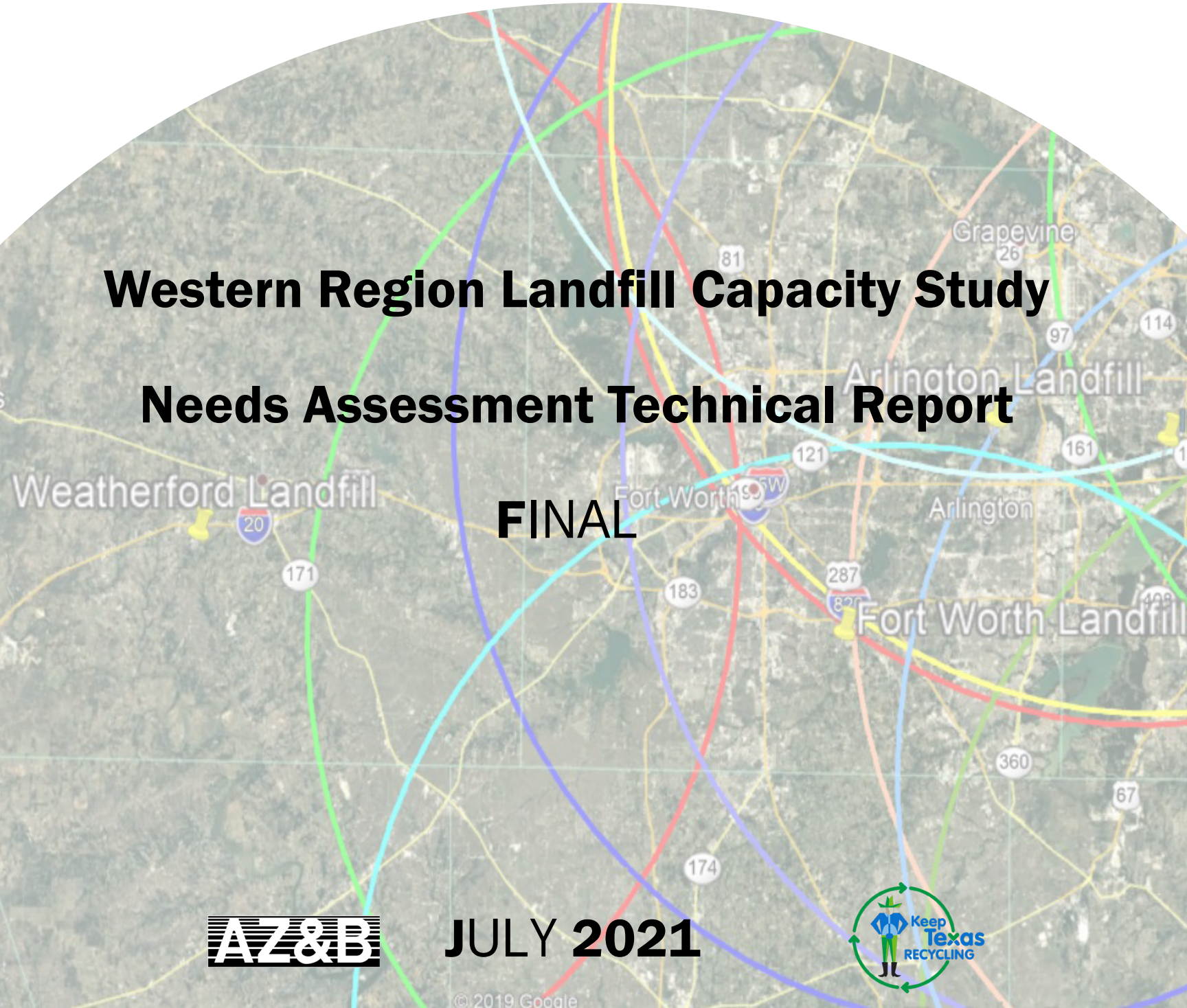
North Central Texas Council of Governments



Western Region Landfill Capacity Study

Needs Assessment Technical Report

FINAL

AZ&B

JULY **2021**

Keep Texas RECYCLING

FINAL

Western Region Solid Waste Capacity Study

Needs Assessment Technical Report

North Central Texas Council of Governments

Arredondo, Zepeda & Brunz LLC

Keep Texas Recycling

JULY 2021

This study was funded through a solid waste management grant provided by TCEQ through NCTCOG. This funding does not necessarily indicate endorsement of the study findings and recommendations.

Contents

Executive Summary

The purpose of the Western Regional Solid Waste Capacity Technical Study ("Study") is to identify specific regional strategies for addressing the solid waste management needs of the eight-county western region. As a result of continued growth in population and related business activity, municipal solid waste ("MSW") increase, landfill capacity continues to be depleted. The Study is intended to provide local governments with recommendations to meet long-term MSW needs, potentially through regional and cooperative approaches.

The western region includes Erath, Hood, Johnson, Palo Pinto, Parker, Tarrant, Somervell and Wise Counties. The western region has a total population of 2.65 million and covers an area of 700 square miles.

A majority of the western region's waste is disposed of at one of four MSW landfills. In one-to-two years, the Weatherford Landfill will reach capacity. The City of Fort Worth Landfill and Turkey Creek landfills have less than 20 years remaining capacity at current rates of disposal. The City of Arlington's landfill does have long-term capacity but is located on the extreme eastern side of the western region. The City of Cleburne has a permitted MSW landfill, however it is used for a minimal amount of waste per year. There are also two construction / demolition landfills located in the western region.

It takes approximately 10 to 15 years to site, permit and construct new landfill capacity. Therefore, it is timely for local governments to start planning for how they will address future disposal needs. Without additional local landfill capacity, MSW will have to be hauled longer distances, significantly increasing the cost to residents, businesses and local governments.

This Needs Assessment Technical Report ("Needs Assessment") is the first phase of the Study. It identifies: i) current and projected waste generation; (ii) existing resources to manage recyclable materials, organics and MSW, (iii) haul costs using both direct haul and transfer haul options; and (iv) background information regarding future facility site selection. The Needs Assessment also includes the results of the Western Region Local Government Survey ("Survey") which identified current programs being sponsored by local governments, as well as their attitudes and concerns regarding potential regionalization of solid waste programs and facilities.

Findings

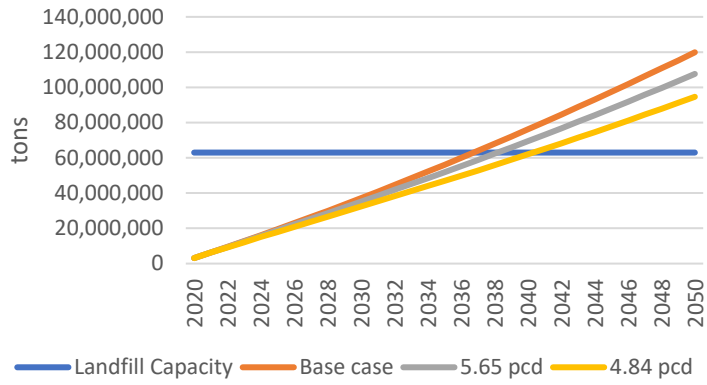
In 2019, the western region generated a total of 3.0 million tons of municipal solid waste. Most of this waste is generated by commercial businesses and institutions, followed by single-family and multi-family dwellings. Except for Weatherford and Cleburne, cities in the western region contract with private firms to provide for the collection of waste from residents. Businesses throughout the region rely on private haulers for the collection, processing and disposal of waste.

Figure E-1
Sources of Waste in Western Region

Source: Refer to Section 3.0 Needs Assessment Report

The population in the region is projected to increase through 2040, and as a result, waste quantities can also be expected to increase. By the year 2040, an estimated 3.6 million tons of waste are forecast to be generated. Cumulative waste generation for the twenty-year period is 69.6 million tons. This compares to the existing estimated regional disposal capacity of 63 million tons over that same time period. With no changes in disposal capacity, landfill capacity will be filled by the year 2036. Efforts to reduce waste through public education and recycling programs can extend landfill life. Figure E-2 illustrates the potential impacts of various reduction scenarios from the current 6.45 pounds per capita per day ("pcd") generation rate. Even with significant reductions, the western region will need to continue to expand landfill capacity in order to manage the amounts of waste projected to be generated in the future.

Figure E-2
Cumulative Waste Generation
Various Waste Reduction Scenarios



Source: Refer to Section 3.0 Needs Assessment Report

Waste Collection: Almost all of the cities in the western region rely on the private sector for collection of residential MSW. Municipal contracts for the collection of waste from the residential sector have several similarities from one city to the next, but also have certain differences. Gaining flow control over the waste stream is an essential element in financing large-scale waste management facilities. Local governments do have the authority to direct waste collected within their communities to a specified facility. However, ordinances such as these may increase the cost of waste disposal services. The cities of Arlington and Fort Worth have flow control over their residential waste streams through franchise agreements. Cities including Weatherford and Cleburne maintain flow control because they are the direct provider of residential waste collection in their communities.

Waste Reduction and Recycling: Most of the communities in the western region have programs to encourage residents to reduce waste and provide separate collection of recyclable materials. Based on data collected, it is estimated that the western region has a waste disposal rate of 6.45 pcd, which is less than the NCTCOG region (7.68 pcd) and the state-wide average (6.96 pcd).

Reducing waste generation is the most cost-effective way of managing waste. Surveyed communities were almost unanimous in their interest in regional public information programs that would be designed to reduce waste, increase recycling, and improve the quality of the recyclable materials.

It is estimated, based on TCEQ data and local information, that approximately 28% of material is recycled by residents and businesses. A majority of the material recycled includes construction / demolition material, brush and other organic material, materials recovered by businesses and industries and finally residential recycling efforts.

According to TCEQ records, there are 24 recycling facilities and 13 compost facilities located throughout the Region. These facilities are essential to process materials collected from recycling and organics programs.

Landfill Disposal: The majority of the waste generated in the western region is disposed at one of the 5 MSW and two construction / demolition ("C&D") landfills. Landfill capacity is approximately 63 million tons. At current rates of disposal, landfill capacity will be reached in approximately 16 years. Expansions are planned for the City of Arlington's landfill and the Turkey Creek Landfill. It should also be noted that there is also a planned landfill expansion at the City of Denton. The Turkey Creek Landfill expansion will increase its capacity by eight years, however from a western regional perspective, this accounts for only 1-2 years of additional capacity. The City of Arlington is still in the planning stages of its expansion and it is uncertain how much additional capacity will be added, but City officials indicated it could provide approximately 40 additional years at current rates of disposal. However, even with these expansions, a large portion of the western region will not have adequate landfill capacity.

Findings of the Western Region Local Government Survey

One of the tasks of the Needs Assessment was a survey of local governments in the western region. The Western Region Local Government Survey ("Survey") was designed to understand local government concerns, interest in regional approaches to solid waste management and their plans for future solid waste management facilities. A total of 38 local governments, including cities and counties responded to the Survey. Below are some of the key findings of the Survey. These findings identify options for the Alternatives Analysis Report, as well as key issues related to implementation of any regional strategy.

The major solid waste management concerns expressed by local officials included the following.

- Cost of service
- Landfill capacity
- Transportation costs
- Recycling markets

According to Survey responses, reducing costs, the ability to implement programs that would otherwise not be feasible and assuring long-term solid waste disposal capacity were the key benefits of a regional approach to future solid waste management. The respondent's biggest concerns related to a regional approach was a loss of decision-making control, higher costs, reduced levels of service and greater bureaucracy and increased regulations.

Most of the cities and counties responding to the Survey indicated an interest in cooperative recycling programs. The types of programs that had the highest degree of agreement included the following.

- Public information programs
- Residential curbside collection
- Material marketing
- Yard waste collection

With respect to waste tires, the biggest concerns are mosquito habitat and the number illegal tire dumps in the western region.

The Survey did identify that several cities and counties are planning major changes to their solid waste management programs. Many of the planned changes focus on the following types of programs and facilities.

- Modify collection programs
- Enhance recycling efforts
- Build compost facilities
- Build or expand transfer stations and landfills

The Survey also evaluated collection practices in the region. With only two exceptions, Cleburne and Weatherford, cities in the region rely on the private sector for the collection of residential and commercial municipal solid waste and recyclables. Reliance on the private sector for this service will have an impact on the future of cooperative actions in the western region. A critical element to solid waste facility is the needed flow control advancements and ordnances to support the most cost-effective per ton rate to all parities involvled. Flow control ordinances allow local governments to direct waste generated in a community to a specific solid waste facility, such as a landfill. Typically, solid waste facilities rely on fees charged to use the facility to pay capital and operating costs. Flow control establishes a guaranteed revenue stream that is needed to pay for these costs.

Next Steps

The Second Phase of the Study is to undertake an Alternatives Analysis of the options available to the western region.

Based on the results of both the Survey and the data collected as part of this Needs Assessment, the areas of focus for the Alternatives Analysis will include the following. It is anticipated that the Policy Advisory Group ("PAG") will review these focus areas and provide additional direction to the Project Team. The following list follows the EPA's solid waste management hierarchy fo waste management.

1. Regional public information programs.
2. Cooperative solid waste and recyclable material collection strategies.
3. Cooperative recycled material marketing options.
4. Increased availability for citizen drop-off centers.
5. Increased capacity for composting organics including yard waste, biosolids and food waste.
6. Increased transfer station capacity in the western region.
7. Increased landfill capacity.
8. Cooperative strategies for managing disaster debris.

The Alternatives Analysis that will document potential legal, regulatory, and implementation challenges, and should include any technical requirements for recommended facilities, programs, or other infrastructure. Identification of the possible environmental, demographic, economic, health, transportation, and other impacts of any waste reduction or capacity expansion options, on both the western region and larger 16-county NCTCOG regional level, will be considered and included in the final report. Budgetary funding requirements for the recommended strategies will be identified.

The Alternative Analysis Report will also include a Recommended Alternative Implementation Matrix that identifies the actions necessary to achieve the alternatives, implementing entities, fiscal impact to public agencies, return on investment, cost-benefit analysis, potential funding sources, and relative implementation priority level

Acronyms & Definitions

Acronyms

C&D	Construction and demolition
CAPCOG	Capital Area Council of Governments
H-GAC	Houston-Galveston Area Council
MRF	Material recovery facility
MSW	Municipal solid waste
NA	Not Available
NCTCOG	North Central Texas Council of Governments
O&M	Operations and maintenance
pcd	Pounds per capita per day
phd	Pounds per household per day
TCEQ	Texas Commission on Environmental Quality
TDC	Texas Demographic Center
tpd	Tons per day

Definitions (Source: TCEQ TAC 330.2)

Compost--The stabilized product of the aerobic decomposition process of organic material, that is used or sold for use as a soil amendment, a component of topsoil, growing medium amendment, or other similar uses.

Composting--The controlled biological decomposition of organic materials through microbial activity.

Facility--All contiguous land and structures, other appurtenances, and improvements on the land used for the storage, processing, or disposal of solid waste.

Landfill--A solid waste management unit where solid waste is placed in or on land and which is not a pile, a land treatment unit, a surface impoundment, an injection well, a salt dome formation, a salt bed formation, an underground mine, a cave, or a corrective action management unit.

Municipal hazardous waste--Any municipal solid waste or mixture of municipal solid wastes that has been identified or listed as a hazardous waste by the administrator, United States Environmental Protection Agency.

Municipal solid waste--Solid waste resulting from or incidental to municipal, community, commercial, institutional, and recreational activities, including garbage, rubbish, ashes, street cleanings, dead animals, abandoned automobiles, and all other solid waste other than industrial solid waste.

Municipal solid waste facility--All contiguous land, structures, other appurtenances, and improvements on the land used for processing, storing, or disposing of solid waste. A facility may be publicly or privately owned and may consist of several processing, storage, or disposal operational units, e.g., one or more landfills, surface impoundments, or combinations of them.

Post-consumer waste--A material or product that has served its intended use and has been discarded after passing through the hands of a final user. The term does not include industrial or hazardous waste.

Processing--Activities including, but not limited to, the extraction of materials, transfer, volume reduction, conversion to energy, or other separation and preparation of solid waste for reuse or disposal, including the treatment or neutralization of waste, designed to change the physical, chemical, or biological character or composition of any waste to neutralize such waste, or to recover energy or material from the waste, or render the waste safer to transport, store, dispose of, or make it amenable for recovery, amenable for storage, or reduced in volume.

Recyclable material--A material that has been recovered or diverted from the nonhazardous waste stream for purposes of reuse, recycling, or reclamation, a substantial portion of which is consistently used in the manufacture of products that may otherwise be produced using raw or virgin materials. Recyclable material is not solid waste. However, recyclable material may become solid waste at such time, if any, as it is abandoned or disposed of rather than recycled, whereupon it will be solid waste with respect only to the party actually abandoning or disposing of the material.

Recycling--A process by which materials that have served their intended use or are scrapped, discarded, used, surplus, or obsolete are collected, separated, or processed and returned to use in the form of raw materials in the production of new products. Except for mixed municipal solid waste composting, that is, composting of the typical mixed solid waste stream generated by residential, commercial, and/or institutional sources, recycling includes the composting process if the compost material is put to beneficial use.

Resource recovery--The recovery of material or energy from solid waste.

Sludge--Any solid, semi-solid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, water-supply treatment plant, or air pollution control facility, exclusive of the treated effluent from a wastewater treatment plant.

Solid waste--Garbage, rubbish, refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, municipal, commercial, mining, and agricultural operations and from community and institutional activities. The term does not include:

(A) solid or dissolved material in domestic sewage, or solid or dissolved material in irrigation return flows, or industrial discharges subject to regulation by permit issued under Texas Water Code, Chapter 26;

(B) soil, dirt, rock, sand, and other natural or man-made inert solid materials used to fill land if the object of the fill is to make the land suitable for the construction of surface improvements; or

Source-separated recyclable material--Recyclable material from residential, commercial, municipal, institutional, recreational, industrial, and other community activities, that at the point of generation has been separated, collected, and transported separately from municipal solid waste (MSW), or transported in the same vehicle as MSW, but in separate containers or compartments. Source-separation does not require the recovery or separation of non-recyclable components that are integral to a recyclable product, including:

(A) the non-recyclable components of white goods, whole computers, whole automobiles, or other manufactured items for which dismantling and separation of recyclable from non-recyclable components by the generator are impractical, such as insulation or electronic components in white goods;

(B) source-separated recyclable material rendered unmarketable by damage during collection, unloading, and sorting, such as broken recyclable glass; and

(C) tramp materials, such as:

(i) glass from recyclable metal windows;
(ii) nails and roofing felt attached to recyclable shingles;
(iii) nails and sheetrock attached to recyclable lumber generated through the demolition of buildings; and
(iv) pallets and packaging materials.

Transfer station--A facility used for transferring solid waste from collection vehicles to long-haul vehicles (one transportation unit to another transportation unit). It is not a storage facility such as one where individual residents can dispose of their wastes in bulk storage containers that are serviced by collection vehicles.

1.0 Introduction & Purpose

The western 8 counties of the North Central Texas Council of Governments' (NCTCOG) 16-county region (hereafter referred to as the western region) has a rich history that includes the birthplace of the Goodnight-Loving Cattle Trail; it is where Fort Worth and Arlington are located; and is the home of major sports and entertainment venues. The western region is also rich in oil and natural gas resources.

The western region includes Erath, Hood, Johnson, Palo Pinto, Parker, Somervell, Tarrant and Wise Counties. The western region has a total population of 2.6 million people. There are 34 cities with populations over 5,000 in the Region. It includes major cities, as well as suburban and rural areas. Each city and county has its own, specific solid waste management needs. What they all have in common is their reliance on a few landfills for the proper disposal of the waste that they generate. These landfills are running out of capacity.

There are opportunities to address future solid waste disposal needs in a cooperative manner. Such cooperation will lead to greater efficiency and a more sustainable future for the entire Region.

The western region is facing short-term and long-term solid waste management challenges that require immediate action. It currently relies on landfills that are nearing capacity. The time frame to secure a new landfill is approximately 10 to 15 years, so the time to now is a time to initiate planning efforts for new MSW infrastructure.

Addressing the municipal solid waste (MSW) needs of 2.6 million people requires a complex system of local and regional programs and facilities. To meet future needs, local governments are now evaluating what options are necessary to assure proper management of MSW. These options may include: 1. Investing in facilities enabling landfill diversion and resource recovery such as material recovery facilities and mulch and compost sites; 2. Constructing facilities that support efficiency such as transfer stations; and, 3. Constructing landfills for regional disposal.

Because of the financial commitments required to implement programs and facilities, it may be in the interest of local governments to work together to fund programs more cost-effectively. Regional approaches to meeting infrastructure needs has worked effectively in the past, notably for water resource management. There are a range of organizational options that could provide more efficient service in the region, including inter-local agreements, the establishment of regional solid waste management agencies, or reliance on existing regional entities.

Western Region Solid Waste Capacity Study

The Western Region Solid Waste Capacity Study (Study) is intended to provide local government officials with information that will lead to a more secure solid waste management future. The first phase of the Study identifies regional solid waste management needs and available resources. The second phase of the Study is to evaluate programs, policies, and organizational structures that have the potential to efficiently and effectively meet these needs.

The Study is divided into two phases. The first phase is the Needs Assessment Technical Report ("Needs Assessment") and the second phase is the Alternatives Analysis. The Needs Assessment, which is this document, provides background information on the western region, quantifies waste generation and disposal capacity, and

analyzes waste haul options. The Alternatives Analysis will provide both technical and organizational options to the participating local governments.

Purpose

The focus of this Needs Assessment is to quantify current and projected MSW generation and to evaluate the current solid waste infrastructure. This analysis will help policy makers determine what facilities are required to meet future solid waste management needs.

In addition to providing data on waste generation and available infrastructure, the Needs Assessment provides regional characteristics and background information relevant to future facility development. This Study is not intended to identify specific sites for future solid waste facilities but does provide background information related to key site selection criteria.

This Needs Assessment will specifically evaluate the following.

- Demographics
- Waste sources including residential, multi-family and commercial sectors
- Projected waste generation
- Waste management facilities including for recycling, organics and disposal
- Waste management practices by cities and counties
- Waste hauling costs
- Regional characteristics affecting future MSW planning and facility site selection

2.0 Western Region Characteristics

The western region includes the following counties:

- Erath
- Hood
- Johnson
- Palo Pinto
- Parker
- Somervell
- Tarrant
- Wise

A review of NCTCOG data indicates that there are 34 cities with populations over 5,000 (major cities) in the western region. Table 2-1 presents the counties and major cities that are part of the western region. Figure 2-1 illustrates the region and the location of major cities. Detailed city population data are in Appendix A and county maps are provided in Appendix B.

Table 2-1 Western Region Major Cities, by County	
Erath County	**Tarrant County (cont.)**
Stephenville	*Euless*
Hood County	*Everman*
Granbury	*Forest Hill*
Johnson County	*Fort Worth*
Burleson	*Grapevine*
Cleburne	*Haltom City*
Joshua	*Hurst*
Keene	*Keller*
Palo Pinto County	*Kennedale*
Mineral Wells	*Mansfield*
Parker County	*North Richland Hills*
Weatherford	*Richland Hills*
Somervell County	*River Oaks*
Glen Rose	*Saginaw*
Tarrant County	*Southlake*
Arlington	*Watauga*
Azle	*White Settlement*
Bedford	**Wise County**
Benbrook	*Bridgeport*
Colleyville	*Decatur*
Crowley	
Source: NCTCOG Regional Data Center	

Population & Population Projections

The western region has a population of 2.65 million, approximately 34% of the total NCTCOG 16 county region. Table 2-2 presents county population data from the Texas Demographic Center ("TDC") The TDC provides past and projected population data for counties and regions, but the TDC does not report data for individual cities. Appendix A presents data for each of the major cities for 2010 and 2020. The source of the data in Appendix A is the NCTCOG (Source: 2019 Population Estimates; North Central Texas Council of Governments; 2019).

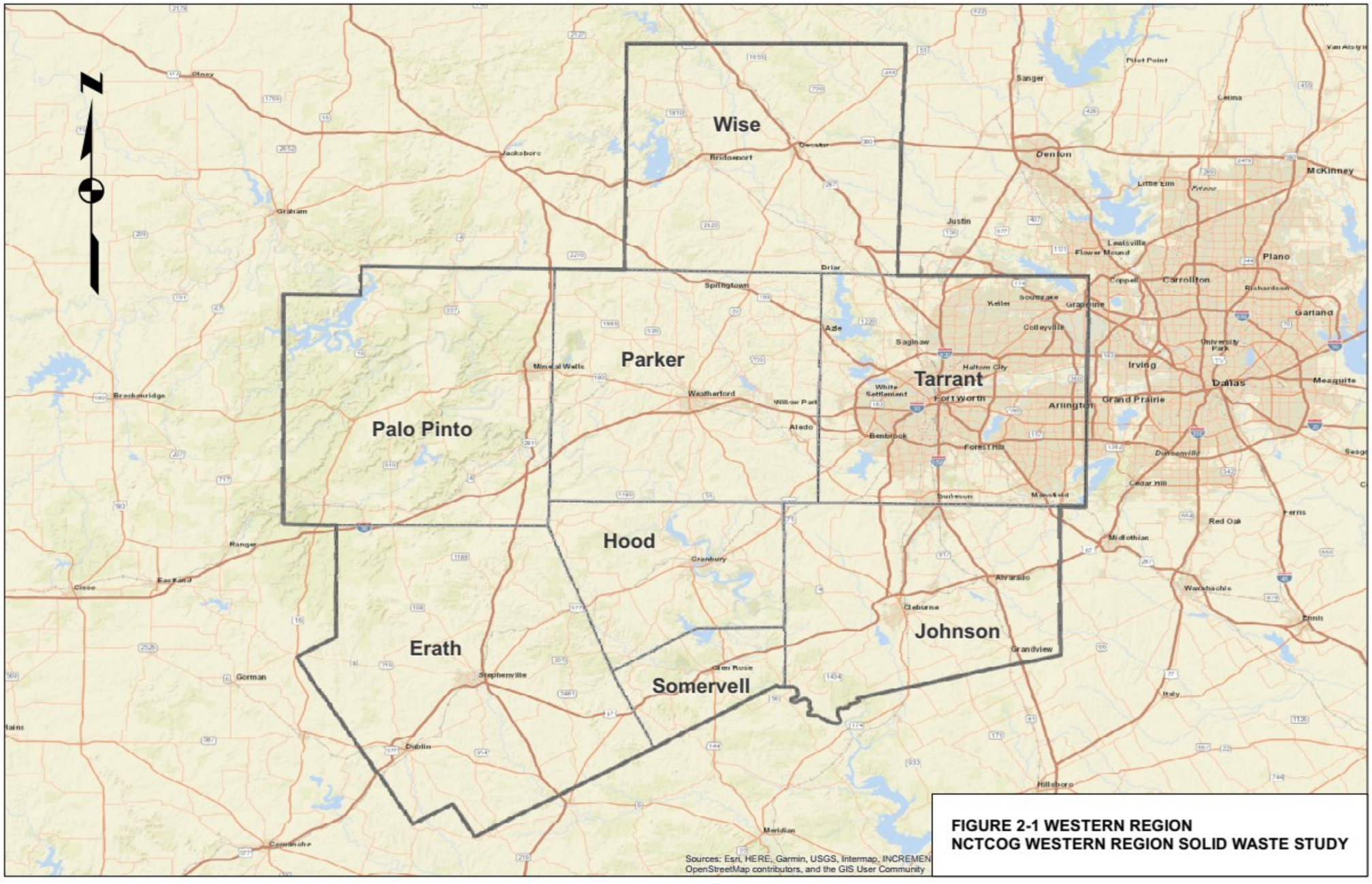


FIGURE 2-1 WESTERN REGION
NCTCOG WESTERN REGION SOLID WASTE STUDY

From 2010 to 2020, the western region's population grew at an annual average rate of 1.1%. By 2050, there will be an estimated 45% more people living in the western region, increasing the population from 2.65 million to 3.87 million over the next 30 years (Table 2-2 and Figure 2-3). The greatest increase will occur in Tarrant County with a 49% increase over the 2020-2050 period, while Palo Pinto's population is projected to decrease in future years. Figure 2-2 presents a map illustrating population growth trends on a regional basis.

Table 2-2 Population Projections for the Western Region by County

Year	Erath	Hood	Johnson	Palo Pinto	Parker	Somervell	Tarrant	Wise	Total
2010	37,890	51,182	150,934	28,111	116,927	8,490	1,809,034	59,127	2,261,695
2015	39,471	54,870	161,209	27,979	125,811	8,832	1,973,526	62,467	2,454,165
2020	41,526	58,643	171,701	27,859	135,621	9,294	2,143,755	65,807	2,654,206
2025	43,590	62,404	182,787	27,568	146,415	9,802	2,322,418	69,101	2,864,085
2030	45,514	66,206	194,098	27,031	157,333	10,253	2,507,170	71,909	3,079,514
2035	47,279	69,917	204,870	26,335	167,589	10,468	2,689,000	74,055	3,289,513
2040	48,715	73,586	215,366	25,486	176,825	10,519	2,862,672	75,458	3,488,627
2045	50,042	77,646	226,440	24,581	185,803	10,428	3,030,318	76,395	3,681,653
2050	51,365	82,296	238,332	23,723	195,261	10,332	3,196,603	77,081	3,8749,93
2050 / 2020	124%	140%	139%	85%	144%	111%	149%	117%	145%
Average Annual Rage	1.007	1.011	1.011	0.995	1.012	1.004	1.013	1.005	1.013

Source: Texas Demographic Center, 2018 Texas Population Projection Tool. 2020. https://demographics.texas.gov/Data/TPEPP/Projections/Tool?fid=9E22434DF77B4A4D913D191DB070EE25

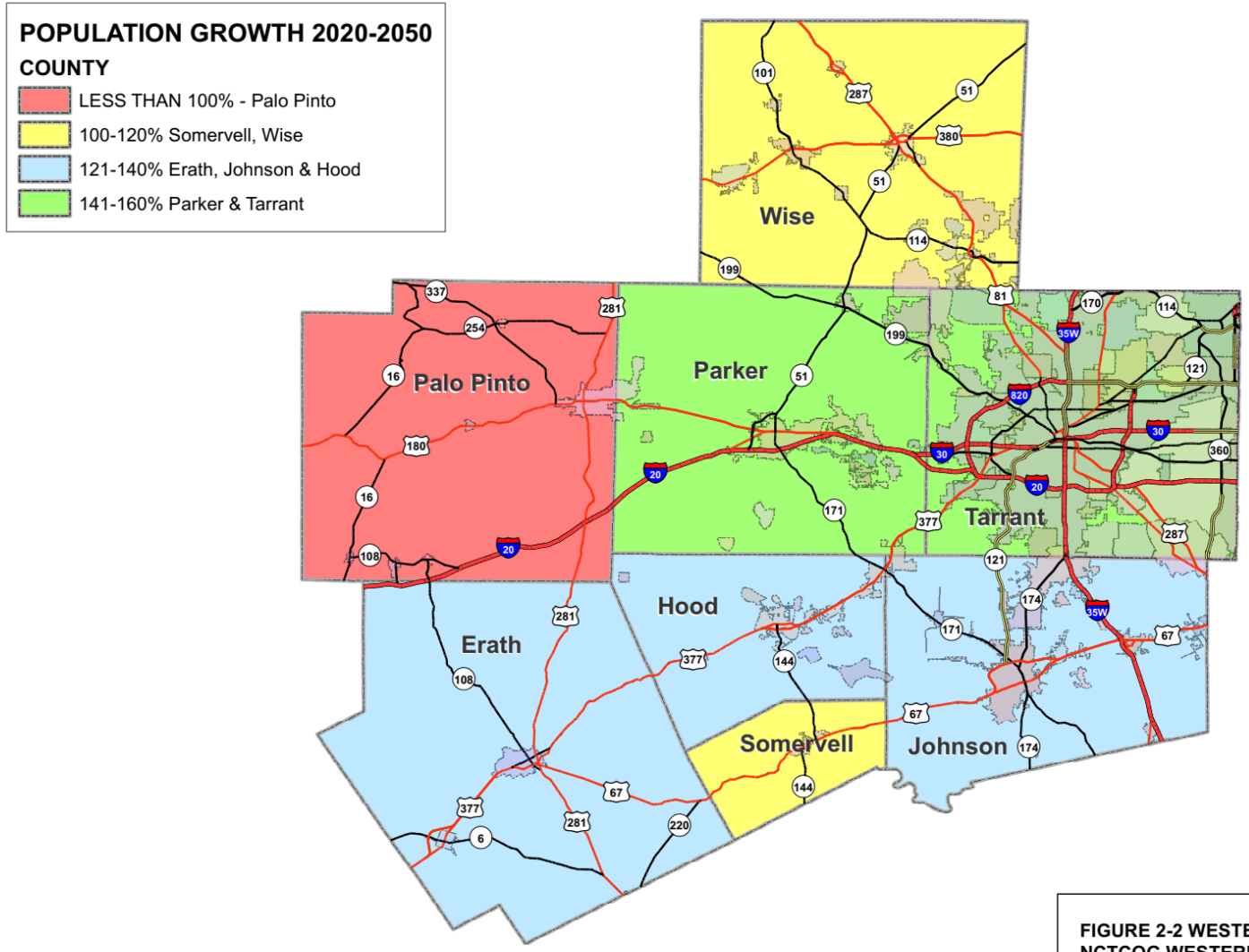
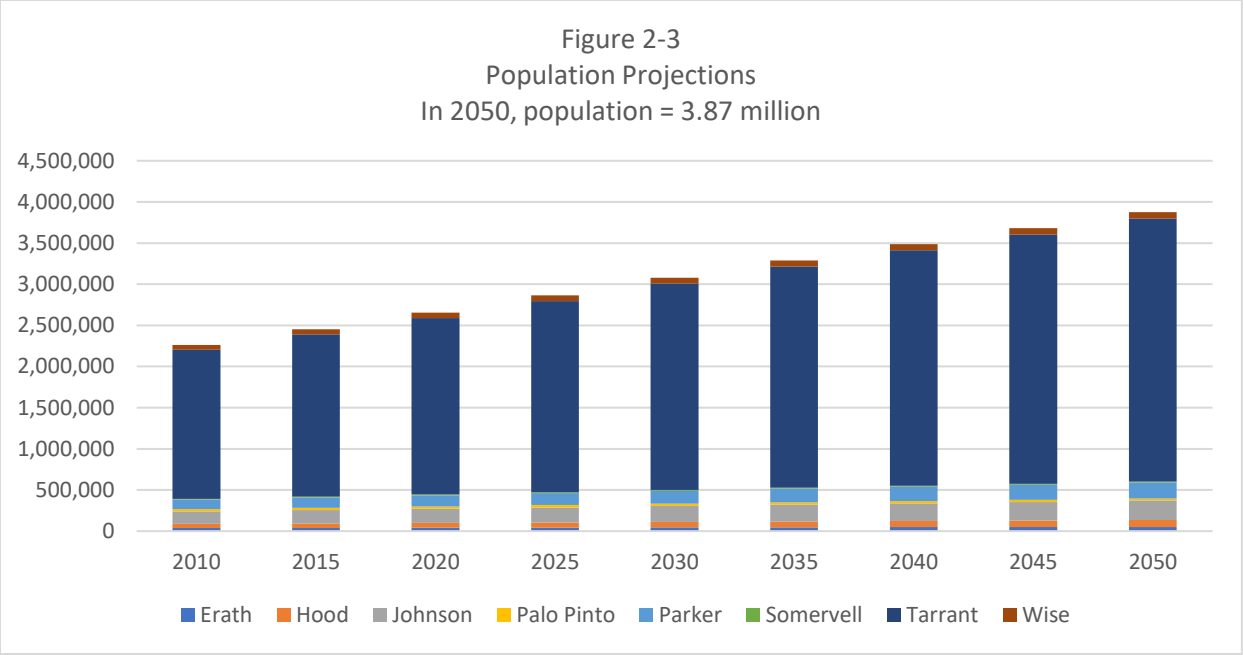


FIGURE 2-2 WESTERN REGION GROWTH TRENDS
NCTCOG WESTERN REGION SOLID WASTE STUDY



Source: Texas Demographic Center, 2018 Texas Population Projection Tool. 2020.
https://demographics.texas.gov/Data/TPEPP/Projections/Tool?fid=9E22434DF77B4A4D913D191DB070EE25

Table 2-3 shows the percent of population that lives in cities with populations over 5,000. Eighty-one percent of the western region's population lives in cities with a population over 5,000. However, for counties including Palo Pinto, Erath, and Johnson, less than 50% of the population live in cities with over 5,000 people. The two largest cities in the western region are Fort Worth (pop. 848,860) and Arlington (pop. 368,180). Tarrant County has the highest population of the eight counties with a population of 2.02 million people, or 80% of the Western Region. (Source: TDC).

Table 2-3 also presents the distribution of population in the western region by county. The table shows that Tarrant County accounts for 80% of the total population in the region.

Municipalities generally have more control over waste management activities than counties do. Cities will negotiate contracts for collection services, while residents in more rural areas of the region have the responsibility of either selecting their own service provider or individually taking responsibility for getting their waste to an acceptable disposal site, often a citizen convenience station.

Table 2-3 Population Distribution for the Western Region Living in Major Cities by County		
County	**Percent Living in cities over 5000 population**	**Percent of Total Western Region**
Erath	*51%*	2%
Hood	*15%*	3%
Johnson	*52%*	7%
Palo Pinto	*58%*	1%
Parker	*21%*	5%
Somervell	*26%*	1%
Tarrant	*92%*	80%
Wise	*21%*	3%
Total	***81%***	**100%**
Source: 2019 Population Estimates; North Central Texas Council of Governments; April 2019, https://data-nctcoggis.opendata.arcgis.com/datasets/2019-nctcog-population-estimates-publication		

Housing

According to the US Census Data Center 2018 data, there were 981,000 single-family (70%) and multi-family households (25%) in the western region in 2018 (Source: US Census Data Center, 2020). Figure 2-4 summarizes housing characteristics for the entire western region and Table 2-4 presents housing data for each county. Seventy percent of these households are single-family residences. Twenty-five percent are multi-family households which include apartments and condominiums. Mobile homes and boat/RV households combined represent five percent of total households. For comparison purposes using the same data source, Dallas has 57% single family households; Bexar County has 68%, Travis County has 57% and Harris County has 61%.

Why are housing data important?

- Projecting residential waste generation
- Estabishing metrics for determining success of public education programs (change in lb/ hh-day disposed)
- Establishing metrics for determining success of residential recycling programs (change in lb/hh-day recycled)

Figure 2-4
Housing Characteristics - 981,000 Households
(Source US Census)

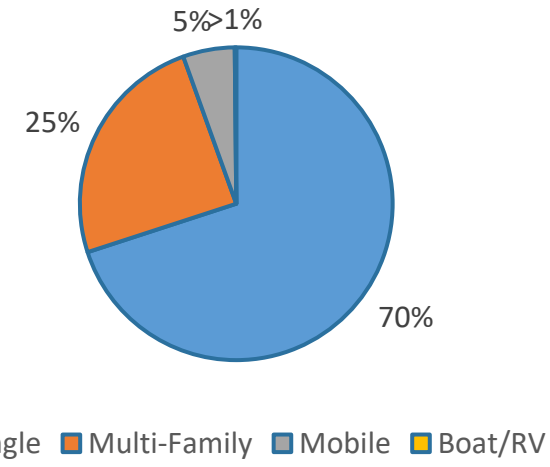


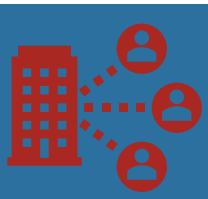
Table 2-4 Housing Characteristics (2018)					
County	Single-Family (households)	Multi-Family (households)	Mobile (households)	Boat/RV (households)	Total (households)
Erath	11,738	3,078	3,059	69	17,944
Hood	18,666	2,482	5,004	105	26,257
Johnson	42,502	7,358	12,392	546	62,798
Palo Pinto	11,067	1,632	2,720	30	15,449
Parker	40,512	3,619	6,631	58	50,820
Somervell	2,795	156	868	-	3,819
Tarrant	542,371	221,119	14,893	654	779,037
Wise	16,990	992	6,879	64	24,925
Total	**686,641**	**240,436**	**52,446**	**1,526**	**981,049**
Percent	**70%**	**25%**	**5%**	**0%**	**100%**
Erath	65%	17%	17%	0%	100%
Hood	71%	9%	19%	0%	100%
Johnson	68%	12%	20%	1%	100%
Palo Pinto	72%	11%	18%	0%	100%
Parker	80%	7%	13%	0%	100%
Somervell	73%	4%	23%	0%	100%
Tarrant	70%	28%	2%	0%	100%
Wise	68%	4%	28%	0%	100%

Source: US Census (2018)

Commercial, Institutional, and Industrial

Businesses, institutions, and local governments employ 1.07 million people across the Region (US Bureau of Labor Statistics Fall 2019).

In the Fort Worth – Arlington Metropolitan Division, approximately 84% of individuals are employed in commercial, institutional, government, finance trades or other professional fields. The remaining 16% of employees are in construction or manufacturing. Figure 2-5 presents employment distribution by sector for the Fort Worth / Arlington Metro Division.



Why are employment data important?

- Data are required to establish a commercial / institutional waste generation rate.
- Identifying the largest employers can help target opportunities to make significant reductions in waste generation.

Table 2-5 presents a summary of employment data for the counties in the western region. The NCTCOG 2045 Forecast City Approximations Report projects households, population and employment for major cities in the NCTCOG Region. An analysis of these data shows that western region cities will increase employment between 2005 and 2045 at a rate of 1.06% per year.

Table 2-5 Employees in Western Region by County	
County	**Employment (2019)**
Erath	16,906
Hood	16,906
Johnson	48,726
Palo Pinto	8,715
Parker	34,924
Somervell	3,692
Tarrant	923,263
Wise	20,901
Total	**1,074,033**
Source: US Bureau of Labor Statistics 2019; projections based on an annual increase of 1.06% per year	

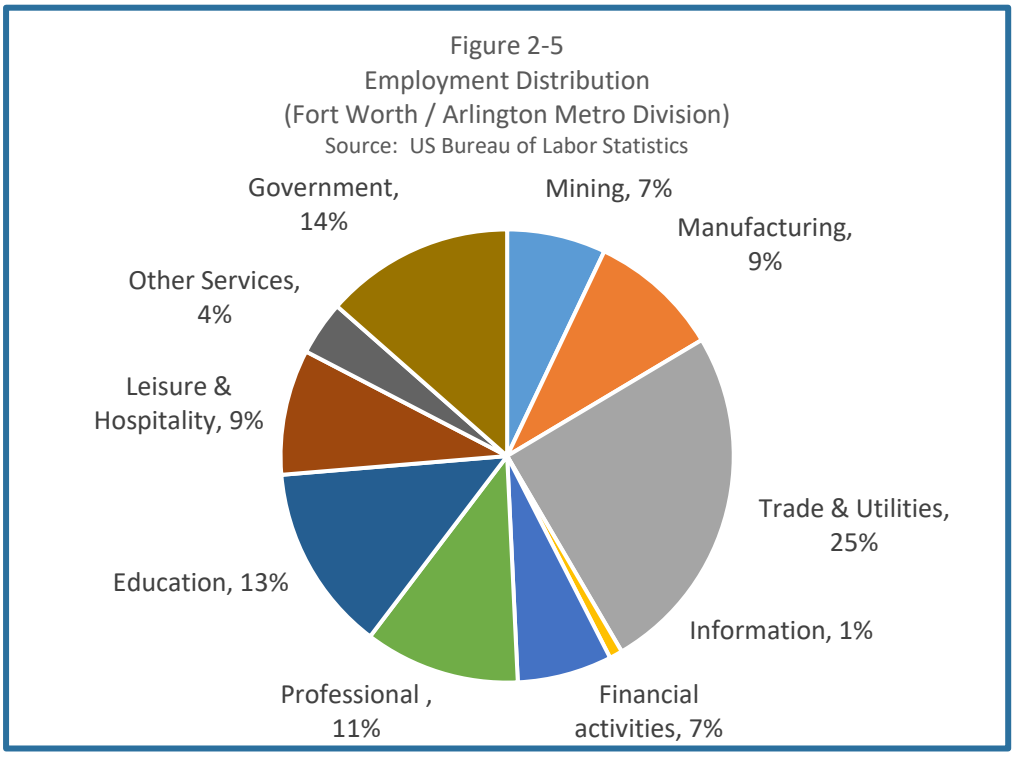


Table 2-6 lists a sampling of major employers in the western region. Retail trade, public administration, manufacturing, education and health care represent the biggest sectors of the western region's economy. Major businesses are sources of significant amounts of waste, but also represent opportunities for significant reductions in waste generation.

Table 2-6 Major Employers in the Western Region

Employer	Employees	Sector	City
Dallas Fort Worth International Airport	14,000	Retail Trade	Grapevine*
Naval Air Station Joint Reserve Base Fort Worth	10,500	Public Administration	Fort Worth
Lockheed Martin Aeronautics Company	10,500	Manufacturing	Fort Worth
L3 Technologies Aerospace Systems	6,500	Manufacturing	Greenville
University of Texas Arlington	5,300	Educational Services	Arlington
Burlington Northern Santa Fe Railway	4,900	Retail Trade	Fort Worth
John Peter Smith Hospital	4,600	Health Care & Social Assistance	Fort Worth
Alcon Laboratories	4,500	Manufacturing	Fort Worth
Arlington Assembly Plant General Motors	4,484	Manufacturing	Arlington
Texas Health Harris Methodist Fort Worth	4,100	Health Care & Social Assistance	Fort Worth
Texas Health Resources	4,063	Health Care & Social Assistance	Arlington
Bell Technical Services Inc.	4,000	Manufacturing	Fort Worth
AMR Corporation	4,000	Retail Trade	Fort Worth
Wise Regional Health System East Campus	1,400	Health Care	Decatur
Luminant	1,200	Utilities	Glen Rose
Tarleton State University	1,055	Educational Services	Stephenville
Walmart Distribution Center	736	Wholesale Trade	Cleburne
Weatherford HS	205	Educational Services	Weatherford

Source: NCTCOG, http://data-nctcoggis.opendata.arcgis.com/datasets/employers
(*) Includes all of DFW International Airport

3.0 Waste Generation

Methodology

To determine the amount of waste generated in the western region, demographic data, waste generation rate data from other studies, and region-specific disposal rates were analyzed. Three specific sectors are examined: single family housing, multi-family housing, and the commercial/industrial sectors.

Once specific generation rates for the three sectors were established, a per-capita composite rate was calculated. This composite rate is applied to future population projections to forecast future waste generation.

"***Waste generation rates***" correspond to the amount of waste generated in the Western Region. This includes all MSW, as well as bulky waste, yard wastes and brush.

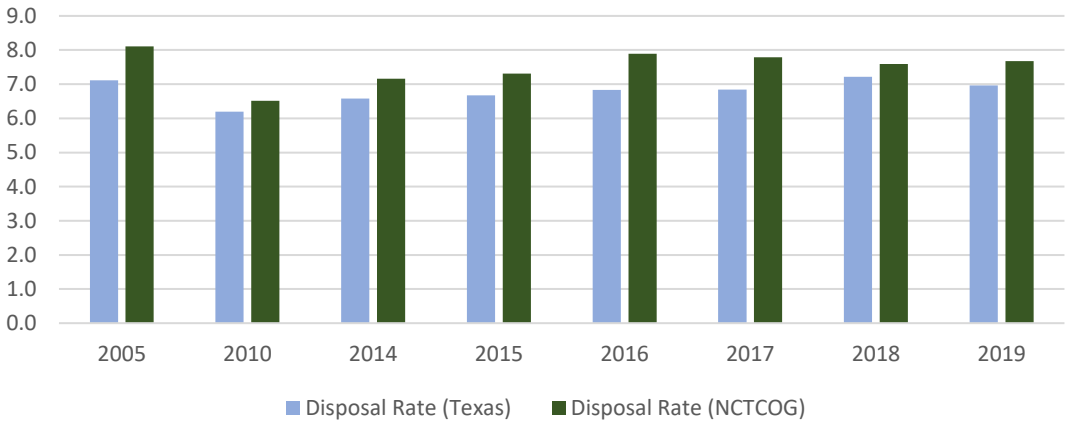
"***Waste disposal rates***" correspond to the amount of waste placed in landfills. This includes waste that may have been imported into the Western Region.

"***Recovery rate***" includes materials recovered through traditional recycling or organics management programs.

Historic Trends

Since 2010, waste disposal rates have trended higher, with a modest decline occurring in 2017 and 2018. In 2019, disposal rates for the state dropped, however the 16-county North Central Texas region increased slightly. In 2005, the Texas disposal rate was 7 pounds/capita-day (pcd), while NCTCOG's rate was 8 pcd. Since 2005, the NCTCOG region has consistently remained at a higher rate than the state average. In 2019, the NCTCOG rate was 7.68, while the state average was 6.96. In comparison to the other regions, Houston-Galveston Council of Governments (Houston) rate was 7.1 pcd, Capital Area Council of Governments (Austin) was 6.13 pcd and Alamo Area Council of Governments (San Antonio) was 5.66 pcd. (Source: TCEQ Annual MSW Report).

Table 3-1
Historic Waste Disposal Rates (pcd)
Source: TCEQ Annual MSW Report



Residential Waste Generation

Residential waste generation and disposal rates vary considerably from one community to another. Factors that affect residential waste generation include: the level of service provided to residents, the effectiveness of residential public information programs to reduce waste and recycling programs. A review of city budgets and local planning documents shows that the range of residential waste generation rates in the largest Texas cities varies from Houston with 9.3 pounds/household/day ("phd"); Dallas with 6.58 phd; San Antonio with 6.02 phd; and Austin with 4.16 tons phd.

For the purposes of this analysis, residential waste generation is the MSW generated and does not include traditional recyclables or organic waste collected if these materials are recovered.

Local Government Survey Results

The Survey conducted as part of the Needs Assessment collected data on residential waste generation and number of households served within a city. From these data, a residential waste generation rate was calculated. Rates ranged from 3.3 phd in Benbrook to 11.7 phd in Grapevine. A weighted average, taking into consideration a city's population, results in a western region average residential waste generation rate of 6.6 phd. Appendix C – Survey Findings includes the specific residential generation rates for each of the cities that participated in the survey.

Applying a waste generation rate of 6.60 pounds per household per day results in a total single-family waste generation of 823,969 tons per year in 2019. Table 3-1 presents estimated generation from single-family households for each county based on this methodology.

Table 3-1 Single-Family Household Waste Generation by County

County	Single Family Households	Single-Family Household Waste (tons/year)
Erath	11,738	14,086
Hood	18,666	22,399
Johnson	42,502	51,002
Palo Pinto	11,067	13,280
Parker	40,512	48,614
Somervell	2,795	3,354
Tarrant	542,371	650,845
Wise	16,990	20,388
Total	686,641	823,969

Source: Number of households is US Census; Waste generation is households * generation rate of 6.58 pounds/capita/day *365 days/2000 lbs./tons

Multi-family Waste Generation

Residents of multi-family households generate MSW that is comparable to MSW generated by single-family households. However, waste generated from multi-family units is typically collected by the private haulers as part

of their commercial collection routes. Because multi-family MSW is collected by private haulers and mixed with wastes from businesses, it is difficult to establish a specific waste generation rate for apartments and other multi-family households.

In this analysis, multi-family households include apartments and condominiums, as well as residents identified as living in either mobile homes or boats.

In the 2017 Fort Worth Long-Term Solid Waste Management Plan ("Fort Worth Plan"), a number of sources were evaluated to establish waste generation rates for multi-family households and the commercial sector. The source referenced in the Fort Worth Plan was CalRecyle Waste Characterization Study (Source: https://www2.calrecycle.ca.gov/WasteCharacterization/General/Rates). The CalRecycle rate for the multi-family sector is 4 phd compared to the single-family generation rate of 6.6 phd. Reasons why multi-family households typically generate less waste per household include: residents are not responsible for any landscaping or yard waste and the average household has fewer people than the average single-family household.

In 2019, it is estimated that the multi-family sector generated approximately 214,918 tons of MSW in the western region.

Table 3-2– Multi-family Residential Waste Generation in Tons (2019), by County

County	Multi-family Households	Multi-family Waste Generation
Erath	6,206	4,530
Hood	7,591	5,541
Johnson	20,296	14,816
Palo Pinto	4,382	3,199
Parker	10,308	7,525
Somervell	1,024	748
Tarrant	236,666	172,766
Wise	7,935	5,793
		-
Total	294,408	214,918

Source: Multi-family households data is from US Census Bureau. Waste generation is households * 4lb. pcd * 365 days / 2000 lbs

Commercial Generation

Included in the Commercial sector are commercial businesses and institutions such as schools, hospitals, airports, and local governments. MSW quantities generated from individual establishments vary considerably depending on the type of business or institution, the size of the business and the types of internal programs implemented to reduce waste generation.

MSW generated by this sector is collected by private haulers and is hauled to one of several landfills located throughout the NCTCOG region. Local governments have regulations that define the minimum frequency of MSW collection and in some cases where the waste must be taken for disposal. There are no reporting requirements on the quantities of waste that are collected, making it more difficult to establish waste generation rates for this sector.

Using the CalRecyle Waste Characterization Study, it is estimated that the western region has a waste generation rate of 10.53 pounds per employee per day (ped) for the commercial sector and an 8.93 ped for the industrial/mining/construction sectors. Based on data from the US Bureau of Labor Statistics (BLS), 84% of the workforce in the Fort Worth / Arlington Metropolitan Division work in the commercial sector, while 16% work in either manufacturing or mining. The weighted commercial waste generation rate is equal to 10.17 ped (10.54 ped *84%)+(8.93 ped*16%).

As in most communities, the commercial sector accounts for approximately two-thirds of the waste stream.

Applying local employment data to these waste generation rates results in annual commercial sector MSW generation estimates of almost 2.0 million tons for the Region. Table 3-3 presents commercial / institutional MSW generation estimates for each county.

Table 3-3 Commercial Waste Generation Estimates (2018) by County

County	Employment (2018)	Tons/Year
Erath	16,906	31,381
Hood	16,906	31,381
Johnson	48,726	90,446
Palo Pinto	8,715	16,177
Parker	34,924	64,827
Somervell	3,692	6,853
Tarrant	923,263	1,713,783
Wise	20,901	38,797
Total	**1,074,033**	**1,993,646**

Source: US Bureau of Labor Statistics. Generation = Employees * 10.17*365 days / 2000lbs

Summary of Waste Generation

Table 3-4 provides a summary of waste generation for the Region by county for single-family, multi-family and commercial wastes. In 2019, the Region is estimated to have generated 3.03 million tons of MSW. This is equivalent to 6.45 pcd. The per-capita generation rate was calculated by dividing the total waste by the total population: [3.03 million tons/yr * (2000 pounds/ton)]/[2.8 million people / (365 days/ year)].

The following conclusions can be drawn from Table 3-4.

- The Region's calculated waste generation rate of 6.4 pcd is less than the average for the NCTCOG Region rate of 7.68 pcd and the Texas rate of 6.96 pcd.
- Within the Region, the generation rate varies from 5.04 pcd (Parker Co.) to 6.74 pcd (Erath Co.). Reasons for the variation include variations in both employment characteristics and a higher ratio of multi-family (including mobile homes and RV/boats) to single-family households.
- A county's population does not necessarily determine whether it has a high or low generation rate. This is consistent with TCEQ data that compare council of government (COG) MSW generation rates. An analysis of those data does not show a correlation between MSW disposal rates for urban versus rural COGs.

- Figure 3-2 illustrates the distribution of waste generation by source (single-family, multi-family and commercial). Commercial generation accounts for 66% of the total waste generation; single-family is 27% and multi-family is 7%. This is important as any future programs targeted at reducing waste or facility design (specifically flow control) will have to take this into consideration.

Table 3–4 - Waste Generation by County

County	Single Family Households (tons/year)	Multi-Family Households (tons/year)	Commercial / Institutional (tons/year)	Total (tons/year)	Generation Rate (pcd)
Erath	14,086	4,530	31,381	49,997	6.74
Hood	22,399	5,541	31,381	59,322	5.69
Johnson	51,002	14,816	90,446	156,265	5.11
Palo Pinto	13,280	3,199	16,177	32,656	6.41
Parker	48,614	7,525	64,827	120,966	5.04
Somervell	3,354	748	6,853	10,955	6.60
Tarrant	650,845	172,766	1,713,783	2,537,394	6.70
Wise	20,388	5,793	38,797	64,977	5.52
Total	823,969	214,918	1,993,646	3,032,532	6.45
Per Capita Generation Rate	1.70	0.44	4.12	6.45	6.45

Figure 3-2
Sources of Waste in Western Region

Comparing Waste Generation and Disposal

The 3.03 million tons per year of MSW generated correlates closely with the 2.81 million tons which are disposed in Western Region landfills. A more detailed analysis of waste disposal quantities is presented later in this Needs Assessment Report.

It should be noted that waste flows into and out of the western region. Landfills in the western region accept waste from at least 18 counties that are located outside the western region. The Turkey Creek Landfill, which accepts a large quantity of Class 2 and Class 3 special wastes, reported that it accepted waste from a total of 25 counties including 7 from the western region. Tables 3-5 and 3-6 present a comparison of landfills and the counties they serve. There are no data on the quantities accepted from outside the western region or imported into the western region. Discussions with landfill operators indicates that the majority of waste generated in the western region is disposed in the western region. The major exception to this is waste that is processed at the Waste Management Westside Transfer Station (221,500 tons per year) that is disposed of at one of its landfills located in either Denton or Ellis Counties. The source for this information is the TCEQ's Annual Landfill Reports that are required to be submitted by landfill operators.

Table 3-5 – Counties Served by Western Region Landfills

Landfill	Number of Western Region Counties Using Landfill	Number of Non-Western Region Counties using Landfill	Total
Arlington	2	2	4
Cleburne	1	0	1
Fort Worth	3	3	6
Turkey Creek	7	18	25
Weatherford	4	1	5
Fort Worth C&D	3	2	5
Stephenville	4	0	4

Source: TCEQ Annual Landfill Reports date?

Table 3-6 Remote Landfills Serving Western Region Counties

County	Number of landfills outside Western Region accepting waste from counties
Erath	3
Hood	1
Johnson	1
Palo Pinto	0
Parker	0
Somervell	0
Tarrant	7
Wise	1

Source: TCEQ Annual Landfill Reports date?

Table 3-7 presents a comparison of waste generation to disposal quantities. The estimated waste generated based on sector generation rates (single family households, multi-family and commercial) is 3.03 million tons per year. Based on TCEQ's Annual Landfill Reports, the amount disposed of in western region landfills was 2.8 million tons in 2019. Given the uncertainties regarding waste flows and estimated generation rates for various sectors the

difference between the 3.03 million tons generated and 3.03 million tons disposed (including quantities processed at the Westside Transfer Station) is negligible and confirms the generation rates assumed for the Needs Assessment.

Table 3-7 – Comparing Waste Generation to Disposal Quantities (2019)	
Estimated Waste Generation based on sector generation rates	3.03 million tons
Disposal Quantities reported by Region Landfills	2.81million tons
Exported from Waste Management Transfer Station	0.22 million tons
Total Disposed and Transferred out of the Region	3.03 million tons

Projected Waste Generation

Table 3-8 presents estimated waste generation for the Region for the period 2020 through 2050. County per-capita waste generation rates and county population projections were used to project these quantities. It is expected that, due to COVID-19, total waste disposal quantities will be less than in past years. Cities have reported an increase in residential waste as more individuals work from home and use home delivery, but there has been a corresponding reduction in commercial waste generation. There is a level of uncertainty regarding future waste patterns after COVID-19, but to be conservative, it is assumed patterns will return to pre-COVID-19 levels in future years. By 2030, waste generation will equal 3.63 million tons and by 2040, a total of 4.11 million tons will be generated, which is 30% more than was generated in 2020.

The projections presented in Table 3-8 assume no major changes in waste generation patterns over the next twenty and thirty years. In evaluating the past 15 years, waste generation patterns state-wide have remained fairly consistent, with the exception of 2010, which saw a drop in waste quantities due to an economic recession.

Factors that could affect the projections presented in Tables 3-8 and 3-9 include the following.

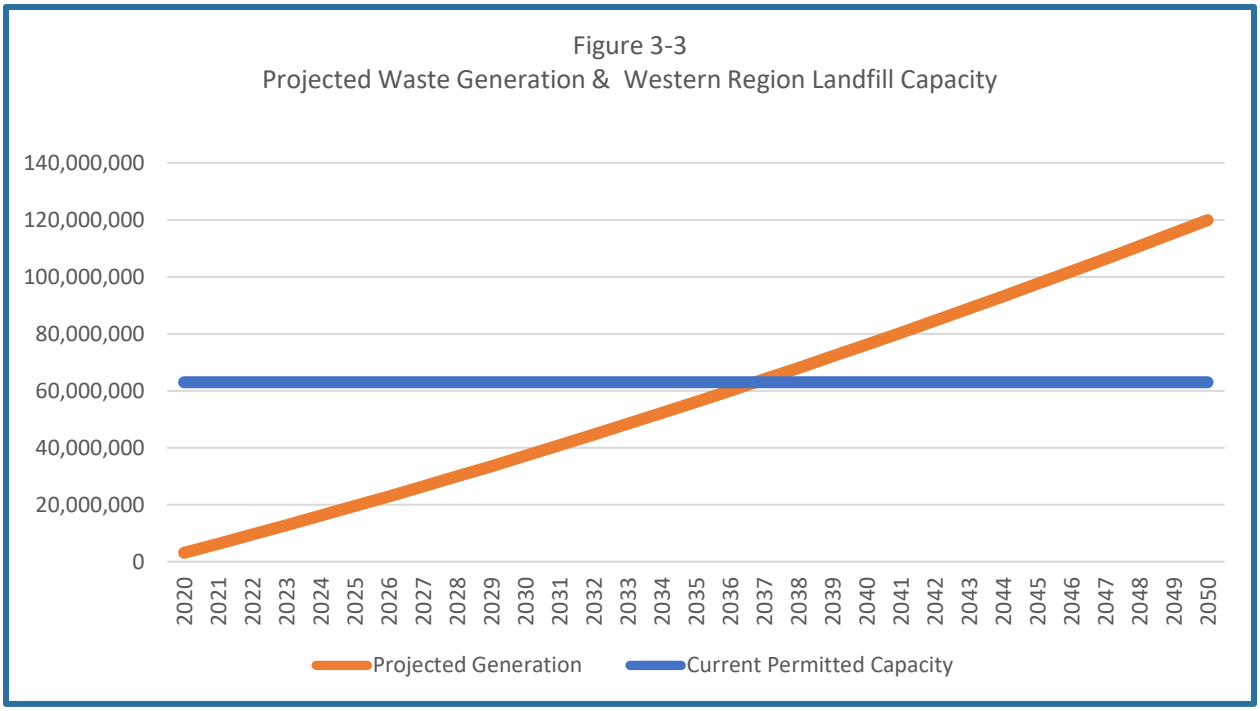
- Successful efforts to reduce wasteful products and packaging, thereby reducing the waste generation rate.
- Increased recycling efforts by both the public and private sectors, thereby reducing the waste disposal rate.
- Significant changes in population or employment trends. This may include a shift to more people living in higher density housing.
- Changes in waste management regulations that could impact waste generation. These may include material disposal bans, forcing the marketplace to abandon these materials, or recycling mandates.

Cumulative Waste Generation

Table 3-9 and Figure 3-3 present the cumulative projected annual waste generation through the year 2050. By the year 2030, it is estimated that a cumulative total of 56 million tons will be generated; by 2040, cumulative waste generation is projected to be 76 million tons. The currently permitted disposal capacity in the western region is 63.5 million tons. If no significant additions to capacity are secured and assuming all other inputs are held constant, there will be no remaining landfill capacity by the year 2037 to serve the western region.

Table 3-8- Projected Annual Waste Generation for Selected Years by County									
	Erath	Hood	Johnson	Palo Pinto	Parker	Somervell	Tarrant	Wise	Western Region
Rate (pcd) in 2019	6.74	5.69	5.11	6.41	5.04	6.6	6.7	5.52	6.40
Annual Generation									
2020	51,079	60,896	160,124	32,590	124,744	11,195	2,621,276	66,294	3,128,199
2025	53,618	64,802	170,463	32,250	134,673	11,807	2,839,737	69,612	3,376,960
2030	55,984	68,750	181,011	31,622	144,715	12,350	3,065,642	72,441	3,632,515
2035	58,156	72,604	191,057	30,807	154,148	12,609	3,287,975	74,603	3,881,958
2040	59,922	76,414	200,845	29,814	162,644	12,670	3,500,332	76,016	4,118,657
2045	61,554	80,630	211,172	28,755	170,902	12,561	3,705,321	76,960	4,347,855
2050	63,182	85,458	222,262	27,752	179,601	12,445	3,908,646	77,651	4,576,998
Cumulative Generation									
2020	51,079	60,896	160,124	32,590	124,744	11,195	2,621,276	66,294	3,128,199
2025	314,136	377,136	991,591	194,657	777,993	68,960	16,378,629	407,870	19,510,972
2030	589,365	712,908	1,875,701	354,099	1,481,522	129,672	31,253,750	764,627	37,161,644
2035	875,942	1,068,252	2,811,080	509,926	2,233,848	192,355	47,252,572	1,133,689	56,077,664
2040	1,172,104	1,442,638	3,795,696	661,010	3,030,333	255,650	64,333,396	1,511,181	76,202,006
2045	1,476,687	1,837,167	4,830,629	806,825	3,868,283	318,669	82,451,971	1,894,161	97,484,392
2050	1,789,348	2,254,472	5,919,351	947,572	4,748,582	381,124	101,588,249	2,281,090	119,909,788

Figure 3-3
Projected Waste Generation & Western Region Landfill Capacity



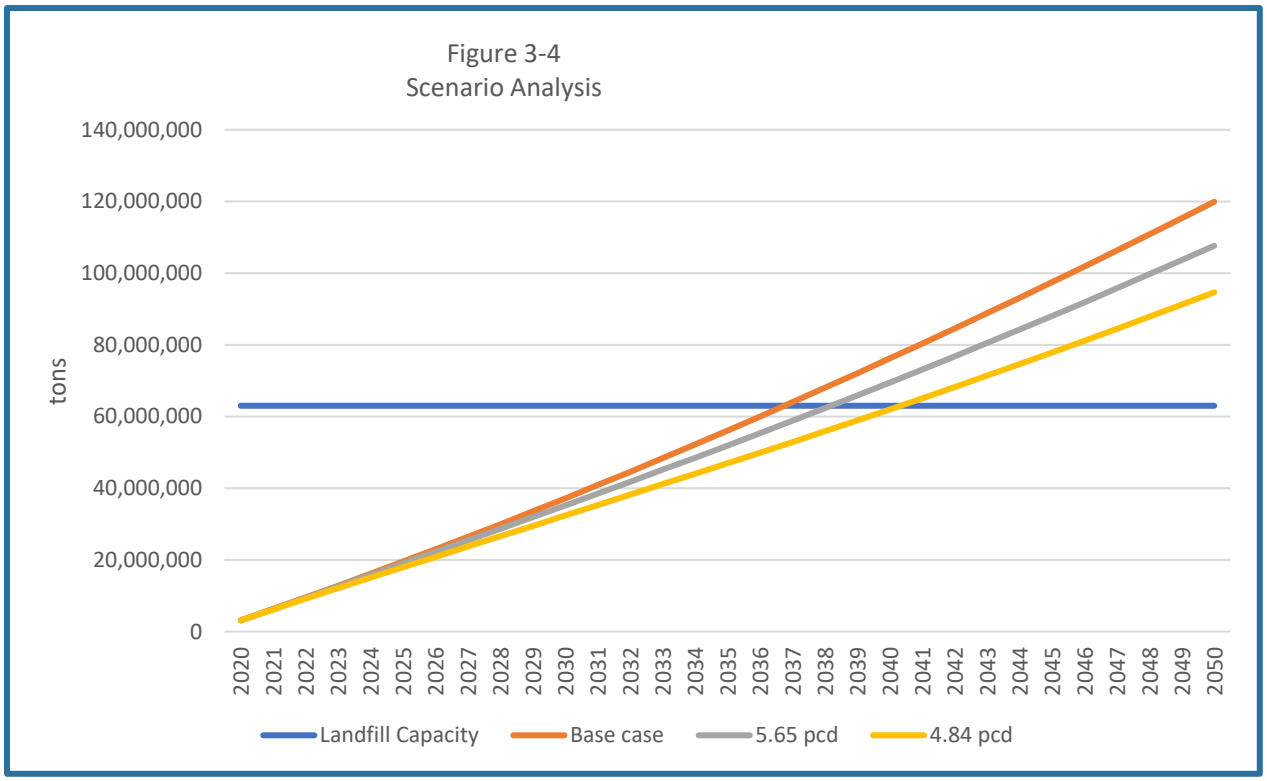
Evaluating Waste Generation Reduction Scenarios

As stated, there are numerous efforts by both the public and private sectors to reduce waste quantities. To illustrate the potential impacts of these efforts, projected the impacts of the Region achieving a disposal rate comparable to the rate achieved in the Capital Area Council of Governments region which is 5.65 pcd, a 14 reduction, and a rate of 4.84 pcd which is equivalent to a 25% reduction in the western region's current disposal rate. To achieve these reductions, especially the 4.84 pcd rate, major reductions in waste generation by the commercial sector are going to be required. It is estimated that it will take between five and ten years to achieve these rates. During this time frame, programs and policies will have to be developed and the processing infrastructure will have to be upgraded to manage the necessary amount of diverted material. Table 3-9 presents two scenarios where the disposal rate incrementally decreases to the 5.65 pcd rate and the 4.84 pcd rate.

These scenarios illustrate major reductions in generation. They also illustrate that even with an aggressive reduction and recycling program, future disposal capacity will be required to accommodate future projected population growth.

Table 3-9 illustrates that reducing the generation rate to 4.84 pcd by 2035 results in a total generation of 62 million tons as compared to 76 million tons in 2040. If the rate is 5.65 pcd, by 2035 a total of 62 million tons are projected to be generated in 2040, compared to base case of 76 million. This represents a reduction of 15 million tons. This would extend the time that landfills in the Region would reach current capacity by approximately three to five years.

Table 3-9 Projected Waste Generation with Lower Generation Rate						
	Scenario 1 – 5.65 pcd by 2035			Scenario 2 – 4.84 pcd by 2035		
Year	Disposal Rate (pcd)	Annual Disposal (tons)	Cumulative Disposal (tons)	Disposal Rate (pcd)	Annual Disposal (tons)	Cumulative Disposal (tons)
2020	6.45	3,124,332.24	3,124,332.24	6.45	3,124,332.24	3,124,332.24
2025	6.13	3,202,816.75	18,983,681.61	5.48	2,865,678.15	17,963,938.98
2030	5.81	3,262,475.63	35,182,479.53	5.16	2,899,978.33	32,400,576.39
2035	5.65	3,391,899.09	51,891,535.86	4.84	2,904,125.99	46,922,000.31
2040	5.65	3,597,210.52	69,470,820.96	4.84	3,079,912.54	61,973,290.88
2045	5.65	3,796,244.45	88,055,142.58	4.84	3,250,324.34	77,885,088.37
2050	5.65	3,995,602.16	107,633,102.64	4.84	3,421,013.35	94,647,633.82



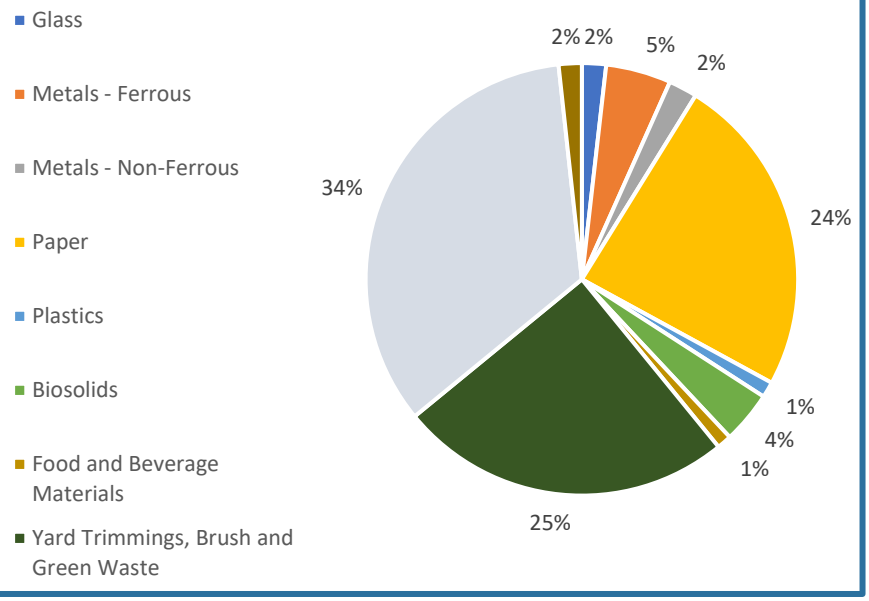
4.0 Solid Waste Management Facilities

MSW generated in the Region is either recycled, composted or disposed of at a landfill. This section of the Needs Assessment Report presents a summary of MSW facilities throughout the Western Region that manage waste. The focus of the Needs Assessment is the eight-county area; however, data are also presented on facilities across the NCTCOG region, as waste and materials cross regional boundaries.

Recycling

According to a TCEQ Study, Technical Report on the Economic Impacts of Recycling (2017), approximately 27% of the waste generated in Texas is recycled. This includes recovery of materials from residential and commercial sectors. It also includes the recovery of construction and demolition materials. The Study estimated 9.1 million tons of materials were recovered state-wide. The western region's 2.65 million people represents 8% of the Texas population. Using a simple ratio, the estimated amount of material recovered through recycling in the Western Region is 709,000 tons of material. This includes materials that are recycled through both public- and private-sector efforts. Figure 4-1 illustrates the types of materials that are recovered. Three materials constitute 83% of the total materials recovered: paper (24%); yard trimmings and brush (25%); and construction / demolition material (34%).

Figure 4-1
Distribution of Recyclables
Source: Technical Report on the Economic Impacts of Recycling (TCEQ)



Material Recovery Facilities: The EPA defines a material Recovery Facility ("MRF") as a central operation where comingled and/or source separated recyclables are processed mechanically or manually."

Recycling facilities in the Region include TCEQ-registered facilities such as material recovery facilities and several un-authorized recycling businesses such as scrap metal and scrap paper dealers.

A material recovery facility ("MRF") is designed to process traditional recyclables and make them ready for market. All materials collected from single stream recycling programs are processed at a MRF.

Registered recycling facilities in the Region are listed in Table 4-1.

Table 4-1 Registered Recycling Facilities in the Western Region (YEAR)		
County	**City**	**Facility**
Johnson	Godley	DC Organics Inc.
Johnson	Burleson	Burleson Trucking LLC
Parker	Weatherford	HD Recycling LLC
Parker	Springtown	Heritage-Crystal Clean
Tarrant	Fort Worth	Laidlaw Fort Worth Transfer Station
Tarrant	Fort Worth	Evergreen paper Recycling Inc.
Tarrant	Arlington	Corrugated Services LLP
Tarrant	Fort Worth	Hanks Recycling
Tarrant	Arlington	Abitibi Consolidated Recycling Division
Tarrant	Euless	Earth Haulers Inco
Tarrant	Azle	D&D construction Materials LLC
Tarrant	Mansfield	Mansfield Plant
Tarrant	Fort Worth	All computer Recycling
Tarrant	Fort Worth	Fort Worth Shingle Recycling
Tarrant	Arlington	R2R Recycling LLC
Tarrant	Grapevine	Winstron Greentech Texas Corp
Tarrant	Fort Worth	Fort Worth NE 23 St Facility
Tarrant	Grand Prairie	Mextek LLC
Tarrant	Fort Worth	Universal Recycling Technologies Facility
Tarrant	Fort Worth	Commodity Recycling Solutions
Tarrant	Grand Prairie	Cinco Electronics Recycling
Tarrant	Fort Worth	Re Teck
Tarrant	Fort Worth	One Oaks Sus
Tarrant	Fort Worth	Commodity Recycling Solutions

Source: TCEQ, 2020

Recycling at Landfills

Excluding brush and yard waste, a total of 203,400 tons of materials were recovered processed at landfills. All but 400 tons of this total was construction / demolition (C&D) material recovered at the Arlington Landfill. For landfills throughout the 16-county NCTCOG region (including the western region) a total of 365,800 tons of materials was diverted. Ninety-nine percent of this material is either C&D or asphalt.

Organics & Composting

As discussed earlier, 34% of the materials recovered state-wide are either yard waste, tree waste or brush. There are two types of organic processing facilities:

- Mulching operations where tree and brush waste are ground or chipped and sold.
- Compost operations where the organic materials, that could include green waste, biosolids, food waste and other organics, are processed to produce a useful soil amendment.

Table 4-2 Authorized Compost and Mulching Facilities in the Western Region

County	City	Facility
Johnson	Joshua	Harrington Organics Produce
Johnson	City?	Harrington Environmental
Parker	Aledo	Living Earth
Tarrant	Fort Worth	Silver Creek Materials Recovery Facility
Tarrant	Fort Worth	Thelin Recycling
Tarrant	Euless	Earth Materials Recycled
Tarrant	Southlake	Alpine Materials LLC
Tarrant	Forest Lake	The Organic Recycler of Texas
Tarrant	Lakeside	Living Earth
Tarrant	Fort Worth	Green Ground Compost
Tarrant	Fort Worth	Living Earth
Tarrant	Arlington	Living Earth
Tarrant	Azle	D&D construction Materials Company
Tarrant	Mansfield	Green Ground Compost
Tarrant	Fort Worth	Silver Creek Materials
Source: TCEQ 2020		

Landfills and Organics Management

Brush, tree waste and other organics are recovered at both the Arlington and Fort Worth Landfills. Living Earth provides organic recovery services at both facilities. In 2019, a total of 77,000 tons or organic materials were recovered at these two facilities. A total of 127,000 tons of organics were reported to be recovered at all landfills in the NCTCOG region.

Citizen Convenience Stations

Table 4-3 presents a listing of citizen convenience stations located in the Region. Data provided through the Local Government Survey are presented in this table.

Citizen convenience stations are defined as: "A facility established for the convenience and exclusive use of residents (not commercial or industrial users or collection vehicles), except that in small communities where regular collections are not available, small quantities of commercial waste may be deposited by the generator of the waste. The facility may consist of one or more storage containers, bins, or trailers." Source TAC 330.1.

Table 4-3 – Citizen Convenience Stations

County	City	Facility
Erath	Stephenville	NIX Manufacturing Citizens Collection Station
Hood	Granbury	Hood County Citizens Collection Station
Parker	Springtown	City of Springtown Citizens Collection Center
Somervell	Glen Rose	Glen Rose Citizen Convenience Station
Tarrant	Fort Worth	City of Fort Worth Hillshire Drop Off Station
Tarrant	Fort Worth	City of Fort Worth Old Hemphill Drop Off Station
Tarrant	Fort Worth	City of Fort Worth Brennan Ave Drop Off Station
Tarrant	Fort Worth	City of Fort Worth MLK Drop Off Station
Tarrant	Town of Westover Hills	Westover Hills Citizens Collection Station
Wise	Decatur	Wise County Decatur Citizens Collection Station
Wise	Paradise	Wise County Cottondale Citizen Collection Station
Wise	Boyd	Wise County Boyd Citizen Collection Station
Wise	Chico	Wise County Chico Citizen Collection Station
Wise	Decatur	Wise County Slidell Citizen Collection Station

Source: TCEQ 2020

Transfer Stations

Transfer stations are designed to improve collection efficiency by transferring waste from collection vehicles to more efficient long-haul vehicles. This allows the collection vehicles to spend more time collecting waste, versus hauling long distances to landfills. There are ten permitted or registered transfer stations in the western region. Table 4-4 presents a list of these transfer stations and the quantities of waste accepted at these transfer stations (Source: TCEQ Annual Reports 2019).

Table 4-4 – Western Region Transfer Stations, by County			
County	**City**	**Facility**	**Tons/ Year**
Erath	Stephenville	City of Stephenville	None reported
Johnson	Cleburne	City of Cleburne Transfer Station Facility	76,733 5,296 grinding of brush for recovery
Parker	City?	Brazos Transfer Station	Inactive
Parker	Weatherford	WC Weatherford Transfer Station	Not operational
Somervell	Glen Rose	Somervell County Transfer Station Facility	10,476
Tarrant	Arlington	Arlington Disposal Transfer Station Facility	Inactive
Tarrant	Fort Worth	North Texas Recycling Complex	11,743 – facility reported all material recovered and not disposed
Tarrant	Haltom City	IESI Minnis Drive Transfer Station	140,777
Tarrant	Fort Worth	Southwest Paper Stock Transfer Station	16,677 of MSW and 28,241 tons recovered
Tarrant	Aledo	Westside Transfer Station	221,532
Tarrant	Euless	Waste Conversions Industries Inc.	Non reported
Source: TCEQ MSW Reports 2019			

Landfills

A majority of the waste generated in the western region is disposed of at one of five Type I (MSW) or two Type IV (C&D) landfills. The landfills in the Region include the following.

A Type I landfill accepts typical MSW and other materials per the landfill's TCEQ permit.

A Type IV landfill accepts only construction / demolition wastes

- City of Arlington Landfill (Type I)
- City of Fort Worth Landfill (Type I)
- City of Cleburne (Type I)
- Turkey Creek Landfill (Type I)
- Weatherford Landfill (Type I)
- City of Stephenville Landfill (Type IV)
- Fort Worth C&D Landfill (Type IV)

A landfill is an engineered facility for the disposal of waste. MSW landfills are designed to mitigate potential environmental consequences of disposal such as impacts to water quality, air, and land resources. Landfill designs include liner systems, leachate collection and removal systems, groundwater monitoring and landfill gas management systems. Each landfill must have an approved site operating plan that is designed to further protect water, air, and land resources. They also are required to prepare approved closure and post-closure care plans as well as provide financial assurance for a 30-year minimum post-closure care period.

Landfill Capacity

There are seven permitted landfills in the Region. MSW landfill capacity is equal to 58.5 million tons and C&D capacity is 5.5 million tons, for a total of 63.5 million tons (Source: TCEQ Annual MSW Reports -2019). While most of the waste generated in the western region is disposed at landfills located in the western region, waste is exported to several landfills located outside the region. Within the total NCTCOG region, there is a total of 381 million tons of capacity. Figure 4-2 illustrates all landfills in the western region.

Table 4-5 through 4-9 present a summary of the ownership, operations and capacity of facilities, as well as the types of materials being disposed.

The Turkey Creek Landfill, the Weatherford Landfill and the Fort Worth C&D Landfill are owned by municipalities. The cities of Stephenville and Cleburne own and operate their landfills with municipal crews. The City of Arlington and the City of Fort Worth own their facilities, but contract with a private firm to operate their landfills. ((RESERVE PAGE for figure))

There are two permit amendments in process at TCEQ:

- Turkey Creek Landfill will be increased by 4.85 million cubic yards.
- Fort Worth C&D Landfill will be increased by approximately 4.5 million cubic yards.

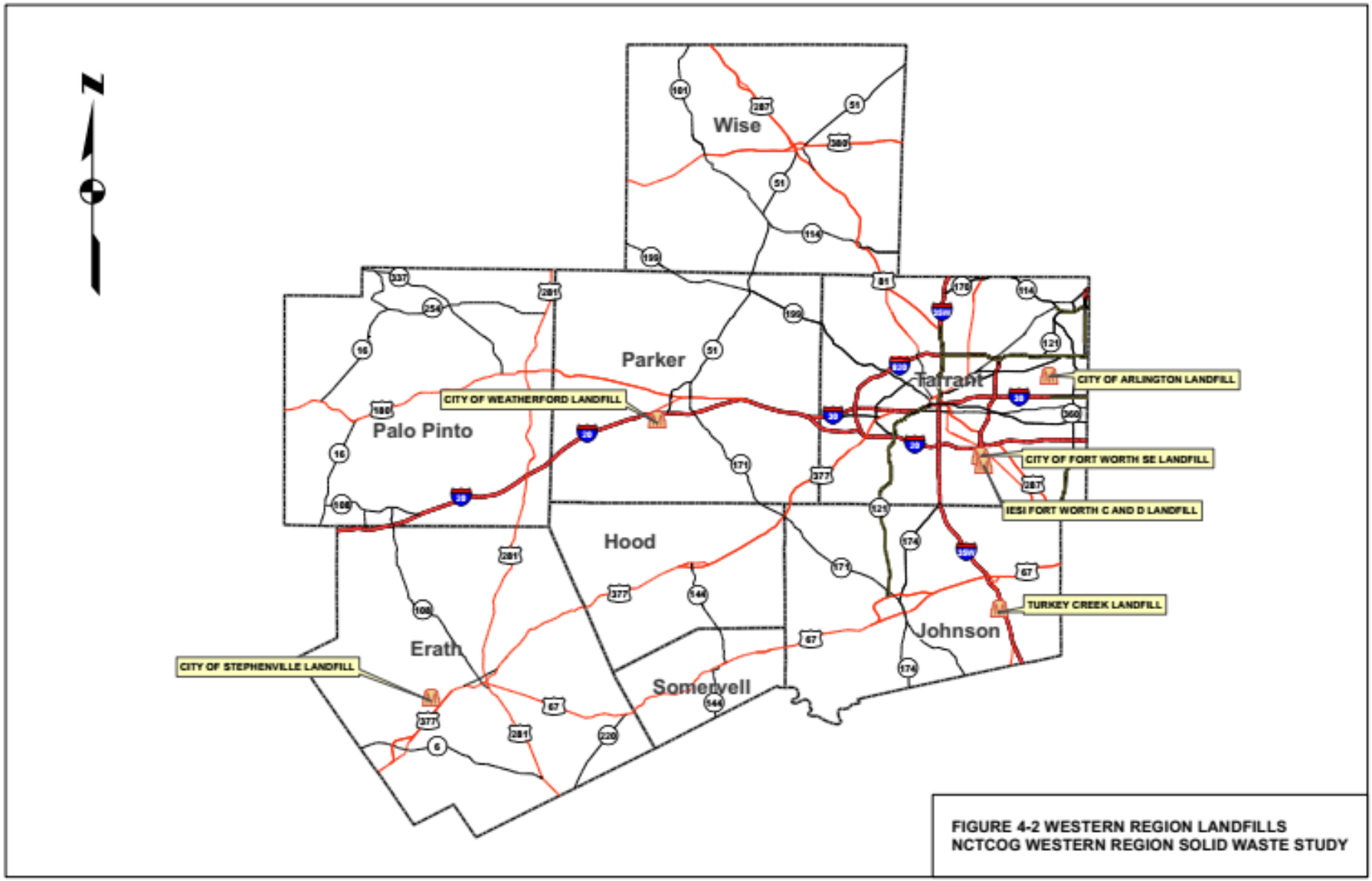
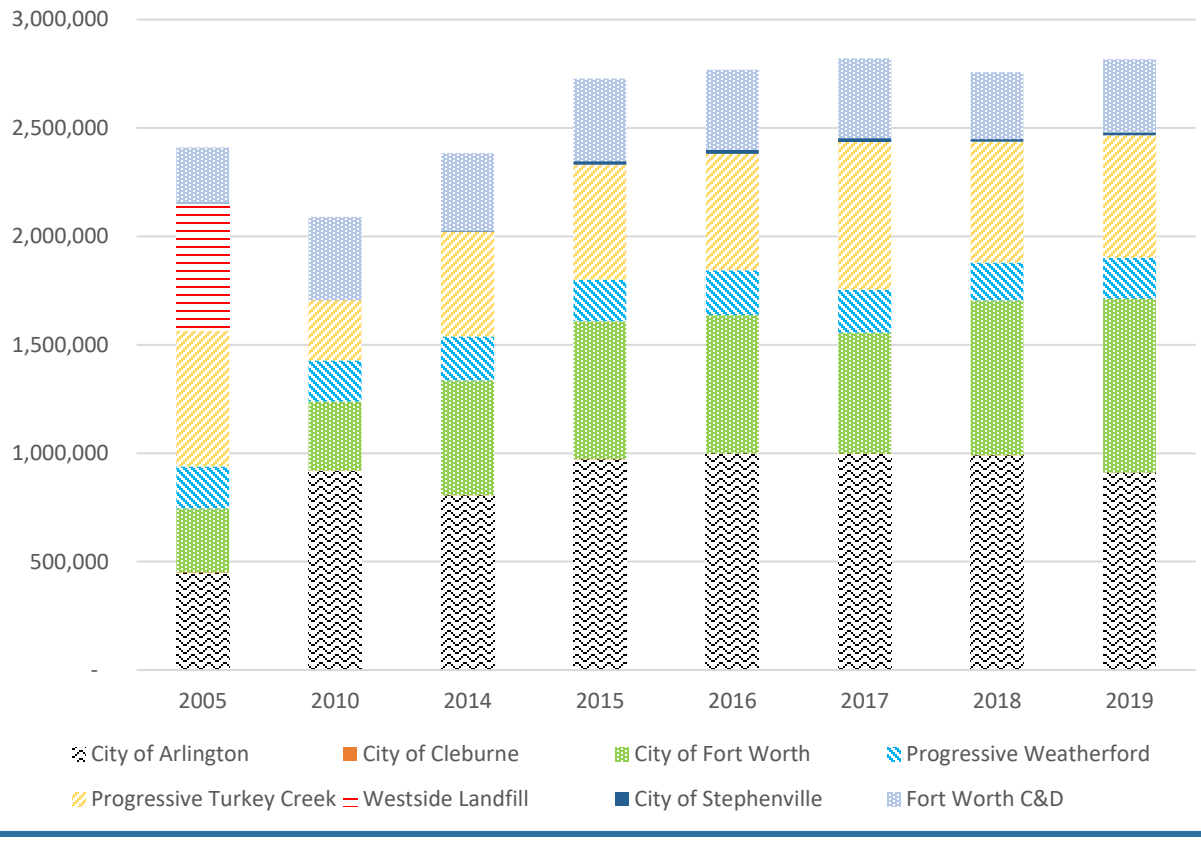


FIGURE 4-2 WESTERN REGION LANDFILLS
NCTCOG WESTERN REGION SOLID WASTE STUDY

Region Landfill Disposal and Capacity Observations

- Based on the waste disposal projections discussed earlier in this report, the 63.5 million tons of capacity provides approximately 16 years of landfill capacity. Should the permit amendments for Turkey Creek and Fort Worth C&D landfills secure their proposed permit amendments the projected capacity would be extended to approximately 19 years. These projections assume increases in population and no change in per capita waste disposal rates.
- For the period 2005-2019, total waste disposal quantities for the western region increased from 2.4 million tons to 2.8 million tons, representing a 17% increase in tonnages (refer to Figure 4-3).

Figure 4-3
Annual Waste Disposal Trends



- For the entire NCTCOG region, waste tonnages are projected to increase from 8.8 million in 2005 to 10.8 million in 2019, representing a 20% increase.

- The Westside Landfill was closed between 2005 and 2010 and is now the location of the Westside Transfer Station. In 2005, the Westside Landfill was still operational and accepted 587,000 tons. This transfer station accepted 200,000 tons of waste in 2019. The waste from the transfer station is now taken to either the DFW Landfill in Lewisville (which has approximately 2 years remaining capacity) or the Skyline Landfill in Ellis County.

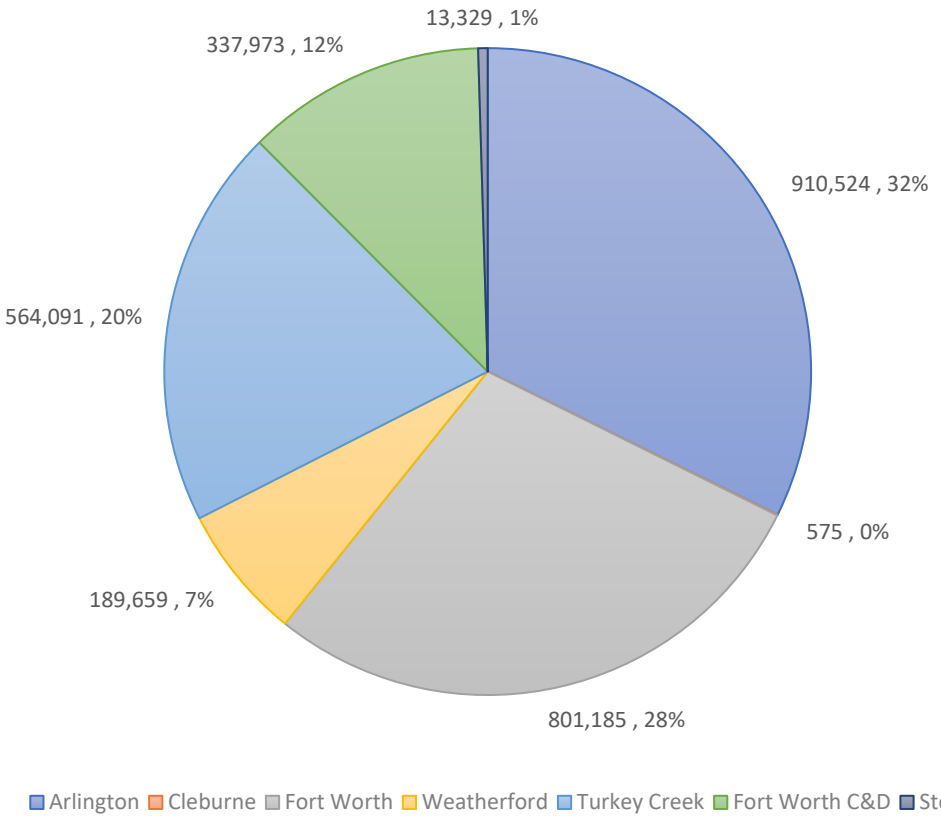
- In 2005, the Arlington and Fort Worth landfills accepted a combined total of 743,000 tons. By 2019, these landfills accepted 1,700,000 tons, a 1 million increase in 14 years! Both landfills

privatized operations over that period – transforming the landfills that took only city-generated waste to becoming regional facilities. Figure 4-4 illustrates the distribution of waste quantities in the western region.

- Over the 14-year period, the Weatherford Landfill's quantities have remained consistent at approximately at 200,000 tons per year. This landfill is anticipated to reach capacity within one to two years. Once closed, the 200,000 tons per year will have to be disposed of at another site, potentially the Turkey Creek Landfill. If Turkey Creek secures an amendment, it will be authorized for an expansion that will result in an additional 4.2 million tons.

Most of the waste generated in the region is disposed of at the Fort Worth and Arlington and Turkey Creek Landfills (80% combined).

Figure 4-4
Three landfills account for 80% of the waste disposal quantities
(2019 tons, Percentage of Western Region)
Source: TCEQ Annual Landfill Reports



- With continued population growth in the region, total C&D disposal quantities increased from 259,000 tons in 2005 to 351,000 tons per year in 2019. Stephenville's landfill quantities almost tripled over the 14-year period from 5,000 tons to 13,000 tons.
- There is very little brush being disposed of in western region landfills. Only 1,770 tons per year of brush are disposed in western region landfills or 0.06% of the total amount disposed. Landfills reported processing approximately 77,000 tons of brush for recovery and recycling.
- A total of 543,400 tons of construction / demolition materials are disposed in the western region. Landfills in the western region report processing a total of 203,000 tons of C&D for recycling.
- A total of 74,700 tons of biosolids were disposed of at western regional landfills.
- A total of 144,600 tons of Class 2 and 3 wastes were disposed in the Region. A majority of this, 135,000 tons, went to the Turkey Creek Landfill. Overall, the NCTCOG region has approximately 32 years of remaining capacity at the current rates of disposal. However, with anticipated growth in both population and economic activity, this projected number is likely an overestimate of actual remaining capacity.

Table 4-5 Historic Trends in Annual Tons Disposed by Landfill/ Year								
	2005	**2010**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
City of Arlington	448,247	917,823	806,546	971,615	999,203	997,520	990,495	910,524
City of Cleburne	1,728	1,404	428	704	717	729	676	575
City of Fort Worth	295,306	319,001	529,776	637,034	636,783	557,081	713,764	801,185
Progressive Weatherford	194,125	188,652	200,857	192,385	207,090	198,594	173,901	189,659
Progressive Turkey Creek	625,461	279,982	484,321	528,994	537,956	681,692	557,783	564,091
Westside Landfill	587,447							
Total MSW Disposal	**2,152,314**	**1,706,862**	**2,021,928**	**2,330,732**	**2,381,749**	**2,435,616**	**2,436,619**	**2,466,034**
City of Stephenville	4,888	1,821	4,707	16,368	18,472	17,635	12,476	13,329
Fort Worth C&D	253,984	381,043	356,826	380,512	368,465	367,447	308,298	337,973
Total C&D	**258,872**	**382,864**	**361,533**	**396,880**	**386,937**	**385,082**	**320,774**	**351,302**
Total Waste	**2,411,186**	**2,089,726**	**2,383,461**	**2,727,612**	**2,768,686**	**2,820,698**	**2,757,393**	**2,817,336**
NCTCOG Total Waste	**8,854,867**	**8,020,289**	**9,238,905**	**9,626,620**	**10,590,049**	**10,694,433**	**10,605,564**	**10,904,643**
Western Region % of Total NCTCOG	**27%**	**26%**	**26%**	**28%**	**26%**	**26%**	**26%**	**26%**

Source: TCEQ Annual Landfill Reports and TCEQ Annual MSW Summary Reports

Table 4-6 – Type I Landfill Ownership & Capacity							
Landfill	**Owner**	**Operators**	**Permitted Acres**	**Fill Acres**	**Remaining Capacity (million tons)**	**Years Remaining***	**Amendment Pending (million tons/capacity)**
City of Arlington	City of Arlington	Republic Services	774	391	38.3	42	No
City of Cleburne	City of Cleburne	City of Cleburne	84.7	24.7	7.7	13	No
City of Fort Worth	City of Fort Worth	Republic Services	300.0	128.6	14.9	18	No
Turkey Creek Landfill	Waste Connections	Progressive Waste	219.0	69.0	4.8	7	Yes, would add 3.6 million tons of capacity
Weatherford Landfill	Progressive Waste	Progressive Waste	112.0	35.0	0.4	1.5	No
Total Western Region			**1,490.0**	**668.0**	**58.5**	**24**	**3.6**
Total NCTCOG Region (includes Western Region)			**6,804.0**	**2,399.0**	**405.4**	**38**	**N/A**
Western % of NCTCOG Region			**22%**	**28%**	**14%**		

Source: TCEQ Annual Landfill Reports (2019) * Assumes TCEQ method of assuming no increase in waste disposal quantities in future years.

Table 4-7 – Type IV Landfill Ownership & Capacity							
Landfill	**Owner**	**Operators**	**Permitted Acres**	**Fill Acres**	**Remaining capacity**	**Years Remaining***	**Amendment Pending (million tons)**
City of Stephenville Landfill	City of Stephenville	City of Stephenville	15.0	N/A	0.5	27	No
Fort Worth C&D Landfill	Progressive Waste	Progressive Waste	152.0	74.0	4.6	16	Yes, would add 3.0 million tons
Total			**167.0**	**74.0**	**5.1**	**14**	**3.0**
Total NCTCOG Region (includes Western Region)			**504.0**	**241.0**	**25.0**	**69**	
Western % of NCTCOG Region			33%	**31%**	**20%**		
Source: TCEQ Annual Landfill Reports (2019) ****Assumes TCEQ method of assuming no increase in waste disposal quantities in future years.***							

Table 4-8 – Total Type I and IV Landfill Ownership & Capacity					
Landfill	**Permitted Acres**	**Fill Acres**	**Remaining capacity**	**Years Remaining***	**Amendment Pending (million tons)**
Type I Landfills	1,490.0	668.0	58.5	24	4.2
Type IV Landfills	167.0	74.0	5.1	14	3.0
Total	**1,657.0**	**752.0**	**63.6**	**23**	**7.2**
Total NCTCOG Region (includes Western Region)	**7,308.0**	**2,640.0**	**430.4**	**39**	**N/A**
Western % of NCTCOG Region	**23%**	**28%**	**14%**		
Source: TCEQ Annual Landfill Reports (2019) ****Assumes TCEQ method of assuming no increase in waste disposal quantities in future years.***					

Table 4-9 Materials Disposed in Western Region Landfills, by Type								
Waste Type	**Arlington**	**Cleburne**	**Fort Worth**	**Weatherford**	**Turkey Creek**	**Fort Worth C&D**	**Stephenville**	**Total**
	tons	tons	tons	tons	tons	tons	tons	tons
MSW	786,287	-	617,648	141,025	411,013	-	-	1,955,973
Brush	-	-	-	1,779	-	-	-	1,779
C&D	37,756	-	130,589	13,674	1,120	337,973	13,329	534,441
Tires	3	-	30,717	-	-	-	-	30,720
Contaminated Soil	41,138	-	8,809	-	1,432	-	-	51,379
Medical Waste	-	-	915	-	-	-	-	915
Dead Animals	12	-	481	39	61	-	-	593
RACM	-	-	-	-	207	-	-	207
Non-RACM	26	-	583	-	-	-	-	609
Sludge	20,800	575	6,471	31,674	15,249	-	-	74,769
Grit trap	1,634	-	-	-	-	-	-	1,634
Class 2 & 3	3,108	-	4,972	1,468	135,009	-	-	144,557
Other	19,760	-	-	-	-	-	-	19,760
Total Tons	910,524	575	801,185	189,659	564,091	337,973	13,329	2,817,336
Source: TCEQ Annual Landfill Reports (2019)								

‘

Non-Western Region Landfill Capacity

- Because waste is currently being exported to landfills located outside the western region, the status of landfills located throughout the NCTCOG region is important to understand when considering both needs and resources. Outside of the western region, there is one C&D landfill and thirteen MSW landfills. For the purposes of this analysis, the eastern region of the NCTCOG region has been divided into four distinct geographic sub-regions. This allows local officials in the western region to better understand the available capacity closest to their jurisdictions. For example, the Denton / Lewisville subregion's capacity is more accessible to Wise and Palo Pinto counties, while Johnson and Somervell are closer to the Dallas and Corsicana subregions. Figure 4-5 presents a breakdown of capacity for the NCTCOG Region by sub-region. Figure 4-6 shows waste generation totals for these same sub-regions.

Figure 4-5
Disposal Capacity in Five Regions
% of total
Source: TCEQ Annual Landfill Reports

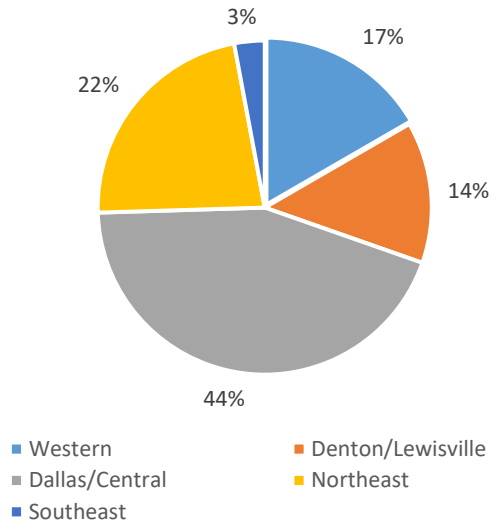
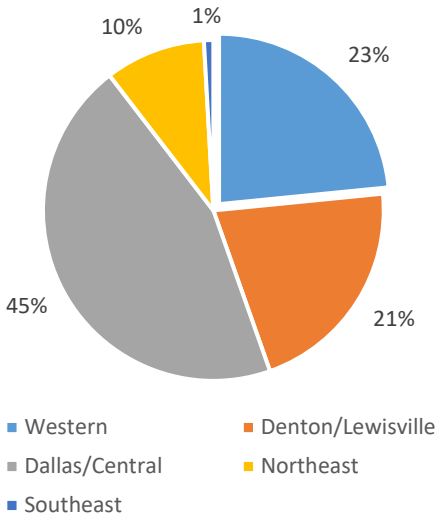


Figure 4-6
Disposal Quantities by Region
% of total
Source: TCEQ Annual Landfill Reports



The total capacity for the NCTCOG region in 2019 was 381.9 million tons. The western region's capacity of 63.2 million tons is approximately 17% of the total. The western region's disposal quantities of 2.8 million tons is equal to 23% of the NCTCOG total disposal quantities.

The City of Denton is in the process of securing a permit amendment. This amendment will increase capacity by approximately 28.5 million tons. The City of Garland is also on the path to expand their current landfill, but it is too early in the process to know what additional capacity will be secured. The Maloy landfill in Hunt County is in the process of securing a permit amendment that will add 30 million cubic yards (approximately 16 million tons) of capacity to the NCTCOG region.

Observations

- The DFW Landfill has an estimated remaining capacity of 2 years. This has significant potential impacts on the NCTCOG Region. This facility accepted approximately 1.5 million tons in 2019, or 12.5% of the NCTCOG region's total disposal quantities. Once this facility closes, the 1.5 million tons will have to be disposed at one of the remaining landfills, impacting the capacity of those landfill(s).
- The Denton/Lewisville sub-region has an estimated capacity of 21 years. Two factors will impact this capacity - the closure of the DFW Landfill and the expansion of the Denton Landfill.
- The Dallas Central sub-region has approximately 31 years of remaining capacity. This subregion accounts for 44% of disposal capacity and 45% of tons disposed in the NCTCOG region. The McCommas Bluff landfill accepts 2.9 million tons per year, the most in the region, and equivalent to the entire waste generation of the Western Region.
- While the Northeast subregion shows over 80 years of remaining capacity, it is also one of the fastest growing parts of the overall region and population growth will likely reduce this capacity significantly. It is also a region that will likely manage some of the waste requiring disposal due to the DFW Landfill closure.
- Finally, the Southeast subregion has just the Corsicana Landfill. This facility disposed of 106,000 tons in 2019 and has over 100 years if this disposal rate remains constant.
- The availability of current and future transfer stations may influence disposal capacity across the NCTCOG Region. As certain landfills close, either in or outside the western region, transfer stations can allow for waste to be hauled to markets which have longer term capacity.

Table 4-10 Summary of NCTCOG Area Landfills Outside Western Region				
Subregion / Landfills	**Type**	**Available Capacity (tons)**	**Annual Throughput in 2019**	**Years of Remaining Capacity**
Denton / Lewisville Subregion				
City of Denton*	I	4,492,631	292,186	15
DFW Recycling and Disposal Facility	I	4,728,267	1,559,494	3
Camelot Landfill	I	26,138,816	681,777	38
Lewisville Landfill	IV	16,995,032	12,981	62
Total Denton / Lewisville Subregion		**52,354,746**	**2,546,438**	**21**
With amendment approved				
Dallas Area Subregion				
City of Dallas	I	61,575,807	2,984,439	36
Garland**	I	16,165,663	576,799	28
Grand Prairie	I	8,870,462	246,384	34
Irving	I	6,731,881	206,447	32
CSC Disposal	I	17,184,969	15	100
Ellis County Disposal	I	28,084,233	165,214	170
Skyline Landfill	I	29,984,439	1,227,393	23
Total Dallas Area Subregion		**168,597,454**	**5,406,691**	**31**
NE Subregion				
121 Regional	I	83,567,370	1,009,200	83
Maloy Landfill*	I	2,522,435	138,983	18
NE Total		**86,089,805**	**1,148,183**	**75**
SE Region				
Corsicana Landfill	I	11,232,718	106,487	105
SE Region Total		**11,232,718**	**106,487**	**105**
Total Outside Western Region		**318,274,723**	**9,207,799**	**35**
Total Western Region		**63,621,345**	**2,817,336**	**23**
Total NCTCOG		**381,896,068**	**12,025,135**	**32**

Source: TCEQ Annual Landfill Reports (2019)
**** references permit amendment pending***
***** planning an expansion***

5.0 Waste Management Practices

Managing waste in the western region is a complex system that is designed to collect, transport and properly process recyclables and dispose of MSW.

The Texas Health and Safety Code requires local governments to assure proper collection and disposal of MSW. Cities and counties sponsor programs to reduce waste, encourage recycling and promote proper adherence to local ordinances. A summary of programs and services include the following.

- Public information programs focused on waste reduction and proper recycling, and management of MSW.
- Implementation of policies to reduce waste and encourage recycling.
- Collection of MSW, bulky waste, brush and recyclable materials.
- Ownership and operation of facilities including drop-off collection centers, material recovery facilities, compost & mulching facilities, transfer stations and landfills.
- Clean-up of illegal dump sites, homeless encampments and illegal waste tire disposal sites.
- Contract management for waste management services including MSW and recyclable material collection and facility management.

Why is this important?

One of the key objectives of the Technical Report is to identify common links between communities that lend themselves to a regional approach to solid waste management. Understanding current programs is the first step in this process.

Understanding the status of private sector collection contracts is also key. Collection contracts can have a significant impact on a community's ability to control the flow of where waste is to be directed.

Flow control is critical to any project that requires significant capital. Flow control guarantees the cash flow to pay for debt service and operating costs.

One of the objectives of the Needs Assessment is to identify opportunities for local governments to establish regional or cooperative programs. Achieving this objective has the potential to increase program efficiency and reduce costs. A starting point in this process is to understand current programs and services provided by local governments.

The Project Team issued a Western Region Local Government Survey ("Survey") as part of the Needs Assessment. A copy of the Survey, as well as survey results, are included in Appendix C. The Survey was issued to all counties and cities in the western region. The City of Denton was also included in the survey to identify potential opportunities for collaboration. A total of 38 cities and counties responded to the Survey. The Survey requested information regarding current programs, planned programs and the results of recycling efforts. In addition to results of the survey, the Project Team also reviewed municipal solid waste department websites to complete the analysis.

This section provides the following information:

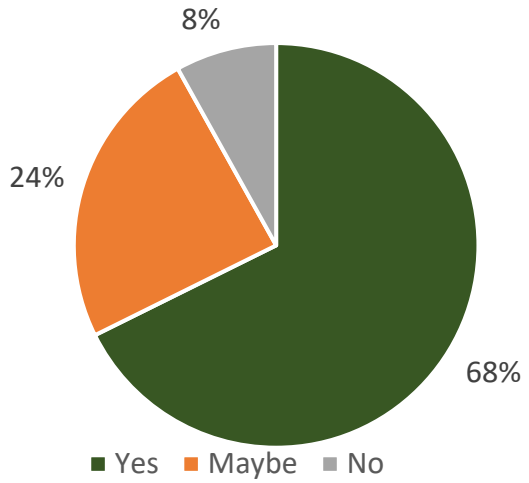
- Inventory programs that are sponsored by local governments
- Collection services provided and the service provider, including which local governments are considering changes to their collection or recycling programs
- Facility ownership and possible facility start-ups or changes

Public Information Programs

The majority of local governments in the western region have some form of public information program related to MSW and recyclables. Universally, local governments provide information on waste management options and recycling opportunities on their websites.

Feedback from the Survey found that a majority of respondents (72%) are interested in regional public information programs; 24% said they might be and only three respondents indicated no interest in regional public information programs.

Figure 5-1
Respondents' Interest in Regional Public Information Programs
Source: *Local Government Survey. 26 respondents*



Waste Collection

The majority of both residential and commercial/institutional MSW is collected by private firms. Table 5-1 lists the service provider for cities with a population over 5,000. With very few exceptions, local governments negotiate contracts for the collection and proper processing of recyclable materials or disposal of waste. These contracts will have a significant impact on the ability to move towards a regional waste management program. Some of the issues that will have to be addressed specifically include variances in levels of service, the timing of when contracts expire and control over management of the contracts.

It is critically important to understand the current status of collection contracts and the potential impacts these contracts will have on the ability of local governments to make significant changes in methods of collection.

In general, the contracts typically address the following issues:

- Level of service provided, including frequency of collection for various types of waste and materials, including MSW, brush, junk or bulky waste, and recyclable materials
- Assurance of proper processing and disposal
- Definition of unacceptable waste and how these materials are to be managed
- Management of waste during extraordinary events such as significant weather events
- Fees for services
- Term of the agreement and renewal provisions
- Communications and customer interface
- Where the waste has to be delivered for either disposal or processing

Maintaining control over the flow of waste is a critical issue related to future regional strategies and will be discussed in greater detail in the Alternatives Assessment Report. Generally, assuring the flow of waste to a specific facility allows local governments to charge for services to pay the debt and

operating costs associated with the construction of and operations of facilities such as transfer stations, material recovery facilities or landfills. Local governments interested in a long-term regional approach must evaluate their contracts and establish a degree of control over the flow of waste in the future.

Table 5-1 Municipal Contract Provider

County	City	Population	Contract Provider	Term
Tarrant	Azle	12,670	Community Waste Disposal	N/A
Tarrant	Colleyville	25,370	Community Waste Disposal	2022
Tarrant	Keller	45,090	Community Waste Disposal	2025
Somervell	Glen Rose	2,560	Knox Waste Services	2023
Johnson	Cleburne	30,770	Municipal	City provider
Parker	Weatherford	28,090	Municipal	City provider
Wise	Bridgeport	6,170	Progressive	N/A
Johnson	Keene	6,310	Republic	N/A
Tarrant	Arlington	386,180	Republic	2022
Tarrant	Bedford	48,810	Republic	N/A
Tarrant	Benbrook	22,920	Republic	2021
Tarrant	Dalworthington Gardens	2,259	Republic	2023
Tarrant	Euless	56,160	Republic	2023
Tarrant	Grapevine	51,370	Republic	2022
Tarrant	Hurst	38,510	Republic	2023
Tarrant	Mansfield	68,520	Republic	2023
Tarrant	North Richland Hills	67,980	Republic	2021
Tarrant	Richland Hills	7,920	Republic	2023
Tarrant	Southlake	30,010	Republic	NA
Erath	Stephenville	22,660	Waste Connections	2023
Hood	Granbury	9,790	Waste Connections	2024
Johnson	Burleson	45,620	Waste Connections	NA
Johnson	Joshua	6,930	Waste Connections	2024
Palo Pinto	Mineral Wells	16,780	Waste Connections	NA
Tarrant	Crowley	15,540	Waste Connections	NA
aaaaTarrant	Everman	6,090	Waste Connections	NA
Tarrant	Forest Hill	12,950	Waste Connections	NA
Tarrant	Haltom City	42,730	Waste Connections	NA
Tarrant	Kennedale	7,650	Waste Connections	NA
Tarrant	Saginaw	22,380	Waste Connections	NA
Tarrant	Watauga	23,770	Waste Connections	2022
Tarrant	White Settlement	17,600	Waste Connections	NA

Tarrant	River Oaks	8,290	Waste Connections	NA
Wise	Decatur	7,190	Waste Connections	NA
Tarrant	Fort Worth	848,860	Waste Management	2023
NA – Not available				

Only 3% of the region's population is served by cities providing collection services by city crews. Cities providing municipal collection include Weatherford and Cleburne. The remaining cities have private collection service. Based on population of the cities getting service, Waste Management and Republic collect a combined 78% of the total number of households. Waste Connections, Community Waste Disposal and Knox provide 17%.

Survey Findings

20% of respondents to the survey plan to modify their collection program and **52%** are considering modifications.

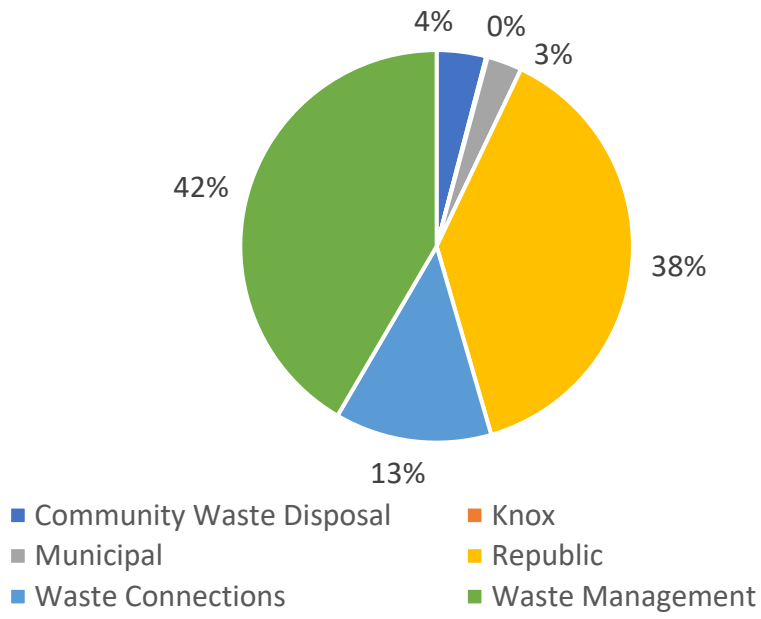
84% of cities would consider a regional approach to curbside collection of waste. **40%** said yes and **44%** said maybe.

Table 5-2 Service Provider Summary

Service Provider	Population	% of Population
Community Waste Disposal	83,130	4%
Knox Waste Service	2,560	<1%
Municipal	58,860	3%
Republic	784,690	36%
Waste Management	848,860	42%
Waste Connections	257,680	13%
Total	**2,035,780**	**100%**

Source: Based on NCTCOG Population data 2019 and Survey responses and City website data

Figure 5.2
Service Providers Percent of Regional Population



Municipal Recycling Programs

Table 5-3 provides a summary of source reduction and recycling programs sponsored by local governments in the Region. The sources for these data are the local government survey and city websites. Materials typically collected as part of recycling programs include metals (steel and aluminum), glass, paper, and various plastic resins. Materials collected from residential recycling programs are taken to one of the regional material recovery facilities for processing and then transported to markets.

Survey Findings:

66% rank recycling markets as either mid/high or high as a major long-term concern

36% of cities are planning to enhance recycling collection; 44% might do so

5 cities may add drop-offs for recyclable materials

1 city is considering building a material recovery facility

1 community has no recycling program at all

11 cities are providing electronic recycling services

Municipal Organics Programs

Organics include yard waste, brush and tree waste. Other organics that are often collected include food wastes and biosolids (sludge). While some organic materials are taken to one of the region's mulching or composting operations, a significant amount of the organics that are recycled in the region are processed at landfills. Table 5-4 presents data collected from the local government survey and local government web sites.

Table 5-3 Public Information and Recycling Programs						
County	City	Public Information	Curbside each week	Drop-off Recycling	Non-Residential Programs	Tons/ year collected
Denton	Denton	X	X	X	X	6,549
Erath	N/A			X		
Erath	Stephenville			X		
Hood	De Cordova					
Hood	Granbury x2		X		X	16565
Hood	N/A			X		2,810
Johnson	Burleson	X	X			1,868
Johnson	Cleburne x2			X		101
Johnson	Joshua		X			
Johnson	Keene					
Palo Pinto	Mineral Wells			X	X	
Parker	Annetta N		X			
Parker	Annetta S x2		X		X	
Parker	Weatherford		X		X	393
Somervell	Glen Rose					
Somervell	N/A			X		
Tarrant	Arlington	X	X	X	X	147,527
Tarrant	Azle		X	X	X	650
Tarrant	Bedford	X	X			
Tarrant	Benbrook		X			2181
Tarrant	Colleyville		X			2789
Tarrant	Crowley		X			
Tarrant	Dalworthington Gardens		X		X	
Tarrant	Euless		X		X	1,183
Tarrant	Everman	X	X			
Tarrant	Forest Hill	X				
Tarrant	Fort Worth x2		X	X	X	57,417
Tarrant	Grapevine	X	X	X	X	6,005
Tarrant	Haltom City		X			
Tarrant	Haslet		X			
Tarrant	Hurst		X		X	2,500
Tarrant	Keller	X	X		X	4,119
Tarrant	Kennedale	X	X		X	
Tarrant	Mansfield		X	X		4,044
Tarrant	N/A	X		X		

Tarrant	North Richland Hills		X		X	3,659
Tarrant	Richland Hills		X			
Tarrant	Saginaw	X	X			
Tarrant	Southlake		X			
Tarrant	Trophy Club		X			
Tarrant	Watauga		X		X	1015
Tarrant	Westworth Village		X			
Tarrant	White Settlement			X		
WIse	Aurora		X			
Wise	Bridgeport		X			
Wise	Decatur		X			
Wise	N/A			X		25-30
Wise	New Fairview					

Table 5-4 Yard Waste & Brush Collection

County	City	Separate yard waste collection	Brush & Tree Waste collection	Tons/year collected
Denton	Denton	X	X	6700
Erath	Stephenville		X	-285
Erath County				285
Hood			X	
Johnson	Burleson		X	
Johnson	Cleburne		X	5,296
Johnson	Joshua		X	
Johnson	Keene		X	
Palo Pinto	Mineral Wells	X		
Parker	Weatherford		X	6000
Parker			X	
Somervell	Glen Rose			
Somervell			X	
Tarrant	Arlington			
Tarrant	Azle	X	X	
Tarrant	Bedford	X	X	
Tarrant	Benbrook	X	X	
Tarrant	Colleyville	X	X	116
Tarrant	Crowley	X	X	
Tarrant	Fort Worth	X	X	26,960
Tarrant	Grapevine	X	X	1,336
Tarrant	Haltom City		X	
Tarrant	Haslet		X	
Tarrant	Hurst			

Tarrant	Keller	X		938
Tarrant	Kennedale		X	
Tarrant	Saginaw		X	
Tarrant	Southlake	X		
Tarrant	Trophy Club		X	
Tarrant	Watauga	X	X	592
Tarrant	Westworth Village		X	
Tarrant	White Settlement		X	
Wise	Aurora	X	X	
Wise	Bridgeport		X	
Wise	Decatur	X	X	
Source: Western Region Local Government Survey and City Websites				

Survey Findings

4 cities are considering the construction of a compost facility

2 cities currently have a compost operation

20 cities would consider a regional yard waste collection program

15 cities would consider a regional food waste collection program

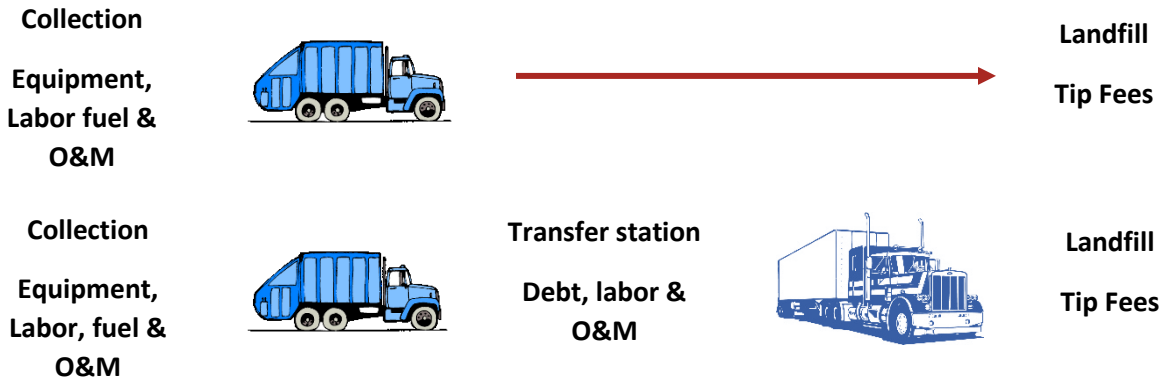
The Fort Worth Environmental Collection Center is a great example of a cooperative regional facility that is owned and operated by the City of Fort Worth. There are several municipalities that participate in this program to properly dispose of HHW. Cities that currently participate in the program include the following.

Arlington
Azle
Bedford
Benbrook
Burleson
Colleyville
Euless
Fort Worth
Grand Prairie
Grapevine
Justin
Kennedale
Midlothian
Roanoke
Southlake
Westlake
White Settlement

6.0 Haul Analysis

As the number of facilities decrease, the cost of hauling waste longer distances will increase. One of the ways to reduce transportation costs is to build and operate transfer stations. Transfer stations are facilities that are designed to transfer waste from smaller collection vehicles to larger, more efficient transfer vehicles. This haul analysis presents preliminary cost estimates for hauling waste from various generation locations to final disposal sites using both direct haul and transfer haul options. The analysis also takes into consideration facility construction and operation and maintenance (O&M) costs. Transfer stations are being considered by both public and private firms as a means of reducing costs. Figure 6-1 illustrates the haul model that is evaluated in this section.

Figure 6-1 – Direct Haul and Transfer Haul Models



To compare direct haul versus transfer haul, the Project Team evaluated the cost of hauling waste directly from the point where the collection vehicle is full (waste generation centroid) to a disposal site. These costs are compared to the use of a transfer station. For the transfer station scenario, a full collection vehicle drives to the transfer station; the waste is dumped at the transfer station and then hauled in full transfer vehicles to a landfill.

The following provides definitions and assumptions that are used in the haul analysis.

Waste generation centroids. A "waste generation centroid" is the presumed starting point of the haul cost comparison. It assumes that the collection vehicle is full and ready to either take the waste to a transfer station or a landfill. For comparative purposes, the waste generation centroid is assumed to be the center of the cities being evaluated.

Transport method. The analysis examines the cost of hauling waste from the centroid to a disposal site using either a direct haul in a typical garbage truck (average 6 tons of capacity) or a transfer haul where the typical garbage truck will transfer the material which will be consolidated to a long-haul truck with a 20-ton capacity to go to the disposal site.

Haul distance and time. The Project Team used Google Maps to determine travel times and distances. It is understood that haul times will vary considerably depending on time of day and level of traffic congestion caused by high traffic volumes or accidents. To the extent practical, the departure time selected will be approximately 3:00 pm. This is determined as a time that is approximate to the end of a day's route and near rush hour times.

Direct Haul Costs. Direct haul costs are the costs of hauling waste from the point the collection vehicle reaches capacity to the disposal site or transfer station site. Direct haul costs include depreciation on the collection vehicle, fuel, operation and maintenance, and labor. An assumed per-mile cost includes depreciation, and operation and maintenance. Labor rates, including overhead costs, are used to calculate time costs.

An advantage of transfer stations is that fewer collection trucks are required because the time saved hauling waste to a landfill can be used to collect waste on residential routes.

Local firms collecting waste in the Region rely on a variety of different types of trucks and collection methods, including automatic slide loader vehicles for collecting carts and rear loader trucks that collect waste in communities that rely on bag collection. Factors that can affect haul costs include the following:

- Type of truck used and truck capital costs
- Number of crew on a collection vehicle
- Age of the truck, affecting maintenance costs
- Diesel fuel prices
- Traffic conditions

Table 6-1 presents estimated direct haul costs for three scenarios based on distances travelled. Data on truck costs are derived from City of Houston fleet department records for their solid waste fleet. Hourly wages are based on local labor market data.

Table 6-1 Direct Haul Cost

	Round Trip Distance (miles)	Truck costs ($/mile) (2)	Time (minutes) (1)	Rate ($/hour) (3)	Total Cost per trip (4)	$/ton (5)
Scenario 1	20	$ 4.44	80	$26.61	$124	$21
Scenario 2	40	$ 4.44	100	$26.61	$221	$37
Scenario 3	60	$ 4.44	140	$26.61	$328	$54

(1)
(2) Includes queue and turn-around time at transfer station or landfill
(3) Includes truck depreciation, maintenance and fuel
(4) Includes base rate and 35% overhead – *base salary of $41,000. Only one driver for automated collection vehicle. Costs increase substantially if two or three crews per truck.*
(5) (Distance * truck costs)+(time * rate) / 6 tons per load
(6) Assumes 6 tons per truck load

Transfer Station. The flow of waste under a transfer station scenario is: 1) once a collection vehicle reaches capacity, it hauls waste an estimated average of 10 miles to a transfer station; 2) it is dumped at the transfer station; 3) from the transfer station it is hauled to the landfill.

Figure 6-2 illustrates the general layout for a transfer station using the North Texas Municipal Water District's ("NTMWD) Custer Road Transfer Station as an example. The entire site is approximately 17 acres in size. The Custer Road Transfer Station includes a site entrance with scale facility, transfer building, citizen convenience drop-offs, brush storage and chipping area, compost/mulch sales area and a facility exit. There is also a separate entrance for transfer vehicles. In 2019, the facility processed a total of 314,340 tons of waste. It also diverted

46,723 tons of brush and 14 tons of used oil. The site is also landscaped to reduce site visibility as it is located in a predominantly residential area. The NTMWD also owns the Lookout Transfer Station in Richardson. This recently constructed facility has a maximum throughput capacity of 1,500 tons per day. The total capital costs for this facility, including engineering and permitting, was $16 million.

Figure 6-2 Custer Road Transfer Station
Aerial Source: *DFWMaps; NCTCOG*

Transfer station costs. Transfer station costs **vary considerably** depending on the size of the facility and operation and maintenance costs. The facility can vary in design and for this analysis, a basic direct dump design is assumed (refer to Figure 6-1). As can be seen in Table 6-2, there are significant economies of scale associated with transfer station construction, and operation and maintenance costs. Annual throughput capacity is based on 310 operating days per year. Debt service and operating costs are included in the analysis which assume a 20-year term at 3%.

Table 6-3 presents data for comparing the costs of transfer stations options for a 250 tpd facility and a 1000 tpd facility. The table shows the cost benefits associated with a larger facility. The range of costs for a 250 tpd transfer haul distance of 20 to 40 miles range from $33.36 per ton to 38.87 per ton; the cost range for a 1000 tpd facility is $27.30 to $33.81 per ton.

Table 6-2 T*ypical* Transfer Station Costs (Budgetary Cost Estimates (+/-20%)				
Size of Facility (tons per day)	100	250	500	1,000
Annual Throughput Capacity	31,000	77,500	155,000	310,000
Capital Costs	$2,000,000	$4,000,000	$7,000,000	$12,000,000
Annual Debt Service	$134,431	$268,863	$470,510	$806,588
Operating Costs	$500,000	$700,000	$1,000,000	$1,500,000
Total Annual Costs	$634,431	$968,863	$1,470,510	$2,306,588
Costs per ton	$20.47	$12.50	$9.49	$7.44

Table 6-3 – Transfer Station Cost Comparison									
	Haul cost to Transfer Station ($/ton) (1)	Transfer Distance to Landfill (2)	Transfer Truck Haul Costs per mile (3)	Time (4)	Cost /hour (5)	Personnel Costs (6)	Transfer Station Cost/Ton (7)	Cost/ton to transport	Cost/ton Direct Haul costs
250 Ton / Day Transfer Station									
Scenario 1	$15.89	20	$2.46	68	$26.61	$30.16	12.50	$33	$21
Scenario 2	$15.89	40	$2.46	100	$26.61	$44.35	12.50	$35	$37
Scenario 3	$15.89	60	$2.46	140	$26.61	$62.09	12.50	$38	$54
1000 Ton / Day Transfer Station									
Scenario 1	$15.89	20	$2.46	68	$26.61	$30.16	7.44	$27	$21
Scenario 2	$15.89	40	$2.46	100	$26.61	$44.35	7.44	$30	$37
Scenario 3	$15.89	60	$2.46	140	$26.61	$62.09	7.44	$33	$54

(1) Cost of hauling waste from collection route to transfer station. Assumes one driver.
(2) One-way distance from transfer station to landfill
(3) Cost / mile
(4) Round trip time that includes queue and turn-around time at the landfill
(5) Driver costs per hour
(6) Transfer Station costs include debt service, operation and maintenance
(7) Capital and operating costs

Landfills. Transfer stations do offer the opportunity for communities to better "shop" the landfill used for disposal. If there are significant differences in landfill tipping fees, it may be advantageous to use a landfill that is actually farther distance from the centroid.

Tipping fees are reported to the TCEQ as part of the annual reporting requirements for landfill owners. It should be noted that these are "reported" rates and do not necessarily reflect tipping fees that can be negotiated between a landfill owner and a user. Table 6-4 lists reported tipping fees for the NCTCOG Region.

Table 6-4 Posted Landfill Tipping Fees	
Type I Landfill	**Posted Tipping Fees**
Western Region	
Arlington	$30.11
Cleburne	N/A
Fort Worth	$28.24
Turkey Creek	$32.00
Weatherford	$53.00
Others in NCTCOG Region	
Denton / Lewisville Subregion Range	$22.79 - $44.00
Dallas Central Subregion Range	$22.00 - $40.00
NE Subregion Range	$31.17 - $34.00
SE Subregion Range	N/A
Source: TCEQ Annual Landfill Reports (2019)	

Comparative Analysis

Figure 6-3 presents the cost for a typical transfer station operating at 250 tons per day. Figure 6-4 presents cost for transfer stations for a 1000 tons-per-day transfer station. Figure 6-3 shows that for smaller sized facilities, the break-even point for a transfer station is distances around 40 miles from the point where collection vehicles have to haul waste once filled. The longer the distance, the more cost-effective the transfer station option is for the owner. For a 1000 ton per day facility, (Figure 6-4) the break-even point is between 25-30 miles from the point of collection to the landfill. This demonstrates that there are definite economies of scale associated with these operations. It should also be noted that for larger facilities, the likelihood is that they are located in larger urban areas, and thereby subject to more congested traffic conditions.

Figure 6-3
Small Scale Transfer Station
(250 tpd or less)

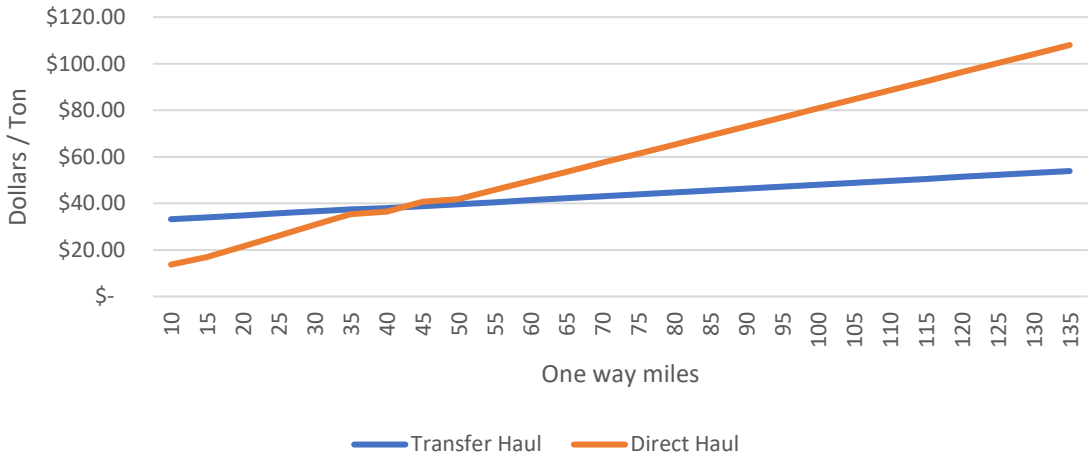


Figure 6-4
Large scale transfer station
500-1500 ton per day

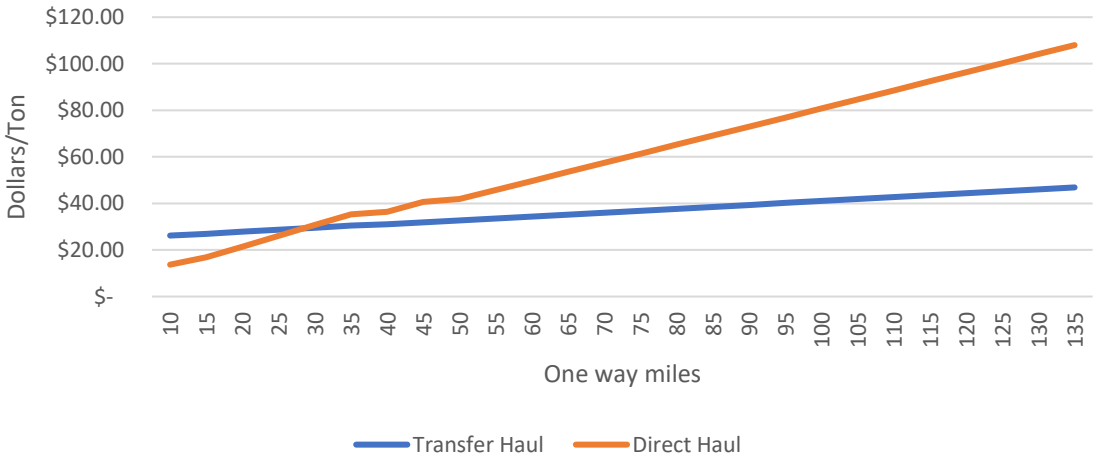


Table 6-5 One-way Distances from Centroids to Western Region Type I Landfills							
County	**City**	**Reported Residential Landfill**	**Arlington**	**Fort Worth**	**Weatherford**	**Turkey Creek**	**Shortest Distance**
Erath	Stephenville	Turkey Creek	96	88	48	71	48
Hood	Granbury	Weatherford	61	41	26	43	26
Johnson	Burleson	Fort Worth	30	13	44	15	13
Johnson	Cleburne	Turkey Creek	49	35	42	13	13
Johnson	Joshua	Turkey Creek	42	28	39	17	17
Johnson	Keene		40	26	46	11	11
Palo Pinto	Mineral Wells		70	56	21	75	21
Parker	Weatherford	Weatherford	48	34	5	53	5
Somervell	Glen Rose		71	57	43	41	41
Tarrant	Arlington	Arlington	6	13	47	40	6
Tarrant	Azle		33	34	26	53	26
Tarrant	Bedford		5	17	47	43	5
Tarrant	Benbrook	Fort Worth	34	14	27	33	14
Tarrant	Colleyville	Arlington	9	20	48	46	9
Tarrant	Crowley		29	13	39	20	13

Table 6-5 (cont.) One-way Distances from Centroids to Western Region Type I Landfills							
Landfills	City	Reported Residential Landfill	Arlington	Fort Worth	Weatherford	Turkey Creek	Shortest Distance
Tarrant	Euless	Arlington	3	24	51	47	3
Tarrant	Everman		21	5	38	23	5
Tarrant	Forest Hill		18	2	37	27	2
Tarrant	Fort Worth	Fort Worth	15	11	33	31	11
Tarrant	Grapevine	Arlington	12	26	56	52	12
Tarrant	Haltom City	N/A	11	16	39	35	11
Tarrant	Hurst	Arlington	5	15	47	41	5
Tarrant	Keller	Arlington	31	22	48	48	22
Tarrant	Kennedale		18	2	40	30	2
Tarrant	Mansfield	Fort Worth	22	14	51	20	14
Tarrant	North Richland Hills	Arlington	10	15	42	41	10
Tarrant	Richland Hills		8	13	41	37	8
Tarrant	River Oaks		23	16	30	35	16
Tarrant	Saginaw		20	22	35	41	20
Tarrant	Southlake		15	29	59	55	15
Tarrant	Watauga	Turkey Creek	13	18	42	40	13
Tarrant	White Settlement		28	20	26	39	20
Wise	Bridgeport		59	61	40	80	40
Wise	Decatur	Waste Solutions (Bowie)	49	50	42	70	42

Table 6-5 Footnotes

- Responses from the Survey related to the landfill that is used by the local government for residential waste disposal [This does not necessarily represent where waste from the commercial sector is disposed. Most cities in the Region allow an open market for the collection of waste from businesses and institutions. Waste haulers will use a number of factors in determining where waste is to be disposed, including proximity to the point of collection, and affiliation with an existing landfill (a Republic hauler is more likely to use a landfill operated by Republic than a landfill owned by Waste Management or Progressive), and tipping fees charged.]
- One-way distances from the waste generation centroid to the landfill [Google Maps data were used for determining distances.]
- The shortest distance from the waste generation centroid to a landfill was identified. However, as can be seen in the table, a city's waste is not always delivered to the closest landfill. Reasons for this are the same as the reasons that haulers do not necessarily haul commercial waste to the closest landfill.
- The Weatherford Landfill has approximately 1-2 years of remaining capacity. A number of cities in the Region rely on that facility for waste disposal. When that facility reaches capacity and there is no Weatherford Transfer Station (it is permitted but not constructed) available, the table identifies the distance that waste will have to be hauled.
- The Turkey Creek Landfill has limited capacity as well. It is in the process of securing a landfill permit amendment but, even that will only provide short-term additional capacity. If that facility were to close, additional cities will have longer haul distances.

Waste Sheds

The expansive nature of the western region requires that subregions be established to better define manageable "waste sheds." These waste sheds help determine the size and potential location of future waste management facilities. The Project Team has examined the data regarding waste generation, current waste flows, political and geographic boundaries. To an extent, the waste sheds also take into consideration current contracts for waste management. The proposed waste sheds, as well as the tonnages generated in these waste sheds are in Tables 6-6 and 6-7.

Table 6-6 - Waste Generation by Waste Shed

Waste Shed	Tons / Year	Tons / Day
Erath / Stephenville	49,997	160
Hood / Somervell	70,277	230
Johnson County (minus Burleson)	115,224	370
Palo Pinto / Mineral Wells	32,656	105
Parker / Weatherford	120,966	390
Tarrant NE / Arlington	1,230,795	3,970
Tarrant SW &NW / Fort Worth	1,347,640	4,347
Wise / Decatur	64,977	210
Total	3,032,532	9,780
Source: ***Refer to Waste Generation Table 3-4***		

Table 6-7 – Solid Waste Facilities by Waste Shed and Haul distances

Waste Shed Descriptions	Type I Landfill #	Type IV Landfill #	Transfer Station #	Primary Landfill	Estimated Haul Distance to Disposal (one-way miles)
Erath / Stephenville	0	1	0	Turkey Creek	71
Hood / Somervell	0	0	0	Weatherford	26 / 43(1)
Johnson County (minus Burleson)	2(2)	0	1	Turkey Creek	13
Palo Pinto / Mineral Wells	0	0	0	Weatherford	21
Parker / Weatherford	1		1(3)	Weatherford	5
Tarrant NE / Arlington	1	0	2(4)	Arlington	6
Tarrant W / Fort Worth	1	1	3(5)	Fort Worth	11
Wise / Decatur	0	0	0	Waste Solutions (Bowie)	32

Notes
(1) Distances from Granbury and Glen Rose
(2) Cleburne Landfill only accepts minimal amount of waste per year
(3) Transfer station permitted but not constructed
(4) IESI Transfer Station is operational / Republic TS in Arlington is not
(5) Includes Southwest Paper Stock and North Texas Recycling Facility which actually operates as a mterial recovery facility

Observations from Haul Analysis

The western region covers a total of 7,006 square miles. Haul distances to landfills are major costs for communities and businesses to get waste to a final disposal site.

Transfer stations may or may not offer an opportunity to reduce costs of waste hauling. For smaller transfer stations, because of the economies of scale, the intersection point for facility feasibility (the point where transfer stations are more economical than direct haul) is approximately 35-40 miles from waste generation centroid to disposal site. The same intersection point for larger scale transfer stations is 30-35 miles from waste generation centroid to disposal site. In areas where there is high traffic congestion, the distances where a transfer station become more viable are reduced.

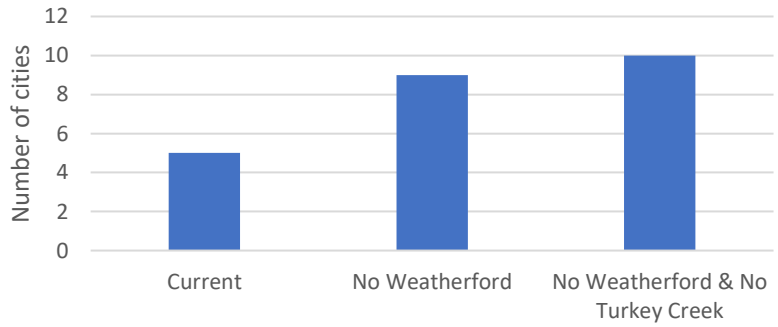
The reliance on the private sector for collection makes investments in transfer stations more complex. The assumption would be that a public investment in a transfer station would result in lower bids for waste hauling. However, if transfer stations are available, the cost of collection contracts should be reduced significantly. Public / private partnerships for transfer station construction and operation may be an option for communities in the western region. The next phase of the Study will address the pros and cons associated with these types of arrangements and implementation issues.

The City of Houston owns three transfer stations. These facilities are leased to the private sector in the same manner that the cities of Fort Worth and Arlington lease their landfills. In Houston, the private operator is allowed to accept waste from the private sector and charge a tipping fee. Houston receives a royalty for any non-Houston waste accepted.

After the Weatherford Landfill closes, waste from the following communities will have to be hauled longer distances: Stephenville, Granbury, Mineral Wells, Weatherford, Azle, and Glen Rose. There is a permitted transfer station in Weatherford, but it has yet to be constructed. If it is constructed, it will provide an option for these local governments versus direct haul to other landfills farther away. Costs will increase to cover the cost of transporting waste longer distances, even with a transfer station. Figure 6-5 shows the number of cities that have longer than 30-mile haul distances. The number of cities with longer than 30-mile hauls increases when the Weatherford Landfill closes and when the Turkey Creek Landfill reaches capacity.

The Waste Management Westside Transfer Station is currently managing approximately 200,000 tons per year (average of 650 tpd) of waste at its facility located on the west side of Fort Worth. It is permitted for up to 3,000 tons per day. Waste going to this facility may increase in coming years due to growth in the western region and the impending closure of the Weatherford Landfill.

Figure 6-5
Cities with longer than 30 mile haul distances
Source: *Google Maps and Reginal Survey*



7.0 Conclusions

The western region faces significant near-term and long-term solid waste management challenges. Some of the critical issues confronting the region include the following:

- Due to expected increases in population and business activity, waste generation is anticipated to increase from 3.0 million to 3.5 million tons per year by 2040. Addressing the needs of this continued growth in waste generation will require investments in solid waste collection, processing and disposal capacity.
- The western region's waste generation rate is estimated to be 6.45 pounds per capita per day (pcd). This is less than both the NCTCOG Region as a whole and the state of Texas pcd rate. However, it is higher than some communities in Texas, such as Austin and San Antonio. If the Region can achieve greater reductions in waste, landfill capacity can be extended.
- Based on state-wide data and local observations, approximately 28% of material generated is recycled. A majority of this is construction/demolition material. Efforts to increase recycling in the future will require additional processing capabilities, including material processing capacity and organics management facilities.
- Except for Weatherford and Cleburne, cities and counties in the region rely on private haulers to collect waste from the residential sector. The contracts for these services will have a significant bearing on what options may exist for a regional approach.
- There are 5 MSW and 2 C&D landfills located in the region. One of these MSW landfills, the Cleburne Landfill, only manages a small amount of sludge each year; and the Weatherford Landfill only has 1-2 years of remaining capacity. This concentration of capacity poses risks for the Region should any one of the other three facilities close. These risks include reduced competition and longer haul distances to dispose of waste. Because of decreased competition and higher transportation costs, local governments and businesses in the western region can expect that solid waste management costs in future years will increase.
- Landfill capacity in the Region is approximately 63 million tons. Assuming the waste disposal rate remains constant and population increases as projected by the Texas Demographic Center, current landfill capacity is anticipated to be depleted in approximately 16 years. The Turkey Creek Landfill is anticipated to have a permit amendment approved in late 2020. This amendment will add approximately 3 million tons of capacity to the region – equal to one year's generation for the entire region.

As part of the Needs Assessment Report, the Project Team undertook a survey of local governments. The survey was intended to identify local government concerns related to solid waste management as well as identify interest in regional approaches to solid waste management. Based on the findings of the survey, local governments are most concerned about the following issues:

- Long-term disposal capacity
- The future cost of solid waste management
- Transportation issues related to hauling waste
- Recycling markets

Local governments identified reduced costs, assured disposal capacity and other factors as benefits of a regional approach to solid waste management. However, they are concerned that a regional approach could increase costs, increase bureaucracy and reduce control over solid waste management decision making.

The survey also identified which local governments are planning future investments in solid waste management services and facilities. Table 7-1 presents a summary of the potential changes that could take place soon.

Table 7-1
Number of Cities Considering Program Changes or New Facilities

Program or Facility	Yes	Maybe	No
Modify Collection Program	10	16	11
Enhance recycling efforts	14	14	9
Add drop-off centers for MSW	1	10	26
Add recycling centers	2	5	30
Build a transfer station	1	5	31
Build a compost facility	0	6	31
Build a HHW facility	0	3	34
Build or expand a landfill	4	1	32
Build a material recovery facility	0	2	35

Based on the results of both the Survey and the data collected as part of this Needs Assessment, the areas of focus for the Alternatives Analysis will include the following. It is anticipated that the PAG will review these focus areas and provide additional direction to the Project Team. These are not necessarily listed by importance to the western region, but follow EPA's waste management hierarchy.

1. Regional public information programs.
2. Cooperative solid waste and recyclable material collection strategies.
3. Cooperative recycled material marketing options.
4. Increased availability for citizen drop-off centers.
5. Increased capacity for composting organics including yard waste, biosolids and food waste.
6. Increased transfer station capacity in the western region.
7. Increased landfill capacity.
8. Cooperative strategies for managing disaster debris.

Appendix A

Municipal Population Data for Cities

Appendix A Municipal Population Data for Cities

Appendix A Population Distribution in the Western Region by Specific City				
County	**City**	**2010 Population**	**2019 Population**	**Heading?**
Erath	*Stephenville*	***17,123***	***22,660***	
Erath	*Cities over 5000*	*17,123*	*22,660*	*51%*
Erath	*Remaining County*	*20,767*	*22,040*	
Erath	**Total & % of Western Region**	**37,890**	**44,700**	**2%**
Hood	*Granbury*	*7,978*	*9,790*	
Hood	*Cities over 5000*	*7,945*	*9,790*	*15%*
Hood	*Remaining County*	*43,237*	*55,900*	
Hood	**Total & % of Western Region**	**51,182**	**65,690**	**3%**
Johnson	*Burleson*	*36,690*	*45,620*	
Johnson	*Cleburne*	*29,337*	*30,770*	
Johnson	*Joshua*	*5,910*	*6,930*	
Johnson	*Keene*	*6,106*	*6,310*	
Johnson	*Cities over 5000*	*78,043*	*89,630*	*52%*
Johnson	*Remaining County*	*112,891*	*84,070*	
Johnson	**Total & % of Western Region**	**190,934**	**173,700**	**7%**
Palo Pinto	*Mineral Wells*	*16,788*	*16,780*	
Palo Pinto	*Cities over 5000*	*16,788*	*16,780*	*58%*
Palo Pinto	*Remaining County*	*11,323*	*12,040*	
Palo Pinto	**Total & % of Western Region**	28,111	28,820	**1%**
Parker	*Weatherford*	*25,250*	*28,090*	
Parker	*Cities over 5000*	*25,250*	*28,090*	*21%*
Parker	*Remaining County*	*91,677*	*106,530*	
Parker	**Total & % of Western Region**	116,927	134,620	**5%**
Somervell	*Glen Rose*	*2,444*	*2,560*	
Somervell	*Cities over 5000*	*2,444*	*2,560*	*26%*
Somervell	*Remaining County*	*6,046*	*7,260*	
Somervell	**Total & % of Western Region**	**8,490**	**9,820**	**0%**

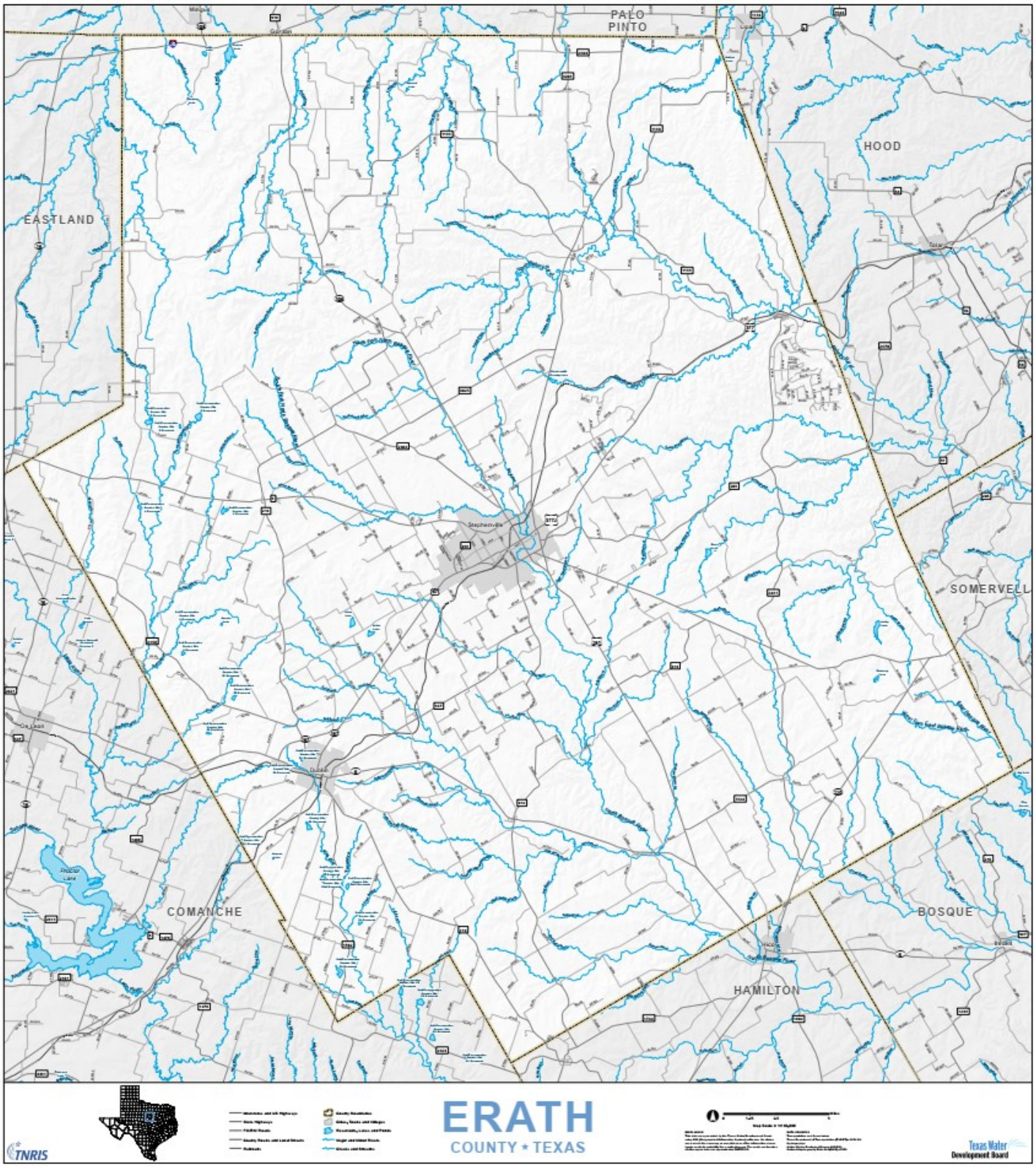
Tarrant	*Arlington*	*365,438*	*386,180*	
Tarrant	*Azle*	*10,947*	*12,670*	
Tarrant	*Bedord*	*46,979*	*48,810*	
Tarrant	*Benbrook*	*21,234*	*22,920*	
Tarrant	*Colleyville*	*22,807*	*25,370*	
Tarrant	*Crowley*	*12,838*	*15,540*	
Tarrant	*Euless*	*51,277*	*56,160*	
Tarrant	*Everman*	*6,108*	*6,090*	
Tarrant	*Forest Hill*	*12,355*	*12,950*	
Tarrant	*Fort Worth*	*741,206*	*848,860*	
Tarrant	*Grapevine*	*46,334*	*51,370*	
Tarrant	*Haltom City*	*42,409*	*42,730*	
Tarrant	*Hurst*	*37,337*	*38,510*	
Tarrant	*Keller*	*39,627*	*45,090*	
Tarrant	*Kennedale*	*6,763*	*7,650*	
Tarrant	*Mansfield*	*56,368*	*68,520*	
Tarrant	*North Richland Hills*	*63,343*	*67,980*	
Tarrant	*Richland Hills*	*7,801*	*7,920*	
Tarrant	*River Oaks*	*7,427*	*8,290*	
Tarrant	*Saginaw*	*19,806*	*22,380*	
Tarrant	*Southlake*	*26,575*	*30,010*	
Tarrant	*Watauga*	*23,497*	*23,770*	
Tarrant	*White Settlement*	*16,116*	*17,600*	
Tarrant	*Cities over 5000*	*1,684,592*	*1,867,370*	*92%*
Tarrant	*Remaining County*	*124,442*	*156,660*	
Tarrant	**Total & % of Western Region**	**1,809,034**	**2,024,030**	**80%**
Wise	*Bridgeport*	*5,976*	*6,170*	
Wise	*Decatur*	*6,042*	*7,190*	
Wise	*Cities over 5000*	*12,018*	*13,360*	*21%*
Wise	*Remaining County*	*47,109*	*50,700*	
Wise	**Total & % of Western Region**	**59,127**	**64,060**	**3%**
Total Region	*Cities over 5000*	*1,844,203*	*2,050,240*	*81%*
Total Region	**Population in unincorporated areas and cities under 5000**	**457,492**	**495,200**	**19%**
	Total	**2,301,695**	**2,545,440**	**100%**

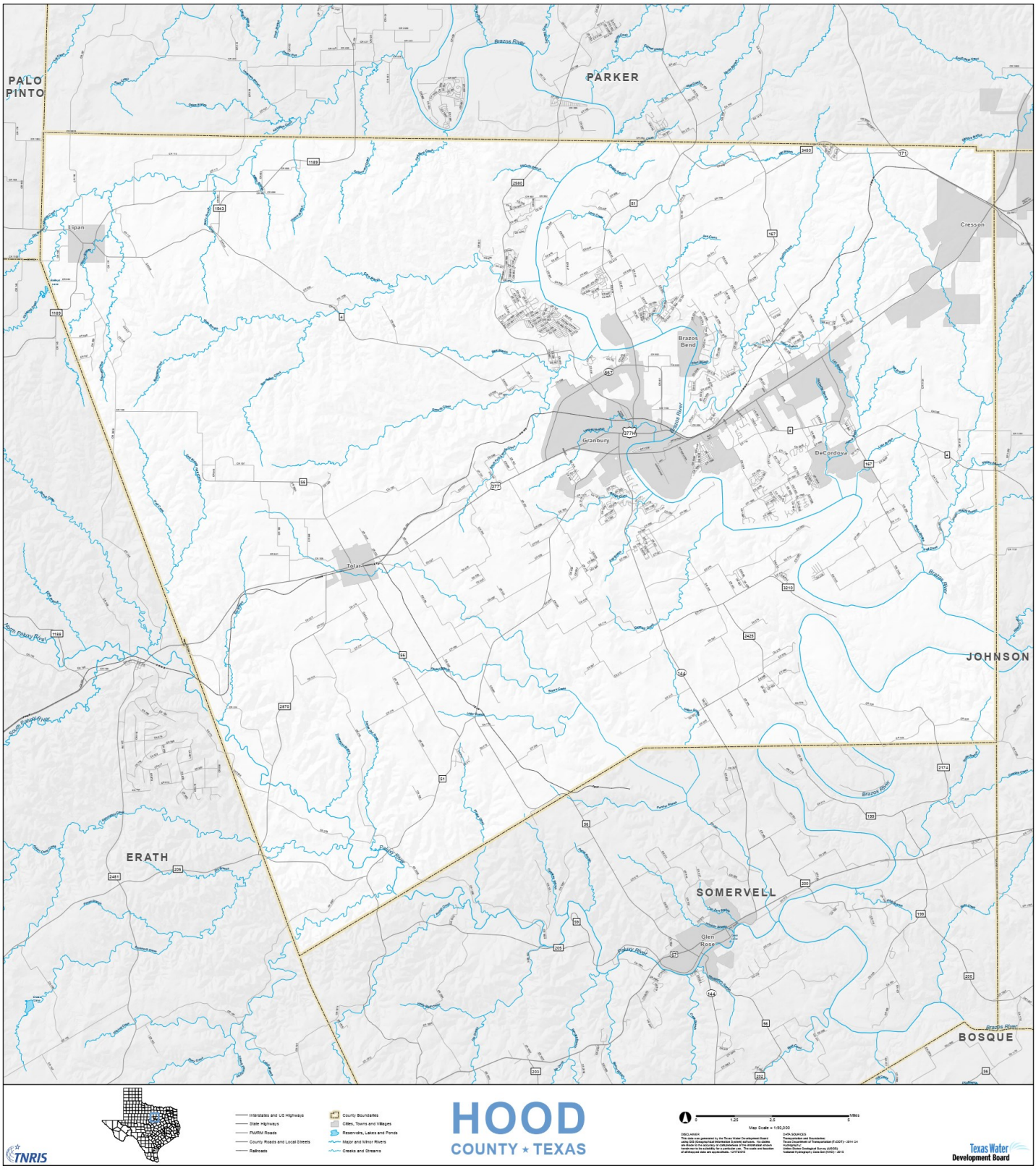
Source: *2019 Population Estimates; North Central Texas Council of Governments; April 2019* https://data-nctcoggis.opendata.arcgis.com/datasets/2019-nctcog-population-estimates-publication

Appendix B

County Maps

Appendix B County Maps

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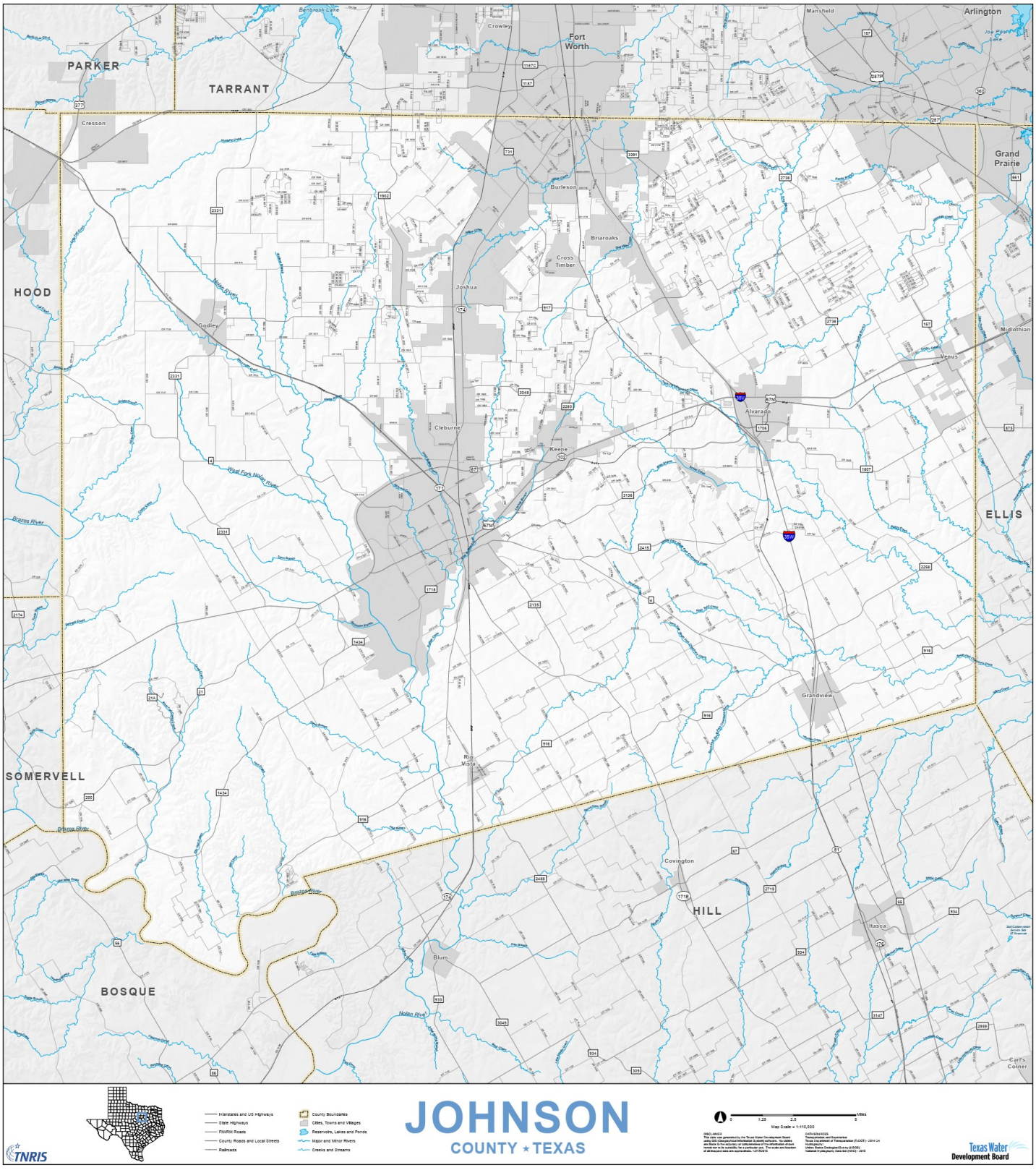
JOHNSON
ERATH
SOMERVELL
BOSQUE
Brazos River
Paluxy River
Lipan
Cresson
Brazos Bend
Granbury
DeCordova
Tolar
Glen Rose
HOOD
COUNTY ★ TEXAS
TNRIS
Texas Water Development Board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SOMERVELL
HILL
BOSQUE
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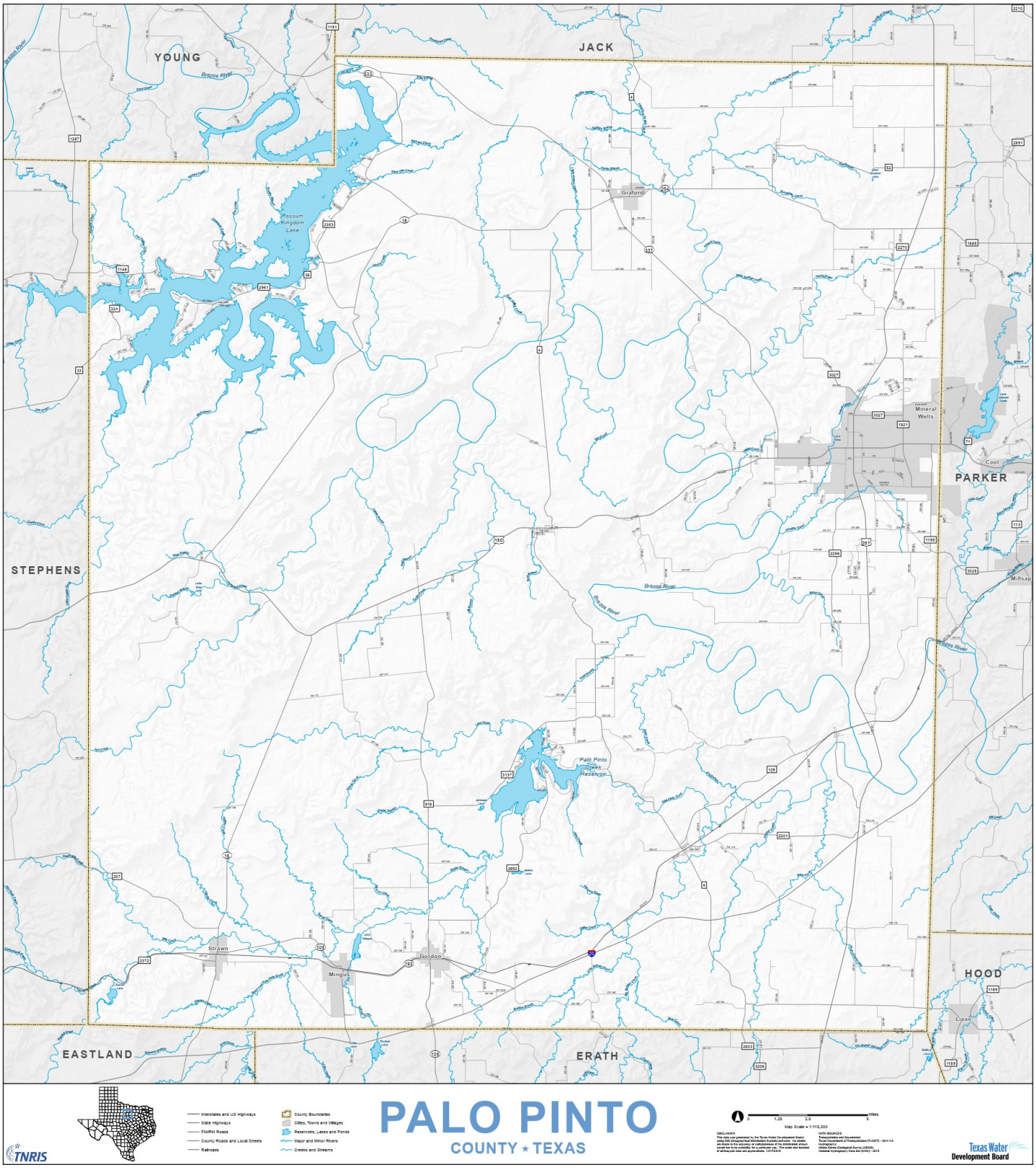
Cross Timber
Joshua
Godley
Cleburne
Keene
Alvarado
Midlothian
Venus
Grandview
Rio Vista
Covington
Itasca
Blum
Cresson
Benbrook Lake
Joe Pool Lake
Nolan River
Brazos River
West Fork Nolan River
Carl's Corner
JOHNSON
COUNTY ★ TEXAS
TNRIS
Texas Water Development Board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ERATH
HOOD
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Possum Kingdom Lake
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Mineral Wells
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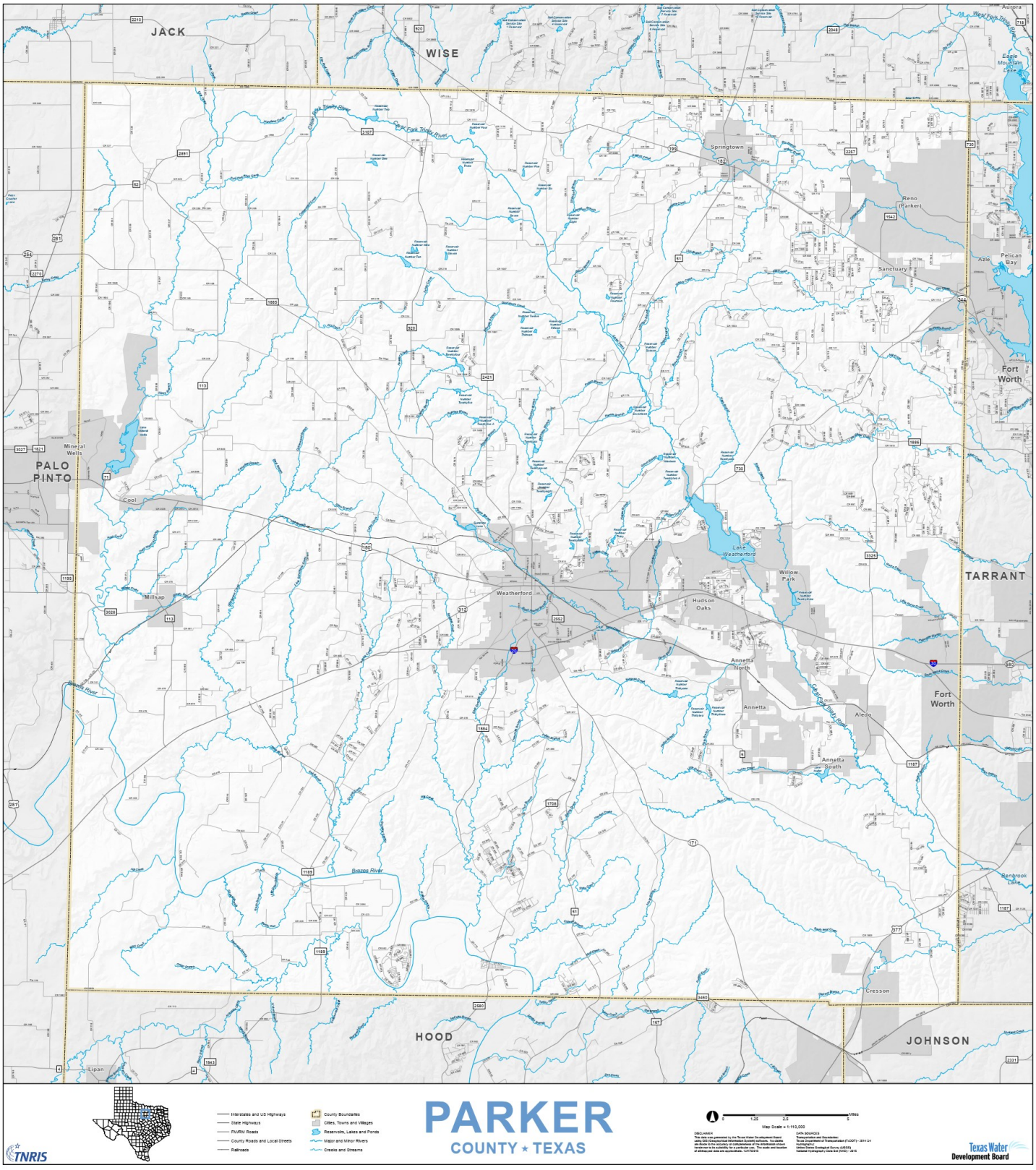
Strawn
Gordon
Mingus
Palo Pinto Creek Reservoir
PALO PINTO
COUNTY ★ TEXAS
TNRIS
Texas Water Development Board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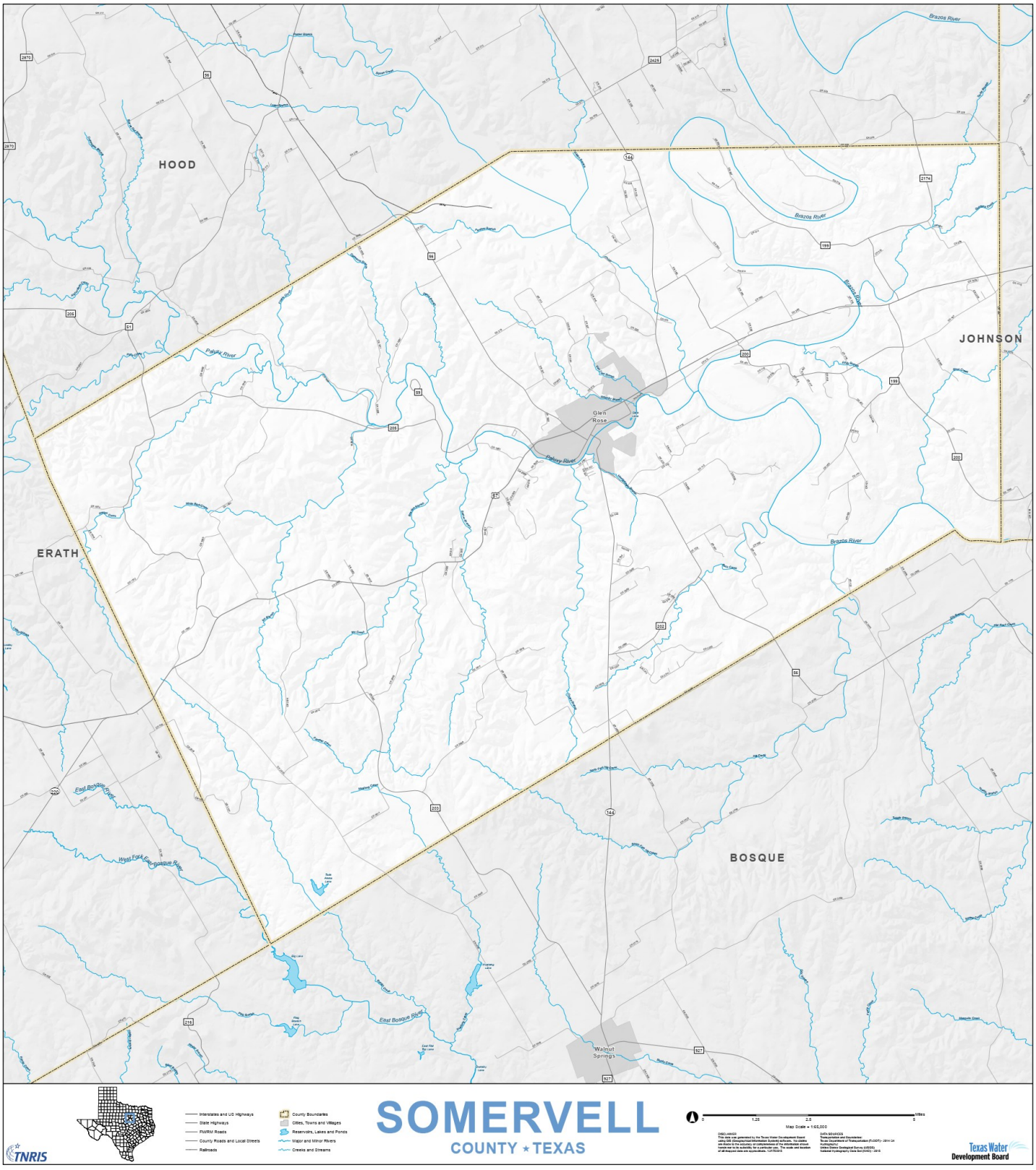
WISE
PALO PINTO
TARRANT
HOOD
JOHNSON
Springtown
Reno (Parker)
Azle
Pelican Bay
Sanctuary
Fort Worth
Mineral Wells
Cool
Millsap
Weatherford
Lake Weatherford
Willow Park
Hudson Oaks
Annetta North
Annetta
Annetta South
Aledo
Fort Worth
Cresson
Lipan
Brazos River
West Fork Trinity River
Eagle Mountain Lake
Benbrook Lake
PARKER
COUNTY ★ TEXAS
TNRIS
Texas Water Development Board


HOOD
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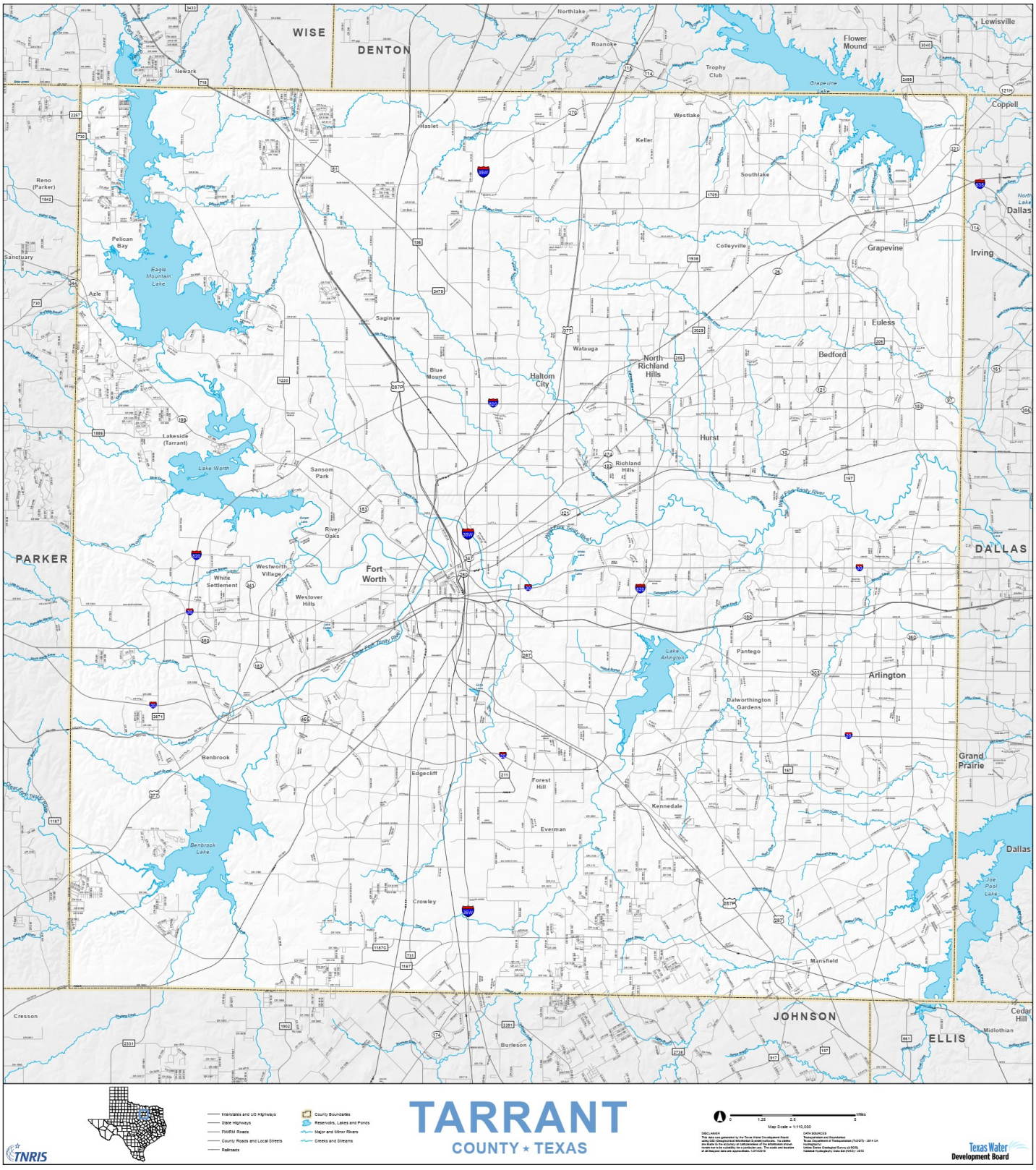
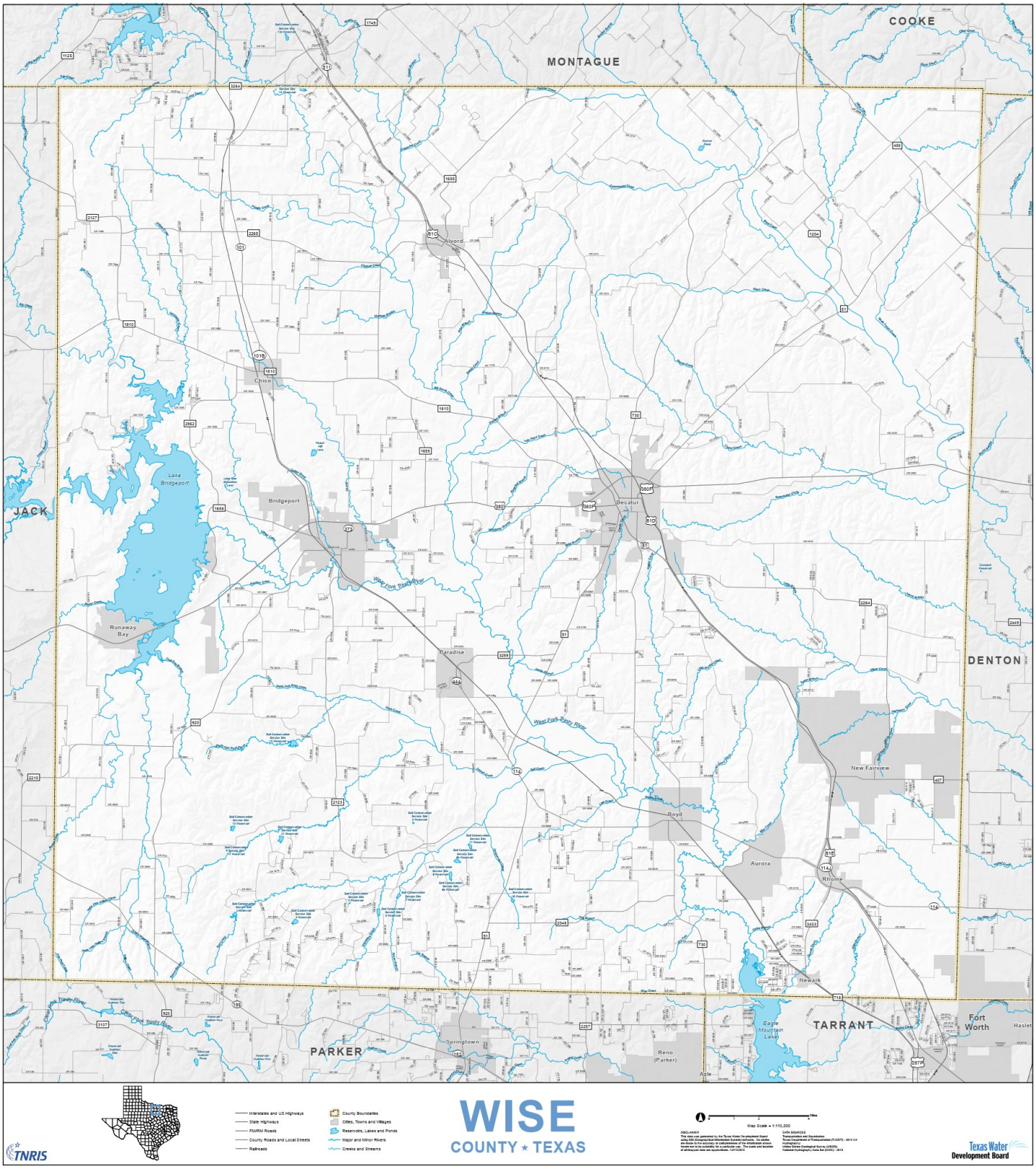
ERATH
BOSQUE
Glen Rose
Walnut Springs
Brazos River
Paluxy River
East Bosque River
West Fork East Bosque River
SOMERVELL
COUNTY ★ TEXAS
TNRIS
Texas Water Development Board
Map Scale = 1:62,000


WISE
DENTON
PARKER
DALLAS
JOHNSON
ELLIS
Fort Worth
Arlington
Grand Prairie
Mansfield
Benbrook
Crowley
Burleson
Cresson
Midlothian
Cedar Hill
Grapevine
Irving
Coppell
Lewisville
Flower Mound
Southlake
Keller
Westlake
Colleyville
Euless
Bedford
Hurst
North Richland Hills
Richland Hills
Haltom City
Watauga
Saginaw
Azle
Reno (Parker)
Sanctuary
Pelican Bay
Eagle Mountain Lake
Lake Worth
Lakeside (Tarrant)
Sansom Park
River Oaks
Westworth Village
White Settlement
Westover Hills
Benbrook Lake
Lake Arlington
Pantego
Dalworthington Gardens
Edgecliff
Forest Hill
Everman
Kennedale
Joe Pool Lake
Dallas
Trophy Club
Roanoke
Northlake
Haslet
Newark
Blue Mound
Clear Fork Trinity River
West Fork Trinity River
TARRANT
COUNTY ★ TEXAS
TNRIS
Texas Water Development Board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MONTAGUE
JACK
DENTON
PARKER
TARRANT
Alvord
Chico
Bridgeport
Lake Bridgeport
Decatur
Runaway Bay
Paradise
New Fairview
Boyd
Aurora
Rhome
Newark
Springtown
Reno (Parker)
Eagle Mountain Lake
Fort Worth
Haslet
West Fork Trinity River
Clear Fork Trinity River
WISE
COUNTY ★ TEXAS
TNRIS
Texas Water Development Board

Appendix C

Survey Findings

Appendix C Survey Findings