a franchise system for commercial recycling.	Medium	Long-Term	Environmental Code Compliance Franchise Agent	Medium	Medium	Medium	High	Varies	Medium
Consider providing technical assistance programs for new and existing commercial customers. Currently, commercial accounts including new customers are managed directly by Waste Connections. The City could provide informal guidance to new commercial establishments at the time customers initiate their solid waste services account with the City, and upon request by existing customers, such as right-sizing services.	Low	Long-Term	Waste Reduction/Diversion Outreach, Engagement & Education	Low	Low	N/A	Low	Medium	Medium
Disaster and Storm Debris (Section 9)									
Perform tabletop exercise of the Disaster Debris Management Plan. Performing a tabletop exercise for the debris management plan will increase staff familiarity with the plan, identify any training gaps or confusion, and set the City up for success in the event that the plan is triggered. The City initiated an effort in 2022 to perform tabletop exercises of all emergency plans on a three-year cycle, to be completed in 2025	Medium	Mid-Term	Planning Office of Emergency Management	Low	Low	N/A	N/A	N/A	High

	Priority	Timing	Program(s)	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "Buy-In"	Sustainability of Operations
Establish a schedule to review and maintain the Disaster Debris Management Plan. FEMA updates guidance periodically. The City should consider establishing a schedule to periodically review and make any updates to reflect any updates in FEMA guidance and lessons learned through tabletop exercise. Plan maintenance could include periodically researching best practices in storm debris management, undertaken by City staff.	Medium	Mid-Term	Planning Office of Emergency Management	Low	Low	N/A	N/A	N/A	High
Consider establishing a reserve fund earmarked for disaster and storm debris management. While FEMA will reimburse the City for approved costs associated with managing disaster and storm debris from declared emergency events, the City must have sufficient funds available to activate these services when needed. The City should consider establishing a reserve fund earmarked for disaster and storm debris management costs.	Medium	Mid-Term	Office of Emergency Management	Low	Low	N/A	Medium	N/A	High
Public Spaces and Special Events (Section 10)									
Provide recycling service at City-sponsored Downtown festivals. There are a variety of options for providing recycling opportunities during Downtown festivals. Given concerns with contamination, the City should consider piloting clear-bagged options (e.g., Clear Stream) to provide cost-effective, clear, temporary recycling containers during its Downtown festivals. Over time, as City-wide and outreach, engagement, and public education efforts are successful at reducing contamination, the City should consider a more permanent solution such as providing well-labeled carts of a specific color for recycling and paired with refuse carts.	Medium	Near-Term	Waste Reduction/Diversion Environmental Code Compliance Outreach, Engagement, & Education Parks and Recreation	Low	Low	Low	Medium	High	Medium
Explore opportunities to provide recycling opportunities in the City's parks. Activities at parks and sports complexes generate recyclables (e.g., water bottles) by the nature of public activity. The City should explore opportunities to provide recycling in parks, which could be implemented in a phrased approach such as initially providing service at sports complexes where higher volumes of recyclables are generated (e.g., water and sports drink bottles).	Low	Mid-Term	Waste Reduction/Diversion Outreach, Engagement & Education	Medium	Medium	Medium	Low	High	Medium
Coordinate with Parks & Recreation to consistently roll out Public Works waste and recycling strategies and education content. Consistency in containers and signage allows for the highest opportunity for proper, consistent, and convenient participation in MSW services. People flow from place to place and from sector to sector (e.g., from home to work to Downtown or public spaces, back to home) every day. It is important that the Parks & Recreation and Public Works coordinate to provide consistency as new programs and messaging are developed and deployed by Public Works.	Medium	Ongoing	Waste Reduction/Diversion Outreach, Engagement & Education Parks and Recreation	Low	Low	N/A	Low	Medium	Medium

	Priority	Timing	Program(s)	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "Buy-In"	Sustainability of Operations
Outreach, Engagement & Public Education (Section 11)									
Strategically allocate resources to support solid waste specific program activities and growth. Staffing levels of mature programs in peer cities are generally higher than the City's, and are structured to include additional program-specific staff that contribute to outreach efforts (e.g., waste reduction specialist, sustainability specialist) and support other programs and efforts that achieve program goals (e.g., reduced contamination). As the City's rebuilds its outreach, engagement, and public education efforts, the effectiveness may be limited if the program goals and metrics and not in alignment with the level of financial and staffing commitment.	High	Near-Term	Outreach, Engagement & Education	Low	Low	N/A	N/A	N/A	Medium
Incorporate content and resources provided by NCTCOG and The Recycling Partnership to develop outreach, engagement and public education materials. The successful NCTCOG regional campaign exposes residents to similar messaging regarding recycling anywhere they are in region. Resources from The Recycling Partnership can be used to develop additional program materials (e.g., bin signage) based on behavior change research and field-tested templates.	High	Near-Term	Outreach, Engagement & Education Waste Reduction/Diversion	Low	Low	N/A	N/A	High	Medium
Integrate ReCollect technology into messaging and outreach. As the City implements the ReCollect app to streamline service requests, it can use the service's WasteWizard tool on the recycling webpage to allow residents to search for recycling information by material (e.g., "what do I do with…?"). WasteWizard search trends can then be used to identify the materials or services where residents have the most questions and develop targeted messaging based on these programs.	High	Near-Term	Outreach, Engagement & Education Waste Reduction/Diversion	Low	Low	N/A	N/A	High	Medium
Update and implement program metrics. The prior metrics for the City's outreach, engagement, and public education program did not translate to a clear and measurable definition of success. The City should develop and implement program metrics (e.g., level of engagement on social media platforms, number of compliance actions taken, participation rate, material capture rate) that are driven by program goals, are suitable based on available funding, and allow the City to better assess program effectiveness at translating messaging into results (e.g., increased recycling participation).	High	Near-Term	Outreach, Engagement & Education Waste Reduction/Diversion Environmental Code Compliance	Low	Low	N/A	N/A	Medium	Medium
Advance data collection efforts that support future content development. The City should consider including requirements such as on-board technology, periodic cart audits or MRF audits into the upcoming RFP to allow the City to assess key metrics such as participation rates and recycling contamination. This information should be tracked systematically and strategically to evaluate the effectiveness and impact of the outreach, engagement and public education program over time.	Medium	Mid-Term	Outreach, Engagement & Education Waste Reduction/Diversion Environmental Code Compliance	Low	Medium	N/A	Low	Medium	Medium

	Priority	Timing	Program(s)	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "Buy-In"	Sustainability of Operations
Downtown Central Business District (Section 12)									
Develop near- and long-term solutions to the collection challenges currently facing customers and the City in Downtown. The current system of carts and shared dumpster collection present challenges for both downtown businesses, the City, and the City's contractor. Options include the removal of carts in favor of shared dumpsters or shared compactors or implementation of a concierge service.	High	Near-Term	MPAC/Main Street Environmental Code Compliance Franchise Agent	Medium	Varies	N/A	Varies	Varies	High
Develop a more equitable service rate structure. Currently only a small portion of Downtown businesses have an account with the City's contractor and pay for service. The City should develop a more equitable service rate structure, including determining the extent to which the City wishes to continue subsidizing Downtown service. Options include pre-paid bags, pay-per-use compactors/enclosures, pay-per-weight compactors, and periodic audits.	High	Near-Term	Finance/Utility Billing Environmental Code Compliance	Medium	Varies	N/A	Varies	Varies	High
City Ordinance, Regulation, and Code Enforcement (Section 13)									
Update Chapter 86 in Code of Ordinances to reflect current departmental activities. The current Chapter 86 in the Code of Ordinances was revised in 2011 and does not reflect current departmental activities such as code compliance being in the Department. There is value in the City periodically updating Chapter 86 to ensure it reflects the current structure and operations of the Department.	Medium	Ongoing	Public Works Department Planning City Attorney	Low	Low	N/A	Low	N/A	Medium
Consider additional staffing for code compliance activities. Current staffing limits the ability to implement proactive code enforcement initiatives, and the implementation of any new programs (e.g., Downtown special event recycling, ordinances to incentivize multifamily or commercial recycling) may increase the responsibilities of the code compliance team. The City should consider additional staffing for code compliance activities in line with the City's growing population and the implementation of this SWMS.	Medium	Mid-Term	Code Compliance	Medium	Low	N/A	Low	Medium	High
Explore ordinance-based approaches to increase multifamily recycling. McKinney continues to experience high levels of growth, including an increasing trend toward multifamily rather than single-family residential development. The City should explore options for diversion incentives & strategies for the multifamily sectors to provide all residents (not just single-family customers) the option to conveniently recycle.	Medium	Mid-Term	Waste Reduction/Diversion Outreach, Engagement & Education Code Compliance City Attorney	Medium	Medium	Medium	High	Varies	Medium

	Priority	Timing	Program(s)	Operational Impact	Financial Impact	Environmental Impact	Policy Impact	Public "Buy-In"	Sustainability of Operations
Further evaluate the existing hauler permitting process and opportunities to improve commercial and multifamily recycling data through modifications of the monthly hauler reports. Developing a comprehensive understanding of material streams and quantities of material generated by the multifamily and commercial sectors is an essential step to developing and implementing effective strategies for current and future materials management. The existing hauler permitting process should be further evaluated to understand its potential use to gather high-quality data related to recycling activity in these sectors and any additional needs (e.g., staffing) to incentivize or require multifamily and commercial recycling data collection.	High	Mid-Term	Waste Reduction/Diversion Franchise Agent Code Compliance	Medium	Low	N/A	Medium	Medium	Medium
City-Wide Strategies (Section 14)									
Move forward with a procurement process for solid waste services. While the current License Agreement has a renewal option, this agreement has been in place for more than 20 years and terms should be updated to be more consistent with industry best management practices. The City should initiate the procurement process in mid-2022 in order to provide a level playing field for haulers to develop any necessary facilities and obtain equipment prior to an October 1, 2024 service start date. Current supply chain and labor challenges have increased the necessary lead time.	High	Near-Term	Franchise Agent Waste Reduction/Diversion Environmental Code Compliance	Low	Low	N/A	N/A	Medium	High
Track and address development trends that reduce serviceability. Shifting development trends can impact solid waste a recycling collection vehicle accessibility. As the City's growth continues, especially in multifamily and mixed-use development, permit review and code updates will become increasingly important to prevent the creation of challenging collection environments	High	Ongoing	Planning Environmental Code Compliance	Low	Low	N/A	Medium	Medium	High
Standardize MSW collection containers and signage. Consistency in containers and signage allows for the highest opportunity for proper, consistent, and convenient participation in MSW services. Currently there is no consistent bin signage or labeling City-wide.	Medium	Near-Term	Outreach, Engagement & Education Waste Reduction/Diversion Environmental Code Compliance	Low	Medium	N/A	Low	Medium	Medium

APPENDIX A - GOAL AND SWOT ANALYSIS

Solid Waste Management Strategy Goals and SWOT Analysis

During the April 2021 kick-off meeting, Burns & McDonnell facilitated discussion to prioritize goals and conduct a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis to gain further perspective on key issues that needed to be evaluated in the development of the Comprehensive Solid Waste Management Strategy (CSWMS). All information from the goals prioritization and SWOT analysis will be used as background information to guide the Strategy development. Tables 1 through 3 communicate the specific points identified during the facilitated discussion. Similar comments have been combined, with the number of responses communicated in parentheses.

Table 1: Initial Goals to Address in the Comprehensive Solid Waste Management Strategy

Initial Goals
• Cost of service (2) • Efficiency (2) • Financial stability of programs • Exploration of area partnerships with other municipalities • Discussion of available technology for efficient recycling/disposal management

Table 2: Three Most Important Goals for the Comprehensive Solid Waste Management Strategy

First Most Important Goal
• Cost efficient • Cost of service • Offering the right number and type of services
Second Most Important Goal
• Great service delivery • Convenience • Programs can be sustained
Third Most Important Goal
• Long-term strategy with regional partners (2) • Environment-focused programs

Table 3: Strengths, Weaknesses, Opportunities and Threats Summary

Strengths
• City Council and City Manager support change and program development • Existing personnel and support structure within Public Works • Funding availability for program implementation • City staff, leadership, and public have a high-level of trust in the current solid waste services • Contracting partners and inter-local relationships • Sharing of program ideas and strategies with NTMWD cities • Timing of next RFP issuance coincides with CSWMS
Weaknesses
• Cost factor and willingness to pay for environmental sustainability • Uncertainty in regional and national solid waste issues, such as recyclable materials/markets • Performance standards or task benchmarks are needed to measure resource commitments against work efforts • The "core business" of Environmental Services needs to be better identified to set budget priorities—what must be done vs. what would like to be done • Competing priorities (development/growth) for residents' attention • Differences in programs in the region cause confusion, such as what's accepted for recycling • Restrictions in existing contracts impacting potential municipal partners
Opportunities
• Continued growth provides opportunity to respond to new demands • Organization structure to meeting increasing customer services demands to ensure ongoing and continuing responsiveness • Population size and growth attractive for technology vendors • RPF timing • Aligning cost of service with use of services • Comprehensive communications plan • Regional partnerships
Threats
• Competing priorities as a community make communications challenging • Increasing costs to the consumer/resident • Growth if we don't adequately plan and prepare now • Unfavorable media requires effective communications to address misinformation • Zoning (including single- or multi- uses, and smart-zoning) creating challenges for solid waste services

APPENDIX B - VISION FOR MCKINNEY THINK-TANK REPORT

McKINNEY TEXAS
Unique by nature.

BURNS McDONNELL

future iQ

SOLID WASTE MANAGEMENT STRATEGY VISION FOR MCKINNEY

THINK-TANK REPORT - MCKINNEY, TEXAS, USA

November 2021





SOLID WASTE MANAGEMENT STRATEGY

VISION FOR MCKINNEY THINK-TANK REPORT

MCKINNEY, TEXAS, USA

November 2021

This visioning report has been produced as part of McKinney's Comprehensive Solid Waste Management Strategy Project and represents a summary of Task 1.

Report Prepared by:

future→iQ®

Create **Future Intelligence**®

BURNS McDONNELL

Think-Tank Hosted By:

McKINNEY® TEXAS

Unique by nature.

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Task 1 of McKinney's Solid Waste Management Strategy Project allowed community stakeholders to take a 'deep-dive' into strategic visioning and future-thinking through a scenario-planning process.

1.0 INTRODUCTION

This report represents the culmination and summary of Task 1 of the McKinney Solid Waste Management Strategy project. The overall project aims to produce an executable strategy, which will guide McKinney's solid waste and recycling priorities for the next twenty years. Task 1 was designed to gather significant and relevant data, leading to the discovery of expected and preferred futures for the future of solid waste management and recycling in McKinney. Each step of Task 1 built upon the preceding steps.

The following provides descriptions of each deliverable completed in Task One:

- **Virtual Project Launch –** Burns & McDonnell and Future IQ collaborated to provide an online overview of the scope and timeline of the project.
- **McKinney Solid Waste Management Community Survey –** A collaboratively developed survey was distributed as broadly as possible in the community. The survey was made available via an online project portal and was live from June through July 2021. 562 individuals participated in the survey.
- **Think-Tank Module 1: Future Trends –** This two-hour module provided participants with an overview of macro and local trends impacting solid waste management. Trends were examined with an eye to current processes, as well as the impact of these trends looking out to 2040. This workshop took place virtually on Thursday, September 9, 2021.
- **Think-Tank Module 2: Key Drivers –** This two-hour module explored key drivers of solid waste management and recycling and introduced participants to the main themes used to create the scenario matrix for Module 3 of the Think-Tank. The Key Driver Workshop took place on Thursday, September 16, 2021.
- **Think-Tank Module 3: Think-Tank –** The two-hour scenario-based planning Think-Tank module on September 30, 2021, provided an important opportunity to engage community stakeholders and city staff in a critical dialogue about the future and to discuss the impacts of changing dynamics solid waste management and recycling looking out to 2040.
- **McKinney Solid Waste Management Expected and Preferred Survey –** Participants of the Think-Tank modules were asked to participate in the Expected and Preferred Survey. Results produced heatmaps that illustrate expected and preferred futures for solid waste management in McKinney looking out to 2040.

In the face of accelerating speed of change, the key to resiliency is the ability to anticipate change and remain agile. To be successful, McKinney's new comprehensive Solid Waste Management Strategy will require the active involvement of all community stakeholders.

2.0 FORCES SHAPING THE FUTURE

The three Think-Tank modules provided a forum for participants to explore the forces of change shaping the future of solid waste management and recycling in the City of McKinney. Participants at the Think-Tank modules explored emerging macro trends, key drivers, and possible future scenarios. Perceptions around the nature of impact of these forces, both in terms of size and timing of impact, were explored to gauge how important participants consider these forces of change. Participants discussed the emerging trends on global, regional, and local scales, and related them directly to solid waste management and recycling in terms of how well prepared they considered the City of McKinney.

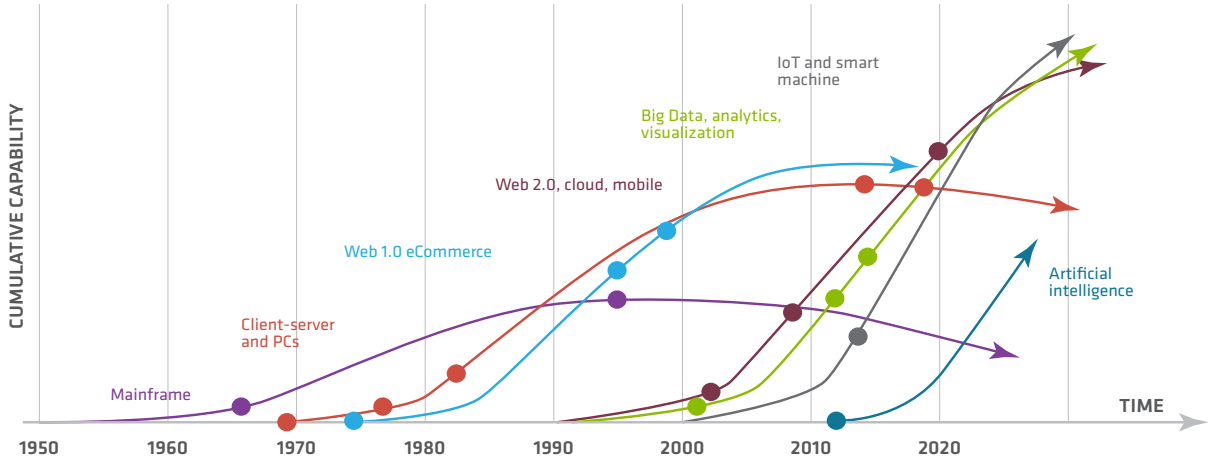
Specifically, the trend areas were:

- Consumption patterns and waste types
- Policy setting and application of technology
- Waste management systems being utilized

Of relevance to the discussion on trends, is the speed and scale of change that is occurring. Newly developed innovations in solid waste management are being implemented globally and locally at all scales, thereby changing the face of industries and society in a rapid and profound way. Advanced technologies are at the forefront of this transformation. At the same time, societal values are shifting, and there is an increased awareness of environmental factors and sustainable resource use.

> "McKinney makes recycling easy. No need to separate materials, no need to take materials further than your curb and McKinney takes a lot of types of recyclable materials."
>
> *- McKinney Community Survey Respondent*

The Increasing Capability of Digital Technologies



The community survey has achieved a strong response rate from private residents. This suggests the survey reflects the desires of the broader community.

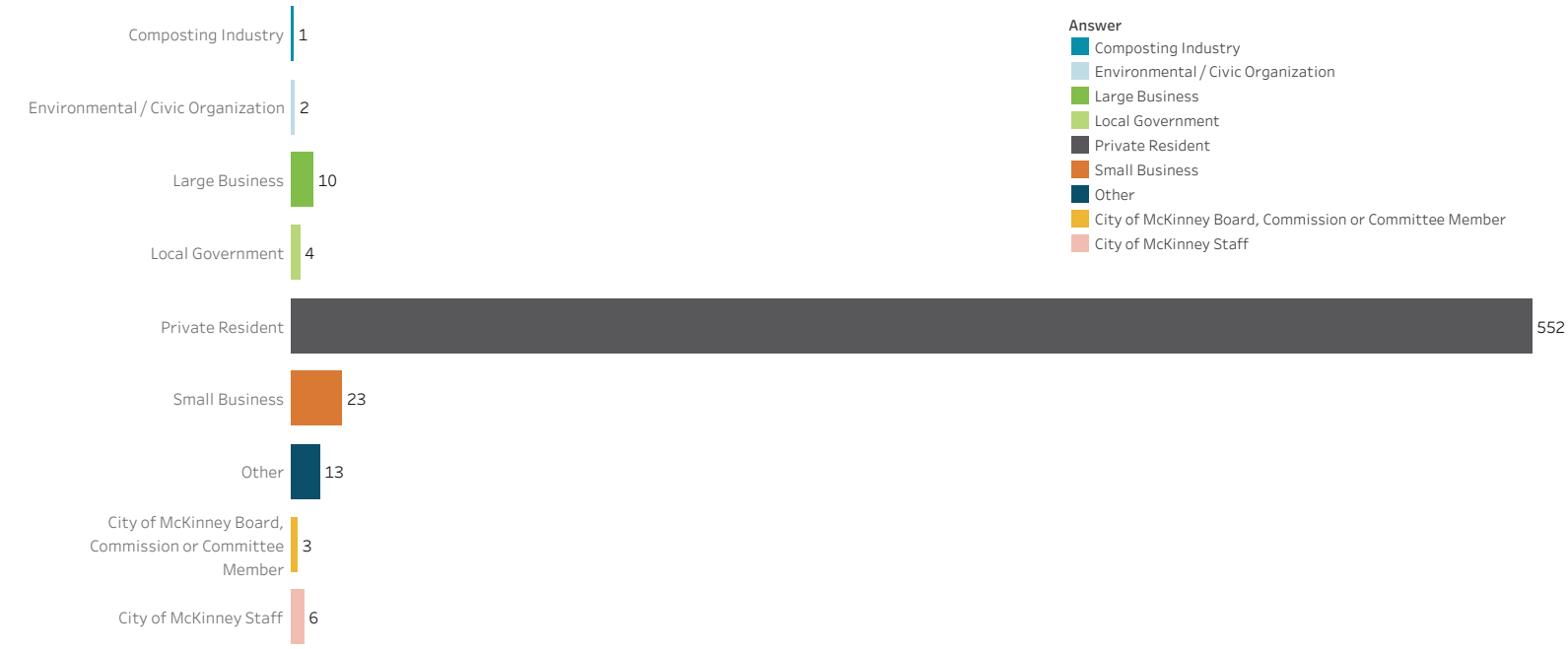
3.0 SURVEY RESULTS – KEY STAKEHOLDER INPUT

Prior to the Think-Tank modules, a community survey was conducted, and 562 community stakeholders responded to the survey. Respondents were asked about their views on having a shared vision for the future of solid waste management and recycling in McKinney. Below are the compiled results of the community survey.

3.1 PROFILE INFORMATION

In terms of survey respondent demographics, most respondents were aged 40 or over, with 19% between the ages of 18-39. Respondents were asked about their organizational affiliation.

Survey respondent self-identified organizational affiliation



DataInsight

DATA INSIGHTS:

- Survey respondents overwhelmingly self-identified as private residents of McKinney (98%).
- Survey respondents represented a broad range of periods living in McKinney, with one third living in the 0-5 years range and one third in the 11-20 years range.
- The majority of survey respondents were female (57%) with 36% male, and 7% preferring not to answer.

A long-term vision for solid waste management in McKinney requires alignment around its importance not only for the city, but also for survey respondents' decision making on the home, business or organization level.

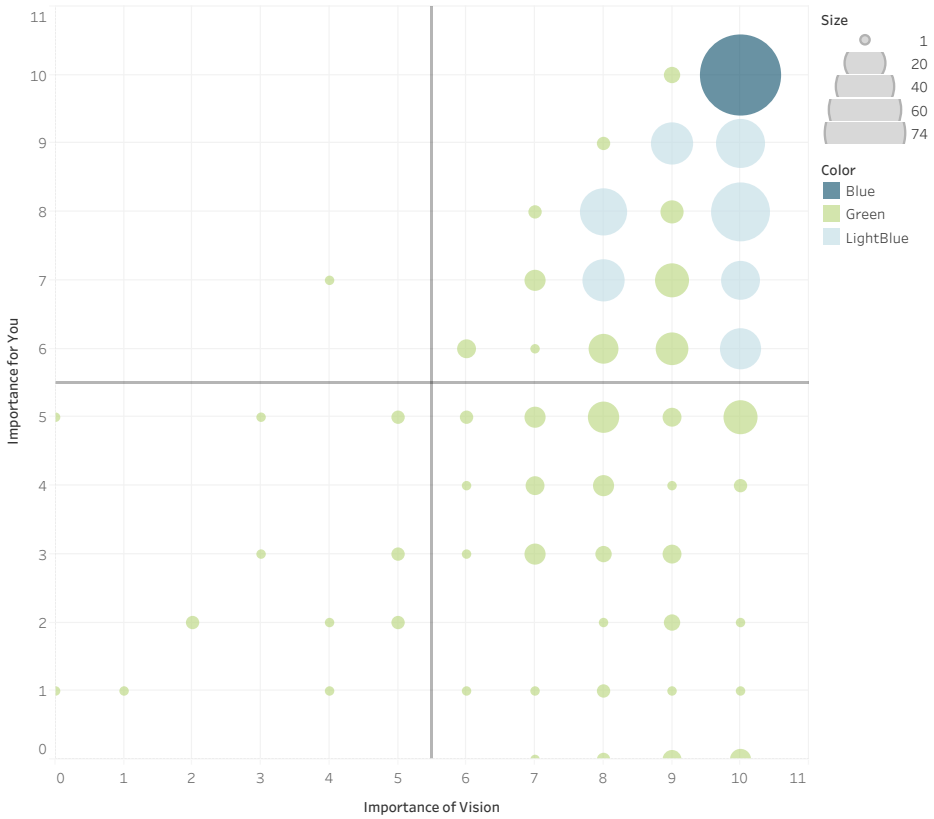
3.2 IMPORTANCE OF A SHARED VISION

Survey respondents were asked two questions about the importance of having a shared vision for the future of solid waste management in McKinney. The questions were:

- How important it is to have a long-term vision for solid waste management in the city?
- How important is long-term vision for making decisions in your home, business, or organization?

The scale was: 1 = Not at all important; 10 = Critically important

Importance of Vision



DataInsight

DATA INSIGHTS:

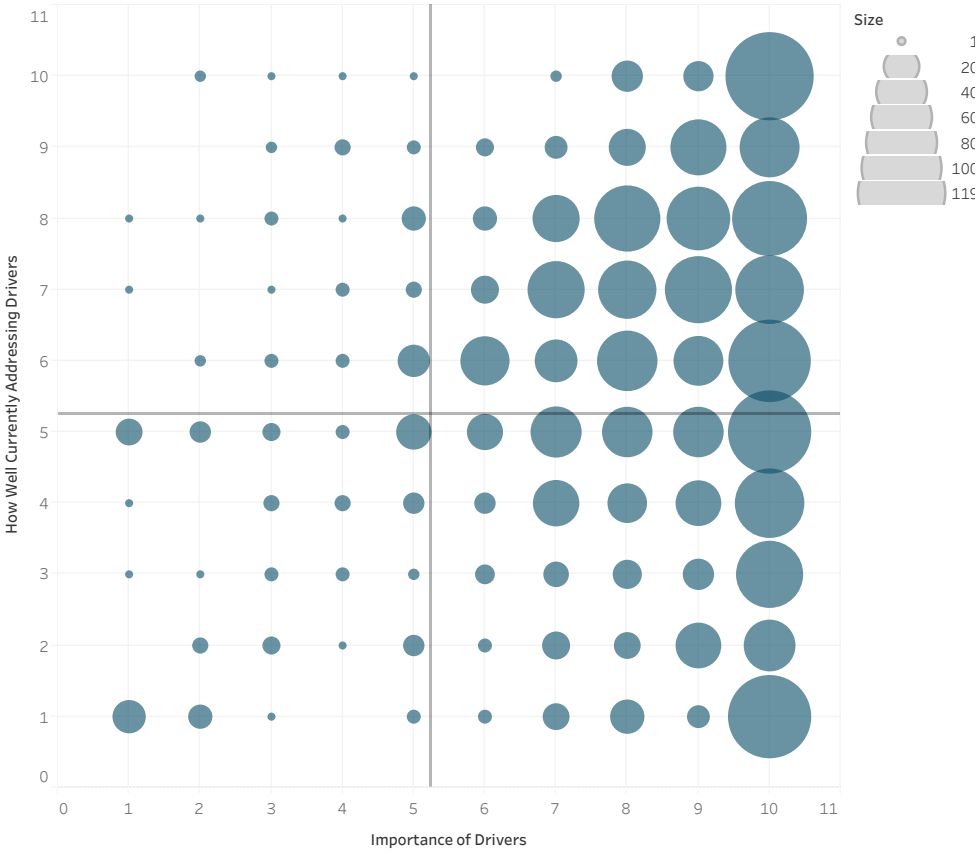
- A majority of responses in the upper right quadrant of the matrix indicates the critically important nature of having a shared vision for solid waste management in McKinney.
- It should be noted that survey respondents indicated that having a shared vision is both important at the city level and at the individual level. This suggests strong support for city action that influences individual household and business behavior.

Drivers are trends, events or changes that shape the future. McKinney survey respondents placed a high level of importance on all of the identified drivers.

3.3 KEY DRIVER ANALYSIS - IMPORTANCE AND PERFORMANCE

To analyze perceived drivers and influences on solid waste management and recycling in McKinney, survey participants were asked about the importance of changes to 18 topic areas over time. Respondents were also asked to rate McKinney's performance in addressing these drivers of change. Below is a pivot chart mapping the two conditions in McKinney.

The scale was: 1 = Not at all important; 10 = Critically important



DataInsight

DATA INSIGHTS:

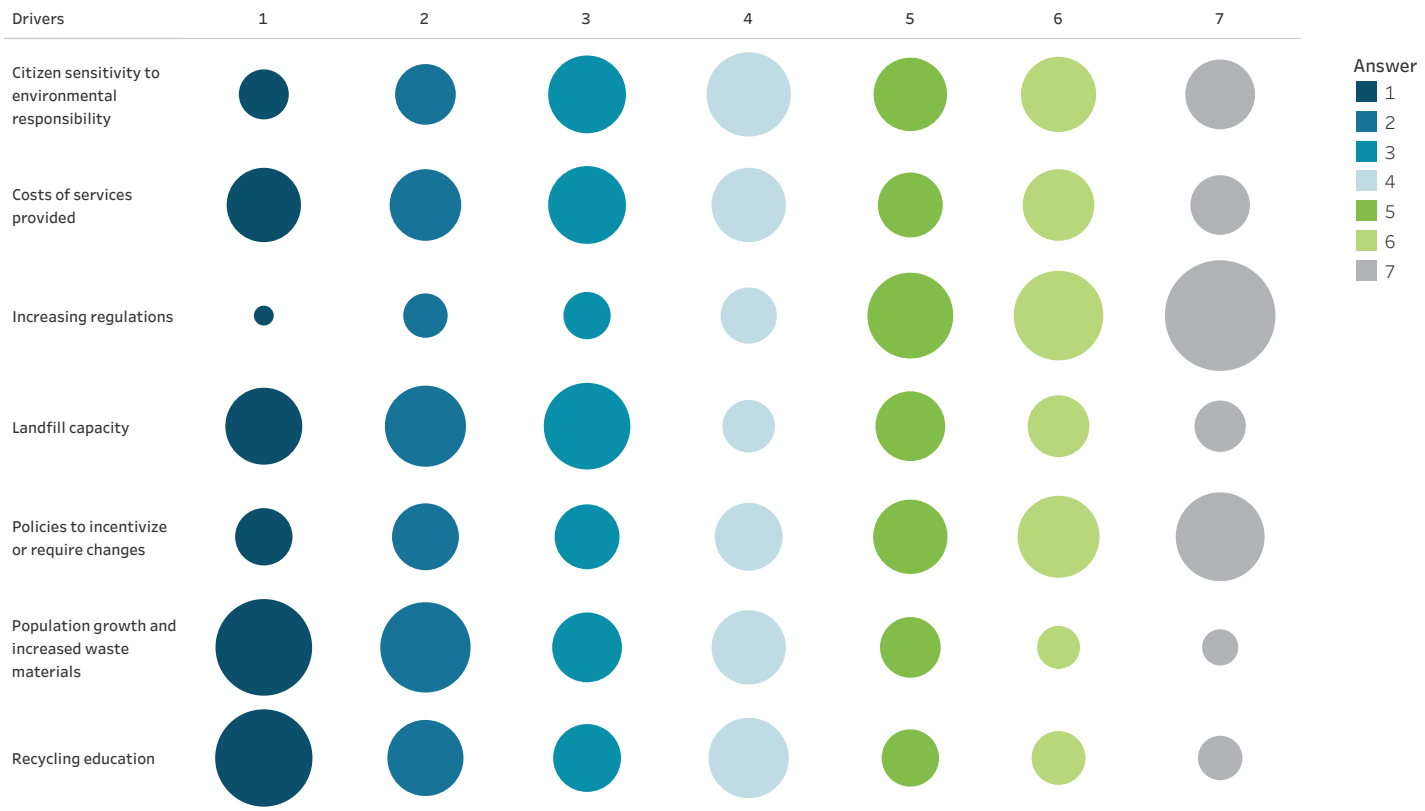
- This data represents the results of all of the drivers with respect to importance and how well the city is currently addressing the drivers. The data shows a very high level of importance attributed across the set of 18 drivers.
- Survey respondents had varying responses to the question about how well the city was addressing the drivers – with a very large spread from 'Not very well' to 'Very well' on the Y-axis.

Changes in citizen sensitivity to environmental stewardship will be important elements in gaining support for McKinney's new Solid Waste Management Strategy.

3.4 RANKING OF KEY FACTORS IMPACTING SOLID WASTE MANAGEMENT

To gauge the relative importance of certain factors and their impact on the future of solid waste management in McKinney, survey respondents were asked to rank seven factors. These had been identified by the City of McKinney team as important to the future of solid waste management.

In terms of their impact on the future of solid waste management in McKinney, please rank the relative importance of the following factors. Scale: 1 = Most important; 7 = Least important



DataInsight

DATA INSIGHTS:

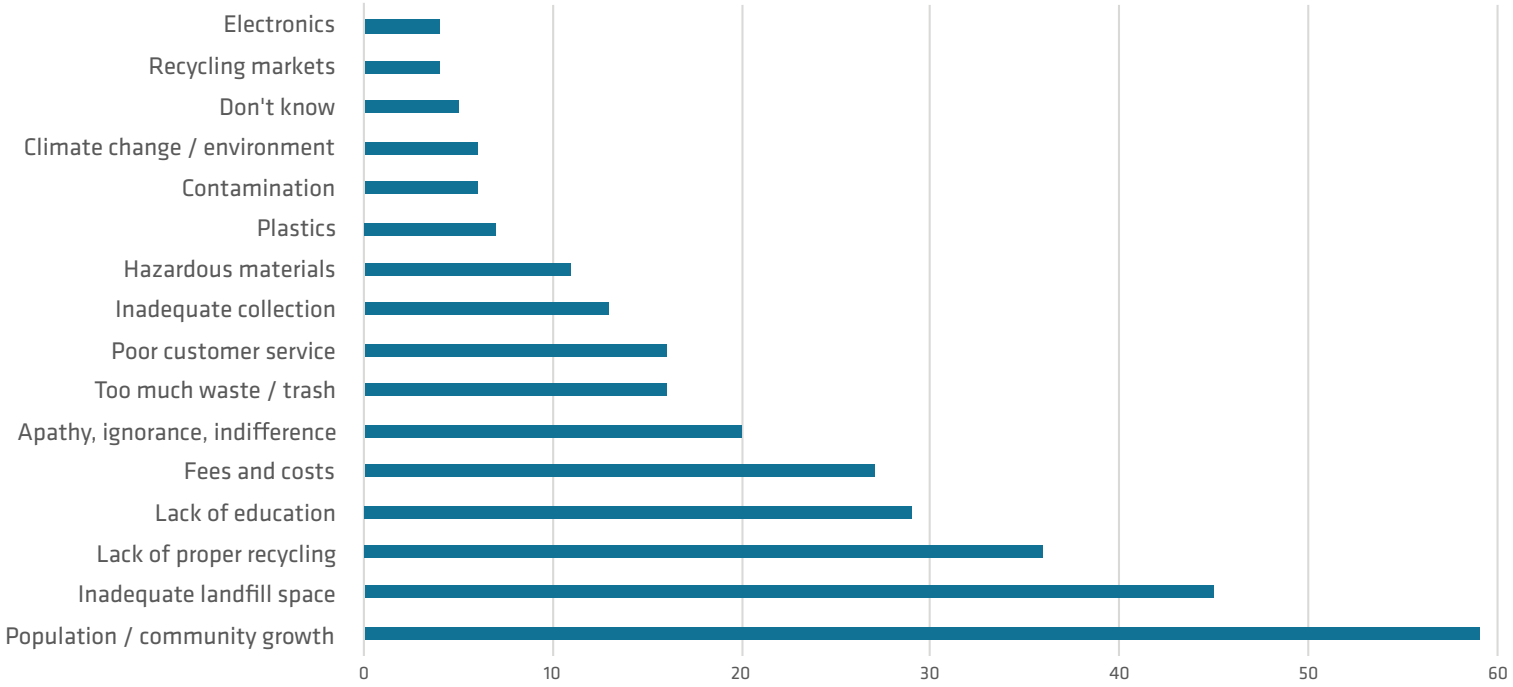
- Population growth and increased waste materials, recycling education, landfill capacity and costs of services provided were identified by survey respondents as the four most important factors.
- The lack of importance given to increasing regulations could have potential negative consequences, particularly related to environmental legislation and climate change.

An effective comprehensive waste management strategy will require increased community education about the benefits of sustainable strategies and to deal with issues of apathy, ignorance, and indifference towards the issue.

3.5 VIEWS OF THE FUTURE – THREATS FACING SOLID WASTE MANAGEMENT IN MCKINNEY

As a measure of where community stakeholders considered the City of McKinney unprepared or threatened by future impacts, survey respondents were asked to cite in narrative form what they believe are the biggest threats facing solid waste management in McKinney looking out to 2040. Initial results show considerable concern over population and community growth, lack of landfill space, lack of proper recycling and stakeholder education, and fees and costs as primary concerns.

What do you think are the biggest threats facing solid waste management in McKinney in the future?



DataInsight

DATA INSIGHTS:

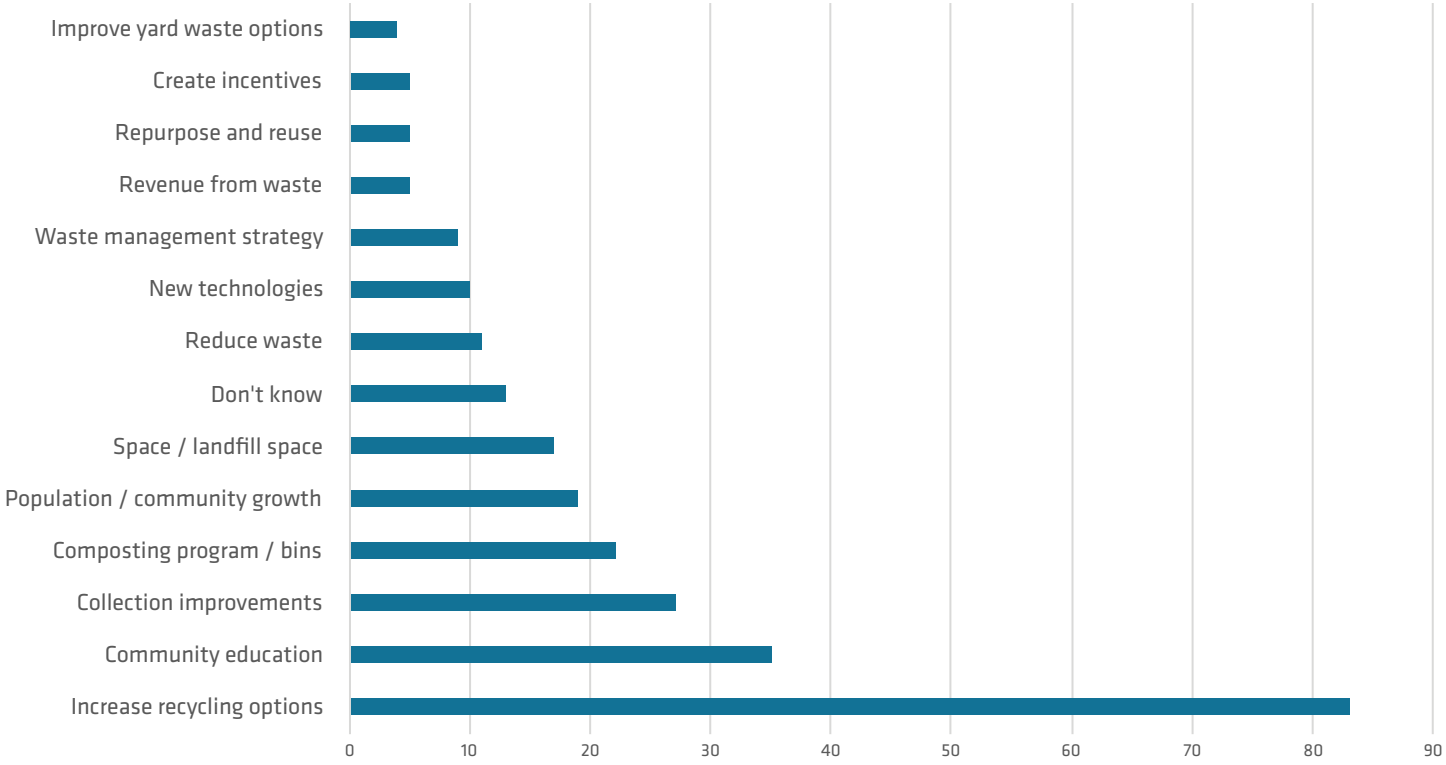
- Survey respondents highlighted poor customer service as a threat to McKinney's future. This ranking would merit a customer service questionnaire to explore the issues in this area.
- The pandemic saw a dramatic increase in household waste brought on by working from home. Addressing perceived threats to waste management in McKinney will take significant and sensitive leadership to achieve the long-term desired effects of waste management for the city.

The messaging and education surrounding the opportunities facing solid waste management in McKinney in the future will be key to gaining public support for necessary policy changes.

3.6 VIEWS OF THE FUTURE – OPPORTUNITIES FACING SOLID WASTE MANAGEMENT IN MCKINNEY

In order to gauge where the City of McKinney should focus its efforts on leveraging resources, survey respondents were asked to describe in narrative form what they believed were the greatest opportunities for future solid waste management in the city looking out to 2040. Increased recycling options were overwhelmingly identified as the greatest opportunity, followed by increasing community education and collection improvements, followed by adoption of a composting program with bins for residents to participate.

What do you think are the biggest opportunities facing solid waste management in McKinney in the future?



DataInsight

DATA INSIGHTS:

- The number one opportunity for the new Solid Waste Management Strategy was identified as support for increased recycling options.
- Population and community growth was identified as both an opportunity and a threat to solid waste management in the future for McKinney. How the city responds to this growth will determine which trajectory that issue will take.

The scenario planning process allowed McKinney community stakeholders to examine the implications of choices about future direction for solid waste management and recycling.

4.0 SCENARIO-BASED THINK-TANK

McKinney's scenario-based Think-Tank modules were conducted virtually over the course of three two-hour workshops in September 2021. Attendees included city staff, community members, industry, and agency representatives. The Think-Tank modules were intended to build coherency around a vision for initial future planning for solid waste management and recycling in McKinney that will guide community stakeholders over the next twenty years.

The scenario planning process provides a method to explore plausible futures and consider the implications of various future scenarios. The Think-Tank workshops aimed to:

- Deepen the understanding and examination of how external events and local conditions could shape decision-making
- Identify and understand the key influences, trends, and dynamics that will shape solid waste management and recycling looking out to 2040
- Create and describe four plausible long-term scenarios for the City of McKinney
- Explore alignment around a shared future vision
- Examine the strengths and weaknesses of the current solid waste management strategy in McKinney as perceived by community stakeholders

The scenarios developed during the scenario planning process and outlined in this report are important to provide a framework to discuss future possible outcomes and implications for sustainable solid waste management and recycling in McKinney. In addition, the Think-Tank deliberations can assist in identifying key actions for the city and in exploring how various groups might collaborate to best contribute to future policymaking.

Think-Tank participants were guided through a scenario planning process to develop four plausible scenarios for the future of solid waste management in the City of McKinney. The process involved exploration of local trends and forces of change; development of a scenario matrix defining four plausible scenario spaces for the future; and, the development of descriptive narratives of each scenario. The event concluded with discussion of the scenarios, selection of a preferred scenario, and consequences of inaction.

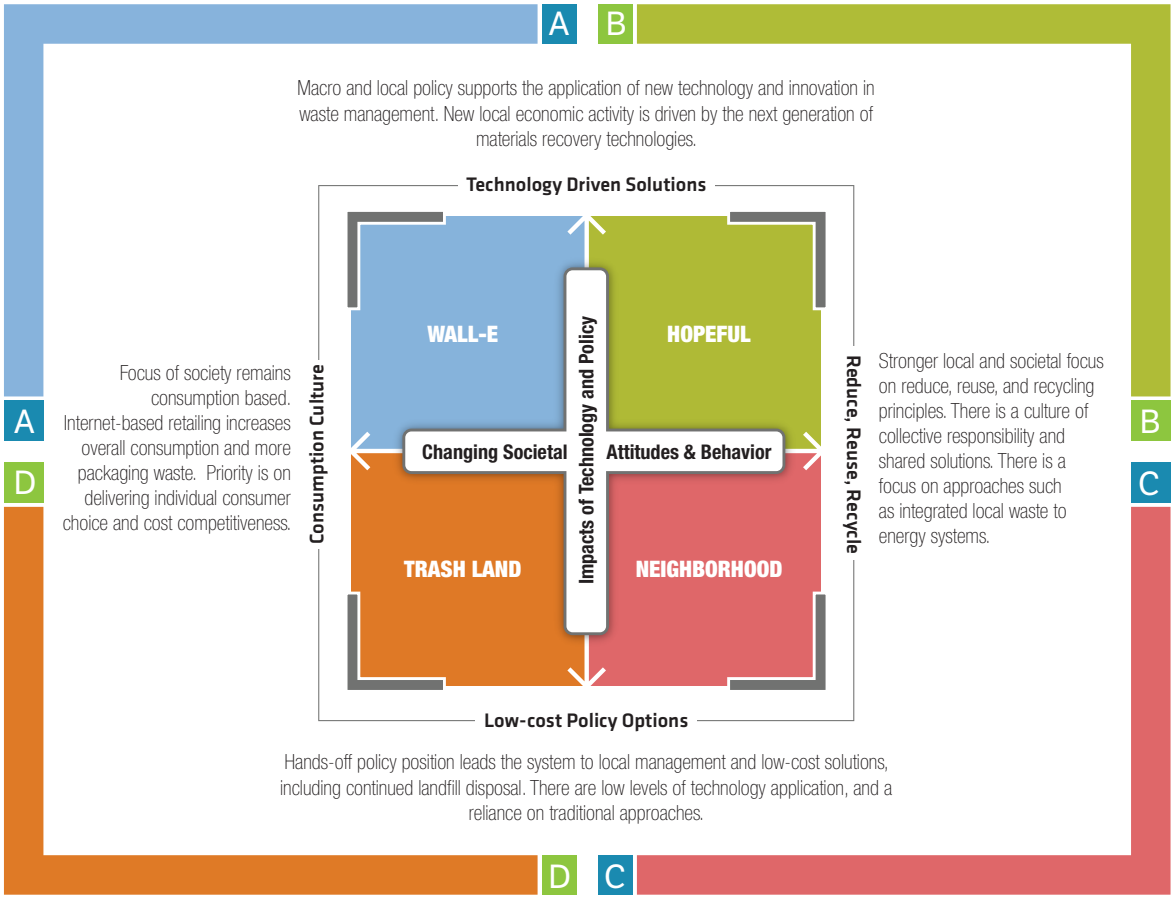
FUTURE-SPLITTING QUESTIONS™

The scenario-planning process provides a way to tease out plausible future scenarios and examine them from a speculative standpoint. They represent different possibilities for the future.

5.0 CREATING THE SCENARIO FRAMEWORK

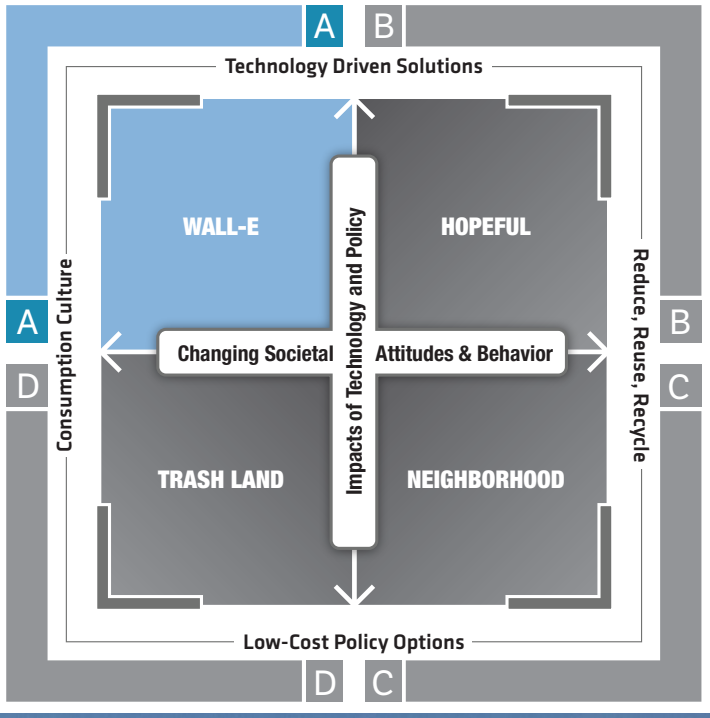
Based on the community survey responses and key input from city staff, themes were identified to become the basis for two axes on the scenario matrix. The two axes identified were **Changing Societal Attitudes and Behavior** and **Impacts of Technology and Policy**.

Think-Tank participants were presented with the scenario matrix, defined by the two major axes of 'Changing Societal Attitudes and Behavior' and 'Impacts of Technology and Policy' (see diagram). Brief descriptions were also attached to the end points of each driver axes. Participants were divided into four groups to develop a narrative for each scenario. Each group was asked to describe the characteristics of solid waste management in 2040 under the conditions of the scenario quadrant that they had been given. After the characteristics were established, Think-Tank participants were asked to devise major events or headlines of how the scenario occurred using the years 2025, 2030, and 2040, and to give their scenario a descriptive name. Narratives and descriptions of each scenario as developed by the workshop participants are included in the following sections.



5.1 SCENARIO A: WALL-E

This scenario forecasts a future where societal attitudes and behaviors remain consumption based and priority is on delivering individual choice and cost competitiveness to the consumer. Ever increasing consumption patterns require expansive investment in new technologies and innovative solutions for waste management. Technologies focus on post-consumer waste and predictive analytics are used to identify what type of waste is coming in and out of households. The inability of consumers to curb waste production necessitates increased use of intricate RFID systems to both help with robotic sorting and enable municipalities to track and fine for severe waste mishandling. New types of packaging that rely on plant-based solutions are created to promote sustainability. Over time, no change in consumer behavior overwhelms the city's capacity to deal with waste and landfills are filled to capacity.



The 'Wall-E' scenario paints a future where advanced technologies are used to deal with increasing consumer waste but eventually run out of capacity to handle the ever-growing volume of waste production over time.

In the 'Wall-E' scenario, consumption continues until resources are extremely limited and expensive to use. ID data is added to waste and consumers are required to pay for mishandling waste.

SCENARIO A CHARACTERISTICS: WALL-E – 2040

The characteristics of this scenario paint a future where human consumption behaviors continue unabated, and waste types become more complex. Innovations in technology accelerate with increased need for capacity to deal with waste. The City of McKinney leans heavily on technological solutions to handle waste management but over time is unable to keep up with waste production and mitigation costs.

Consumption Patterns and Waste Types

Waste types and consumption levels continue to rise with growing population.

- AI is used to help understand consumption patterns.
- RFID codes instruct robots in waste sorting.
- Consumption patterns eventually overwhelm waste management systems.

Policy Setting and Application of Technology

RFID technology is used and supported by policies to sort and track mishandling of waste.

- Packaging policies require producers to allow collection data to ID consumers mishandling waste.
- Advanced technology use is accelerated as waste levels climb.
- Policy pressures on producers and manufacturers force transformations in packaging and energy use.

Waste Management Systems Being Utilized

The community invests in technology to deal with increased waste streams.

- Waste management is localized as the city seeks to monetize waste materials.
- Predictive analytics are used system wide to monitor material placement and location.
- New providers emerge as new technologies are required to deal with volume and complexities of waste stream.

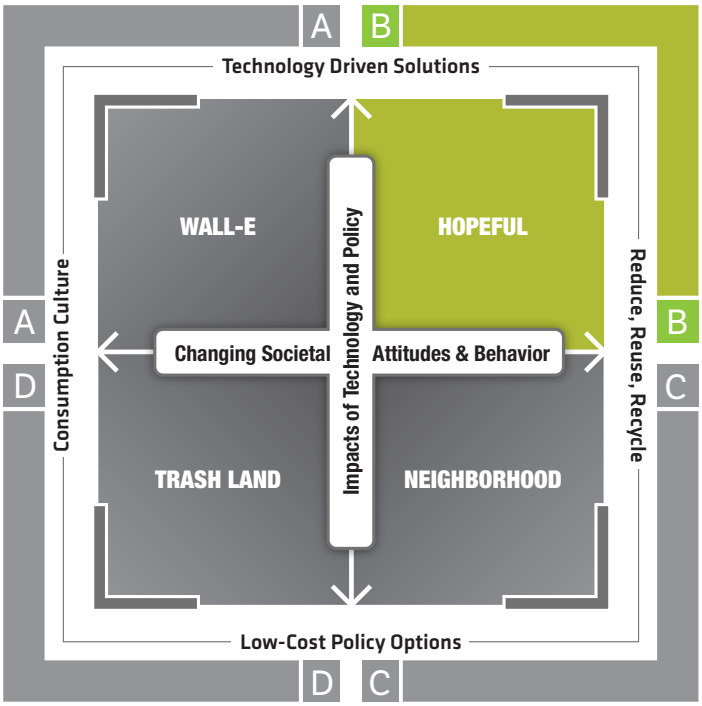
2025 HEADLINE NEWS:
"McKinney invests in waste management technology!"

2030 HEADLINE NEWS:
"Waste levels climb and McKinney answers"

2040 HEADLINE NEWS:
"McKinney overwhelmed by consumer waste"

5.2 SCENARIO B: HOPEFUL

This scenario forecasts a future where use of technology and policy settings align with a forward-thinking community that strongly supports a reduce, reuse, recycle approach to solid waste management. Youth value sets highly influence societal awareness to change behaviors. Education and outreach play a significant role in this scenario's success in helping the community to understand their role in solid waste management. The city mandates haulers to comply with policies that reflect a community that values collective responsibility and shared solutions for waste management. There is heavy investment in state-of-the-art technologies that sort and track many different kinds of waste. Contamination is easily detected by RFID systems and innovation in new technologies is encouraged. Collaboration among area cities brings costs down and supports a coordinated systems approach to solid waste management for the region.



The 'Hopeful' scenario paints a future where aggressive requirements from society mandate system-wide changes that promote collective responsibility and shared solutions for solid waste management in McKinney and the region.

In the 'Hopeful' scenario, generational change and continuous investment in both new technologies and consumer education provide the impetus needed to change the trajectory of solid waste management in McKinney.

SCENARIO B CHARACTERISTICS: HOPEFUL – 2040

The characteristics of this scenario paint a future where the culture of collective responsibility and shared solutions towards solid waste management propels the city of McKinney to the forefront of industry innovation and best practices. New local collaboration opens new markets for materials and economic activity is driven by next generation of materials recovery technologies.

Consumption Patterns and Waste Types

Heightened societal awareness changes attitudes and behaviors.

- Youth value sets have a collective impact on planet perspective.
- New and different types of waste streams are collected and utilized.
- Materials are more valuable after use providing economic motivation to change.

Policy Setting and Application of Technology

Aggressive requirements from society necessitate strong leadership and policy settings.

- Adoption of collective responsibility for mining and reuse.
- Short and long-term implementation plans are adopted.
- Cities mandate policies with waste management companies for shared responsibilities.

Waste Management Systems Being Utilized

Regional collaboration and coordination of solid waste management occurs.

- Sister cities collaborate on solid waste management systems.
- Cities find and utilize best practices for education and outreach to residents and businesses.
- Route monitoring occurs to identify where contamination originates.

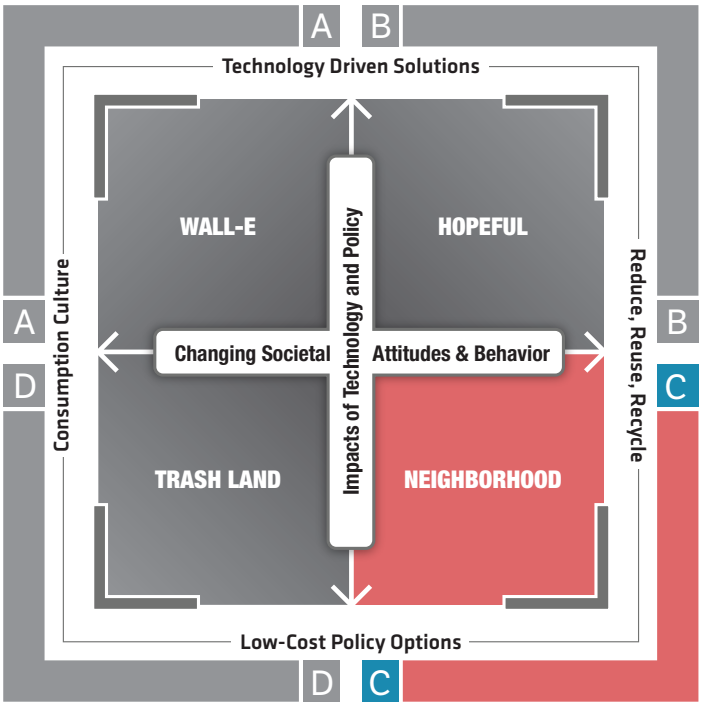
2025 HEADLINE NEWS:
"Youth vote challenges status quo in solid waste management!"

2030 HEADLINE NEWS:
"McKinney leads the region in recycling numbers."

2040 HEADLINE NEWS:
"Solid waste mining pays off for McKinney!"

5.3 SCENARIO C: NEIGHBORHOOD

This scenario forecasts a future where a low-cost policy approach to solid waste management leads to highly localized solutions and stop-gaps. Community stakeholders are actively involved in reduce, reuse, and recycling programs that take on a neighborhood orientation and active civic engagement. Community gardens are popular and creative low-tech solutions such as drop-offs, reusable containers, and incentives are promoted through city-wide education programs. Lack of political will to support adoption of new technologies to handle changing waste stream production gradually overtakes the community's ability to deal with waste on a local level. Over time, landfills are filled to capacity and competition with other communities for space becomes fierce. Taxes and fees are implemented to discourage waste production as much as possible.



The 'Neighborhood' scenario paints a future where localized community efforts to deal with solid waste management cannot keep up with waste production in the city.

In the 'Neighborhood' scenario, community buy-in to reduce, reuse, recycle principles is high, but the hands-off approach of the city eventually precludes the city from options in the future.

SCENARIO C CHARACTERISTICS: NEIGHBORHOOD – 2040

The characteristics of this scenario paint a future where community stakeholders have a keen awareness of their collective responsibility for solid waste management in McKinney and turn to highly localized solutions to deal with it. Lack of political will to support technology driven solutions force the city leadership to adopt low-cost policy options that over time cannot keep up with waste production in the city.

Consumption Patterns and Waste Types

Consumers are actively aware of their role in solid waste management and strive to reduce, reuse, and recycle.

- Waste streams are greatly reduced.
- Waste collection is on a local basis and the community struggles to deal with new types of waste.
- The city turns to community gardens and education programs to influence consumption patterns.

Policy Setting and Application of Technology

Policy settings do not support adoption of new technologies causing long term inflexibility.

- Low-cost solutions increase landfill use.
- Volunteer neighborhood arrangements grow to pursue societal values of reduce, reuse, recycle.
- The financial cost of not adopting new technologies cause increased taxes on waste production.

Waste Management Systems Being Utilized

Waste management is highly localized and competition for landfill space grows with other communities.

- Local focus causes siloed approach to waste management.
- Low-cost approach emphasizes recycling and reuse options, and McKinney expands services in these areas.
- Lack of collaboration and coordination with regional communities causes an 'us vs. them' perspective to waste management.

2025 HEADLINE NEWS:

"Neighborhood programs drive McKinney's solid waste management strategy."

2030 HEADLINE NEWS:

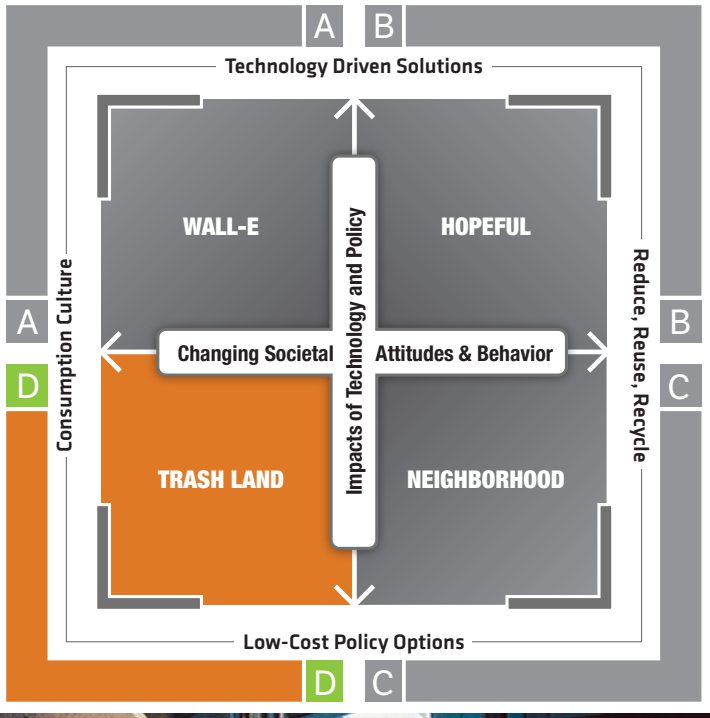
"We all have a responsibility to reduce, reuse, and recycle!"

2040 HEADLINE NEWS:

"Landfills are close to capacity – we need new solutions!"

5.4 SCENARIO D: TRASH LAND

This scenario forecasts a future where the combination of a consumption culture with a lack of policy support for environmentally sound policies or new technologies completely overwhelms McKinney's ability to deal with the realities of solid waste management in the city. This laissez-faire approach relies on low-cost, low-tech policy options with landfills as the go-to solution. Society's obsession with internet-based retail increases overall consumption and packaging waste. Policy settings allow priority on delivering individual consumer choice without requiring any recycling standards. Food and recycling waste continues to fill landfills at an exponential rate. Eventually landfills reach capacity and the city is forced consider incineration or other locations for waste disposal and financial costs to the consumer climb.



The 'Trash Land' scenario paints a future that portrays the worst-case scenario for the City of McKinney. The combination of current consumption patterns and reliance on low-cost policy options would have severe long-term consequences for quality of life in McKinney.

In the 'Trash Land' scenario, the conditions created by consumerism and lack of leadership become unsustainable. McKinney experiences irreparable damage to its natural resources.

SCENARIO D CHARACTERISTICS: TRASH LAND – 2040

The characteristics of this scenario paint a future where the City of McKinney is gradually overwhelmed by solid waste production and pollution and quality of life is severely denigrated for residents and businesses. The refusal of policy makers to adopt environmentally conscious regulations that curb consumerism and waste production eventually creates unsustainable conditions for the city.

Consumption Patterns and Waste Types

Consumers continue current consumption patterns with no regard to environmental impact.

- Consumers increase online consumption, and more products are delivered to the door.
- Grocery stores move to curbside pick-up only.
- Low participation rates in recycling or composting rapidly decreases landfill capacity.

Policy Setting and Application of Technology

Leadership denies policy support for environmentally conscious practices and new technology development.

- Use of low-cost technologies causes city to look elsewhere to deal with new product waste.
- Costs to consumers increase as waste production increases.
- Lack of new technologies eventually make recycling of new waste streams impossible.

Waste Management Systems Being Utilized

Traditional waste management systems decrease capacity to deal with waste volume and type.

- The environmental consequences of a traditional solid waste management approach create a crisis situation.
- Localized solutions cut off collaboration opportunities with other communities.
- Financial costs rise as landfills reach capacity and the city searches for other disposal options.

2025 HEADLINE NEWS:
"Consumers can get anything delivered to their door!"

2030 HEADLINE NEWS:
"Landfills reach capacity for McKinney."

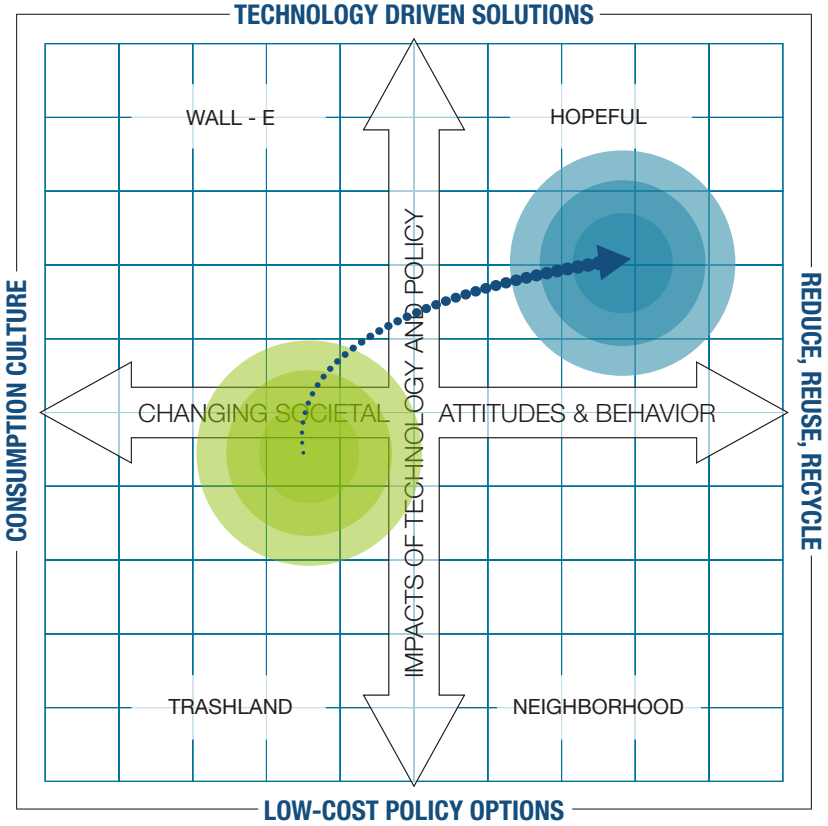
2040 HEADLINE NEWS:
"Nowhere else to put our trash – what do we do?"

Significant change can occur within the timeframe between now and 2040. Developments now and early on can have cumulative positive impacts on change that make the 'Hopeful' vision of the future an attainable reality for McKinney.

6.0 EXPECTED AND PREFERRED FUTURES

Think-Tank participants discussed the ramifications and implications of failing to achieve the preferred future. There was strong alignment among participants that Scenario B, 'Hopeful' represented the preferred scenario for McKinney. To get to the preferred future, there was recognition among Think-Tank participants that where the consumer approach to commercialism seems to be responding to environmental concerns, society will need to revolutionize its way of thinking if the planet is to survive in the long-term.

Expected X Preferred Future - All Data



McKinney Solid Waste Management Strategy Think-Tank Heatmaps

EXPECTED FUTURE
This is the future most likely to eventuate by 2040 if McKinney's solid waste management strategy stays on the existing trajectory.

PREFERRED FUTURE
This is the future participants thought was most optimal for McKinney's solid waste management in 2040.

FutureInsight

FUTURE INSIGHTS:

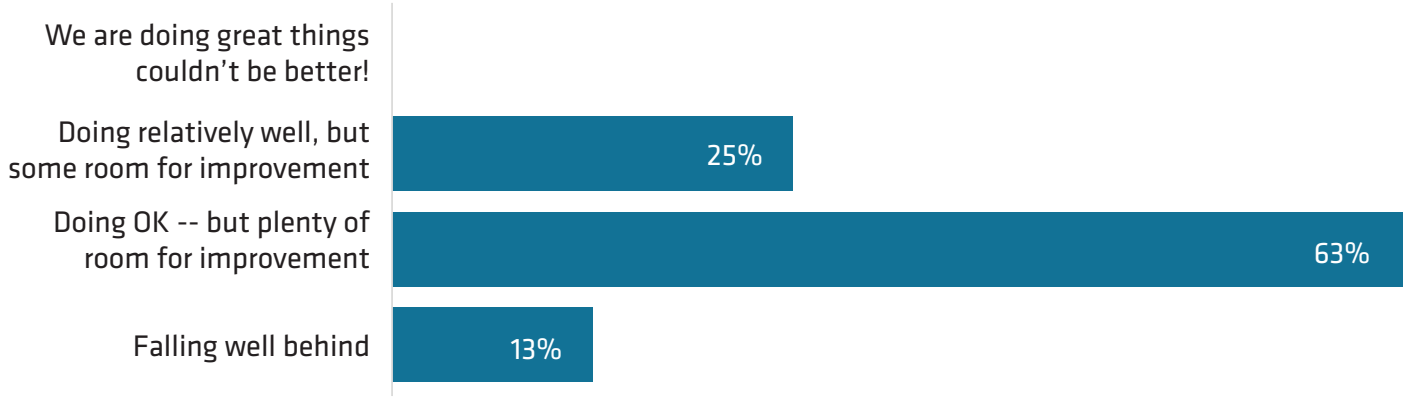
- A definite preference for the 'Hopeful' scenario gives a clear mandate to the City of McKinney to pursue strategies that support that vision for the future.
- It was emphasized throughout the Think-Tank Modules that generational change would have an outsized impact on progress towards the preferred future for solid waste management in McKinney.

With support from the community, the City of McKinney is well-positioned to take measures to improve its solid waste and recycling services.

6.1 PERCEIVED RELATIVE PERFORMANCE TO SURROUNDING PEER COMMUNITIES

To measure how well McKinney is doing in the area of solid waste management and recycling, Module 1 participants were asked about the perceived relative performance to surrounding peer communities. The majority of respondents considered the city's performance ok, with plenty of room for improvement.

Relative to surrounding peer communities, how well is McKinney performing in the area of solid waste and recycling?



"The fact that time is being spent thinking about this issue is a real plus, especially if solutions for the future can be implemented now before bigger problems arise."

- McKinney Community Stakeholder Survey Respondent

FutureInsight

FUTURE INSIGHTS:

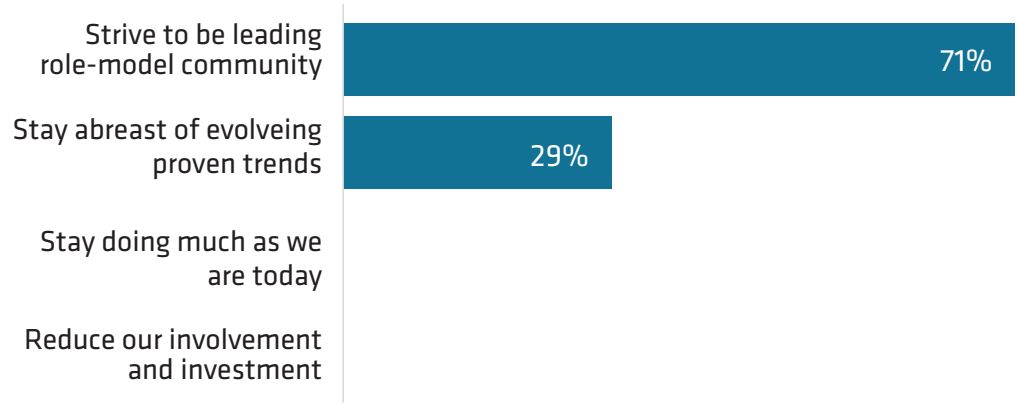
- The middling rating given by Module 1 participants of McKinney's performance in the area of solid waste and recycling indicates community members are looking to the city to improve these services.
- The new McKinney Solid Waste Management Strategy will provide the roadmap for improved solid waste management services in the city.

With ongoing support from the community, the City of McKinney has the opportunity to become a leading role-model community for solid waste management in the State of Texas.

6.2 APPETITE FOR CHANGE

To gauge appetite for change to McKinney's Solid Waste Management Strategy, Think-Tank Module 1 participants were asked a series of rapid polling questions. The first question asked what kind of waste management leadership role the city should take relative to similar Texas cities. An additional question asked how much respondents would be willing to pay for improved solid waste management services in McKinney. Survey respondents overwhelmingly thought that the City of McKinney should strive to be a leading role-model community in solid waste management relative to similar Texas cities.

What future-posture should McKinney adopt relative to similar TX cities?



"Being proactive and innovative could put our city on the cutting edge that could make us a leader in waste management solutions."

- McKinney Community Stakeholder Survey Respondent

FutureInsight

FUTURE INSIGHTS:

- Module 1 Think-Tank participants were highly supportive of efforts to strive to be a leading role-model community in solid waste management and for the city to stay abreast of evolving trends in this area.
- 88% of Module 1 participants indicated a willingness to pay for improvements in solid waste and recycling services in McKinney.

7.0 ACKNOWLEDGMENTS

Future iQ and Burns & McDonnell team members would like to thank McKinney community stakeholders for their dedication and time committed to this project. Their presence at the virtual Think-Tank modules and participation in the community survey were critical elements in the success of the visioning process. We would also like to thank Eric Hopes and the staff at the City of McKinney for the many hours of meetings and material review they dedicated to this project. All of your help has been much appreciated.

8.0 FOR MORE INFORMATION

For more information about McKinney's Solid Waste Management Strategy Project, please contact:

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"As large a city we have become, our footprint on the environment is huge and matters. We have a responsibility to future generations to understand and consider the problems related seriously...I appreciate the city taking it on in a serious way."

- McKinney Community Survey Respondent

9.0 CONSULTING TEAM – TASK ONE

The Task One consulting team was led by Burns & McDonnell, with survey and visioning components delivered by Future iQ.

Future iQ specializes in applying innovative tools and approaches to assist municipalities, organizations, regions, and industries shape their economic and community futures. With nearly two decades of experience, the company has a global clientele spanning three continents.

To learn more visit *www.future-iq.com*

Burns & McDonnell is a full-service engineering, architecture, construction, environmental and consulting solutions firm, based in Kansas City, Missouri. Our Solid Waste and Resource Recovery group assists public and private clients throughout North America.

To learn more visit *www.burnsmcd.com*

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