Waco Comprehensive Plan 2040

utilities

Chapter 5 – Utility Infrastructure

5.1 Water

5.1.1 Introduction

The City of Waco currently provides water service to 131,139 people. The population within the water service area is projected to grow by almost 40,000 people in the next 25 years. The purpose of this water plan is to accommodate this growth in an efficient and cost effective manner, while also focusing on the maintenance of existing water system assets.

The project team of Freese and Nichols, Inc. and The Wallace Group was retained in 2013 by the City of Waco to prepare a Water Master Plan. The goals of the Water Master Plan were to evaluate the integrity of the existing water distribution system and water supply to recommend a phased and integrated Capital Improvement Program (CIP) through the year 2040. The recommended improvements will serve as a basis for the design, construction, and financing of facilities required to meet Waco's water capacity and system renewal needs. The major elements of the scope of this project included:

- Population and Water Demand Projections
- Water Supply Analysis
- Hydraulic Water Model Development
- Field Testing and Water Model Calibration
- Existing and Future System Hydraulic Analysis
- Water System Capital Improvement Plan
- Water Master Plan Report

5.1.2 Population

Population and land use are important elements in the analysis of water distribution systems. Water demands are dependent on the residential population and commercial development served by the system and determines the sizing and location of system infrastructure. A thorough analysis of historical and projected populations provides the basis for future water demands.

The City of Waco Planning Department and the Waco MPO worked together to develop the 2010 and 2040 population projections. Population projections were calculated by Traffic Analysis Zone (TAZ). The City of Waco planning staff also developed 2022 population projections for the master planning effort. For the Water Master Plan, Freese and Nichols, Inc. and The Wallace Group utilized the TAZ projections to plan for the 2015, 2020, 2030, and 2040 planning periods. Table 5.1 shows the population projections for 2015, 2020, 2030 and 2040. The yearly growth rates for each planning period based on the TAZ projections from the MPO that fell within the water service areas.

Table 5.1: Population Projections for Water Service Area

Year	Population	Yearly Growth Rate
2015	131,139	1.06%
2020	138,539	1.10%
2030	154,179	1.08%
2040	167,633	0.84%
Average	--	0.99%

5.1.3 Water Demands

A water utility must be able to supply water at rates that fluctuate over a wide range. Rates most important to the hydraulic design and operation of a water distribution system are average day (AD), maximum day (MD), and peak hour (PH). Average day use is the total annual water use divided by the number of days in the year. The average day rate is used as a basis for estimating maximum day and peak hour demands. Maximum day demand is the maximum quantity of water used on any one day of the year. Treatment and supply facilities are typically designed based on the maximum day rate. Peak hour use is the peak rate at which water is required during any one hour of the year. Since minimum distribution pressures are usually experienced during peak hour, the sizes and locations of distribution facilities are generally determined based on this condition.

Water demands were projected for existing, 2020, 2030 and 2040 conditions. The evaluation of historical data provided a basis for determining the design criteria used to project water demands. Large non- residential water users were also examined to ensure those demands were being accounted for in future projections. Three years of billing data were analyzed to determine an average water usage for the top users. After analyzing the residential and commercial demand, the large customer demands and the wholesale customer demands, the project team developed multiple alternatives for future water demands to be served by the City of Waco. Due to changing dynamics in water supply in McLennan County, Freese and Nichols, Inc. and The Wallace Group worked with the City to develop potential water demand projection alternatives. For the purpose of developing the capital improvements plan (CIP), the project team utilized Alternative 2: 100 percent of Waco and 50 percent of Wholesale Demand for Peak Day Demands (50 percent of Peak demand to be met by conjunctive use with groundwater supply), since it makes the most sense for the City of Waco and limits the amount of additional water supplies needed in the future. Table 5.2 summarizes the projected water demands for the City of Waco for the 2015, 2020, 2030 and 2040 planning periods.

Table 5.2: Water Demand Projections*

Year	2015	2020	2030	2040
Waco Avg Day Demand	28.33	31.74	35.73	39.49
Wholesale Avg Day Demand	7.91	11.13	12.20	13.18
Total Avg Day Water Demand	36.24	42.87	47.93	52.66
Waco MD to AD Peaking Factor	1.70	1.70	1.70	1.70
Waco Max Day Demand	48.17	53.96	60.74	67.13
Wholesale Max Day Demand	9.87	12.10	13.25	15.15
Total Max Day Water Demand	58.04	66.06	73.99	82.28

*In million gallons per day

5.1.4 Water Supply Analysis

The primary objective of the water supply analysis is to evaluate how much supply is available from existing supplies and compare the existing supplies and projected demands to identify supply shortages. Another objective is to develop strategies for potential future supply sources required to meet the projected needs for future decades.

Existing Supplies

Waco holds Texas water rights for supplies from Lake Brazos and Lake Waco. Lake Waco is owned and operated by the U.S. Army Corps of

Engineers (USACE). The reservoir is located on the Bosque River in McLennan County. The City of Waco contracts with USACE for storage space in the reservoir and owns two Texas water rights authorizing storage and use from the reservoir: Certificate of Adjudication (CA) 12-2315 and Permit/Application P-5094. The City of Waco also has a water right to access supplies from Lake Brazos authorized by CA 12-4340. The water right authorizes diversion of 5,600 acre-feet for municipal and industrial uses. City of Waco is currently operating two water wells within the city limits.

Water Availability Modeling

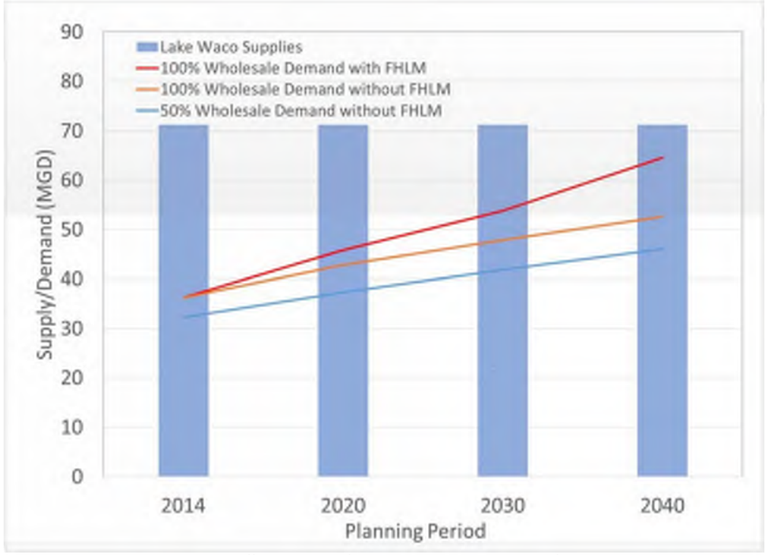
Firm yield was calculated using the Modified Brazos water availability model (WAM). Under current conditions, the firm yield of Lake Waco is 81,070 acre-feet per year, which is 1,200 acre-feet per year more than the authorized diversion of 79,870 acre-feet per year. The additional yield is small and probably not worth pursuing additional authorizations and will eventually disappear with further sediment accumulation. Therefore, the current available supply using the Modified Brazos WAM would be 79,870 acre-feet per year. The yield computed using the Modified Brazos WAM reflected the worst case scenario for 1940 through 1996. The critical period for this analysis is from 1951 through 1956. The critical period, or critical drought, is the period of low inflow that determines the yield of a reservoir.

5.1.5 Water Supply Strategies

Three future demand scenarios (Alternatives 1 through 3) were considered for developing the CIP plan to address City of Waco's infrastructure needs for the future decades. Alternative 2 was chosen since it represents a conjunctive use strategy that results in a decrease in the dependency on groundwater usage to meet maximum day demands throughout McLennan County. A study of the local groundwater suggests that the current usage rates are not sustainable into the 2070 planning period. The future demand projections are presented in Table 5.2.

The total permitted diversions from Lake Waco are 79,870 acre-feet per year. The firm yield of Lake Waco based on the water availability modeling is about 81,070 acre-feet per year. The total permitted diversions limit the supply available to City of Waco as the firm yield is greater than the total permitted diversions. Available supplies are compared against the projected demands to identify any supply shortages or surpluses. If a shortage is identified in the future decades, water supply strategies are evaluated to meet the shortage in the supply availability. Comparison of the supply and demand numbers for the near-term and long term future is included in Chart 5.1. It should be noted that Lake Waco supplies (71.2 million gallons per day) are sufficient to meet the 2015 demand for all scenarios.

Chart 5.1: Comparison of Lake Waco Supply vs. Water System Demand



Note: FHLM = Freestone, Hill, Lime, and McLennan Water Supply Corp.

Potential Strategies

The following is the list of potential strategies identified for the City of Waco to supplement the Lake Waco water supply.

1. Local Groundwater Supply
2. Imported Groundwater Supply
3. Conjunctive Use
4. Conservation
5. Lake Brazos
6. Lake Bosque
7. Lake Creek Reservoir
8. Tradinghouse Creek Reservoir
9. Wastewater Reuse
10. Aquifer Storage and Retention
11. Purchase from Brazos River Authority

A fact sheet was developed by summarizing the relevant information associated with each one of the strategies listed above. Each factsheet includes a description of the strategy, a location map (where applicable), supply reliability assessment, infrastructure configuration, cost estimate, regulatory and permitting requirements, timing/schedule, and a summary of potentials risks/benefits/challenges associated with the strategy. Selection of the most preferred strategy or a combination of strategies is primarily based on the following variables:

1. Supply Reliability
2. Cost
3. Risk
4. Stakeholder Preference

A comparative analysis of the strategies and the strategy recommendations are included below.

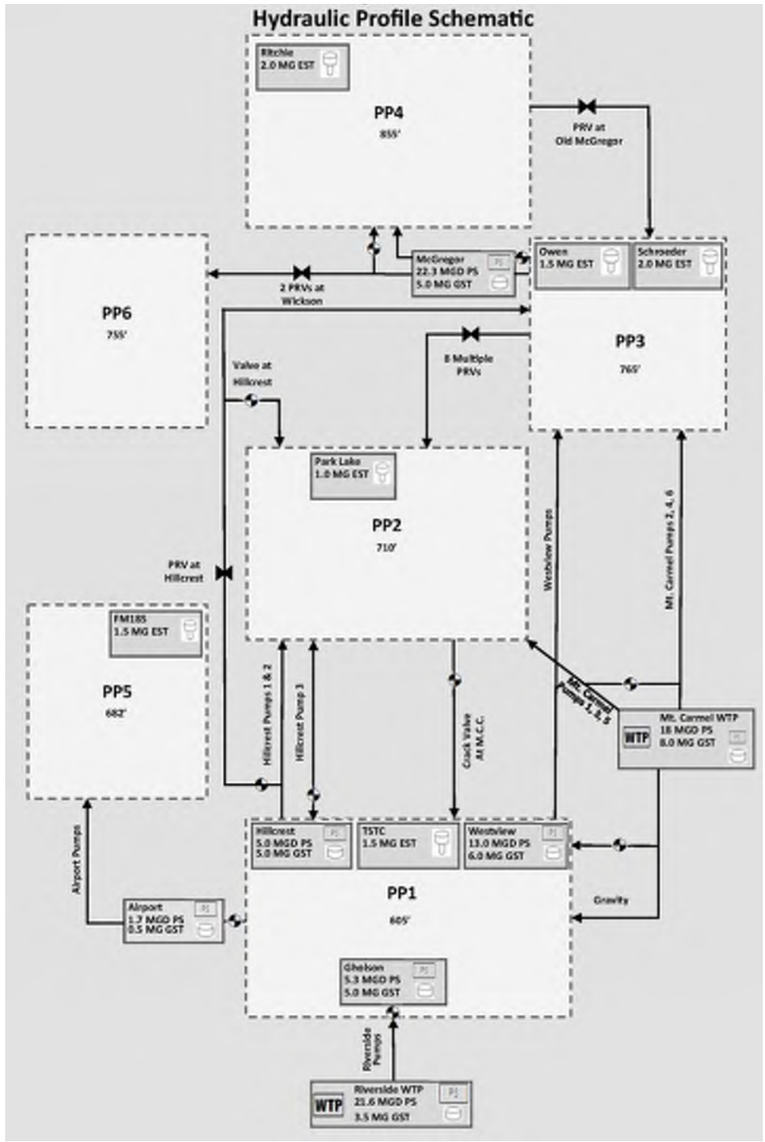
Recommended Strategies and Summary of Water Supply Evaluation

The City of Waco's water supply plan is developed as a pro-active planning approach for the City as the City does not anticipate any shortages in the near term decades for an average day demand projection scenario. A recommended strategy is selected based on a comparison of the unit costs associated with each one of the individual strategies, reliability of the supply source to meet City of Waco's needs, risks and challenges associated in the process of securing the source of supply, environmental impacts, and the stakeholder preference. Conservation is the most recommended strategy as it does not take a significant capital investment but will provide long term returns in terms of supply reduction and cost savings. Based on the preliminary discussions with the City of Waco, it was determined that the Conjunctive Use strategy is the most preferred strategy for the City to address the needs arising during the CIP period from 2020 – 2040. Various potential demand scenarios were evaluated and the scenario with 50 percent of the wholesale customer demand without Freestone, hill, Lime, and McLennan Water Supply Corp. (FHLM) was identified as the most probable demand scenario. The conjunctive use strategy is a combination of use from City's groundwater supplies and the surface water supplies from Lake Waco. The additional supplies from groundwater used conjunctively with surface water can safely address demands without significantly impacting the aquifer levels in the Carrizo aquifer. The City may choose to develop the most feasible strategy among the additional strategies to meet the demands in the long term future.

5.1.6 Existing Water Distribution System

The existing water distribution system includes high service pump stations at two water treatment plants (WTPs) (Mt. Carmel WTP and Riverside WTP); six elevated storage tanks (ESTs); five ground storage tanks (GSTs) (the Airport GST and Pump Station, the Gholson GST and Booster Pump Station, the Hillcrest GST and Pump Station, the Westview GST and Pump Station, the Old McGregor GST and Pump Station), and 14 Pressure Reducing Valves (PRVs). The existing distribution system has over 155 million gallons per day (MGD) of total pumping capacity at various facilities spread throughout the City. The City's water distribution system is currently separated into six pressure planes; Pressure Plane 1 through 6. Chart 5.2 is a schematic of the Waco water distribution system.

Chart 5.2: Water Distribution Schematic



5.1.7 Capital Improvement Program

A capital improvement program (CIP) was developed for the City of Waco to promote a high level of water service that encourages residential and commercial development. The recommended improvements will provide the required capacity and reliability to meet projected water demands through the 2040 planning period. Locations shown for new mains and other recommended improvements were generalized for hydraulic analyses. Specific alignments and sites will be determined as part of the design process. It is recommended that these projects be constructed generally in the order listed. However, development or renewal patterns will likely make it necessary to construct some projects sooner than anticipated. Capital costs were calculated for the recommended improvements. The costs are in 2015 dollars and include an allowance for engineering, surveying, and contingencies. Tables 5.3 through 5.6 identify the recommended projects for the water system and summarize the costs of the CIP for the City of Waco. These projects are then identified on Map 5.1.

Table 5.3: Water System Capital Improvement Plan: 2020 Improvements

Project #	Water Distribution System Projects	Cost
1	Hillcrest PS and GST Rehabilitation and 24-inch Water line Replacement	$15,661,020
2	Westview PS and GST Rehabilitation	$8,085,000
3	5.0 MGD Airport Pump Station	$3,307,510
4	FM-185 20-inch Water Line Replacement in PP 5	$8,524,540
5	24-inch, 30-inch, and 36-inch Faulkner Water Line in PP 1	$10,160,060
6	16-inch Water Line and 8-inch Water Line with Pressure Reducing Valves in PP 4	$5,798,280
7	15.0 MGD Low Head Pump Station at Mt. Carmel WTP	$4,557,000
8	20-inch and 24-inch Replacement Water Line in PP3	$6,271,770
9	3.0 MG Ground Storage Tank at Old McGregor Pump Station	$2,646,000
10	16-inch and 24-inch Water Lines in PP3	$7,289,740
11	16-inch, 20-inch, and 24-inch Water Lines in PP 2	$10,017,400
12	0.75 MG Bagby Elevated Storage Tank in PP2	$2,009,500
13	12-inch Water Line in PP4	$2,647,630
14	24-inch and 12-inch Water Lines in PP6	$3,561,600
15	72-inch Parallel Raw Water Line	$1,314,190
16	Expand Riverside Treatment Capacity to 45 MGD	$10,363,510
17	Pilot Leak Detection Study	$52,920
18	Citywide Automatic Meter Reading	$20,580,000
	2020 Improvements Total	$122,847,670

Table 5.4: Water System Capital Improvement Plan: 2030 Improvements

Project #	Water Distribution System Projects	Cost
19	20-inch Parallel Water Line in PP1	$14,047,920
20	1.0 MG Ground Storage Tank at Airport Pump Station	$882,000
21	24-inch Replacement Water Line in PP3	$4,702,690
22	30-inch Parallel Water Line in PP4	$3,898,440
23	1.0 MG Elevated Storage Tank in PP6	$2,377,000
24	8.0 MGD Low Head Pump Station at McGregor Pump Station	$3,675,000
25	20-inch/24-inch Replacement Water Line in PP3	$4,271,040
26	24-inch Water Line in PP3	$8,973,700
27	16-inch Replacement Water Line along HWY 84 in PP6	$4,512,410
	2030 Improvements Total	$47,340,200

Table 5.5: Water System Capital Improvement Plan: 2040 Improvements

Project #	Water Distribution System Projects	Cost
28	9.0 MGD Mt. Carmel H.S.P.S. Firm Capacity Expansion	$1,470,000
29	20-inch/24-inch Replacement Water Line in PP1	$7,425,430
30	12-inch Water Lines in PP5	$5,798,130
31	20-inch Water Line in PP2	$2,943,690
32	20-inch Water Line Replacement in PP3	$2,616,990
33	16-inch Replacement Water Line in PP4	$1,263,030
34	16-inch/12-inch Replacement Water Line in PP4	$6,245,610
35	12-inch Water Line in PP4	$3,652,960
36	12-inch Water Line in PP2	$1,117,510
37	16-inch Water Line in PP1	$4,849,250
38	16-inch and 12-inch Water Line in PP3	$2,312,320
39	20-inch transmission Line in PP1	$2,085,940
40	16-inch/12-inch Water Line and PRV Stations in PP6	$9,330,390
41	16-inch/12-inch Water Lines and PRV Station in PP7	$10,554,600
42	12-inch Water Lines in PP7	$14,138,470
43	12-inch Water Line in PP5	$2,988,090
44	16-inch Water Line in PP1	$3,023,370
45	16-inch Water Line in PP1	$670,320
	2040 Improvements Total	$82,486,100

Table 5.6: Replacement and Renewal Projects

Project #	Water Distribution System Projects	Cost
R1	30-inch Renewal Water Line in PP1	$1,749,310
R2	20/24/30-inch Renewal Water Line in PP1	$2,373,480
R3	16-inch Renewal Water Line in PP1	$1,860,150
R4	16-inch Renewal Water Line in PP1	$1,793,110
R5	16-inch Renewal Water Line in PP1	$1,508,230
R6	16/24-inch Renewal Water Line in PP1	$1,667,280
R7	20/24-inch Renewal Water Line in PP1	$1,805,160
R8	16/20-inch Renewal Water Line in PP1	$2,038,900
R9	16-inch Renewal Water Line in PP1	$2,094,760
R10	20-inch Renewal Water Line in PP1	$1,758,120
R11	20-inch Renewal Water Line in PP1	$2,121,220
R12	20-inch Renewal Water Line in PP1	$2,140,320
R13	20-inch Renewal Water Line in PP1	$1,528,800
R14	20-inch Renewal Water Line in PP1	$1,643,470
R15	20-inch Renewal Water Line in PP1	$1,662,580
R16	24-inch Renewal Water Line in PP1	$1,995,980
R17	24-inch Renewal Water Line in PP1	$2,317,900
R18	24-inch Renewal Water Line in PP1	$2,382,290
	Replacement and Renewal Total	$34,441,060

Grand Total – All Projects: $287,115,030

5.1.8 Redevelopment Analysis

Following the development of the growth CIP, the project team performed a 2040 system analysis of the water distribution system for areas targeted for redevelopment. The project team delineated two redevelopment areas that cover 2,250 acres and 1,750 acres. These locations have been identified by the City as key areas where Waco is expecting to experience large-scale growth and transformation. The redevelopment areas were selected for a variety of reasons. Some reasons include access to major forms of transportation, proximity to higher education institutions (Baylor University), and development of mixed use urban villages (McLane Stadium, Downtown, etc.). The potential redevelopment is expected to occur by 2040 for the purposes of this study.

5.1.9 Redevelopment Capital Improvement Program

Based on the results of the water system capacity and condition analysis, the project team developed improvements to serve future growth related to redevelopment. For the purposes of this study, the team concentrated on smaller distribution lines localized to the redevelopment areas for the Redevelopment CIP and not large transmission mains. Condition related improvements were identified for water lines with a pipe age greater than 50 years and/or consisting of more problematic pipe materials such as Asbestos Cement. The capacity and condition improvements were combined to represent the proposed redevelopment improvements. The proposed improvements address capacity and condition issues from the analysis of the Riverside and Downtown redevelopment areas. The recommended CIP lines for redevelopment related growth for the Riverside and Downtown redevelopment areas are shown in Table 5.6.

5.2 Wastewater

5.2.1 Introduction

The City of Waco retained the Team of Walker Partners, HDR, rjn group and Burgess & Niple to develop a Wastewater Master Plan for the City's wastewater collection system. In 2000, three broad-based wastewater planning recommendations were presented as part of the overall *Comprehensive Plan 2000*. Since that time the City's wastewater collection system has both aged and grown in size and complexity. Unlike the 2000 study, this Master Plan conducted a detailed evaluation of the system and recommendations that will enable city planners and engineers to manage budgets, growth, and capital improvement projects for the next two decades.

The Wastewater Collection System Master Plan report has been prepared to provide the City of Waco a road map that will serve as a guide for short-term and long-term improvements to the wastewater system infrastructure. The plan will provide the City with a strategy to not only preserve previous investments in the existing sanitary sewerage infrastructure, but to plan for future needs for a growing City. The key objectives in preparing this roadmap are summarized as follows:

- **Capture, document, and map historical and institutional knowledge of the system.**
- **Develop comprehensive and accurate population and flow projections.** The population projections are for the Wastewater Master Plan are the same as those used for other components of The City Plan and are based on an assumed annual city-wide growth rate of 1.07.
- **Analyze the existing sanitary sewer system to identify under dry weather conditions and stormwater events.** Approximately 60 percent of the 58 existing lift stations within the system are 30 years old or older. Many of these stations are located near or adjacent to Lake Waco. It is recommended that

the City limit and/or reduce the number of lift stations due to their operating and maintenance costs and to the consequence of failures.

- **Protect the City's water supply.** It is essential to protect Lake Waco and the Brazos River from the detrimental environmental effects of wastewater spills and overflows.

- **Develop a prioritized Capital Improvement Program** that will improve the existing collection system and accommodate projected wastewater flows through 2040.

5.2.2 Conclusions and Recommendations

1-10 Year Capital Improvement Projects

The greater part of the recommendations made within the 1-10 Year Capital Improvement Program are the enhancement of the functionality and general structural condition of the wastewater collection system. Table 5.7 presents the summary of the proposed 1-10 Year CIP. Map 5.2 provides shows their locations. The total 1-10 Year CIP cost is approximately $245 Million in 2015 dollars (Table 5.7).

Chart 5.3 shows the projects lumped together by the five recognized project types. Approximately 47 percent of the estimated program cost is exclusively to address the rehabilitation and/or replacement of existing deficient City of Waco assets (labeled "Rehabilitation" and "Asset Renewal"). Based on the dry and wet weather flow monitoring, it was determined that many portions of the system experience high inflow and infiltration. In addition, significant portions of the "Linear", "WMARSS", and "Lift Station" projects have also been prioritized taking into account the poor structural condition of the existing assets. The City's ultimate roadmap to success includes rehabilitating the current system while sensibly expanding for future growth. It should be noted that the priorities assigned to wastewater projects in the 1-10 Year CIP support the Growth Area Priorities recommended in the Growth Management component of The City Plan (See Map 3.7).

A risk matrix was developed to assist in prioritizing the various identified CIP projects using a risk-based analysis. Each project was rated, or scored, individually using two types of scoring elements.

First, the projects were evaluated using traditional engineering elements that included the following:

- Risk Avoidance
    - Pipe Diameter with larger pipes posing larger risks
- Structural Integrity Evaluation
    - Pipe Material
    - Age
    - Condition
- Hydraulic Capacity Evaluation
    - Pipe Capacity
    - Volume of Wastewater Overflow

The second elements applied included the following social, political and economic factors:

- Effect on Public Safety
    - Evaluation of location in relation to public facilities, neighborhoods and environmentally sensitive areas
- Improvement for Economic Development / Redevelopment
    - Projects receiving higher scores
        - Provide more downstream capacity that allows for more growth upstream
        - Permits more growth in downstream areas that could not be developed under current conditions
- Return on Investment Evaluation
    - Initial cost versus working life of the updated system based on improvements made
    - Difference in maintenance costs resulting from improved system

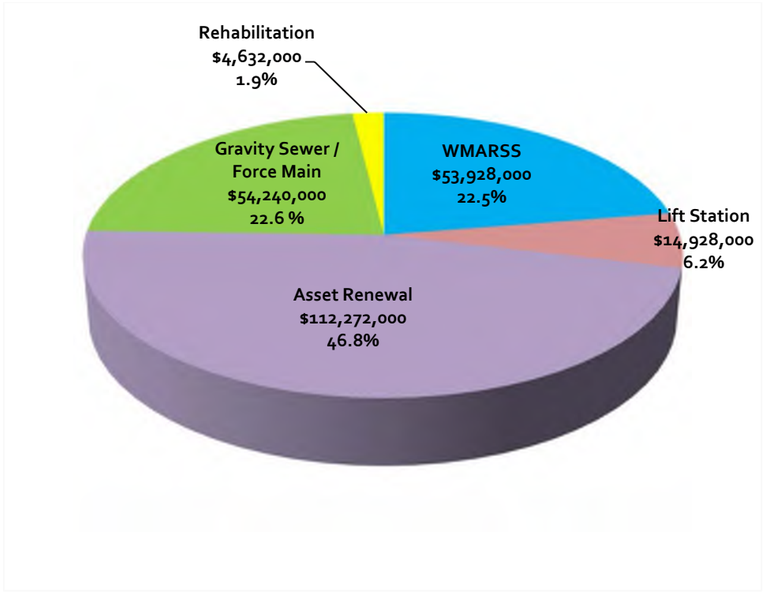
It is important to note that most of the elements included in the scoring matrix either directly or indirectly reflect the Growth Management priorities of The City Plan (See Chapter 3).

Table 5.7: City of Waco Collection System 1 to 10 year Capital Improvement Program Summary

Project #	Year	Project Description	Cost*
1	2015	WMARSS Project #1 – LaSalle Lift Station Relocation & Force Main Extension to Central Plant	$30,660,000
2	2015	West Bank Interceptor Rehabilitation (Part 1)	$2,280,100
3	2015	2015-2018 City Identified Asset Renewal Project #1	$39,128,500
4	2016	Brazos Basin Interceptor (Lower Limits – Project 1)	$21,037,800
5	2016	Village Lake Hydraulic Capacity Improvements	$1,766,900
6	2017	Reroute Church Road Lift Station Flows to Bull Hide / Castleman Creek Wastewater Line	$2,355,425
7	2018	Brazos Basin Interceptor (Upper Limits – Project 2)	$12,658,250
8	2018	WMARSS Project #2 – Lacy-Lakeview / Bellmead / TSTC Interceptor	$8,908,000
9	2019	Church Road Lift Station Added Capacity and Force Main Replacement	$4,441,700
10	2019	2019-2022 Asset Renewal Project #2	$35,000,000
11	2020	West Bank Interceptor Rehabilitation (Part 2)	$2,362,750
12	2020	WMARSS Project #3 – Rehabilitate Bellmead Interceptor	$2,179,000
13	2020	Reroute of Wooded Acres Lift Station Flows from Cottonwood Basin to Brazos Basin Interceptor	$1,626,525
14	2020	Added Pumping Capacity at Landon Branch Lift Station	$1,559,300
15	2021	Added Capacity TSTC Lift Station and Force Main Improvements	$6,463,525
16	2021	Abandon Lindsey Hollow Lift Station and Force Main Improvements	$2,817,750
17	2022	Barron's Branch Added Capacity Wastewater Line	$4,277,825
18	2022	WMARSS Project #4 – Replace Lower Limits of Cottonwood Interceptors	$5,683,000
19	2022	Cottonwood Basin Added Capacity Wastewater Line	$8,272,400
20	2023	2023-2026 Asset Renewal Project #3	$35,000,000
21	2023	Abandon McLennan County Jail Lift Station and Gravity Extension to WMARSS LaSalle Lift Station	$1,187,000
22	2023	Lake Shore Lift Station	$1,764,325
23	2024	WMARSS Project #5 – Replace Middle Section of Cottonwood Interceptors	$4,485,000
24	2024	Gravity Line Upstream of Church Road Lift Station	$6,159,650
25	2024	Reroute Greenleaf, Village Green, Park Lake, and Chimney Hill Lift Stations	$1,159,125
26	2024	Syrian Club Lift Station	$1,060,800
		Total Estimated Cost of Projects	$244,294,650

*Inflation is not included in estimated costs. Costs include engineering, construction, contingencies (37.5 percent) and land acquisition.

Chart 5.3: Wastewater CIP Projects by Type and Estimated Cost



11-20 Year Capital Improvement Projects

Map 5.3 identifies Waco projects that the City of Waco should consider in the 11-20 Year timeframe. Each project should be evaluated carefully as part of a subsequent wastewater collection system master plan update. These projects were identified as part of this effort but did not have a resultant rating to merit inclusion within the proposed 1-10 Year Capital Improvement Program project listing. Projects such as these that are driven by development should be supported by an impact fee to assist in paying for asset renewal and added capacity type projects.

The 2015 Wastewater Collection System Master Plan will make sure that City of Waco residents and businesses are provided with efficient and reliable wastewater service. The challenge for the City will be to effectively finance the implementation of the Capital Improvement Program. Projects have been distributed to appropriate future years to provide a fiscal year cash flow projection. As a result, the implementation of the projects can be tailored to meet the needs of the Water Utilities department, as well as economic and cash flow considerations.

5.3 Stormwater Management

5.3.1 Introduction

The City of Waco includes portions of four major, regional watersheds, all within the Brazos River Basin. Three of these watersheds, the North Bosque River, the Middle Bosque River, and the South Bosque River all converge into the City's primary water supply reservoir – Waco Lake. Waco Lake is a U.S. Army Corps of Engineers reservoir which is intended to provide flood control to the Waco area as well as boating, fishing, recreation, and our water supply.

The remaining areas of Waco drain into the Brazos River, as does the discharge from the Waco Lake Dam. The Brazos River has a labyrinth weir dam within Waco's city limits which forms Lake Brazos. Lake Brazos is a viable water supply source although it is currently not being used as such. It is, however, being used as a major source for water sports, fishing, and recreation, and is a key component to the economic viability of Waco's core Central Business District as well as to the growth and sustainability of Baylor University.

Therefore, since the entire area of the City of Waco lies wholly within these key, critical watersheds, comprehensive planning for the future should include:

- The quality of water for drinking water supplies.
- The quality of water for recreational use of the rivers and lakes.
- Public safety and the reduction of flood damage, including loss of human life and property damage.

Contributing to these four rivers which create these two reservoirs are 15 major creeks comprising over 53 miles of waterways all within the city limits! Through sound planning and keen vision these creeks and streams can provide natural networks to not only provide floodwater conveyance, but to provide connected corridors for trail systems for current and future users (pedestrians, cyclists, equestrians, etc.), greenways (greenbelts), and wastewater collection systems.

5.3.2 Managing and Protecting Stormwater Assets

Waco's Past

Historically, Waco, along with most U.S. cities, has focused on protecting human life and property from floodwaters. Waco's *Storm Drainage Design Manual* was published in 1959 and was the forerunner for municipal stormwater management. Municipalities around the State and across the U.S. used information from the Manual to establish their own drainage design criteria. The City of Austin, considered by many to be a leader in urban stormwater management, has utilized Waco's Manual as the foundation for much of their own drainage design criteria.

The Manual is an excellent reference for engineers and designers to use to design components of an urban storm drain system – inlets, storm sewers, culverts, ditches, and channels. The Manual's focus and intent is to provide criteria for engineers to utilize when designing storm drainage systems for new urban development or for the rehabilitation for existing infrastructure. The Manual does not 1) address the effects of urbanization on downstream waterways and properties; 2) the management and protection of floodplains; or 3) the quality of the stormwater runoff from urbanized areas and the possible effects it may have on the water quality of the receiving streams, rivers, and lakes.

In 2013 the City of Waco adopted new "Stormwater Management Regulations" in order to 1) supplement the *Storm Drainage Design Manual*; 2)establish new stormwater management policies to mitigate the adverse impacts of increased stormwater flowrates due to urbanization; 3) preserve and protect the floodplains; and 4) enhance the quality of stormwater runoff from urbanized areas.

Stormwater Management Today

The City is currently updating their Stormwater Master Plan which will be the "roadmap" for future stormwater management planning. The goals for the Master Plan will need to include the following:

- Accurate establishment and mapping of the limits of the 100-year floodplains of the creeks and streams within the city limits, based upon urbanization as it exists today, as well as for future growth/urbanization.
- The review and updating of stormwater management regulations and design criteria in an effort to reduce the loss of human life caused by flooding; to reduce flood damage to property; and to reduce soil erosion.
- The assurance of adequacy and safety of existing drainage infrastructure including bridges, culverts, channels, and other facilities/structures.
- New policies, regulations, and ordinances to minimize pollutants and soil sediment transport in stormwater runoff from new and existing development.
- The exploration of regional approaches to stormwater management planning.
- Identification of local and regional flood mitigation projects to provide long-term, sustainable flood protection measures.

- Guidelines and recommendations for some type of stormwater fee structure in order to maintain and manage the existing drainage infrastructure as well as for the planning and construction of new capital improvements.

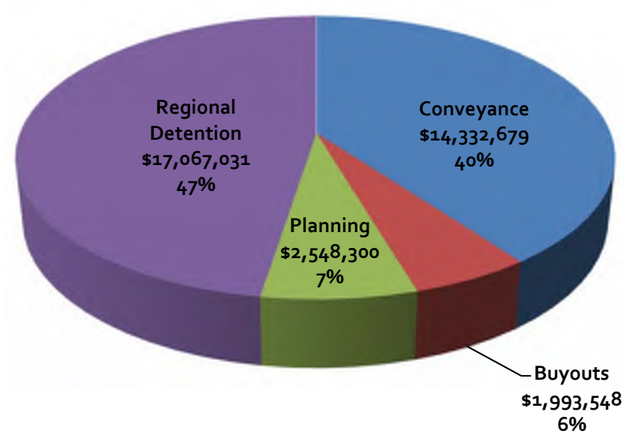
5.3.3 Regional Stormwater Management Planning

Stormwater runoff travels downhill from wherever it lands to a nearby creek or stream and ultimately to a river or lake with no regard for property boundaries or limits of a municipality's jurisdiction. Consequently, stormwater management is "regional" by its very nature. Recently, the City of Waco applied for a Flood Protection Planning Grant through the Texas Water Development Board for flood protection engineering and planning for 7 of the 15 major creeks in Waco – Flat Creek, Cottonwood Creek, Lower Waco Creek, Upper Waco Creek, Waco Creek North, Primrose Creek, and Barron's Branch. Due to the fact that many of these creeks flow through multiple jurisdictions, the Cities of Robinson, Hewitt, Woodway, Beverly Hills, and McLennan County were all participants in the grant application process. As a result of this application process, these entities have seen the potential benefits of managing the "shared" watersheds, creeks, and streams on a regional level and now the Cities of Lacy Lakeview and Bellmead are participating in discussions on the value of regional alliances in developing regional stormwater management policies and guidelines and in implementing regional flood mitigation projects. These alliances will need to be developed further and strengthened in order to implement regional stormwater management.

5.3.4 Funding Waco's Stormwater Assets

The City of Waco's 2003 Stormwater Master Plan identified $36 million in stormwater related capital improvement projects (see Chart 5.4). These projects consisted of $2.5 million in planning; $2 million in buyouts or purchasing flood-prone properties that were cost prohibitive to mitigate; over $14 million in stormwater conveyance improvements; and over $17 million in regional detention facilities.

Chart 5.4: Stormwater Capital Costs from 2003 Plan



This stormwater capital improvement program has not been implemented to date primarily due to two reasons:

- Waco (and Texas) has experienced a severe drought for the past six years, as has most of the western United States, and therefore flood mitigation projects have not had as high a priority as water supply improvement projects.
- Waco has no funding source or revenue stream by which to fund these improvements.

There are basically two types of stormwater fee programs that have been implemented locally and nationally in order to manage, maintain, and construct new stormwater management infrastructure facilities:

- A "flat" fee that is set annually whereby each property owner pays the same amount regardless of how much property or amount of impervious cover is owned.
- A "consumption-based" fee whereby every land owner pays a pro-rata share determined by the amount of property and impervious cover owned.

The "flat" fee method is the most simplistic and generally has a land use categorical variant such as residential, commercial, and industrial so that local homeowners/citizens do not bear the same burden as industries or commercial establishments. Some cities, such as Houston, have combined this "flat" fee assessment with their street maintenance / management fund to provide a revenue stream for the upkeep of both their drainage and street assets.

The "consumption-based" fee is a more complex approach but is often deemed as a more fair approach in that the more acreage and impervious cover a property owner has, the greater the contribution of stormwater runoff and hence the higher the fee. A combination of the "flat" fee and "consumption-based" fee has been used successfully in tandem whereby a fixed rated is established for residential, commercial, and industrial owners and a "consumption-based" fee is applied accordingly. This method can keep the fees for small homeowners and citizens on fixed incomes to a minimum and allow the larger, more intensely developed properties to support an appropriate pro-rata share.

The structure of the stormwater fee(s) is limitless, and there are many ways for a city to achieve its goals. A stormwater fee program does allow a city to treat stormwater as a utility, similar to water and sanitary sewer, and therefore assess a utility fee just as they would for each of these utilities.

In addition to a utility-type of fee for stormwater management, some municipalities have been successful in applying impact fees to new developments to help fund downstream maintenance or capital improvement costs. Under this scenario, new developments may pay their pro-rata share of CIP or operation and maintenance costs without having to bear the burden of paying for all of the off-site improvements just to accommodate the proposed development. The city could then save these fees until enough funds are generated by other developments to move forward with the necessary improvements, or go ahead and fund the project and reimburse themselves through future impact fees.

- Storage Tanks
- Pressure Reducing Values

Pipe Priorities

- 2020
- 2030
- 2040
- As Funds Permit

Pressure Planes

- 1st Pressure Plane
- 2nd Pressure Plane
- 3rd Pressure Plane
- 4th Pressure Plane
- 5th Pressure Plane
- 6th Pressure Plane

Waco City Limits

Outside Waco City Limits

N

0 0.5 1 2

Miles

July 2016

Map 5.1: Proposed Water Utility Improvements

CITY OF WACO

Lake Waco

Brazos River

Tehuacana Cre

Lacy-Lakeview

Bellmead

Woodway

Beverly Hills

Robinson

Hewitt

China Spring Rd

Steinbeck Bend Dr

Lake Shore Dr

N 19th St

North River Crossing

N Hwy 6

Speegleville Rd

Old Loreno Rd

Park Lake Dr

N 25th St

MacArthur Dr

Hillcrest Dr

New Rd

Bosque Blvd

Lake Air Dr

N Valley Mills Dr

S Valley Mills Dr

Sanger Ave

Franklin Ave

Memorial Dr

Santa Fe Dr

Imperial Dr

Tx Central Pkwy

Hewitt Dr

Chapel Rd

Panther Way

Ritchie Rd

Bagby Ave

N 4th St

N 18th St

Herring Ave

M L King Jr Dr

Gholson Rd

Elm St

E Waco Dr

Washington Ave

S 17th St

LaSalle Ave

S Univ Parks Dr

Craven Ave

Airbase Rd

Bellmead Dr

E Loop 340

S Loop 340

Orchard Ln

S 3rd St Rd

E Hwy 6

New Rd

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Waco Comprehensive Plan 2040

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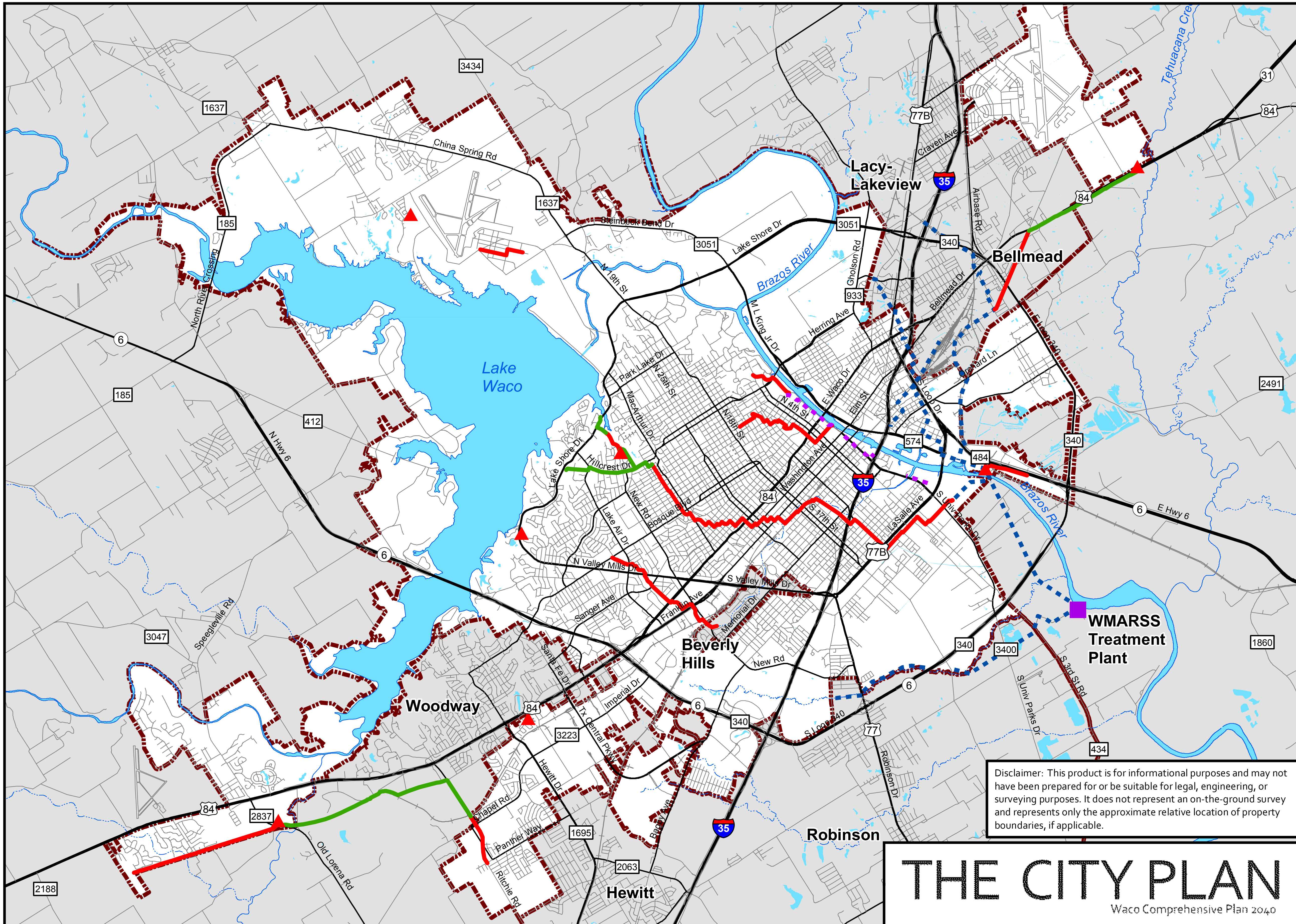
Lift Station Upgrade
Gravity Line Rehab
Proposed Force Main
Proposed Gravity Line
WMARSS Project
Waco City Limits
Outside Waco City Limits

0 0.5 1 2
Miles

July 2016

Map 5.2: Proposed Wastewater Utility Improvements: 2015 to 2025

CITY OF WACO



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Lift Station Upgrade

Treatment Plant

Proposed Force Main

Proposed Gravity Line

Waco City Limits

Waco ETJ Limits

Other City Limits

Outside Waco City Limits and ETJ

N

0 0.75 1.5 3

Miles

July 2016

Map 5-3: Proposed Wastewater Utility Improvements: 2025 to 2040

CITY OF WACO

Bosque County

Hill County

Limestone County

Coryell County

Falls County

McLennan County

Valley Mills

Tokio

Ross

Leroy

Gholson

Axtell

China Spring

Chalk Bluff

Bosqueville

Lacy-Lakeview

Bellmead

Lake Waco

Speegleville

Crawford

Woodway

Beverly Hills

Hallsburg

Mart

Riesel

Hewitt

Robinson

McGregor

Rosenthal

Lorena

Golinda

Brazos River

North Bosque River

Middle Bosque River

Tehuacana Creek

933 1858 3149 3149 308 2311 308 933 2490 1637 1637 3434 185 3051 939 2957 2491 340 185 3268 3047 2188 2837 2113 2416 2416 2113 1860 3400 1695 3148 2643 938 1330 84 6 317 35 31 164 434 77

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Waco Comprehensive Plan 2040

housing

Chapter 6 Housing

6.1 Introduction

One of the most important considerations in selecting a place to live is neighborhood. A neighborhood is much more than the sum of its structures. It is defined by a sense of community and livability enjoyed by its residents. A neighborhood is the setting in which residents may develop a sense of belonging, through their interactions, common interests and by simply "being neighbors".

A successful neighborhood is one that creates a sustainable environment where ongoing investment in property is supported by public investment in schools, parks, green space, infrastructure and essential services. It is a place where there are opportunities for social interaction, and where there is accessibility for pedestrians, cyclists, transit riders and motorists. Finally, a neighborhood is a place where distinctive characteristics are apparent, which give an area its unique identity.

Waco's neighborhoods vary in character that includes the urban form found downtown; the densely populated mix of single family and multifamily historic residences that surround downtown; the older and less dense suburban neighborhoods; and the recently developed suburban neighborhoods located on the edges of Waco and in within its extraterritorial jurisdiction. The City Plan provides strategies for the stabilization and rehabilitation of deteriorating housing stock and the preservation of older neighborhoods, as well as guidelines for new forms of sustainable residential development.

6.2 Housing Development Trends

The year 2013 had the sixth lowest number of residential lots created in the 20 year period from 1994 to 2013 as seen in Chart 6.1. Lot creation reached its lowest point during this period between 2007 and 2010 following the "great recession" and remained relatively low from 2011 to 2013. The trend may be explained in part by the relatively large supply of lots available between 1994 and 2011 in Waco Proper, Highway 84 Area, China Spring and West Waco as depicted in Chart 6.2. Most of these lots are outside of Loop 340 as demonstrated by the map showing the location of residential subdivisions approved from 1994 to the present (Map 6.1). Building permits issued from 2007-14 reflected the continued movement of residential development outside of the loop as denoted on Map 6.2; while a large supply of vacant lots remain available for infill development as illustrated in Map 6.3.

Chart 6.1: Lots Created by Year within the City of Waco

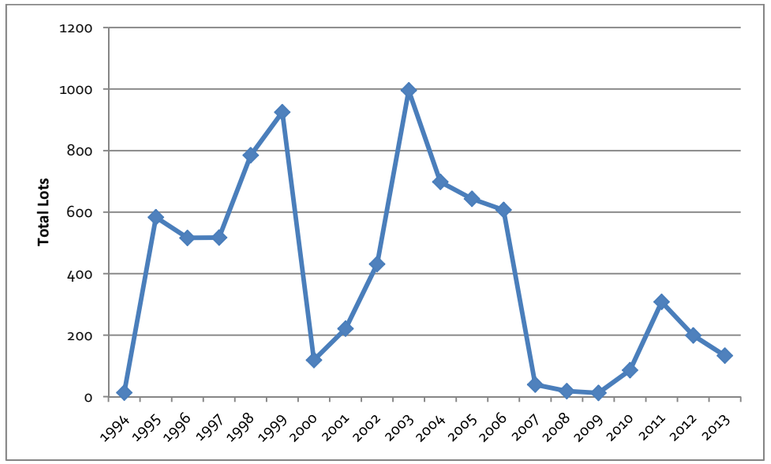
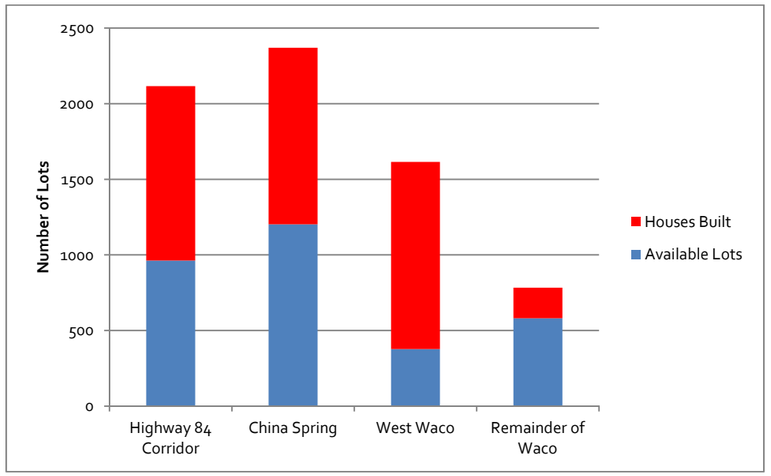


Chart 6.2: Total Lots vs. Built Lots within the City of Waco – 1994 to 2011

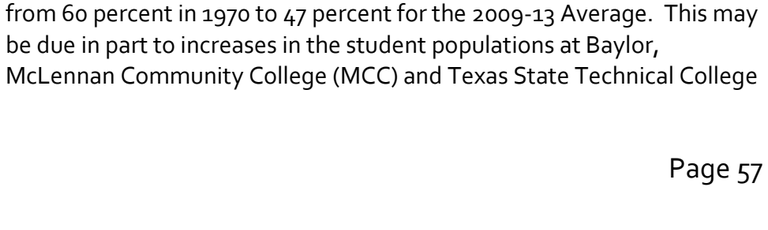


6.3 Condition of Housing Stock

Six percent of the housing units in the city of Waco were built prior to 1940 which is only slightly higher than its peer cities as shown in Chart 6.3. Obviously, almost all of these houses are located in older, inner-city neighborhoods. Many of the houses in this age category are of wood frame construction making them more difficult to maintain and less energy efficient. This conclusion is supported by the concentration of green tagged (feasible to repair) and red tagged (infeasible to repair) properties in these neighborhoods as shown on Map 6.4. While our peer cities do not differ significantly in the age of housing stock, they do differ in the level of poverty. It is probably no coincidence that the same inner-city area with the highest number of tagged structures is also the same area with the highest level of poverty as shown in Map 6.5.

At the same time, these old structures are a major contributor to the distinctive character of these neighborhoods and serve as an attraction for young families with an interest in finding an old house at a relatively low price and restoring it over time. Evidence of this trend appears to have increased in recent years; however, many of these houses remain in jeopardy. One positive trend is the decrease in tagged structures from 219 to 132 between 2011 and 2015. In general, approximately one third of these structures are demolished with the remainder being renovated. While restoration is preferable, the demolition of dangerous, unsightly structures can improve the appearance and safety of the neighborhoods.

Chart 6.3: Percent of Housing Units built prior to 1940



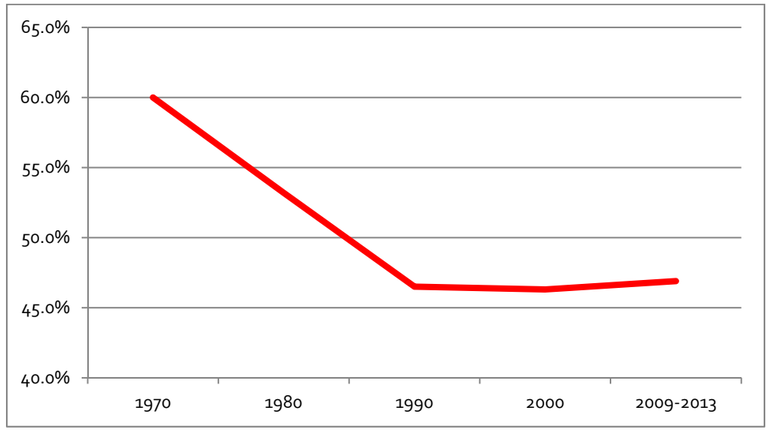
Source: US Department of Commerce: Bureau of the Census – American Community Survey; 2009-2013

6.4 Housing Tenure

Historically consistent, the number of renter-occupied housing units is higher than owner-occupied units reflective of a large student population. As shown in Chart 6.4, the owner occupied rate has fallen from 60 percent in 1970 to 47 percent for the 2009-13 Average. This may be due in part to increases in the student populations at Baylor, McLennan Community College (MCC) and Texas State Technical College

(TSTC). However, the percent of owner occupied housing units continues to rank substantially behind those of the county, state and nation as well as Waco's peer cities average. The most current figures indicate that Waco has a homeownership rate of 40 percent as compared to an average rate of over 50 percent for its 11 peer cities, seven of which have colleges, universities or a military base that comprise from approximately 10 percent to 40 percent of their populations (see Chart 6.5).

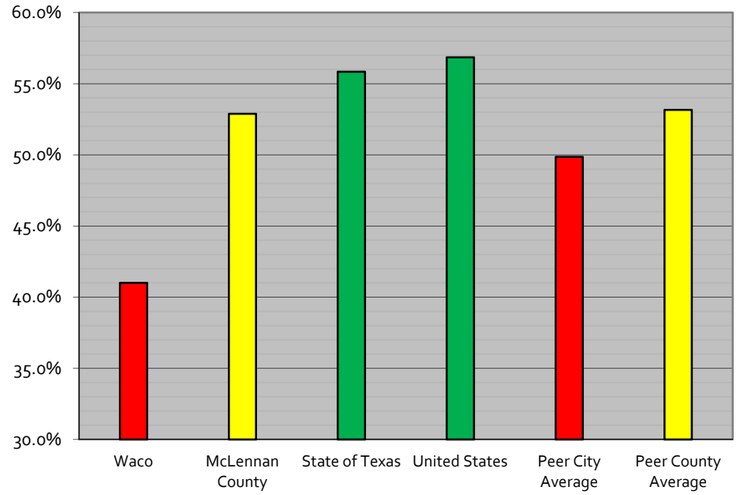
Chart 6.4: Percent Owner-Occupied Housing Units within City of Waco – 1970 to Present



Source: US Department of Commerce; Bureau of the Census

It is highly likely that a primary contributor to Waco's low homeownership rate is its relatively high rate of poverty. The high housing cost burden for Waco's low to moderate income residents, especially for those that rent, makes it extremely difficult for them to become homeowners. This conclusion is further substantiated by the fact that the percentage of those households renting is greater in the areas where there is the greatest concentration of poverty as portrayed by Map 6.6.

Chart 6.5: Percent Owner Occupied Housing Units



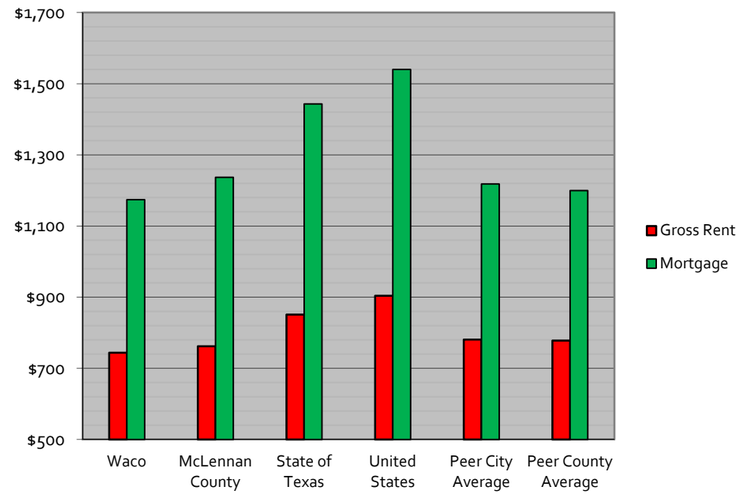
Source: US Department of Commerce: Bureau of the Census – American Community Survey; 2009-2013

6.5 Housing Affordability

The city of Waco's most common housing problem is housing cost burden with 35.14 percent of total households, regardless of income, having a cost burden. A household that spends over 30 percent of its income on housing is considered to have a cost burden. The lower the income, the greater is the percentage with a housing cost burden. Of total households, 70.3 percent of extremely low income; 73.8 percent of low income; and 48.1 percent of moderate income households have a cost burden. This translates to 14,680 low to moderate income households in Waco with a cost burden.

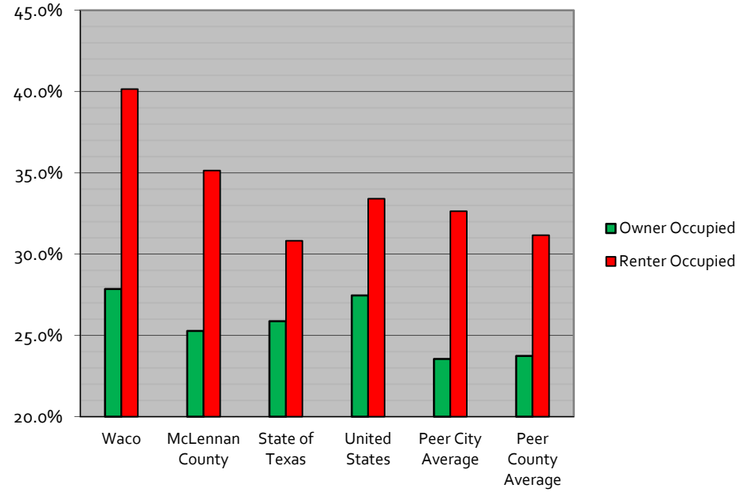
Waco's median mortgage costs and gross rent are slightly lower than peer city average and considerably less than those of the state and the nation as shown in Chart 6.6. However, rent and mortgage costs as a percent of household income are substantially higher than for their peer city average as well as for the state and nation with one exception: Waco's mortgage costs as a percent of household income is on a par with that of the nation as demonstrated in Chart 6.7. Given that Waco's median mortgage costs and gross rents are lower, this significantly higher cost burden is most likely related to the fact that almost 30 percent of Waco's residents live below the poverty level and more than 50 percent live at less than 200 percent of the poverty level (considered a living wage).

Chart 6.6: Median Mortgage Costs & Gross Rent



Source: US Department of Commerce: Bureau of the Census – American Community Survey; 2009-2013

Chart 6.7: Housing Costs as a Percent of Household Income



Source: US Department of Commerce: Bureau of the Census – American Community Survey; 2009-2013

The City of Waco works together with a number of public and nonprofit organizations on programs to reduce the barriers to affordable housing. Examples of these programs include:

- Owner-Occupied Rehabilitation /Reconstruction Loan Program
- New Construction Loan Program and New Housing Acquisition Program that provide income qualified home buyers with down payment and closing cost assistance.
- Infill Development Program offers release of liens and fee waivers as incentives for builders and developers to purchase private property in designated areas for construction of new housing.
- Residential Tax Abatement Program for qualified homebuyers purchasing or making substantial improvements to homes in low income areas.
- Development of Affordable Housing Units working in cooperation with Community Development Corporations and Community Housing Development Organizations.

Map 6.7 illustrates the impact of these programs on meeting the housing needs of low to moderate income households and encouraging infill development in the inner city. This map documents the new construction and rehabilitation projects completed by the City of Waco and its nonprofit partners. While these projects date back as far as 1980 for Habitat (and even further, if included, for the City of Waco) the great majority of the projects were completed between 2000 and the present. Most of the projects shown on the map were assisted through the City of Waco's down payment and closing cost assistance programs. Rehabilitation and construction projects by private sector builders (not shown on the map) have also benefited from these programs.

Image 6.1: Example of single family residential infill development project by the Waco Community Development Corporation, Habitat for Humanity & Neighborworks

6.6 The Role of Housing in Achieving Sustainable Development

The quality and livability of Waco's neighborhoods are integral to the community's overall character and quality. It is in the public interest to maintain the highest possible housing quality and environmental character within each neighborhood.

New housing subdivisions being developed on vacant land have the opportunity to build in the sustainable principles that will create more livable neighborhoods for current and future generations. This can be accomplished through preserving the rural character of these areas in the form of open space, creating connectivity within a subdivision as well as connecting to surrounding developments; and minimizing the infrastructure required to support new homes.

Many of Waco's existing neighborhoods consist of well-maintained homes. It is important that the city use the tools at its disposal to ensure that these neighborhoods remain stable through the enforcement of codes and ordinances; the provision of quality services; and the maintenance and improvement of public infrastructure.

Image 6.2: The Castle Heights Neighborhood is recognized as one of Waco's stable inner-city neighborhoods. It received National Register Historic District status in the fall of 2009.

Inner-city neighborhoods are particularly impacted by an aging housing stock; the greatest concentration of tagged properties; low levels of home ownership; and the greatest concentration of poverty. Housing conditions and poverty must be addressed simultaneously if progress is to be achieved in either of these important realms. As stated in the economic development component of this plan, the Prosper Waco initiative represents the greatest promise for directly addressing Waco's high poverty rate. The City Plan can support this effort through providing strategies that encourage the creation of a built environment that will facilitate the implementation of the Prosper Waco programs. This environment will include decent affordable housing; quality public infrastructure and services; pedestrian and bicycle friendly neighborhoods; improved public transit; and access to jobs, health care, and childcare facilities.

6.7 Area Specific Strategies

Five strategies have been identified for the purpose of addressing the diverse needs of all of Waco's neighborhoods. These strategies are defined below and applied to areas within the City of Waco on Map 6.8.

Development and Redevelopment Guidance – This strategy is intended to be used during the stages of zoning change and/or subdivision approval and should provide City staff with an opportunity to ensure that the City's commitment to quality will be reflected in the design and construction of new residences. Development generally involves large parcels of vacant land; while redevelopment involves land that is transitioning to a more urban form that includes mixed residential densities and commercial development.

Image 6.3: Redevelopment within the College and University Neighborhoods District surrounding Baylor University. This overlay district was implemented to facilitate development which complements the physical and social characteristics of a higher education institution while protecting the surrounding existing neighborhoods.

Neighborhood Preservation – This strategy is intended to sustain and protect existing desirable conditions through enforcement of local statutes such as zoning ordinances, building codes and other applicable

regulations intended to protect the public health, safety and welfare of the community.

Maintain and Restore/Rehab – This strategy is appropriate where the housing units are substantially sound, but are in need of minor repairs, defined as repairs that can be accomplished without excessive costs or can generally be achieved by the property owners themselves. A relatively small percentage of these houses are beyond rehabilitation and in need of demolition and reconstruction.

Restore/Rehab and Redevelop – This strategy applies to areas in which housing conditions have reached the point where spot demolition and redevelopment may be required on a limited scale. This condition is likely related to the age, composition, and level of deferred maintenance.

Image 6.4: A red tagged structure near Downtown Waco

Urban Core District - This strategy applies to the areas generally known as the Downtown and Elm Avenue areas. Both areas play a unique role in defining Waco's image and contain a concentration of historically significant structures. The restoration of historic structures; rehabilitation of other structures in need of repair; and redevelopment of vacant land (including surface parking lots) to an urban form are critical components of this strategy. Development should respect the unique character of the two areas and be carried out in accordance with *Imagine Waco: A Plan for Greater Downtown.*

Image 6.5: Franklin Place in Downtown Waco

6.8 Implementation Strategies

- Incentivize more sustainable residential subdivisions that minimize the requirements for public investment; protect the environment; and preserve the character of rural areas.

- Amend the subdivision ordinance to increase the minimum single-family residential lot size for greenfield developments and encourage cluster development through the provision of density bonuses.

- Give priority to capital improvement projects that contribute to the stabilization and redevelopment of inner-city neighborhoods.

- Amend the land use plan and zoning ordinance to encourage more mixed use development as a means of revitalizing neighborhood commercial areas; providing a range of housing densities and affordability; and creating a more pedestrian, bicycle and transit friendly environment.

- Strengthen building code and zoning ordinance enforcement through increasing the number of enforcement officers and involving neighborhood associations as a means of stabilizing inner city neighborhoods.

- Implement a periodic inspection program for residential rental properties as a means of maintaining neighborhood stability.

- Amend the zoning ordinance to permit accessory structures in order to achieve a more sustainable level of density; increase the supply of affordable housing; create more income diverse neighborhoods; and allow senior citizens to continue to remain in and better maintain their homes.

- Adopt design guidelines for the sale of tax foreclosed and City owned properties that contribute to the preservation of neighborhood character.

- Strengthen the standards of the Neighborhood Conservation overlay zoning district and apply them to all properties in the district.

- Amend the Historic Landmark Preservation Ordinance to facilitate the designation and maintenance of neighborhoods as historic districts.

- Continue to work closely with neighborhood associations through seeking their input concerning projects, policies and issues that impact their neighborhood.

- Consider creation of a housing trust fund that would receive ongoing contributions of public and private funds to support the preservation and construction of affordable housing and increase opportunities for families and individuals to access decent, affordable homes.

- Engage in Land Banking as a means of assembling parcels of land for development in a manner that would contribute to the long term stability of an area.

- Consider creation of a community land trust that would purchase or otherwise receive land and make it available for community purposes, including affordable housing.

- Consider using Public Improvement Districts and Reinvestment Zones for Residential Tax Increment Financing to serve as tools for the creation of stable, mixed income neighborhoods.

- Adopt inclusionary zoning provisions that would offer incentives such as density bonuses and reduced parking requirements for including an agreed upon percentage of affordable housing units in residential developments.

- Continue the use of land; low interest; and forgivable loans; closing cost and down payment assistance; and fee waivers as a means of providing access to affordable housing.

- Continue to work closely with the Waco Housing Coalition to ensure effective and efficient use of the limited resources available to meet the need for decent, affordable housing.

Date Submitted

- 1994 to 1999
- 2000 to 2009
- 2010 to Present

Waco City Limits

Waco ETJ

Outside Waco City Limits and ETJ

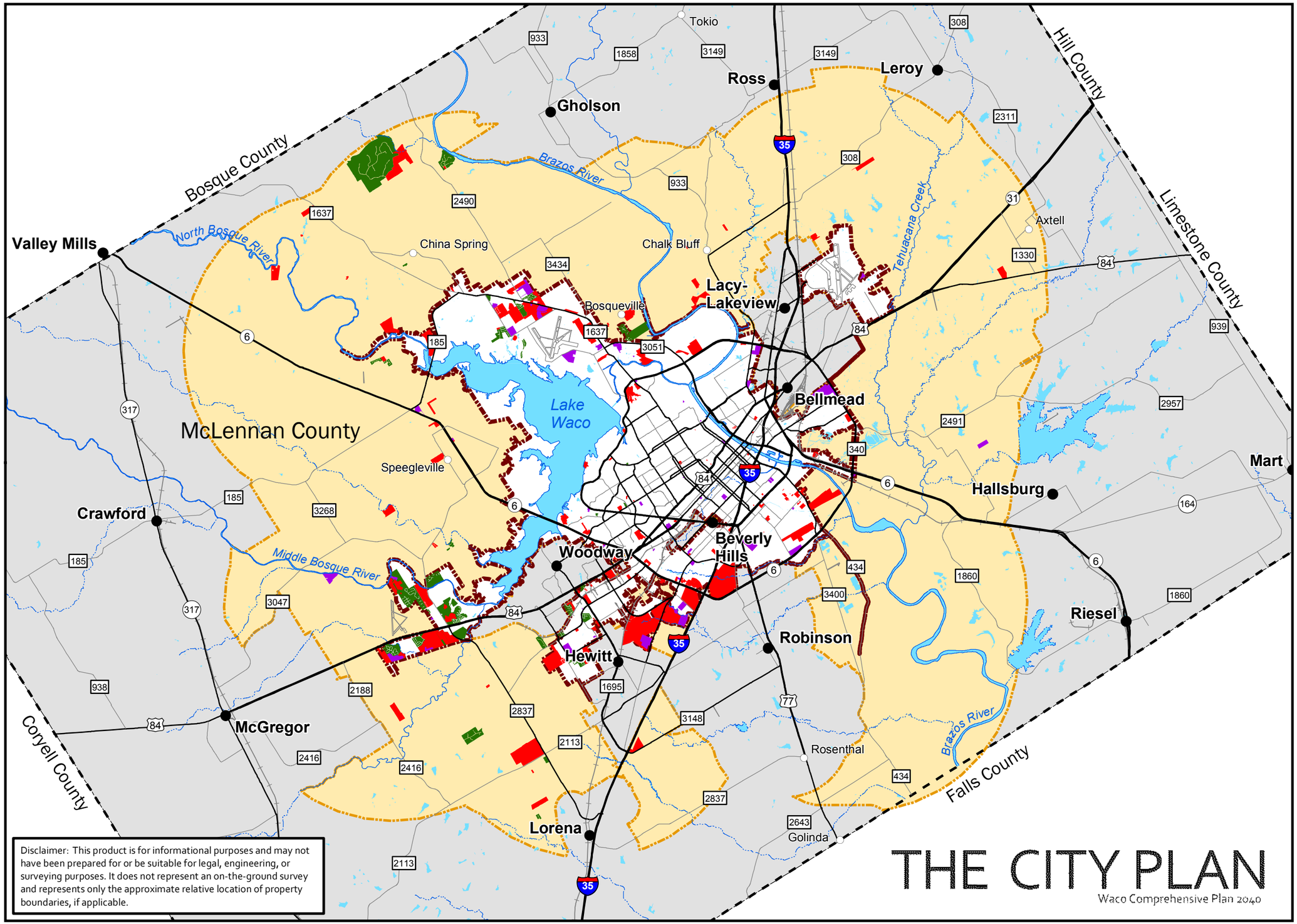
0 0.75 1.5 3

Miles

July 2016

Map 6.1: Residential Subdivisions Submitted Since 1994 City of Waco and ETJ

CITY OF WACO



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THE CITY PLAN

Waco Comprehensive Plan 2040

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Total Permits

- None
- Less than 10
- 10 to 20
- 21 to 100
- 101 to 200
- Greater than 200

Waco City Limits

Outside Waco City Limits

0 0.5 1 2

Miles

July 2016

Map 6.2: Total Residential Building Permits 2007 to 2014 by Census Tract*

CITY OF WACO

*Census Tracts at least partly within the City of Waco.

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Waco Comprehensive Plan 2040

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Vacant Property

Waco City Limits

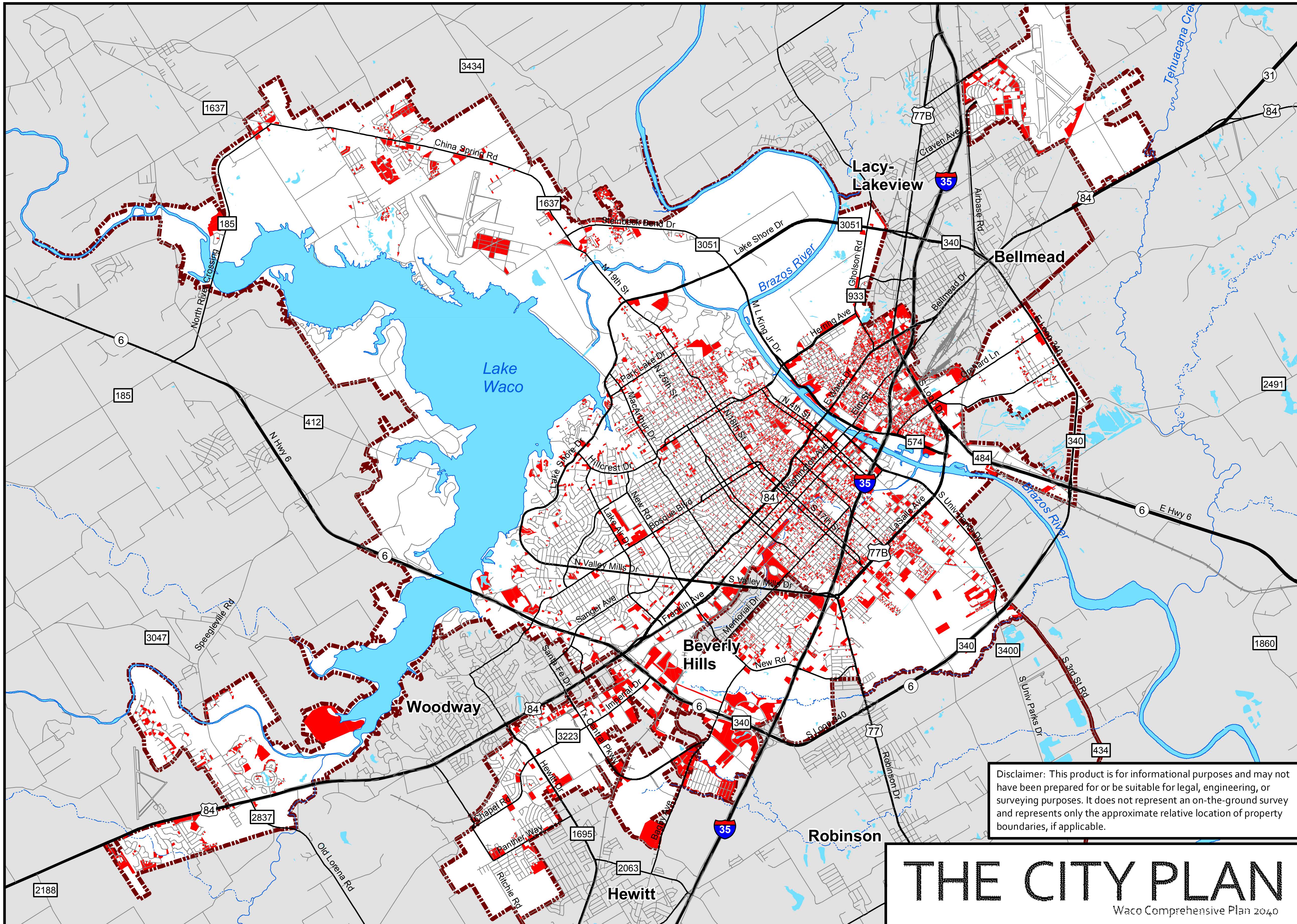
Outside Waco City Limits

0 0.5 1 2
Miles

July 2016

Map 6.3: Vacant Property Available for Development - 2013

CITY OF WACO



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THE CITY PLAN
Waco Comprehensive Plan 2040

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Map 6.4: Residential Structures Tagged for Repairs - 2015

Tag Color

- Red
- Green

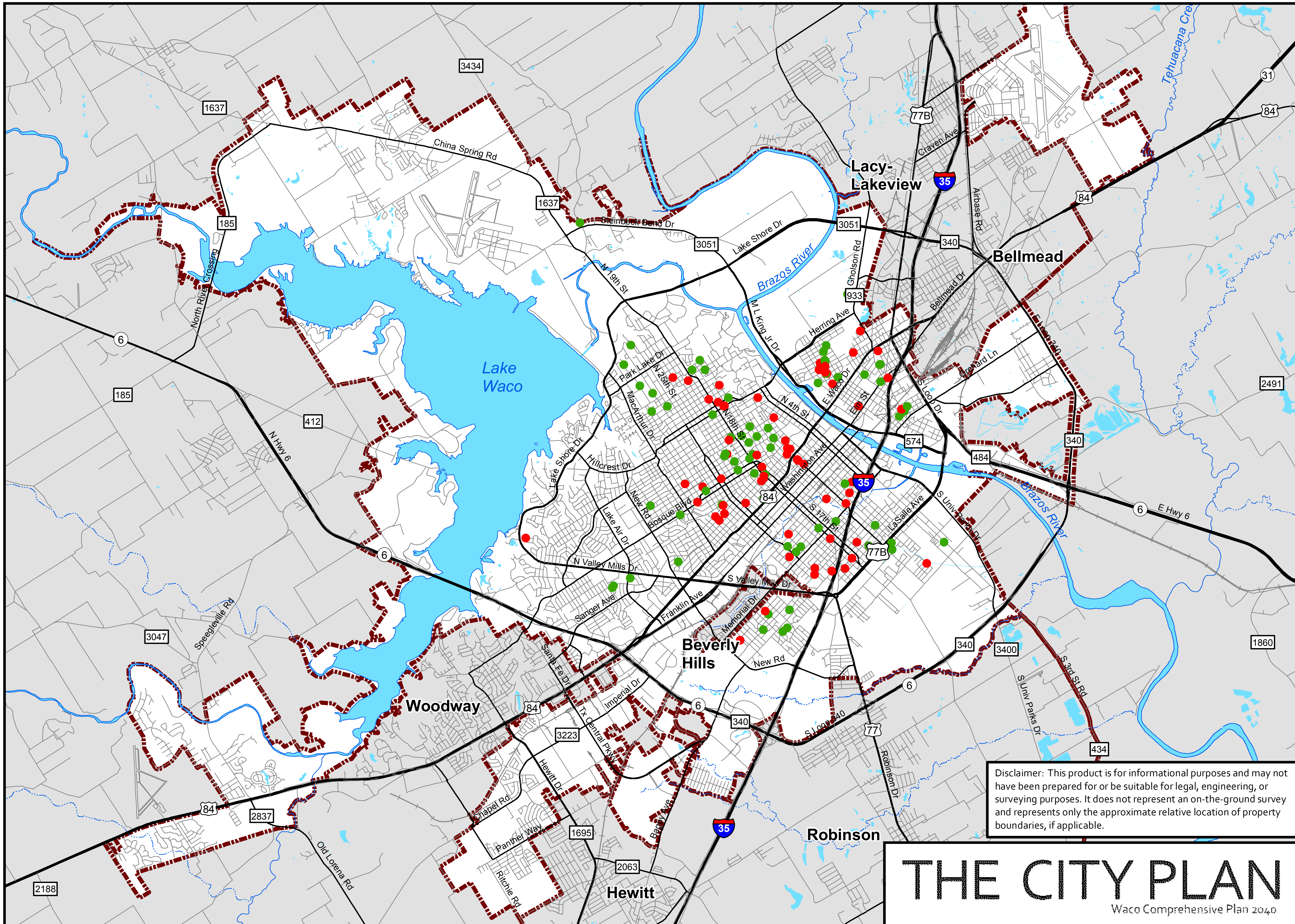
Waco City Limits

Outside Waco City Limits

0 0.5 1 2
Miles

July 2016

CITY OF WACO



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THE CITY PLAN

Waco Comprehensive Plan 2040

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Percent of Population

- Less than 25%
- 25.0% to 49.9%
- 50.0% to 75.0%
- Greater than 75%

Waco City Limits

Outside Waco City Limits

0 0.5 1 2

Miles

July 2016

Map 6.5: Percent of Population with Income less than 200% of Poverty City of Waco by Census Tract*

CITY OF WACO

*Census Tracts at least partly within the City of Waco.

Source: US Department of Commerce; Bureau of the Census - American Community Survey: 2009 to 2013

Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries, if applicable.

THE CITY PLAN
Waco Comprehensive Plan 2040

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Percent Renter Occupied

- Greater than 75%
- 51% to 75%
- 25% to 50%
- Less than 25.0%

Waco City Limits

Outside Waco City Limits

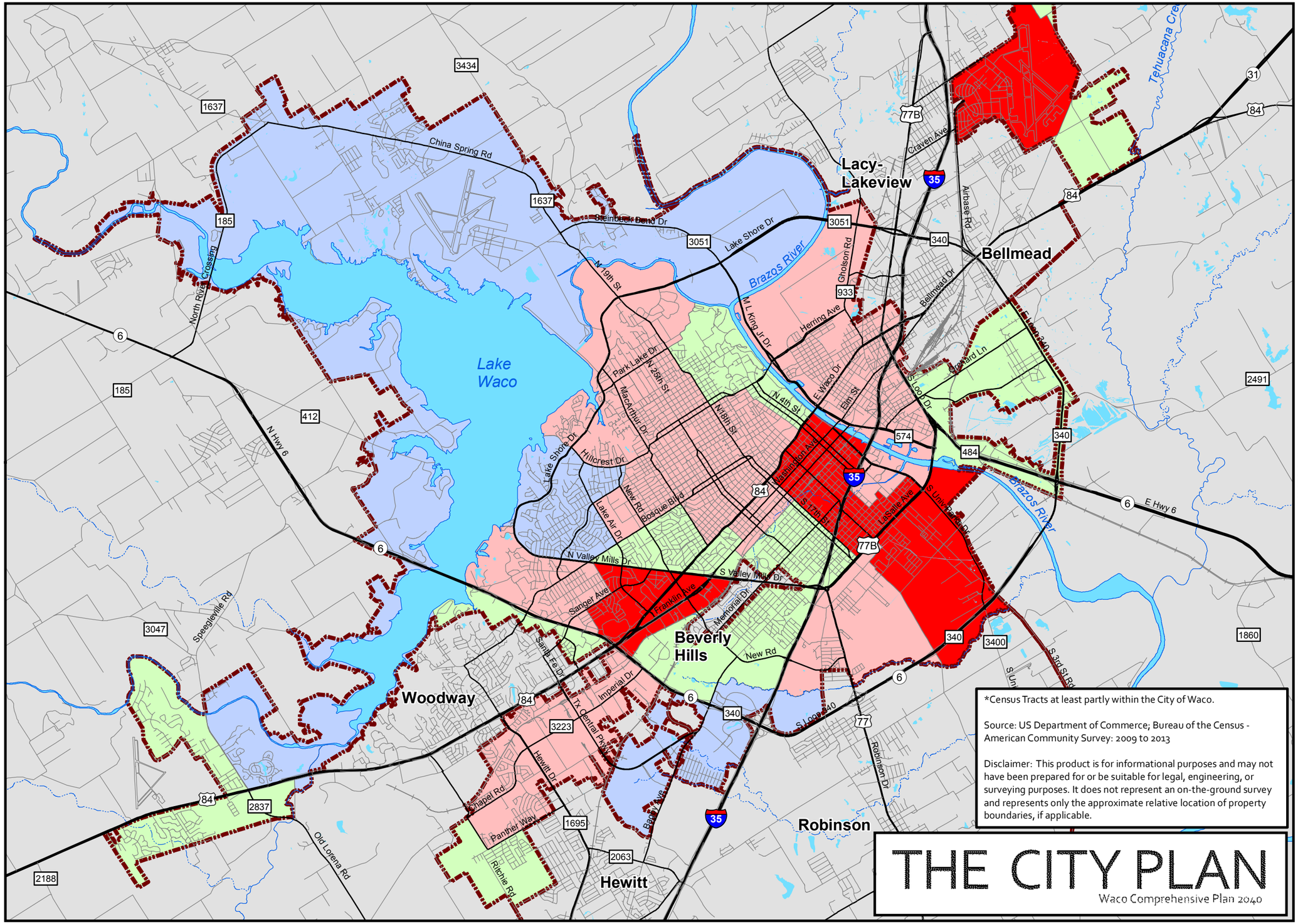
0 0.5 1 2

Miles

July 2016

Map 6.6: Percent Renter Occupied Housing Units City of Waco by Census Tract*

CITY OF WACO



*Census Tracts at least partly within the City of Waco.

Source: US Department of Commerce; Bureau of the Census - American Community Survey: 2009 to 2013

Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries, if applicable.

THE CITY PLAN

Waco Comprehensive Plan 2040

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Agency

- Waco CDC
- NeighborWorks
- Habitat New Homes

Waco City Limits

Outside Waco City Limits

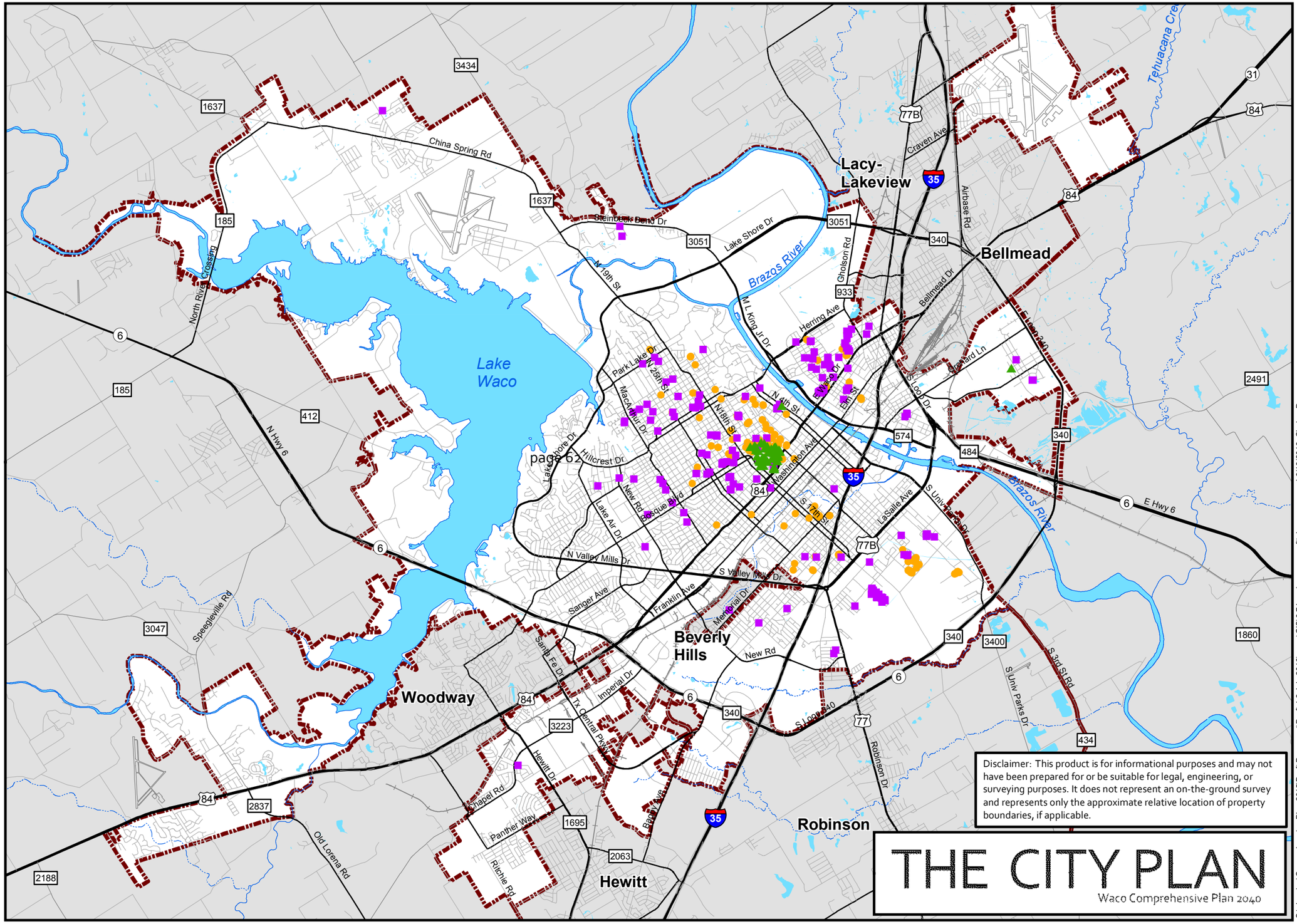
0 0.5 1 2

Miles

July 2016

Map 6.7: Single Family Housing Units Constructed or Rehabilitated by Non-Profits

CITY OF WACO



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THE CITY PLAN

Waco Comprehensive Plan 2040

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Proposed Strategies

- Neighborhood Preservation
- Maintain & Restore / Rehab
- Restore / Rehab & Redevelop
- Develop & Redevelop Guidance
- Urban Core District

Waco City Limits

Outside Waco City Limits

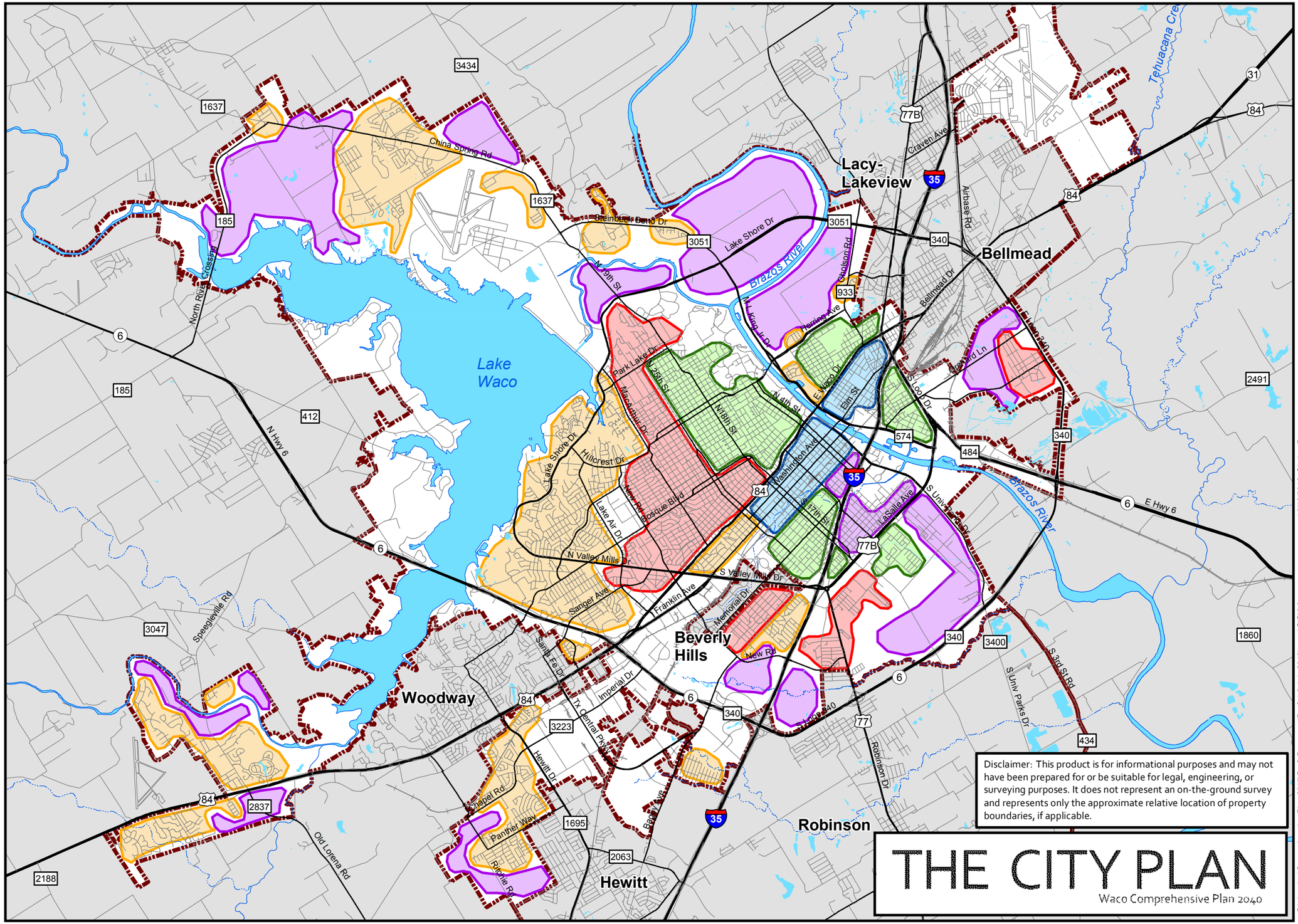
0 0.5 1 2

Miles

July 2016

Map 6.8: Proposed Residential Strategy Areas

CITY OF WACO



Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries, if applicable.

THE CITY PLAN

Waco Comprehensive Plan 2040

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Waco Comprehensive Plan 2040

livability

Chapter 7: Livability

7.1 Introduction

"Livability is the sum of the factors that add up to a community's quality of life: including the built and natural environments; economic prosperity; health and safety; social stability; educational opportunity; and cultural, entertainment and recreational possibilities."
Source: Partners for Livable Communities

Waco's livability continues to improve at an accelerating pace. One need only look to the recent changes along the Bosque and Brazos River corridors for proof of the metamorphosis that is occurring throughout the city. These changes include the Waco Mammoth National Monument; Riverbend Park (a recreational complex that includes the Dubl-R Ball Fields, Hawaiian Falls Water Park and the Waco Regional Tennis & Fitness Center); the ever expanding Cameron Park Zoo; a restored Cameron Park; an essentially new Brazos Park East; a beautifully renovated Waco Convention Center; increasing reinvestment in Greater Downtown; an expanding Baylor Campus on both side of the river; a new signature bridge over the Brazos on IH-35; and the continuing expansion of the Brazos Riverwalk. It is safe to say that Waco has not experienced changes of this magnitude in decades.

7.2 Parks and Recreation

A city's parks and recreational facilities are a major contributor to its livability. Waco has a number of outstanding parks and recreational facilities with the crown jewel being the 400 plus acre William Cameron Park. According to the 2014 inventory, the City of Waco park system included 56 facilities covering approximately 1,300 acres. In addition, the U.S. Army Corps of Engineers maintains approximately 3,800 acres of park land and open space. Finally, there are approximately 846 acres of private/fee use facilities that consist mostly of public and private golf courses and a waterpark.

A classification system based on standards identified by the National Recreation and Park Association was used to identify different types of parks based on criteria such as site size, type of facilities and service area. The following is a brief description of each of the five standard park categories:

Open Space – consists of little or no developed areas or recreational venues. They may include bicycle and/or pedestrian facilities and thus are often linear in nature.

Image 7.1: Karem Park

Neighborhood Parks – service area of ¼ to ½ mile and should provide 1.25 to 2.5 acres per 1000 persons served.

Image 7.2: Alta Vista Park

Community Parks – service area of 1 to 2 miles and should provide 5.0 to 8.0 acres per 1000 persons served.

Image 7.3: Sul Ross Park includes a skate park with ramps, grinds and rails. It also features a pavilion, tennis courts and playground area

Regional Parks – service area covers an entire region, such as a county and there are no set standards for acreage.

Image 7.4: Redwood Shelter in Cameron Park, which is a regional park

Special Use Parks – service area covers an entire region and addresses specific recreational venues such as golf, baseball/softball, soccer, and disc golf.

Image 7.5: Cottonwood Golf Course, an example of a special use park

Charts 7.1 and 7.2 respectively show the percentage of the total number of parks and the percentage of the total acreage of parks devoted to each of the five categories within the City of Waco park system. In terms of absolute numbers, the City of Waco hierarchy generally conforms to expectations, with a greater number of neighborhood and special use parks and a lesser number of community or regional parks.

Chart 7.1: City of Waco Parks by Classification - 2014

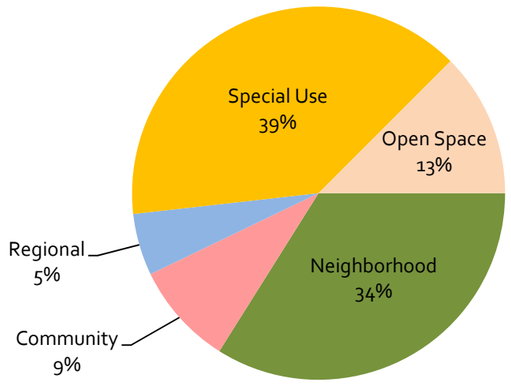
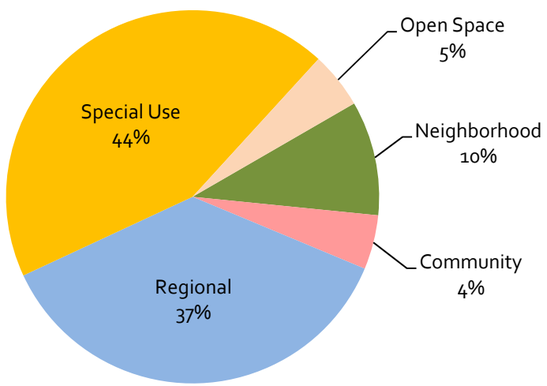


Chart 7.2: City of Waco Parks Classification by Acreage - 2014

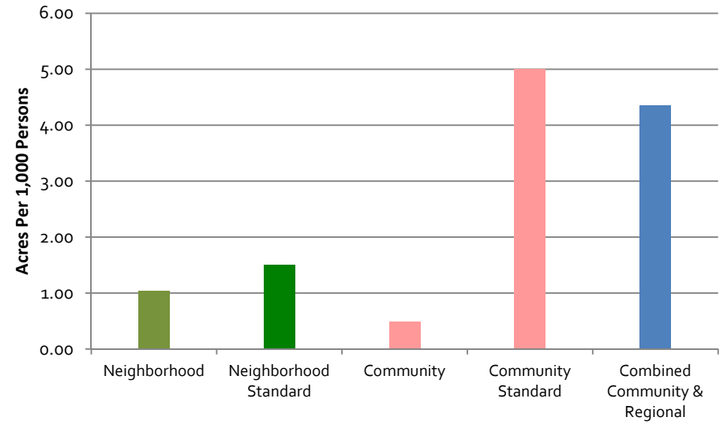


When compared to the national minimum standards, as shown in Chart 7.3, Waco falls about 30 percent below the minimum acreage in the Neighborhood Park category; additionally, in the Community Park category, Waco provides only about one-third acre per 1,000 persons as compared to national minimum of five acres. While the combined acreage of dedicated Community and Regional Parks in Waco compares more favorably, it still remains significantly below the national minimum standard for Community Parks.

Image 7.6: Pecan Bottoms, Cameron Park

Map 7.1 shows the location of all City of Waco parks and recreational facilities by classification. It is interesting to note that the inner-city neighborhoods, which are more densely populated with a higher percentage of low to moderate income households, have the greatest concentration of Neighborhood Parks. It is likely that this concentration of neighborhood parks is due in part to the fact that these areas of the city were developed during an era when neighborhood parks received a higher priority or were developed with federal funding targeted to serve low income households. Since households in these neighborhoods are less likely to have access to an automobile or to other venues for recreation, these parks play a particularly important role in improving the health and wellbeing of the areas' children and youth.

Chart 7.3: Comparison of City of Waco Parks to National Standards



While Waco has done relatively well in providing neighborhood parks in the older areas of the city, it has not kept pace in the more recently developed areas, as demonstrated by Map 7.2. The lack of parks in these more suburban areas is due largely to three factors. First, the demand for parks in these areas is less than in inner-city neighborhoods due to the higher incomes and greater mobility of residents. Secondly, these areas are not eligible for the federal funds that have been used in inner-city neighborhoods. And finally, the City of Waco has not adopted a "parkland dedication" ordinance that would require developers to contribute to the construction of parks in or near new residential subdivisions. Chart 7.4 graphically illustrates the impact of projected population growth, showing a significant increase in the percent of Waco's population beyond park service areas from 17 to 19 percent between 2010 and 2040. Adoption of a parkland dedication ordinance, as recommended in Chapter 3, Growth Management, would be helpful in addressing this shortage.

Chart 7.4: City of Waco Population Beyond Park Service Areas

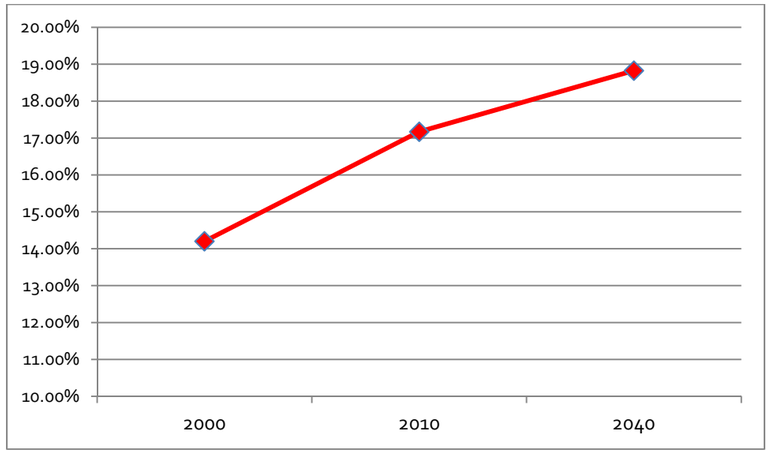
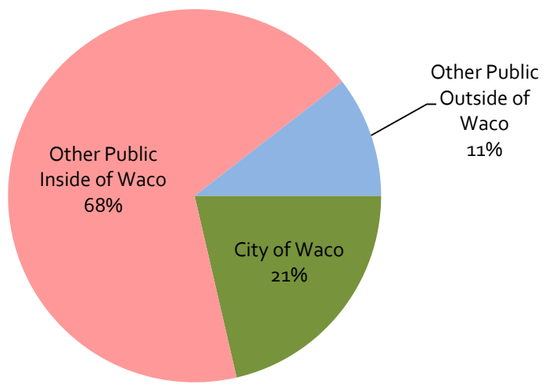


Chart 7.5 shows that the City of Waco provides nearly double the public acreage for parks and recreation facilities of the remainder of McLennan County, despite the fact that Waco represents only slightly more than half of the population of McLennan County. As a result, the City of Waco is almost certainly providing recreational services and opportunities to a significant number of non-residents.

Chart 7.5: Public Land Distribution – City of Waco vs. Remainder of McLennan County



7.2.1 Greenbelts as Linkages

The importance of creating linkages between points of interest cannot be overstated. Providing linkages between places and events creates the synergy that is critical to the revitalization of downtown and the surrounding neighborhoods. These linkages must be multimodal with a concentration on pedestrian, bicycles, public transit, and water transportation.

As the Brazos River Corridor continues to develop, an excellent opportunity exists to use natural areas such as wetlands and floodplains along creeks as linkages between the Corridor and surrounding neighborhood parks, schools, and other activity centers via a system of bicycle and pedestrian trails. In addition to preserving access to valuable open space in an urban setting, these greenbelts will contribute to reduced transportation costs through decreasing dependency on the automobile; improved transportation safety; improved public health; stormwater management; and the revitalization of inner city neighborhoods.

Abandoned railroad corridors can also provide a unique opportunity for creating linkages. Two such opportunities exist for conversion of the abandoned Southern Pacific rail line that runs along Mary Avenue spanning the Brazos River and the abandoned MKT line that begins across from Martin Luther King Park, crosses Elm Avenue and continues north toward Lakeshore Drive. Like the creeks discussed previously, when converted to greenbelts, these abandoned rail corridors also provide an opportunity to connect the wider community to the Brazos River Corridor (see Map 7.3).

7.2.2 Parks and Open Space Expansion

The city of Waco is faced with a growing need for parks and open space both in the center of the city and in suburban areas near the city's edge. As development in the center of the city increases in density and number of residential and commercial uses, residents, employees, and visitors rely more heavily on public spaces. This open space may take the form of pocket parks, public plazas, and landscaped pedestrian and bicycle linkages. As property values continue to rise at an increasing pace, it becomes particularly important that measures be taken to secure appropriate properties as they become available.

At the same time, many new residential subdivisions are located in areas further toward the city's edge, which have the largest deficit of parks. Without a requirement for parkland dedication in new subdivisions, these outlying subdivisions will continue to suffer from the largest deficit of parks. In order to keep pace with the population growth in these underserved areas, it is critical that Waco adopt a parkland dedication ordinance that provides developers with an option of dedicating land from their subdivisions or paying a fee in lieu of land for the purchase and development of appropriate property. This method of financing parks ensures that the persons benefiting most from the park pay their fair share of development costs.

7.2.3 Conclusions

- Waco's parks and recreation system is dominated by Regional scale and Special Use facilities
- Waco is significantly undeserved by Community Parks compared to National Standards
- Fast growing areas of Waco are generally beyond existing park service areas
- Waco operates nearly double the public land acreage of the remainder of McLennan County
- The City of Waco is almost certainly providing recreational opportunities to a significant number of nonresidents

7.3 Urban Design

"Urban design is the process of giving form, shape, and character to groups of buildings, to whole neighborhoods, and the city. It is a framework that orders the elements into a network of streets, squares and blocks."
Source: The Center for Design Excellence

"Good Urban Design occurs with thousands of small decisions on the architecture of buildings, the open spaces, the site, its relationship to other buildings, and other considerations which if judged individually are often considered minor in the overall activity stream of the city, but if well done can truly project an image of quality."
Source: Waco Comprehensive Plan 2000

7.3.1 Streetscape and Walkability

Streets are one of the dominant visual elements in an urban environment. They should be designed to accommodate all modes of transportation and should be sensitive to the context of the development that they serve. Sidewalks should be wide and include street trees, attractive lighting and street furniture. Attractive bus shelters and/or benches should be provided for transit riders. Well-

designed way-finding signage is yet another element that contributes to good urban design. Streets serving less complex environments may include fewer design elements, but at a minimum should be attractively landscaped and lighted.

Image 7.7: West Campus Lofts is a multi-family residential redevelopment project that is geared for student housing and targets the Baylor University population

Signage is a key component of streetscape. Good signage should be in context with the scale and character of the area in which it is located. Significant improvements in signage were achieved with the rewriting of the zoning ordinance following the 1983 comprehensive plan. Since that time, amendments to the off-premise section of the ordinance have led to a decrease in the number of off-premise signs in Waco. Consideration should be given to achieving the same quality of signage required in the Lake Brazos Corridor and the Downtown Overlay Districts throughout the city.

7.3.2 Connectivity

For development to build the synergy necessary to reach its maximum potential there must be connectivity between major nodes of activity. In order to be effective, the transport network referenced in Chapter 4 must be both attractive and user friendly. While we may continue to experience success in revitalizing Downtown; Elm Avenue; the surrounding neighborhoods; and the riverfront, we will not approach the level of success that could be accomplished without linking all of these distinct areas together. For example, the development of pedestrian and bicycle trails along the creeks that feed into the Brazos River would connect the surrounding neighborhoods to the riverwalk. An expanded riverwalk could then be used to provide access to Lake Waco, the Mammoth National Monument, MCC, Cameron Park and Brazos Park East, the Cameron Park Zoo, Downtown, and Baylor University.

Image 7.8: The Waco Riverwalk connects Cameron Park, Downtown Waco and Baylor University campus

7.3.3 Building Form

Building form is a major determinant of how a building relates to its surroundings. With the advent of the automobile and the resulting spread in suburban development, buildings were constructed for the automobile. They were located in commercial strips along major arterials and included large parking lots between the building and the street. In most cases, no sidewalks were provided. This is still a dominant form; however, in recent years we have seen some movement toward new construction that is designed with buildings that house a mix of uses located along a landscaped sidewalk adjacent to the street with parking in the rear or in a garage. This same concept has also been effectively applied to the renovation of old strip centers. While success in influencing new construction may be gradual, a concerted effort should be made to retain and restore the existing examples of this building form. Finally, it is essential to the continued success of downtown that the City of Waco work with City Center Waco and other partners to continue its efforts to preserve the concentration of this building form in Greater Downtown.

Image 7.9: City Lofts at the 700 block of Austin Avenue, showing a mixed use building abutting a landscaped sidewalk

7.3.4 Historic Preservation

The historic character of Waco's built environment is one of the most important contributors to the city's unique sense of place. From Downtown to the Elm Avenue area and the adjacent residential neighborhoods, Waco is home to countless examples of historic architecture that are uniquely Waco. Many of these structures are in good to fair condition; however, many are in danger of being lost or of losing their historic character. While it is important that we preserve these historic structures, it is of equal importance that we put in place both standards and incentives to ensure compatible infill development. The historic charm of the buildings and residences and the mature trees found in older neighborhoods can be a major draw to young, middle income families. Attracting these families contributes to the goal of creating more stable, mixed income inner-city neighborhoods.

Image: 7.10: The historic Hippodrome Theatre in Downtown Waco

Efforts of the City of Waco to preserve our community's architectural history have included the adoption of a historic preservation ordinance; creation of a Historic Landmark Preservation Commission; compilation of a Historic Resource Survey; designation of the City of Waco as a Certified Local Government by the Texas Historical Commission (THC); listing of the Waco Downtown Historic District and the Castle Heights Historic District on the National Register of Historic Places; and the incorporation of historic preservation standards into local regulatory and economic incentive programs (see Table 7.1). These efforts need to be strengthened and expanded upon if Waco is to realize its full potential as a truly unique place (Map 7.4).

Table 7.1: City of Waco Historic Structures and Landmark Status

Landmark Classification	Structures
National Register	21
State Antiquities	3
Recorded Texas Historic Landmark	30
City of Waco Landmark	32
Downtown Historic District Contributing Structures	172
Priority 1 Structures from Historic Survey	223

Note: Some structures may be included in two or more classifications.

Image 7.11: Insurers of Texas Building, an example of adaptive reuse of a warehouse as office and historic preservation using national and local incentives

Image 7.12: Historic Lofts of Waco High, an example of reuse of a high school building as affordable housing, using national and local incentives

7.3.5 Preservation of Rural Character

While much has been said under the heading of Urban Design about preserving and building upon the character of the built environment, it is equally important that the natural character of the land that surrounds the city be protected. One advantage of developing previously undeveloped land is that there are fewer constraints than in an urban environment. While this topic is discussed in more detail in the Growth Management chapter of this plan, it is important that it be touched on under the heading of Urban Design. One of the most frequently stated reasons given for wanting to live on the edge of a city is the rural character of the environment. One method of preserving this character is through "cluster development". This form of development allows the clustering of housing in a variety of densities on the property thereby leaving more land as open space. This type of development offers both economic and environmental benefits; one of which is the preservation of open space. Additional advantages of this concept and recommendations as to how it may be implemented are addressed under the topic of Growth Management.

Image 7.13: Example of rural residential development

7.4 Arts and Culture

"Place is more than a location on a map. A sense of place is a unique collection of qualities and characteristics --- visual, cultural, social and environmental --- that provide meaning to a location."
Source: Edward Mahon, Senior Fellow, Urban Land Institute

The arts and culture, like good urban design, contribute to place making and have played a major role in the successful revitalization efforts of cities throughout the country. One of the keys to creating and sustaining a vibrant urban center is to attract large numbers of people throughout the day and into the evening hours. What better way to achieve this than through an active arts scene. From assisting businesses in attracting a workforce of young professionals to promoting creativity in children and youth from diverse socioeconomic backgrounds, the arts contribute significantly to the economic, social and cultural climate of our community.

Image 7.14: The cattle drive sculpture is a Cultural Arts of Waco project that is displayed in front of the Waco Suspension Bridge, which came to be known as part of the Chisholm Trail

Waco is fortunate to have a number of active arts organizations that provide a wide venue in both the visual and performing arts. In addition, we are beginning to see a growing number of businesses that provide exhibition space, studios, and performance venues for artists. Finally, Waco has a growing collection of public art located within the Greater Downtown Area that continues to attract visitors and residents.

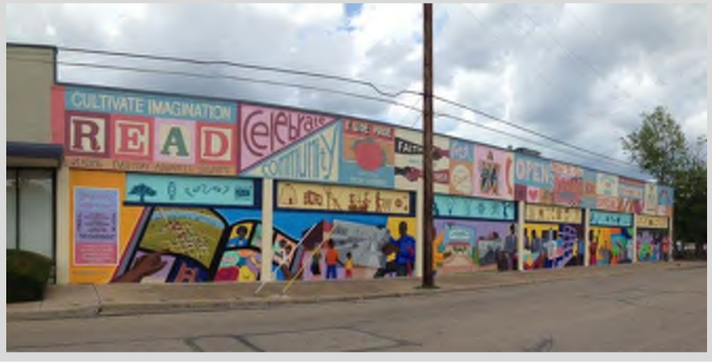


Image 7.15: East Waco Library Mural

If Waco is to gather the momentum needed to achieve its full potential as a cultural arts destination, it is important that the arts organizations create a framework to work together to accomplish their common goals. The current movement to build support for a Cultural District in Greater Downtown Waco has the potential to create an excellent framework to make this happen.

7.5 Public Health

"As an increasing number of Americans suffer from chronic diseases like obesity, diabetes, and asthma, research is showing that the built environment – the way American cities and towns are developed – contributes to the epidemic rates of these diseases. Witness the following:

- Places built exclusively for automobiles, where walking and biking are not only challenging but frequently dangerous
- Neighborhoods known as "food deserts" because it is so difficult to buy fresh fruits and vegetables
- Neglected neighborhoods that contribute to violence and mental distress
- Housing that promotes asthma and other respiratory diseases because it is poorly maintained"

Source: How to Create and Implement Healthy General Plans, Change Lab Solutions

Waco and McLennan County face many of the same public health problems faced by other American cities. These problems are an outgrowth of modern lifestyles, economic circumstances, and the urban environment. Obesity and access to healthcare have been identified as Waco's two major health problems by the Waco McLennan County Health District. Providing for the needs of children and the physically impaired are also listed as serious concerns.

The Health District is in the process of completing a Community Needs survey of Waco's most vulnerable populations (those most at risk for disease) based on factors such as income, age and ethnicity. These surveys will form the basis for developing implementation strategies and will be updated on a regular basis.

Map 7.5 shows the location of healthcare facilities that include hospitals, clinics, surgical centers, and family health centers in relationship to those areas of the city with the highest concentration of persons living near or below the poverty level. Waco is fortunate to have a wide distribution of health facilities to serve the needs of a diverse population. Given Waco's high poverty rate, we are particularly fortunate to be home to one of the best Family Health Center programs in the nation. While the number and distribution of health facilities is probably better than that of many cities, the transportation system serving them is limited.

Recommendations included in Chapter 4, Transportation , present specific strategies to improve access to Waco's active transportation network (public transit, bicycle and pedestrian facilities), which will also help to encourage active living and build healthy communities.

7.6 Public Safety

Public safety is vital to the development of a vibrant growing city. From the more dense development found in or near the center of the city to the suburban neighborhoods on the city's edge, residents, workers and visitors deserve and expect to live, work and play in a safe environment. According to the Comprehensive Plan Fiscal Impact Analysis, the cost of providing police and fire protection is directly related to the growth and location of the city's current and future population. In order to serve the growth in population as projected by The City Plan, the cost of police and fire protection can be expected to increase significantly, depending on how the level and pattern of this growth occurs. See Map 7.6 for a location of existing police and fire stations.

7.6.1 Police Services

The Waco Police Department is headquartered in central Waco and provides police protection to residents within the city limits. There are no satellite police stations. The Waco Police Department is currently staffed by 247 sworn police officers and 100 civilian staff. As Waco continues to grow, police services will also need to evolve to accommodate changing demographics, population growth, suburban development, annexations, and other factors that influence police response areas and times, and the expenditure of resources. For the purpose of this comprehensive plan, it is assumed that approximately 2 sworn officers and 1.2 civilian support staff per 1,000 residents are required to provide adequate police services and response to emergency calls for service. This ratio of police staff to residents is a commonly used industry standard for jurisdictions in the south and western parts of the United States. In addition to residential population, according to the 2010 US Census, Waco also experiences a 22 percent surge in daytime population, mostly consisting of commuters from the Waco suburbs and ETJ.

Using population projection figures from the 2010 Census, and adding the 22 percent daytime commuter surge, it is projected that by 2019 police department staffing will need to increase to 313 sworn officers and 141 civilian staff to serve 165,432 residents and daytime commuter population. By 2029, population growth will require 342 sworn officers and 156 civilian staff for an 182,512 service population. Data for the years 2029 to 2040 were not available.

7.6.2 Fire Services

The City of Waco Fire Department protects lives and property from fire, medical emergencies, and environmental incidents and other emergencies and disasters through proactive fire prevention, code management and enforcement activities, life safety community education, emergency preparedness and emergency incident response. The Waco Fire Department's service area encompasses all area within the City's corporate limits.

The industry standard for fire service protection is the Insurance Services Office (ISO) Public Protection Classification (PPC) rating system. ISO collects information on municipal fire-protection efforts in communities throughout the United States, and assigns a PPC class from 1 to 10. Class 1 generally represents superior property fire protection, and Class 10 indicates that the area's fire-suppression program doesn't meet ISO's minimum criteria. Waco's current ISO rating is 2.

Presently, the City of Waco deploys 15 engine companies, 12 ISO creditable engine companies, and 3 dedicated ladder truck companies from 12 fire stations. Two additional fire stations (Stations 10 and 13) provide aircraft rescue and firefighting only. The fire department employs 204 firefighters and 6 administrative staff and responds to over 9,000 calls and incidents per year.

In 2015, the City commissioned a study to assess the immediate and future need for new fire stations (to achieve an ISO rating of 1). The report, Demonstrating a Master Fire Station Location, prepared by W. Michael Pietsch, P.E., utilized 1.5-road mile response boundaries (approximates 3- to 4-minute response times) for engine companies, which is consistent with ISO methodology. The study recommended the following expansion of existing Waco fire protection services and facilities, in order to achieve an ISO rating of 1:

- Erect three new fire stations to achieve a 1.5-road mile response boundary for Waco:
    - Two new stations are required based on existing conditions -- one in the vicinity of Bagby and Loop 340 and one in the vicinity of Ritchie Road and Panther Way.
    - Based on projected population growth and development patterns, one new fire station will likely be required in the vicinity of Martin Luther King Jr. Boulevard and Lakeshore Drive.
- Deploy three additional ladder truck companies from Fire Station 3, Fire Station 9 (or proposed Bagby/Loop 340 fire station), and Fire Station 12.

In order to continue to provide adequate fire protection service as Waco grows, the study also recommended 18 new fire stations within the current ETJ, to be erected as these areas are annexed and developed. In addition to the 1.5-mile response boundary, several other factors are considered when determining the best location for a new fire station, including: proximity to schools; roadway and site geometry for truck access; sufficient and expedient roadway access to all areas within the response district; and proximity to railroad crossing and load-zoned bridges.

7.7 Implementation Strategies

Parks and Recreation

- Establish a Neighborhood and/or Community Park in the China Spring area
- Establish a Neighborhood Park in the western portion of Greater Downtown
- Establish a Community Park in the West Waco area between Hewitt Dr. and Richie Rd.
- Construct a centrally located indoor multipurpose athletic facility
- Develop four additional Community Centers, including facilities that serve seniors
- Develop additional programmed athletic amenities: Construct additional outdoor tennis courts; Construct additional disc golf courses; Develop two to four additional baseball/softball fields.
- Continue expansion of the Brazos Riverwalk from LaSalle Avenue to the Lake Waco Dam
- Convert the former MKT rail line through East Waco to a multi-purpose bicycle/pedestrian trail
- Convert the Mary Avenue former Southern Pacific rail corridor to a multi-purpose bicycle/pedestrian trail from South 18th Street to South 32nd Street
- Construct a regional football/soccer complex
- Develop creek beds as linear parks that could link neighborhoods to the Brazos River Corridor
- Adopt a parkland dedication ordinance as a means of funding new parks either through dedication of land to be developed as a park or the payment of a fee in lieu of land, as deemed appropriate.

Urban Design – Streetscape and Walkability

- Apply the context sensitive design standard for streets included in the transportation component of The City Plan into street expansion and reconstruction projects where appropriate.
- Implement a street tree planting program as part of an effort to improve walkability, which would include planting of street trees when sidewalks are repaired, replaced, and extended.
- Conduct a review of sign regulations and make recommendations for changes in the height, area, number, placement and character of signs to improve compatibility with typical adjoining land uses for each street classification.
- Review and evaluate the current sign regulations for the use of temporary banners, flags, decorative fringe or tinsel, pennants and/or balloons for their effectiveness and enforceability.
- Provide street lighting along city streets to improve safety and walkability. Ensure that street lighting is appropriate for neighborhood scale, density, and land use.

Urban Design – Connectivity

- Review current policies, regulations and standards impacting the quality of development to ensure that they support the basic principles of connectivity.
- Use creeks to connect neighborhoods and community activity centers to the Brazos River Corridor and other potential areas through a system of pedestrian and bicycle facilities. Reference existing plans for specific recommendations as to points of linkages including the following: *For All of Our Lifetimes: A Vision for the Brazos & Bosque Rivers Plan* and *Imagine Waco: A Plan for Greater Downtown.*

Urban Design – Building Form

- Apply form based mixed use overlay zoning similar to the Downtown District to areas identified as Development Nodes in the Growth Management chapter of this plan (Chapter 3).
- Consider the use of Reinvestment Zones for Tax Increment Financing and Public Improvement Districts as means of incentivizing private development and funding public improvements.

- Provide incentives and develop regulations to preserve existing buildings that are built to urban standards and to incentivize appropriate infill development.

Urban Design – Historic Preservation

- Work with the Historic Landmark Preservation Commission, the local Main Street Program, the County Historical Commission and Historic Waco Foundation to educate the general public, owners of historic properties, developers, architects, and building contractors as to the economic and cultural value of historic properties and districts; the regulations governing their renovation and restoration; and incentives available for their restoration at the local, federal and state level.
- Amend the Historic Landmark Preservation Ordinance to better facilitate the creation of local historic landmarks and districts.
- Continue the Historic Landmark Preservation Commission's Excellence in Preservation Awards as a means of encouraging preservation through recognition of outstanding efforts in the area of historic preservation.
- Work with the Historic Landmark Preservation Commission and the Texas Historic Commission to strengthen the City's Historic Landmark Preservation Ordinance with the goal of better preserving the existing historic resources within the city. This includes adoption of the Secretary of Interior's Standards for Rehabilitation.
- Professionally update Waco's historic resources survey. An updated survey would identify local historic districts, landmarks, and other areas or properties that are eligible for the National Register of Historic Places.

Urban Design – Preservation of Rural Character

- Incentivize cluster development through density bonuses for open space preservation.
- Encourage low impact development practices.
- Adopt appropriate measures to ensure that development in rural areas pays its fair share of extending and/or upgrading infrastructure required to serve the area.

Arts and Culture

- Support and encourage public/private partnerships and creative initiatives to enhance the potential for a greater downtown cultural arts district, such as public art, walking museums, street vending, creative reuse of vacant structures, and enhancement of outdoor space for public events.
- Support the designation of Greater Downtown Waco as a Texas Commission on the Arts recognized Cultural District and the adoption of a cultural plan to grow the arts and promote Waco's cultural identity.
- Develop new recreational, cultural and tourism opportunities, events and attractions that enhance Waco's appeal as a destination for visitors, residents and businesses.

Public Health

- Complete the Community Needs Survey of Waco's most vulnerable populations and develop a process to update the survey on a regular basis.
- Work with Prosper Waco and other nonprofits to address the health needs of persons with limited incomes.
- Create a more walkable and bike friendly city with the addition of sidewalks and bike lanes, and connect these facilities to parks and other destinations, as a means of encouraging a healthier lifestyle.
- Improve access to public transportation for persons with special needs and those without access to automobiles, including senior citizens, as a means of improving access to basic services such as healthcare, shopping and jobs.
- Encourage the location of employment centers, childcare services and healthcare facilities within walking or biking distance of low income households.

Public Safety

- Maintain a service ratio of 2 sworn officers and 1.2 civilian support staff per 1,000 citizens, taking into account daytime surge in population, to ensure adequate police protection.
- Strive to achieve an ISO fire rating of 1 by maintaining adequate firefighter staffing, and erecting new fire stations as needed to achieve a 1.5-road mile response boundary per engine company.
- Periodically evaluate public safety facilities for adequacy, including the potential need for new space and additional land to house staff and equipment in locations that serve existing and new development and minimize response times.
- Incorporate public safety principles such as adequate lighting, visibility, security and mobility into design standards for the built environment.
- Provide adequate security and appropriate lighting within greater downtown and the Brazos River corridor to encourage both night-time and day-time activities.
- Explore strategies to maintain dedicated alleys, including clearly identifying roles and responsibilities of property owners and City departments.

Facility Classification

- Community
- Neighborhood
- Regional
- Open Space
- Special Use

Other Public Lands

Waco City Limits

Outside Waco City Limits

N

0 0.5 1 2

Miles

July 2016

Map 7.1: Existing City of Waco Park & Recreation Facilities by Facility Classification

CITY OF WACO

Lake Waco

Brazos River

Tehuacana Cre

Lacy-Lakeview

Bellmead

Beverly Hills

Woodway

Hewitt

Robinson

China Spring Rd

Steinbeck Bend Dr

Lake Shore Dr

N 19th St

North River Crossing

N Hwy 6

Speegleville Rd

Old Lorena Rd

Craven Ave

Airbase Rd

Gholson Rd

Bellmead Dr

Howard Ln

Herring Ave

M L King Jr Dr

Park Lake Dr

N 25th St

MacArthur Dr

N 18th St

N 4th St

E Waco Dr

Elm St

S Loop Dr

Lake Shore Dr

Hillcrest Dr

New Rd

Bosque Blvd

Lake Air Dr

Washington Ave

S 12th St

LaSalle Ave

S University Dr

N Valley Mills Dr

S Valley Mills Dr

Sanger Ave

Franklin Ave

Memorial Dr

New Rd

Santa Fe Dr

Tx Central Pkwy

Imperial Dr

Hewitt Dr

Chapel Rd

Panther Way

Ritchie Rd

Bagby Ave

S Loop 340

S 3rd St Rd

S Univ Parks Dr

Robinson Dr

E Hwy 6

1637 3434 185 1637 3051 3051 933 340 77B 84 31 84 340 484 574 340 6 2491 1860 3400 340 77 434 3047 84 2837 2188 412 6 6 6 6 1695 2063 3223 35 35 35

THE CITY PLAN

Waco Comprehensive Plan 2040

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Areas Beyond Park Services

Public Lands

- City of Waco System
- Other Public Lands

Waco City Limits

0 0.5 1 2

Miles

July 2016

Map 7.2: City of Waco Areas Beyond Service Areas for Neighborhood & Community* Parks

CITY OF WACO

*Also includes Regional Parks

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THE CITY PLAN

Waco Comprehensive Plan 2040

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Existing Park & Rec Facilities

- City of Waco System
- Other Public Lands

Proposed New Facilities

- Community or Nbrhood Park

Waco City Limits

- Linear Trail

N

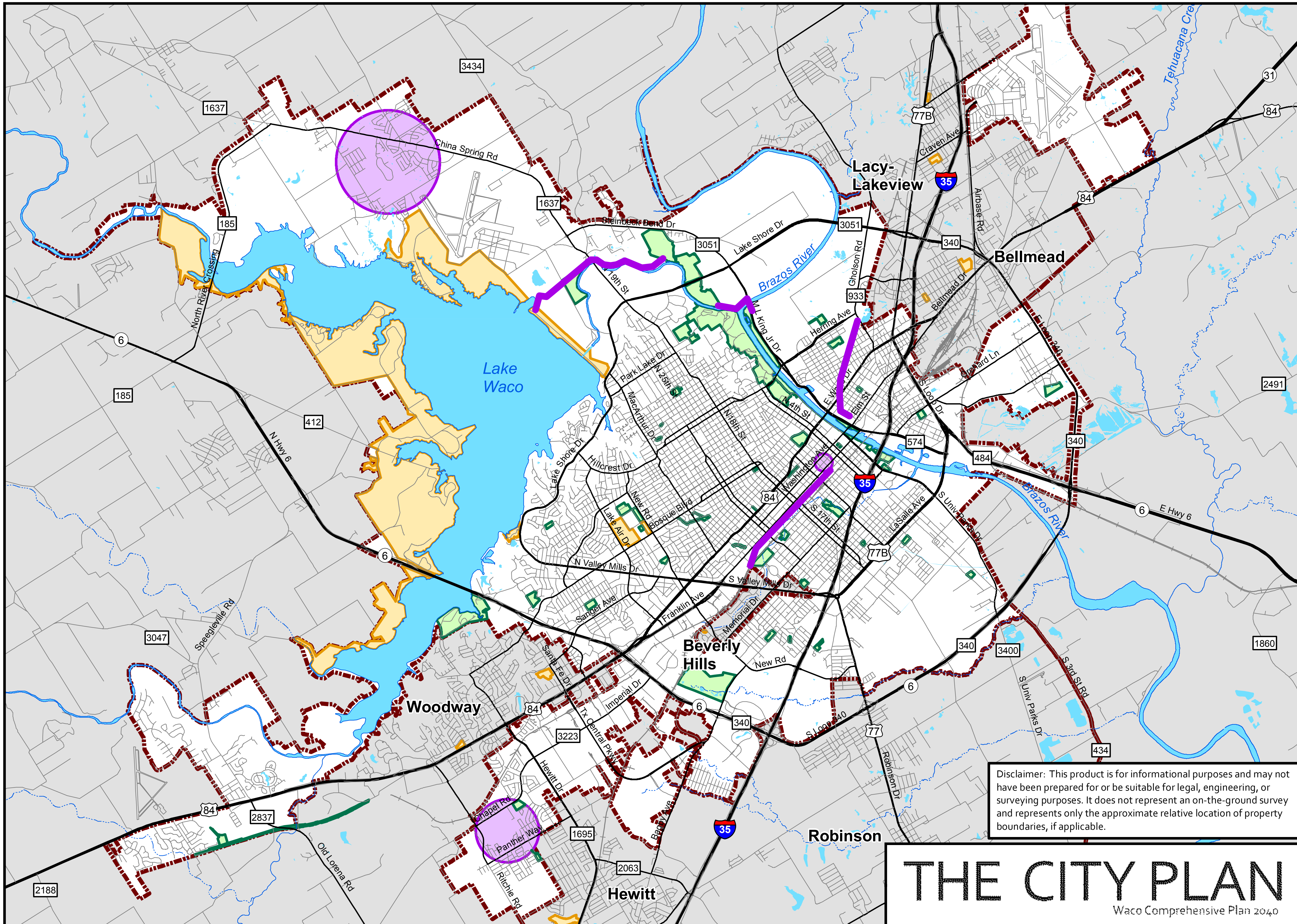
0 0.5 1 2

Miles

July, 2016

Map 7-3: Facility Recommendations for Parks and Recreation

CITY OF WACO



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THE CITY PLAN

Waco Comprehensive Plan 2040

Landmark Status

- Texas Historic
- Local Landmarks
- Historic Dist Contributing
- Historic Survey Priority 1
- National Register
- State Antiquities

Waco City Limits

Outside Waco City Limits

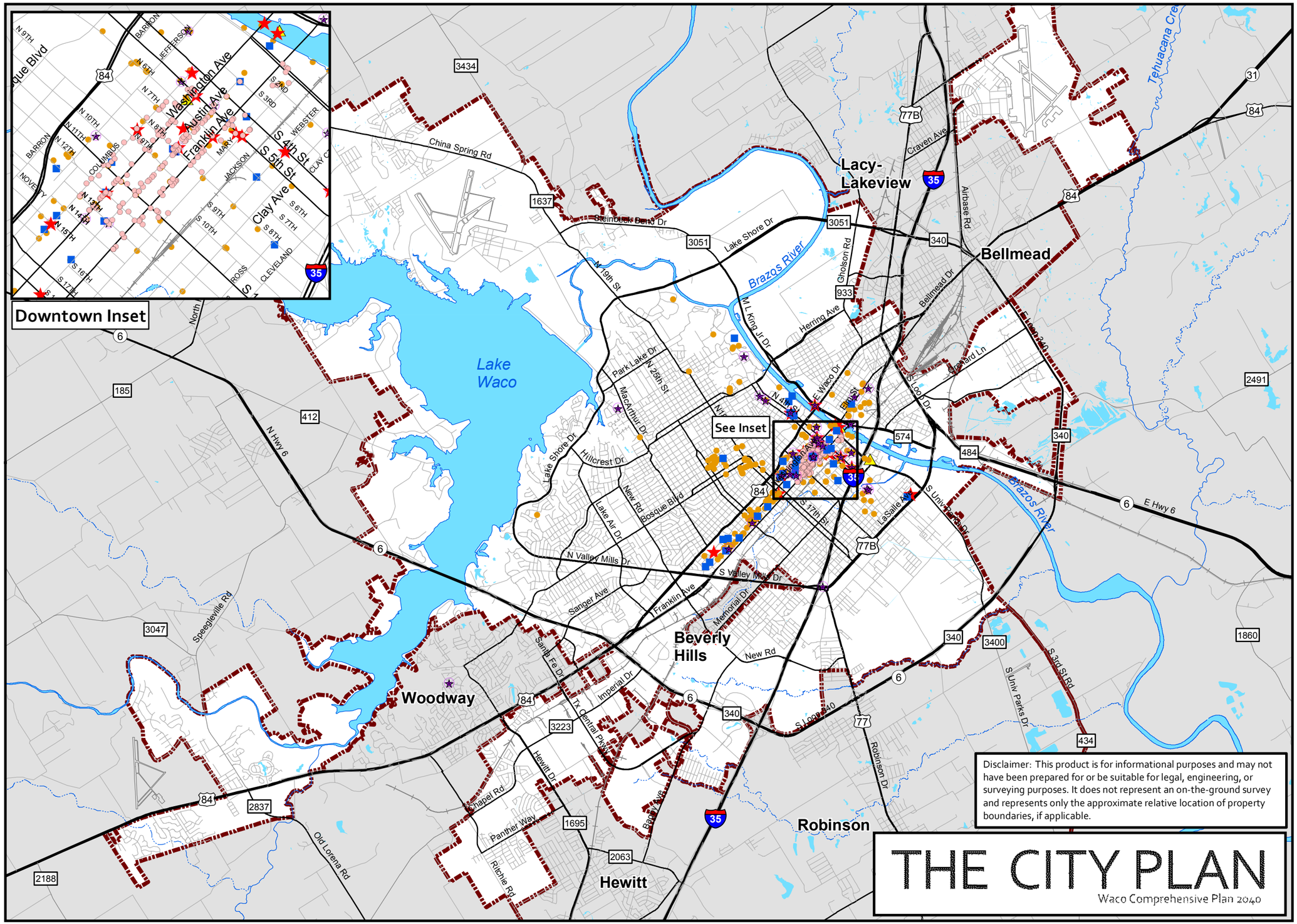
0 0.5 1 2

Miles

July 2016

Map 7.4: Structures of Historic Significance and Landmark Status

CITY OF WACO



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THE CITY PLAN

Waco Comprehensive Plan 2040

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Percent in Poverty

- Less than 50%
- 50% to 75%
- Greater than 75%
- Family Health Centers
- Other Medical Facilities

Waco City Limits

0 0.5 1 2

Miles

July 2016

Map 7.5:
Medical / Community Health Services and Percent of Population with Income less than 200% of Poverty

CITY OF WACO

Source: US Department of Commerce; Bureau of the Census - American Community Survey: 2009-2013

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THE CITY PLAN

Waco Comprehensive Plan 2040

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Fire Station

Police Station

Waco City Limits

Outside Waco City Limits

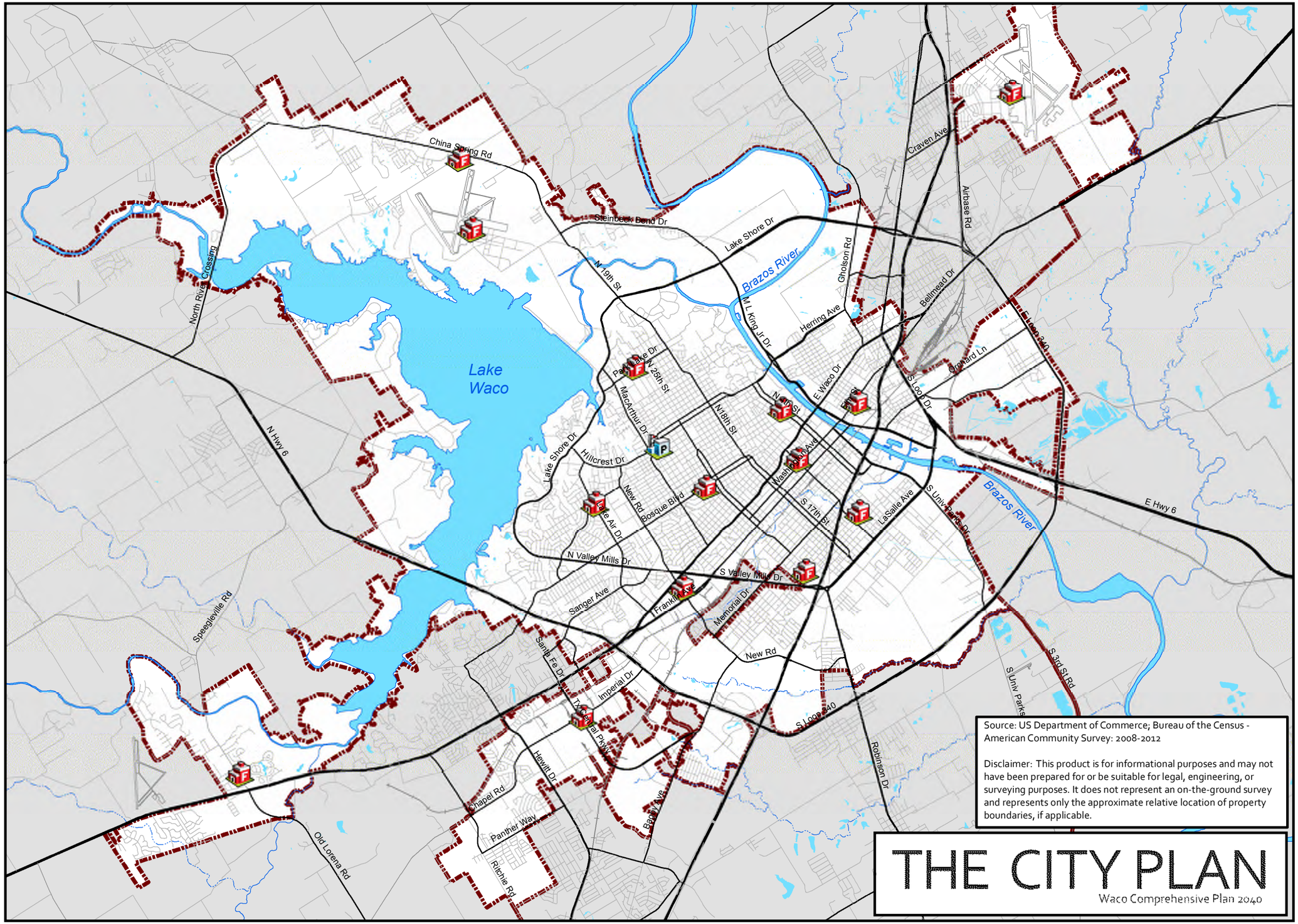
0 0.5 1 2

Miles

July 2016

Map 7.6: Existing Waco Police and Fire Stations

CITY OF WACO



Source: US Department of Commerce; Bureau of the Census - American Community Survey: 2008-2012

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THE CITY PLAN

Waco Comprehensive Plan 2040

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Waco Comprehensive Plan 2040

environment

Chapter 8: Environment

8.1 Introduction

Protection of the environment is a critical component of sustainability. One of Waco's greatest assets is the beauty and diversity of its natural environment. The gently rolling uplands of the Texas Blackland Prairie located between the Brazos and Bosque Rivers is one of the primary areas of urban development in the City of Waco, according to the *Environmental Atlas of McLennan County*. Lake Waco, the Bosque Escarpment, and the Brazos River have been identified as significant environmental features that influence land use and development patterns.

A scenic area, Lake Waco is a site of multiple recreational activities including hiking, biking, water activities and camping. A linear geologic formation along the South Bosque River and Lake Waco, known as the Bosque Escarpment is the most striking environmental feature in the city. As part of the Balcones Fault zone, the Bosque Escarpment's steep slopes are the result of faults, evidenced by as much as 260 feet of vertical displacement. Spectacular views both from below and from atop the formation attracts people to this area and encourages investment. However, the challenging topography, geologic characteristics and pristine fragility of the area impose aesthetic, environmental and economic constraints to development.

As sustainability is the guiding principle of The City Plan, the environment is addressed at some level in every component of the plan. Rather than repeat the issues and strategies identified in these components, this section of the plan will address these issues in more general terms and identify strategies not previously covered.

8.1.1 Climate

The climate of Waco can best be described as moderate. Winters are generally mild with temperatures only occasionally dropping below freezing and rarely experiencing ice or snow. Summers are warm to hot with high temperatures often rising above 100 degrees Fahrenheit. Rainfall is typically concentrated during the spring with much drier conditions during summer and early fall. Table 8.1 shows the seasonal variations in temperatures and precipitation.

Table 8.1: 30-year Seasonal Climatological Averages: Waco, TX

	High Temp*	Low Temp*	Precipitation**
Winter (Jan to Mar)	62.2	39.7	6.1
Spring (Apr to Jun)	84.8	63.7	11.1
Summer (Jul to Sep)	94.6	70.8	7.2
Fall (Oct to Dec)	77.8	46.7	7.6

Source: US Department of Commerce; National Oceanic & Atmospheric Administration – Waco Regional Airport Monitoring Station
*Mean Temperatures
**Measured in Inches

Waco generally experiences 25 to 30 days above 100 degrees in a typical year. The highest temperatures during the year are generally in the range of 105 degrees. The hottest temperature ever recorded is 112 observed in 1969. Higher temperatures can result in a number of adverse impacts as noted below:

- Roadway pavements can significantly degrade by softening and expansion
  - Results in increased rutting, potholes and spalling of concrete joints
  - Effect is more significant on high volume roadways
- Plants and agriculture experience increased water loss and stress resulting in increased need for irrigation
  - Increased water usage places increased stress on water delivery pipes leading to the possibility of additional line breaks
  - Reserves for both ground and surface water can be decreased
- Energy usage, especially electricity for air conditioning, is increased resulting in increased utility costs for city facilities
  - Extremely high temperatures can cause electricity demand to exceed the available supply resulting in periodic disruptions in electric delivery
  - High temperatures and the resulting high energy usage can pose serious economic and health problems for persons living on limited resources
- Outdoor work by city staff is reduced to limit exposure and minimize risk of heat exhaustion & heat stroke
  - Outdoor projects during the summer may require longer timelines to complete

On the opposite extreme, the lowest temperatures for Waco in a given year are generally in the range between 15 and 18 degrees Fahrenheit. The lowest temperature ever observed is -5 in 1949. Waco experiences approximately 35 days with a low temperature below freezing in a typical year.

Image 8.1: Several days of snow, sleet and ice in February 2015 caused the closures of several important regional highway facilities resulting in significant transportation delays. As an example of the infrequency of such events, no measureable snow or ice were recorded in Waco for the winter of 2015/2016.

Annual precipitation for Waco generally averages around 33 inches, although this value is highly variable from year to year and month to month. Waco has recorded as much as 48.91 inches in 1957 and a low of 13.39 inches in 1917 (not at the Waco Regional Airport). In terms of single events, Waco recorded a 24 hour maximum of 7.98 inches on December 20, 1997. Although a rare event, Waco has recorded as much as 13 inches of snow twice in its history, once in 1924 and again in 1929. In general, snow and/or ice events are observed once every two or three years.

Image 8.2: Early June 2015 flooding that resulted in closure of the Waco Riverwalk for several weeks

Flooding along stormwater channels and significant waterways is the primary concern from extreme precipitation events. The Open Space recommendations within Chapter 3 are targeted to protect these floodplain areas. Another problem of extreme precipitation events is infiltration of the sanitary sewer system and potential discharges of raw sewage as a result (See Chapter 5).

Extreme drought, on the other hand, brings a completely different set of challenges which are identified below. Note that some of these issues are similar to those identified for high temperatures as drought and extreme heat tend to be strongly correlated.

- Due to the high proportion of clay in many soils with Waco, roadway pavements can significantly degrade as soils expand and contract
  - Results in increased potholes and spalling of concrete joints
  - The same soil processes can also significantly damage water and sewer pipes

- Plants and agriculture experience increased water loss and stress resulting in increased need for irrigation
  - Increased water usage places increased stress on water delivery pipes leading to the possibility of additional line breaks
  - Reserves for both ground and surface water can be significantly decreased

- The lack of moisture within plants and soils can lead to an increase in grass fires
  - Structures in rural areas are more threatened
  - Large fires may require significant evacuations and require the closure of major transportation facilities
  - Air quality may be adversely impacted as a result of smoke leading to health concerns for all residents

- In extreme drought, water availability at reservoirs for electric power generation may be depleted to the point where units may need to be taken offline resulting in power disruptions

8.2 Low Impact Development

Much of the information contained in this chapter was drawn from the *Waco LID Guidance* Manual prepared by the Center for Research in Water Resources and the Lady Bird Johnson Wildflower Center, University of Texas at Austin. Low Impact Development (LID) is a comprehensive approach to site planning, design and pollution prevention strategies that creates a more economically sustainable and ecologically functional landscape. As such, the LID approach provides many benefits to a community's water resources and overall livability. While emphasis of LID is placed on stormwater runoff, it involves a comprehensive approach to land development that has many benefits beyond stormwater management. The benefits of LID include the following:

Environmental Benefits

- **Pollution abatement.** LID practices can reduce the volume of runoff and pollutant loadings through settling, filtration, adsorption and biological uptake resulting in improved wildlife habitat and enhanced recreational uses.

- **Groundwater recharge.** LID practices can be used to infiltrate runoff and to recharge groundwater.

- **Improved water quality and reduced treatment costs.** A study of 27 water suppliers conducted by the Trust for Public Land and the American Waterworks Association found that 50 to 55 percent of the variation in treatment costs can be explained by the percentage of forest cover in the source area.

Land Value and Quality of Life Benefits

Many of the direct and indirect benefits of LID are derived from improved land value through improved aesthetics, additional lot yield, or property protection – and quality of life benefits. These latter benefits are some of the most difficult to quantify, yet are also some of the most important for a community as LID techniques can help brand a community, provide multiple amenities, and provide for improved landscape and sense of place.

- **Reduced downstream flooding and property damage.** Reduce downstream flood and property damage through the reduction of peak flows and the total amount of volume of runoff.

- **Real estate value/property tax revenue.** Homeowners and property owners are willing to pay a premium to be located near LID installations in the form of aesthetically pleasing amenities like water features, open space and trails.

- **Lot yield.** LID practices typically do not require large, contiguous areas of land that are usually necessary when traditional stormwater controls like ponds are used leaving more land area for development.

- **Public spaces.** Placing LID installations on individual lots provides public open spaces throughout the neighborhood. An American Lives, Inc. real estate study found that 77.7 percent of potential homeowners rated natural open space as "essential" or "very important" in planned communities.

Image 8.3: The Greater Waco Chamber of Commerce built America's First Green Chamber of Commerce building in 2008, and has received a LEED (Leadership in Energy and Environmental Design) certification at the gold level for its headquarters and regional marketing center at 101 S. Third St. at Heritage Square

8.3 Water Conservation & Quality

8.3.1 Water Conservation

Waco, unlike many cities in the state, has a relatively abundant supply of water. In addition, the recently completed Water Master Plan has identified a number of options for increasing the supply over time. However, in light of the recent droughts and rapid population growth experienced by Texas in recent years, water rights have become a contentious issue. For these reasons, it is important that Waco adopt strategies to protect and conserve an adequate supply of water to meet the needs of the projected growth trend for the area. It has been said that the least expensive way to increase the water supply is through conservation.

8.3.2 Water Quality

The water quality in Lake Waco is significantly impacted by runoff from dairy farms located in the Bosque River watershed; however, recent years have seen an improvement in the water quality of the watershed. The primary reason for this improvement has likely been a sizable decrease in the number of dairy cows in the watershed. The reasons given for this decrease include the relocation of some of the dairies to areas outside the watershed; the impact of the 2007 recession followed by a collapse in milk prices; the record drought that has been ongoing since 2011; improved practices for dealing with runoff by dairy farmers; and construction of a wetland by the City of Waco to improve the quality of water entering the lake. Lake Waco's water quality is also impacted by upstream municipal wastewater treatment plant discharges; stormwater runoff from surrounding cities and towns within the watershed; and runoff from agricultural uses.

Other water bodies in Waco include the Brazos and Bosque River as well as numerous creeks feeding into the rivers. Water quality in these creeks and rivers is primarily impacted by urban runoff that includes motor oil washed off of roads and parking lots, litter, soil erosion, and lawn fertilizers and pesticides washed into the stormwater system during a rain event. Overflows from the City's aged wastewater collection system are also a concern and are addressed in the Chapter 5, Utility Infrastructure, of this plan.

Image 8.4: The Baylor Research and Innovation Collaborative is a great example of low impact development and redevelopment. The former General Tire building once employed over 1400 people in the manufacturing industry. The BRIC received a Preservation Excellence Award for Sustained Excellence of an Adaptive Reuse of a Commercial Structure in 2014.

8.4 Energy

Energy conservation and renewable energy measures can provide significant environmental and economic benefits. Environmental benefits include conservation of scarce resources that include a reduction in air pollution levels resulting from auto emissions; reduction in water pollution produced by runoff from streets and parking lots; and a decrease in the heat island effect created by an urban environment.

A direct economic benefit resulting from the adoption of energy conservation and renewable energy measures would be a decrease in energy costs as a result of more energy efficient vehicles, equipment, and buildings. Potential indirect economic benefits may include the costs savings resulting from improved public health due to a decrease in air and water pollution levels and an increase in walking and biking as a means of transportation.

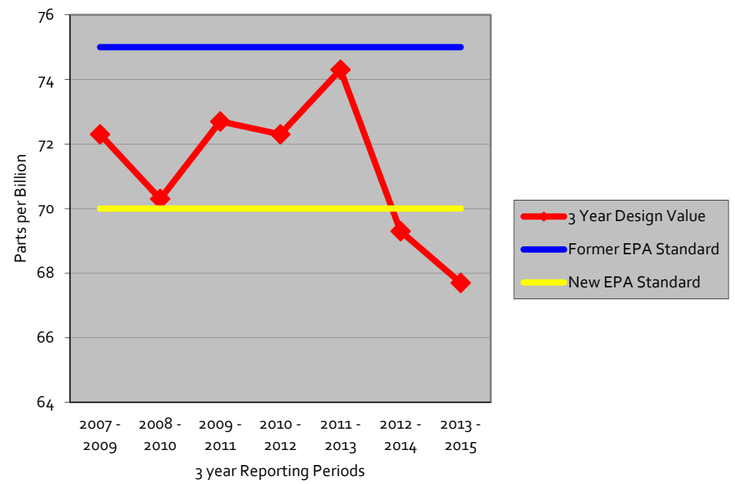
8.5 Air Quality

One of the enviable qualities of the Waco region is that compared to many cities within Texas, air quality is generally good. The Environmental Protection Agency (EPA) regulates several air pollutants under the National Ambient Air Quality Standards (NAAQS) that are considered a threat to human health. As a result of Waco's clean air status, the Waco Metropolitan Area is classified by the EPA as attainment for all criteria air pollutants. Metropolitan Areas under this classification are not required to establish control measures to improve air quality. Despite the attainment status, the Waco Metropolitan Area has previously monitored ozone values close to the maximum allowable standard permitted by the EPA. Standards identified within the NAAQS, definition of non-attainment areas and the processes required for non-attainment areas are identified within the Glossary section of The City Plan.

8.5.1 Changes to Ozone Standards

Recent scientific studies, however, suggest that the current standards used by the EPA do not sufficiently protect the health of many vulnerable populations, most significantly those with severe respiratory or pulmonary diseases and persons under the age of 12. As a result, in 2015 the EPA lowered the NAAQS 8-hour ozone standard from 75 parts per billion (ppb) to 70 ppb. The current design value for the Waco region is 68ppb from the 2013 to 2015 period. As a result, the air quality status for the Waco Region remains classified as attainment. Chart 8.1 shows the trend in design values for the Waco monitor since the beginning of operation in 2007.

Chart 8.1: Ozone Design Value Trend for the Waco Ozone Monitor – 2007 to 2015



Source: Texas Commission on Environmental Quality – Waco Mazanec Monitor (CAMS 1037) Ozone Design Values: 2007 to 2015

8.5.2 Sources of Ozone and Efforts to Reduce Emissions

Ozone is formed by a chemical process where certain compounds of Nitrogen Oxides (NO_x), or Volatile Organic Compounds (VOCs), are exposed to either ultraviolet radiation or high temperatures. These compounds are known as precursor emissions and their presence is required for the creation of ozone. NO_x compounds are generally a product of some type of combustion such as those from a motor vehicle engine. VOCs are generally a product of some type of vapor release such as those from refueling a motor vehicle or many industrial processes. Due to the secondary required condition for ozone formation being solar radiation or high temperatures, unhealthy levels of ozone are generally only observed between the period of May 1 to October 31.

Unfortunately the operations at the Waco monitor are not of sufficient duration to be able to infer the long-term trends of ozone levels. Using observations from cities such as Houston or Dallas / Fort Worth, however, ozone readings have been trending significantly downward for the past 20 years. Much of this trend can be attributable to the following factors:

- Increase in motor vehicle fuel efficiency
- More stringent new motor vehicle emission requirements
- Cleaner emissions from industrial processes
- Cleaner and more efficient electric power generation units

Thus, notwithstanding increases in population, motor vehicles and other sources of ozone precursors, it is anticipated that future design values for the Waco monitor should be lower than at present for the reasons stated above. These trends could be negated, however, should the Waco Region significantly increase the sources of NO_x or VOC whether this is from motor vehicles or from new industries.

The Heart of Texas Council of Governments has produced an emissions inventory of the Waco airshed which identifies the primary controllable source of ozone precursor emissions within the airshed as NO_x. Therefore the most effective strategies to reduce ozone within the Waco airshed are those that target the combustion of fossil fuels.

8.6 Waste Management

Environmentally sound waste management practices are an important contributor to the environmental quality and livability of a city. The impact of waste management on the environment includes the collection and disposal of solid waste in a manner that meets strict environmental standards; resource conservation through recycling programs; and the maintenance of a more attractive environment through litter reduction and abatement programs. These functions will undoubtedly increase in importance as resource conservation and environmental protection become more critical. The City of Waco currently operates a regional landfill facility that serves eleven counties; provides curbside recycling to Waco residents and businesses upon request; converts yard waste to mulch; and administers an extensive public education program. Map 8.1 identifies the current facilities operated by solid waste services.

An example of the evolving roll of solid waste management in Waco can be seen in the area that includes Greater Downtown (as defined within the Imagine Waco Plan) and the Bosque and Brazos River Corridors. This area has experienced a dramatic increase in development over the past 10 years. An area once characterized by vacant property and empty structures is becoming the focal point for increasing development. Development within the area includes major additions to the campuses of Baylor University and McLennan Community College, a downtown that is rapidly transition to a vibrant core that houses a mix of residential, commercial, office and entertainment uses in an urban setting.

This area was recognized in the 1967 Comprehensive Plan as one which held the greatest promise for creating a "new image" for Waco. The handling of solid waste in this area will require new techniques that meet the needs of an urban core and a riverine environment. Some of the challenges will include working closely with stormwater management to reduce the volume of litter being transported to the river via a network of creeks and implementing collection techniques that will serve the mix and density of land uses on both sides of the Brazos River. This is just one example of the many challenges facing waste management in the future.

Image 8.5: The City of Waco provides drop-off locations operated by Solid Waste Services for multiple types of waste and recycling services

8.7 Implementation Strategies

Low Impact Development

- Conduct comprehensive reviews of local policies to identify any existing regulatory barriers to the implementation of LID
- Incorporate LID into regulatory guidance
- Provide incentives for LID such as increased development densities; adjustments to parking requirements; tree canopy credits
- Encourage "conservation design" techniques* that include preservation of undisturbed areas; preservation of stream buffers; reduction in clearing and grading; locating projects in less environmentally sensitive areas; and clustering development

*Conservation design techniques can reduce impervious cover; stormwater pollution; construction costs; and the need for grading and landscaping while providing for conservation of natural areas.

Water Conservation

- Improve maintenance of the water distribution system to minimize leakage
- Continue to build on our capacity to recycle pretreated water from the wastewater treatment plant for industrial and irrigation use

- Practice sustainable planting practices, including xeriscape landscaping and using drip irrigation systems on City facilities, and explore methods to incentivize their use on private property
- Use LID techniques such as detention ponds and vegetated swales as means of replenishing the groundwater supply and reducing flooding
- Incentivize the use of low flow and waterless plumbing fixtures and rainwater capture facilities as part of a Green Building Program
- Continue to use a progressive pricing structure for water use

Water Quality

- Continue the cooperative efforts to protect and improve water quality in the Lake Waco watershed
- Carry out the recommendations of the Wastewater Master Plan for monitoring and programming for repair, replacement and upgrading of the City's aging wastewater system
- Incentivize the use of LID methods that use of on-site, natural measures to improve the quality of stormwater runoff while preserving the natural environment
- Identify and purchase property for future use as regional stormwater detention facilities
- Consider the adoption of a stormwater fee as a means of financing the implementation of strategies to improve the quality of stormwater runoff
- Continue support of the Waco Wetlands to improve the water quality in Lake Waco and to educate the public on the importance of natural ecosystems in maintaining water quality and protecting the lake's fragile ecosystem

Energy

- Transition toward the use of more energy efficient vehicles and equipment for City operations. Explore the use of clean fuel vehicles for City operations
- Construct new City buildings or retrofit existing buildings to Leadership in Energy and Environmental Design (LEED) certifiable standards
- Consider the adoption of the Green Building Code as a means of encouraging more energy efficient buildings in both the public and private sectors
- Promote the use of solar power in residential, commercial, and industrial development
- Create a built environment that will facilitates energy efficient forms of transportation such as walking, biking and public transit
- Consider implementation of a street tree planting initiative by the City to decrease the urban heat island effect and encourage walking
- Strengthen the tree preservation and planting standards in the zoning ordinance.
- Encourage the preservation and creation of open space.

Air Quality

The following are several voluntary recommendations for the City of Waco to reduce NO_x emissions, improve ozone readings and to avoid a potential non-attainment designation:

- Reduce or eliminate engine idling for city vehicles
- Encourage city employees to drive below the speed limit especially while using city vehicles
- Set air conditioning thermostats for city facilities at 78 degrees Fahrenheit
- Provide bicycle lockers and showers at city facilities for employees to commute via bicycle
- For days with forecasted high temperatures above 95 degrees:
    - Conduct lawn mowing and landscaping activities before 10:00am or after 6:00pm
    - Discourage the use of drive-through services between the hours of 10:00am and 6:00pm
- Review the recruitment of industries with processes that produce significant emissions of NO_x
    - Encourage the implementation of cleanest available emission control technology
- Encourage use of public transit, walking and bicycling.
- Explore the use of cleaner fuels for the city's fleet and Waco Transit

Waste Management

- Improve access to recycling service for commercial and multi-family properties
- Evaluate alternative disposal sites to meet the needs of a growing market. (The current landfill is projected to be full in 9 years.)
- Increase access to recycling centers for the underserved populations in by locating recycling stations near transit routes and in areas with good pedestrian access
- Relocate Cobbs recycling center to a more convenient location
- Increase business diversion and recycling by 10 percent (43.5 percent of waste is generated by businesses)
- Work closely with the stormwater division of Water Utilities to improve water quality
- Reduce dumping in creeks through strengthening enforcement of litter abatement ordinances
- Purchase equipment to vacuum leaves that interfere with stormwater drainage
- Move toward increased use of renewable fuel
- Continue and strengthen public education aimed at litter abatement and recycling
- Work with local contractors to gain support for the adoption of a Green Building Code as a means of keeping building materials out of the landfill

City of Waco Landfill

City of Waco Landfill

Non-City Landfill

Waco City Limits

Outside Waco City Limits

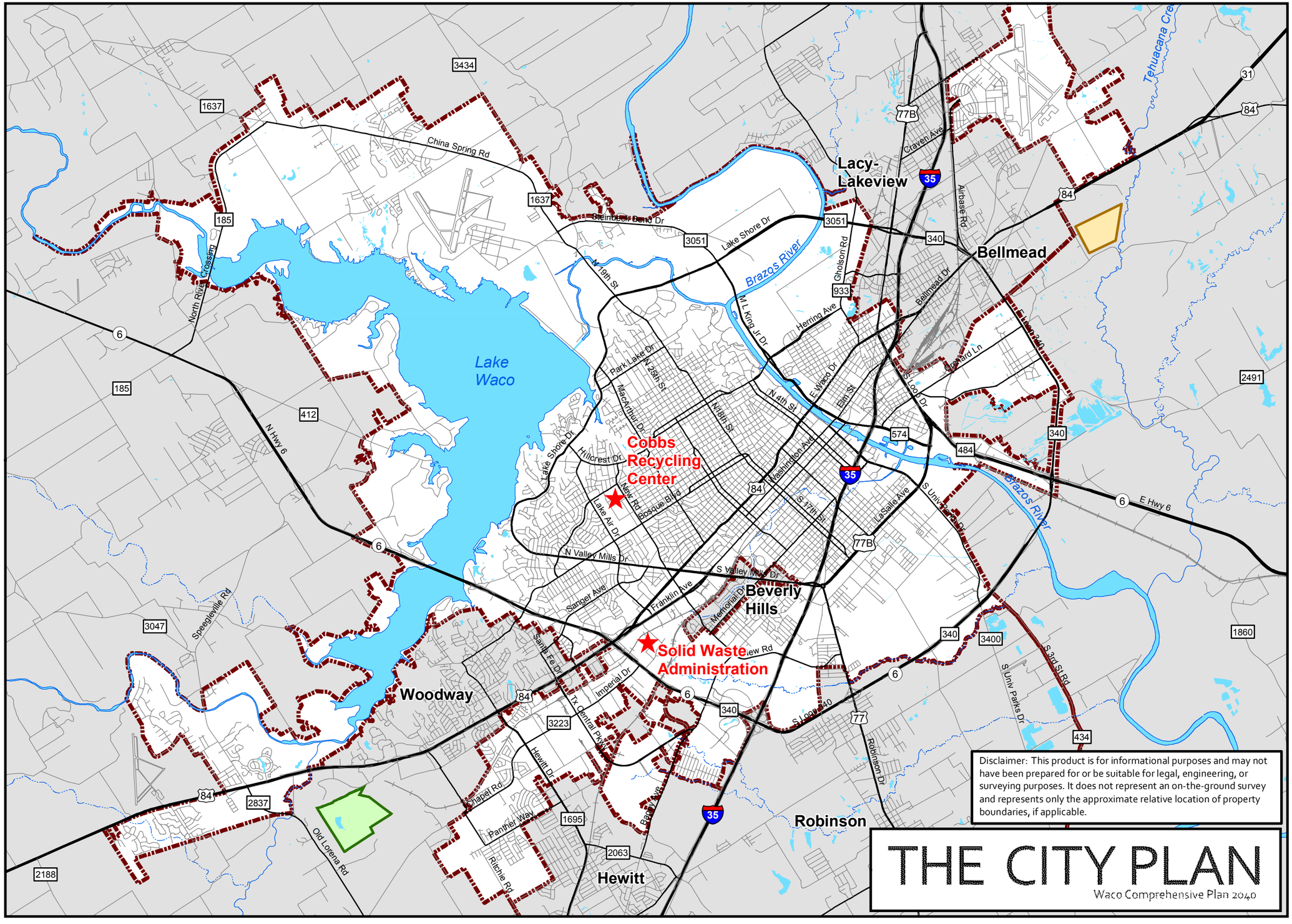
0 0.5 1 2

Miles

July 2016

Map 8.1: Existing Waste Management Facilities

CITY OF WACO



Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries, if applicable.

THE CITY PLAN

Waco Comprehensive Plan 2040

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Waco Comprehensive Plan 2040

implementation

Chapter 9: Implementation of the Plan

9.1 Use of the Plan

The comprehensive plan should be the city's lead and overall policy guide for the growth and development of Waco. The adoption of this comprehensive plan is the first step in the implementation process. It is the product of considerable effort on the part of the City of Waco and its City Council, Plan Commission, numerous city departments, community leaders, and citizens. Continuing action to implement the Plan will be needed for it to have lasting impact.

- The zoning and subdivision ordinances are the primary tools for implementing the comprehensive plan's policies, particularly the Future Land Use Plan. The City should use the Plan to assess the appropriateness of proposed development cases including zoning actions and special exceptions to the zoning ordinance. Also, the zoning and subdivision regulations should be evaluated for conformance with the Plan. Much of the ordinance may need revision and reorganization, ranging from new definitions to updated development and design standards, and even new zoning districts. It is recommended the City undertake this process beginning in 2017.

- The City's Capital Improvement Program (CIP) is an important mechanism to implement public projects and infrastructure improvements that support the growth and development of the City. Public dollars will always be limited, so the City should balance its priorities with available revenues and other funding sources. When updating its annual CIP, the comprehensive plan should be consulted when establishing priorities within the City's CIP. It is recommended that a scoring matrix be created to evaluate proposed CIP projects and how the carry out the priorities and recommendations included in the Plan.

- All future plans related to the City's growth and development and related infrastructure or public facilities should be consistent with and be incorporated into the comprehensive plan.

- The City needs to be able to measure successes and challenges in the implementation of the comprehensive plan. The Planning Department should be required to prepare an annual report to assess the progress of the City in implementing the Plan's recommendations and to recommend priorities for the coming year.

- Recommendations and implementation strategies included in the Plan will have major impacts on growth and development of the City including new development regulations and requirements for private property. Therefore, implementation efforts should go through a vigorous public involvement process that meets or exceeds all state and city requirements including public outreach, public input meetings, a public comment period and public hearings before the Plan Commission and/or the City Council.

9.2 Update of the Plan

The comprehensive plan is a dynamic and evolving working document that should be updated regularly to assure its usefulness and relevance to the community. Updates to the Plan should reflect shifts in demographic and economic trends that occur over time, as well as changes in policies, strategies, programs, and project status. To maintain the Plan's currency, the City should undertake a major re-evaluation and update of the comprehensive plan every five years.

Image 9.1: Planning Department staff has and will continue to facilitate public meetings to receive feedback from citizens for the Waco comprehensive plan. Once adopted, there will be more public involvement for the implementation stages of the plan

9.3 Role of the City Plan Commission

Section 2 of Article IX in the City Charter states that "The City Plan Commission shall recommend a City Plan for the physical development of the City and amendments thereto." This requirement was the basis for the City Plan Commission being the steering committee for adoption of this plan. It is recommended that the Commission continue this role in the implementation of the Plan by providing input and recommendations to City Council on implementation priorities and strategies.

glossary

Glossary

Annexation
A process by which a city may incorporate territory into its city limits. This process may be voluntary, at the request of the property owner, or involuntary. Involuntary annexations require the development of an annexation plan 3 years in advance providing details regarding the provision and timing of city services after annexation.

Certificates of Convenience and Necessity (CCN)
A type of regulatory compliance certification issued by the Texas Commission on Environmental Quality (TCEQ) for retail public utilities (including municipalities) to render water and sewer service to the public.

Cluster Development
Allows principal structures to be grouped together on a site, leaving the remaining land area for common open space, agriculture, recreation, and public and semi-public uses. Grouping structures minimizes the cost of public services and infrastructure required to serve the development, while maintaining the rural character that often attracts residents to these areas. Density bonuses are generally given to encourage this type of development.

Context Sensitive Solutions (CSS)
A set of guidelines intended to create a network of thoroughfares that support all users and that enhance community character. A key component of CSS is that the design of a roadway may vary depending upon the land use context within which the roadway traverses. CSS is sometimes also referred to as context sensitive design.

Extraterritorial Jurisdiction (ETJ)
The ETJ is the unincorporated land within five miles of Waco's boundary that is not within the city limits or ETJ of another city. It is the territory where Waco alone is authorized to annex land.

The ETJ enables the City to extend regulations to adjacent land where development can affect quality of life within the city. ETJ regulations also help to ensure that subdivisions that may be annexed by Waco in the future meet minimum standards for road access, lot size, and other factors.

No City taxes are collected in the ETJ. Services such as public safety, road maintenance, and parks are provided by the County or special districts.

Food Desert
A food desert is a geographic area where affordable and nutritious food is difficult to obtain, particularly for those without access to an automobile. Food deserts usually exist in low-income communities or rural areas. Some research links them to diet-related health problems in affected populations. They are also associated with supermarket shortages and food security.

Green Building Code
Refers to both a structure and the using of processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from siting to design, construction, operation, maintenance, renovation, and demolition.

Greenfield
Greenfield land is undeveloped land in a city or rural area, often along the outer edges of the city or within the ETJ.

Historic Landmarks
City landmark is a property that has been designated by the City of Waco that meets the following criteria:

- A building located within the boundaries of a historic overlay district, that contributes to the district's historical significance through location, design, setting, materials, workmanship, feeling or association, and whose demolition or destruction would constitute an irreplaceable loss to the quality and character of Waco.
- A building, structure, object, or site of historical, cultural, architectural, archaeological, paleontological or natural significance outside of a historic district.

City Landmarks are eligible for partial tax exemptions, partial building code exemptions and permit fee refunds subject to the conditions of the ordinance. The property requires a certificate of appropriateness prior to commencement of certain types of intrusive activity and demolition.

Recorded Texas Historic Landmarks (RTHLs) are properties judged to be historically and architecturally significant. The Texas Historical Commission (THC) awards RTHL designation to buildings at least 50 years old that are judged worthy of preservation for their architectural and historical associations.

National Register of Historic Places is a federal program administered in our state by the Texas Historical Commission in coordination with the National Park Service. Listing in the National Register provides national recognition of a property's historical or architectural significance and denotes that it is worthy of preservation. Buildings, sites, objects, structures and districts are eligible for this designation if they are at least 50 years old (with rare exceptions) and meet established criteria.

National Register Historic District possesses a significant concentration, linkage, or continuity of buildings, structures, sites, or objects united historically or aesthetically by plan or physical development. Overall, the district as a whole must have historical, architectural, engineering, or archaeological significance, even if some or all of the properties lack individual distinction.

Contributing Structure A contributing property is a building, structure, object, or site within the boundaries of the district that adds to the historic associations, historic architectural qualities, or archaeological values for which the historic district is significant. A contributing property must also retain integrity, meaning enough of its historic physical features to convey its significance as part of the district.

Non Contributing Structure A noncontributing property is a building, structure, object, or site within the boundaries of the district that does not add to the historic associations, historic architectural qualities, or archaeological values for which the historic district is significant. Typically this means that the property is less than fifty years old, has been significantly altered, or is not associated with the historic theme or time period of the district.

Housing Tenure
Tenure refers to the arrangements under which the household occupies all or part of a housing unit. Types of tenure include ownership by a member of the household, rental of all or part of the housing unit by a member of the household, etc.

Impact Fees
An impact fee is a charge on new development to pay for the construction or expansion of off-site capital improvements that are necessitated by and benefit the new development.

Infill Development
The process of developing vacant or under-used parcels within existing urban areas that are already largely developed.

Large Lot Development
Typically requires a minimum lot size in the vicinity of two acres and maximum impervious cover of 40 percent. Earthen swales are often used rather than curb and gutter to manage stormwater runoff, while on-site sewer facilities are likely the primary means of sewage treatment. These development standards help reduce construction and maintenance costs for public infrastructure, while maintaining more green space.

Livability
Livability is the sum of the factors that add up to a community's quality of life – including the built and natural environments; economic prosperity; health and safety; social stability; educational opportunity; and cultural , entertainment and recreational possibilities.

Low Impact Development (LID)
The minimizing or eliminating pollutants in storm water through natural processes and maintaining pre-development hydrologic characteristics, such as flow patterns, surface retention, and recharge rates.

Master Thoroughfare Plan
A long-range planning document that identifies future thoroughfare corridors, their intended function and conceptual design recommendations. The thoroughfare plan is used to determine the amount and alignment of right of way dedications within new subdivisions and in the calculation of roadway impact fees for new developments.

Metropolitan Planning Organization (MPO)
The agency designated by the Governor of Texas to administer the federally required transportation planning process for a census defined urbanized area. An MPO is required for each census urbanized area of greater than 50,000 persons. MPOs are governed by a Policy Board comprised of local elected and governmental officials. The Policy Board is required to identify through the transportation planning process all projects for which federal highway or public transportation funds are utilized within their respective urbanized area.

Metropolitan Statistical Area (MSA)
A census defined geographical region with a relatively high population density at its core and close economic ties throughout the area. MSA boundaries are generally contiguous with county boundaries. In 2010, the Waco MSA covered McLennan and Falls Counties.

National Ambient Air Quality Standards (NAAQS)
A set of air pollutant standards established by the US Environmental Protection Agency (EPA) with which all metropolitan areas are required to conform. The NAAQS was developed to comply with the Clean Air Act Amendments of 1990 which directed the EPA to regulate atmospheric levels of the following pollutants: ozone, carbon dioxide, particulate matter less than 10 microns in size, sulfur dioxide, nitrous oxides and lead.

For ozone, compliance with the NAAQS standard is determined by averaging every possible 8-hour period within a calendar day. The highest daily 8-hour average becomes the official value for that day. The official value accepted by the EPA for a given year is the fourth highest daily 8-hour average. In other words, each metropolitan area is permitted three "bad" ozone days a year in recognition that there are certain circumstances beyond the control of the area that could lead to unhealthy levels of ozone. Finally, compliance is determined by averaging 3 consecutive annual values to calculate the region's "design value". A design value in excess of 75 parts per billion is considered non-compliant with the NAAQS and may lead to a regions classification of non-attainment by the EPA.

Non-Attainment Areas
Areas determined by the US EPA to be out of compliance with the NAAQS for one or more pollutants. Regions designated as non-attainment by the EPA are required to submit a plan, in coordination with the TCEQ, to return to compliance with the NAAQS. These plans are known as a Statewide Implementation Plan or SIP.

Peer Cities
A list of 10 cities that are considered to have similar characteristics to the city of Waco such as a similar population; not located in a major metropolitan area surrounding a large city; and presence of a college, university and/or military base that attracts a significant young and transient population. The City Plan averaged statistics from these cities in order to provide a comparison. The cities used for this analysis are as follows: Abilene, Amarillo, Bryan, College Station, Lubbock, Odessa, Temple, Tyler, San Angelo, and Wichita Falls.

Peer Counties
List of counties derived from the list of Peer Cities that are considered to have similar characteristics to McLennan County. The City Plan averaged statistics from these counties in order to provide a comparison. The counties used for this analysis are as follows: Bell (Temple), Brazos (Bryan & College Station), Ector (Odessa), Lubbock (Lubbock), Potter (Amarillo), Randall (Amarillo), Smith (Tyler), Taylor (Abilene), Tom Green (San Angelo), and Wichita (Wichita Falls).

Statewide Implementation Plan (SIP)
For metropolitan areas failing to meet the NAAQS standards for one or more regulated air pollutants, adoption of a SIP plan is required to identify the regions strategies for returning to compliance. Several strategies implemented within SIPs by non-attainment areas within Texas include mandatory motor vehicle emissions testing, reformulated gasoline & diesel, fuel vapor recovery systems and restrictions on types of industries and/or hours of operation.

Sustainability
Sustainable development consists of development that meets the needs of the present without compromising the ability of future generations to meet their own needs

Tagged Structures
Red Tagged: A structure that is deemed infeasible to repair and is unfit for human habitation.

Green Tagged: A structure that is deemed repairable and is unfit for human habitation.

Whole Life Costing
Whole life costing is a technique for systematically evaluating the costs of owning an asset over its entire life. This can include consideration of design, acquisition, construction, operation and maintenance, renewal and rehabilitation, financing, depreciation and replacement/disposal costs. Whole life costing may also take into account environmental impact and social costs.

acronyms

Acronyms

AD – Average Day

ADA – Americans with Disabilities Act

BRIC – Baylor Research and Innovation Collaborative

BRT – Bus Rapid Transit

CA – Certificate of Adjudication

CCN – Certificate of Convenience and Necessity

CIP – Capital Improvement Program

CSS – Context Sensitive Solutions

DASH – Downtown Area Shuttle

EPA – Environmental Protection Agency

EST – elevated storage tank

ETJ – Extraterritorial Jurisdiction

FHLM – Freestone, Hill, Lime, and McLennan Water Supply Corp.

GED – General Educational Development

GST – ground storage tank

GWAMA – The Greater Waco Advanced Manufacturing Academy

LEED – Leadership in Energy and Environmental Design

LID – low impact development

MCC – McLennan Community College

MD – Maximum Day

MGD – million gallons per day

MPO – Metropolitan Planning Organization

MSA – Metropolitan Statistical Area

MTP – Metropolitan Transportation Plan

NAAQS – National Ambient Air Quality Standards

No_x – nitrogen oxides

PH – Peak Hour

PID – Public Improvement District

ppb – parts per billion

PRV – pressure reducing valve

RPP – Regional Price Parities

RTHL – Recorded Texas Historic Landmark

TAZ – Traffic Analysis Zones

TCEQ – Texas Commission on Environmental Quality

THC – Texas Historical Commission

TIF – Tax Increment Financing

TIP – Transportation Improvement Program

TOD – Transit Oriented Development

TOPRS – Texas Oklahoma Passenger Rail Study

TSTC – Texas State Technical College

TxDOT – Texas Department of Transportation

USACE – U.S. Army Corps of Engineers

VMT – vehicle miles traveled

VOC – volatile organic compound

WAM – Water Availability Model

WMARSS – Waco Metropolitan Area Regional Sewer System

WTP – water treatment plant

appendix

Appendix A:
Permitted Zoning under Proposed Land Use Designations

Rural Residential
Allows for clustered or large lot low density residential development and agricultural uses with a maximum density of 1 unit/acre and a potential density bonus for cluster development
Examples: Design elements would preserve rural character with a high percentage of open space.
Zoning: R-E

Suburban Residential
Allows for large lot, single-family residential and cluster development with a maximum density of 3.5 units/acre and a potential density bonus for cluster development.
Examples: Riverside, Twin Rivers
Zoning: R-1A

Urban Residential
Single family residential, zero lot line, accessory dwelling unit and duplex development with accompanying uses such as churches, playgrounds, schools, civic buildings, and limited office and commercial uses and with a maximum density of 10 units/acre (currently 14.5 units/acre)
Examples: Development would look like many of our low density residential subdivisions.
Zoning: R-1B, R-1C, R-2, O-3 subject to certain criteria described in the notes section*

Medium Density Residential Office Flex
Duplexes, townhouses, condos and apartments with a maximum density of 25 units per acre
Examples: Magnolia Villas, Cameron Heights and Palm Court Apartments
Zoning: O-1, O-3, R-2, R-3A, R-3B, R-3C

Office Industrial Flex
A mixture of compatible office and industrial uses with limited high density residential and commercial ranging from large campus settings to the adaptive reuse of an existing structure and with access to arterial or collector roads as well as transit routes
Examples: Offices, apartments, crafts and trades, the Baylor Research Innovation Collaborative (BRIC), and low impact manufacturing
Zoning: O-1, O-2, O-3, C-1, C-2, M-1

Mixed Use Flex
Limited commercial, office and medium to high density residential developments
Examples: Austin Avenue between 18th and 26th Streets, Elm Avenue and 15th and Colcord
Zoning: R-3C, R-3D, R-3E, O-1, O-2, O-3, C-1, C-2, C-4 on Elm Avenue and Bridge Street only

Mixed Use Core
The most densely developed area of the city with a mixture of commercial, office and high density residential uses
Examples: Austin Avenue between 3rd and 18th Streets, Franklin Place, Praetorian Building
Zoning: R-3D, R-3E, O-2, C-2, C-4

Industrial
General industrial or manufacturing uses
Examples: Texas Central Industrial Park, Cargill, Sanderson Farms
Zoning: M-2

Institutional
Large educational and medical campuses
Examples: Baylor, TSTC, MCC, Providence, Baylor – Scott & White
Zoning: O-2

Open Space

Parks, recreational areas, undeveloped flood zone risk areas (1% per year) and areas designated for preservation of existing agriculture, open space or natural areas
Examples: Cameron Park, Lake Waco Wetlands, Cottonwood Creek Golf Course
Zoning: R-E for large parcels; small, odd shaped parcels within the 100 year flood plain assume the zoning of adjacent properties with restrictions applied either through the creation of an overlay zoning district or though the addition of criteria for development within the floodplain to the text of the zoning ordinance.

Notes:
Mixed land use categories offer greater flexibility in the development of property through providing a broader choice of zoning options within each land use category and an expansion of uses within each zoning district. The granting of a zoning district that is permitted within a land use category will be based on criteria that are incorporated into the zoning ordinance. These criteria will include considerations such as compatibility with surrounding land uses and the availability of required infrastructure.

The R-E (Rural Estate) zoning district will be repurposed as the Rural Residential District. It will replace R-1B (Single Family Residence) zoning district as the holding district for most newly annexed areas.

The O-3 zoning district on property designated as Medium Density Residential Office Flex land use will be expanded to include specified neighborhood commercial uses that currently require C-2 zoning subject to meeting established criteria. This is done to offset the expansion of the C-2 district to allow a broader range of commercial uses by special permit.

The O-3 zoning district may be allowed on property designated as Urban Residential land use subject to the following criteria:

1. The O-3 is located on a street classified as a collector or higher or has access to two intersecting streets, one of which is classified as a collector or higher; or
2. 2. The O-3 zoning provides a buffer between a residential neighborhood or residential zoning and zoning districts that would allow more intensive commercial uses; or
3. The O-3 zoning would bring an existing nonconforming commercial or office building(s) on a site into conformance with the zoning ordinance.

The C-1 zoning district will eventually be eliminated. The only difference between C-1 and C-2 is that C-1 does not allow the sale of alcohol for on or off-premise consumption. This C-1 zoning district use has been limited primarily to the Brook Oaks Neighborhood.

The C-3 and C-5 zoning districts will eventually be eliminated. Commercial uses currently allowed in C-3 and C-5, but not C-2 will be allowed in C-2 by Special Permit. Industrial uses currently allowed in C-5 will be allowed in M-2.

The M-3 (General Commercial) zoning district will eventually be eliminated. Uses currently allowed in M-3, but not M-2 will be allowed in M-2 by Special Permit.