

section 4: geography and demographics

4.1 – geography

Located midway between Dallas and Austin on IH-35, Waco is centrally located in the region known as the “Heart of Texas.” The Waco Urbanized Area, as identified by the US Census Bureau, encompasses approximately 91 square miles and an estimated population of 172,378 as of the year 2010.

In order to account for future growth and activities that impact mobility within the urbanized area, the MPO studies a much larger area when developing the Metropolitan Transportation Plan. This area is referred to as the Waco Metropolitan Area and it is coextensive with McLennan County, Texas. The Waco Metropolitan Area encompasses 1,060 square miles and in 2010 had an estimated population of 234,906. Map 2.1 shows both the Waco Urbanized Area and the Waco Metropolitan Area.

4.1.1 – physical geography

The Waco Metropolitan Area is located at the confluence of the Brazos and Bosque Rivers. The Brazos River roughly bisects McLennan County into two equal parts. The North, Middle and South Bosque Rivers enter the Metropolitan Area from the north, northwest and west respectively and flow into Lake Waco and then form the Bosque River. These rivers create significant natural barriers across the Waco Metropolitan Area.

The Waco Metropolitan Area is relatively flat and without much change in relief despite being bisected by the Balcones Fault system. The highest point within the region is 962 feet above sea level at a point northwest of Crawford and the lowest point is 349 feet above sea level along the Brazos River at the McLennan / Falls County Line. Elevation and severe slopes generally do not create significant natural barriers within the Waco Metropolitan Area.

Most of the Waco Metropolitan Area lies within the Blackland Prairie region of Texas. Broad grasslands within fertile soils containing a large amount of clay characterize this region. Although this clay is beneficial for agriculture, it is problematic for road construction as

these clays will experience a significant amount of swelling when wet and will shrink significantly when dry. The resulting shrinking and swelling often significantly reduce the useful life of pavements within the metropolitan area.

4.1.2 – climate

The climate of Waco can best be described as moderate. Winters are generally mild with temperatures 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 typically is concentrated during the spring with much drier conditions during summer and early fall.

Since snow and ice are rare occurrences, there is little need for the use of salt to de-ice roads. The result is less wear and tear on pavement surfaces and bridge structures as compared to areas with significant icing. This also results in a somewhat older motor vehicle fleet as vehicle bodies are less prone to rust and corrosion. This has potentially negative consequences for air quality and carbon emissions as is discussed in more detail in section 4.3.5.

The mild climate also makes bicycle and pedestrian travel modes more appealing to a larger segment of the population. Although the summers can be quite hot, the uncomfortable temperatures usually occur between 12:00 noon and 7:00 PM, which does not impose significant restrictions on these modes of travel.

table 4.1 – waco 30 year climatological data

	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)	69.4	46.9	7.6
Mean	77.8	46.7	32.0

*Mean temperatures.

**Measured in inches.

4.1.3 – existing land use

Much of the Waco Metropolitan Area can be described as rural in character with much of the urbanized uses concentrated in a relatively small area in the center of the region. In 2013, nearly 81% of land in McLennan County was used for either agricultural purposes or was considered forested. Of the land considered ‘developed’, nearly 70% was devoted to residential uses.

table 4.2 – 2013 land use percentages

Category	Acres	Percent of County
Agricultural	477,152	70.3%
Forested / Wooded / Marsh	70,869	10.4%
Residential	40,967	6.0%
Highway Right of Way	28,223	4.2%
Water	18,460	2.7%
Vacant / Undeveloped	10,216	1.5%
Surface Mining	8,365	1.2%
Parks / Recreational Areas	5,646	0.8%
Industrial	5,841	0.9%
Commercial	2,791	0.4%
Other Development	9,870	1.5%

table 4.3 – 2013 developed land uses

Category	Percent of Developed Uses
Residential	68.9%
Industrial	9.8%
Commercial	4.7%
Office	0.5%
All other development	16.1%

The relatively flat and well-drained soils that promote agriculture, however, are also very easy to develop into residential subdivisions. This, when combined with a favorable property tax structure, the - traffic congestion have contributed to significant levels of urban sprawl. Between 2005 and 2013, developed land uses increased by 8.2%, whereas population increased only 7.5% during the same time period.

table 4.4 – increases in developed land uses and population: 2005 -2013

Category	New Acreage or Population	Percent Increase 2005 to 2013
Commercial	242	9.5%
Residential	3367	9.0%
Office	29	10.0%
Industrial	558	10.6%
Other Development*	1,007	11.8%
Right of Way	1,452	5.4%
Total All Developed Uses	6,655	8.2%
Population	16,813	7.5%

*Does not include landfills or surface mining.

Unlike the decade between 1995 and 2005, developments constructed during the last 8 years were very similar in terms of overall acres of development per person. While a welcome trend, it is hypothesized that this was due primarily to the slowdown in the economy as a result of the Great Recession from 2007 to 2010. Despite this most recent trend, the Waco Metropolitan Area continues to use more developed land to support each person than most other metropolitan areas in the United States.

table 4.5 – change in developed acres per person

2005	2013	Percent Change	Acres per Person for New Development
0.362	0.363	+2.7	0.396

Of greater concern than the density of new developments is the location. Slightly more than half of new residential acreage is found in areas considered rural in 2005. Locations of commercial and industrial developments, however, were very different with most new development occurring within the urbanized area. Despite the increase in urban residential development, the trends of the past 8 years have further exacerbated the existing disconnect between where the region’s residents live and where they work, go to school, shop and perform all other activities of life. The resulting distances between various land-uses forces residents of these new developments to use an automobile to perform any task. In addition, many of the developments furthest from the urban core also have the highest average age, many from retiring baby-boomers. The concern is that as these retirees age, their ability to utilize an automobile declines resulting in a significant increase in demand for very limited rural public transportation services. Section 4.3.4 describes in greater detail the distribution of elderly citizens within the Waco Region.

table 4.6 – location of new developed land uses: 2005 -2013

	City of Waco	Remainder of Urbanized Area	Rural
Residential	26.8%	19.2%	54.0%
Commercial	40.0%	43.6%	16.4%
Industrial	46.6%	30.5%	22.9%
Other Development*	25.2%	12.2%	62.6%
All Development	29.1%	19.9%	51.0%

*Does not include landfills, surface mining or right of way.

4.1.4 – forecasted land use

In 2005, the Waco MPO contracted with Wilbur Smith Associates (WSA) to identify future land uses patterns for the Waco Region for the year 2030. Three scenarios were identified, 1.) A trend scenario assuming no significant changes in land-use or transportation policies, schools, tax structure, or economics, 2.) An alternative scenario resulting in most new development occurring within the current urbanized area, and 3.) An alternative scenario resulting in most new development occurring in close proximity to existing development, whether urban or rural. Each of the alternative

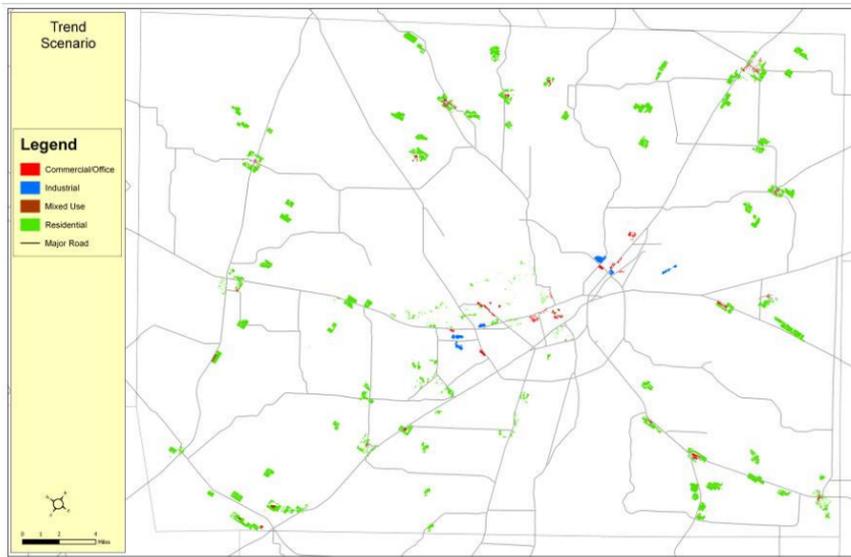
scenarios assumed that these could reasonably be accomplished by 2035 with the result of minimizing the need for new transportation and other municipal infrastructure and services. Additionally, the alternative scenarios were to accomplish the goal of minimizing the region’s fuel consumption thus reducing the emission of ozone precursors (nitrogen oxides and volatile organic compounds) and reducing the region’s carbon footprint.

The land use forecast estimated where residential, commercial and industrial uses would be located in the year 2030 assuming 56,000 new residents and 21,800 new jobs. The complete report with methodologies, results and recommendations can be found in the document titled “Future Land Use Study for McLennan County”.

trend scenario

In their analysis, WSA projected that without significant change in policy or economics, development patterns through 2030 should be similar to the patterns observed between 1995 and 2005, although at a lower population density and further dispersed. In the trend scenario, nearly all new residential development would occur in very low density developments in areas currently classified as rural. The average distance from each projected residential development and Downtown Waco is estimated to be 16 miles. The projected population density of most new development is estimated to be between 1 and 2 persons per acre, too low for any one development to support even modest commercial development by itself.

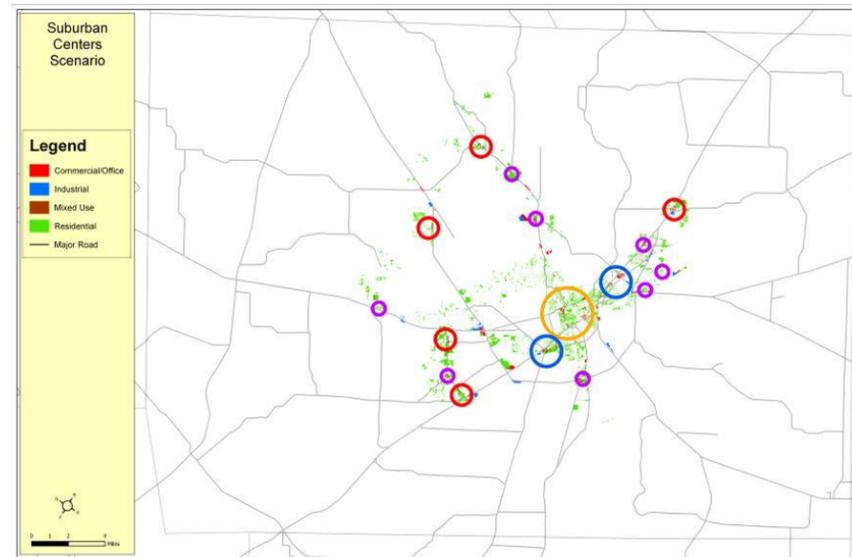
As a result of the projected low population densities, most commercial, industrial and office developments are projected to be concentrated within the existing urban core, generally adjacent to or in close proximity of existing expressway or principal arterials roadways.



The MPO staff used the trend scenario to estimate 2040 population and employment projections for development of the regional travel demand forecast model (section 6.1.2). This represents the ‘worst case’ scenario in terms of automobile travel demand. The alternative scenarios described below represent preferred scenarios for future land use distribution. Project recommendations found in Section 8 are intended to use the limited transportation resources projected to be regionally available to encourage a more efficient land use pattern.

alternate scenario 1 – suburban centers

The ‘Suburban Centers’ scenario assigns nearly all future population and employment growth to the existing urbanized area and as little as 5% is assigned to areas beyond. This alternative produces the most efficient transportation network but requires significant investment in public transportation, bicycle and pedestrian modes. Nevertheless, the reduced need for additional highway capacity more than offsets this increase. This scenario was preferred by persons identifying a thriving natural environment as the most important emphasis. This scenario also produces the least farmland impacts of the 3 scenarios.



alternate scenario 2 – urban center

The ‘Urban Center’ scenario is similar to the first alternative in that most future population and employment growth is assigned to the existing urbanized area. The primary difference, however, is that as much as 20% of the future growth is assigned to cities and towns outside of the urbanized area. This scenario acknowledges the presence of existing developments and is considered more politically realistic in that it does not assume the relocation of existing residents or jobs. This scenario was preferred by persons identifying transportation for all as the most important emphasis.

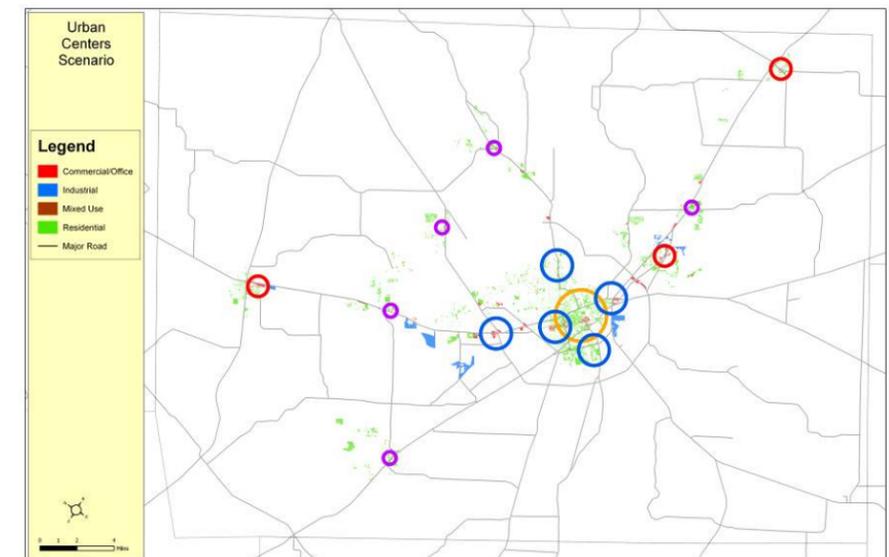


Table 4.7 provides a comparison of the 3 land use alternatives in several important metrics. In general, there are only small differences between the 2 alternatives, but significant positive differences between the alternatives and the trend.

table 4.7 – comparison of 3 land use scenarios

Metric	Trend	Alternative 1	Alternative 2
Acres of New Development	9,977	6,913	6,672
Daily Vehicles Miles of Travel	11.2 million	9.9 million	10.0 million
Annual Fuel Usage at 18 mpg	227,100,000 gallons	200,800,000 gallons	202,700,000 gallons
Carbon Dioxide Emissions*	4.85 billion lbs	4.06 billion lbs	4.10 billion lbs
Arterial & Collector 2030 Network Speed	31.7 mph	35.9 mph	35.8 mph

*Estimated 10% of VMT due to heavy trucks at 6 mpg. Automobile and light trucks estimated at 23 mpg. Estimated CO2 emissions: 19.4 lbs per gallon of gasoline, 22.2 lbs per gallon of diesel. Source: US EPA.

4.2 – demographics

4.2.1 – current population

Estimates from the Texas Data Center indicate that the Waco Metropolitan Area experienced a 10.02% increase in population between 2000 and 2010. This trend is slightly less than the rate of change experienced between 1990 and 2000. The City of Waco contains the majority of the population of the MPO Study Area with 53.13 percent in 2010, essentially unchanged as compared to 2000. The fastest growing communities within the Metropolitan Area are Hewitt, Lacy-Lakeview, Lorena, and Robinson, all of which experienced double-digit percentage growth since 2000. Ross and Gholson both experienced double-digit growth but with a population base of less than 1,000. Table 4.8 and Map 4.4 show the population changes between 2000 and 2010 within the Waco Metropolitan Area.

table 4.8 – population trends for the waco metropolitan area: 2000-2010

Geography	2000 Population	2010 Population	Change	Percent Change	Percent of Metro Growth
City of Waco	113,726	124,805	11,079	9.74%	51.80%
Suburban Cities*	50,914	57,573	6,659	13.08%	31.13%
Rural Cities**	11,536	11,774	238	2.06%	1.11%
Unincorporated Areas	37,341	40,754	3,413	9.14%	15.96%
McLennan County	213,517	234,906	21,389	10.02%	100.0%

*Includes the Cities of Bellmead, Beverly Hills, Hewitt, Lacy-Lakeview, Lorena, McGregor, Robinson and Woodway.

**Includes the Cities of Bruceville-Eddy, Crawford, Gholson, Hallsburg, Leroy, Mart, Moody, Riesel, Ross and West.

Source: US Department of Commerce: Bureau of the Census

A trend of concern is the continued population growth of unincorporated areas. These areas, which are primarily rural, have few development restrictions and lower property taxes. These areas also have an inadequate transportation infrastructure to accommodate this growth. Additionally, these areas are also

developed at very low densities (1 to 2 housing units per acre or less) resulting in greater centerline mile requirements for highway infrastructure and also makes these areas unfeasible for transit service. Conversely, many areas within the urban core have excess highway capacity and housing unit densities appropriate for mass transit. These areas, however, continue the trend of losing population. The 3rd guiding principal of this plan is to increase usage of the underutilized highway infrastructure and mass transit (refer to Section 3.1).

chart 4.1 – percent population change: 2000-2010

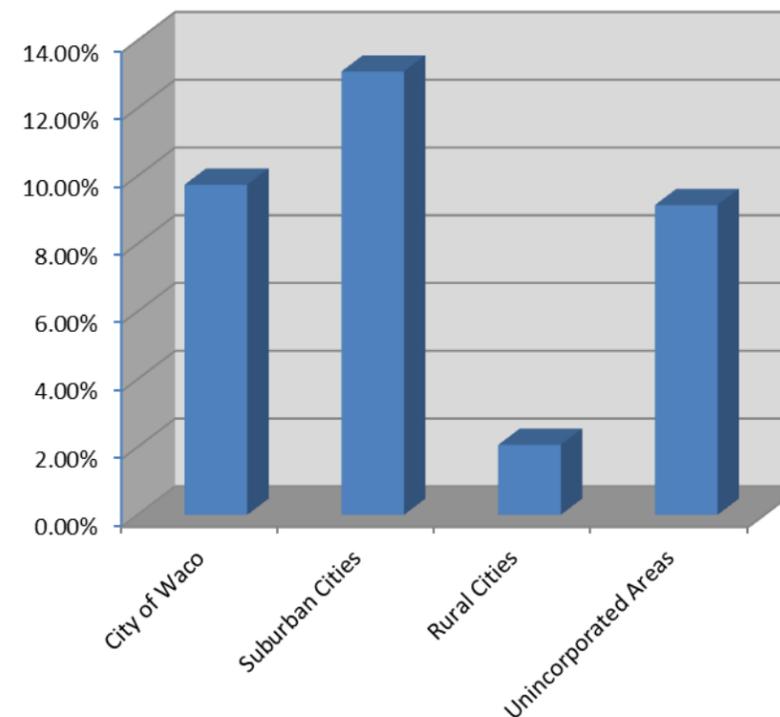
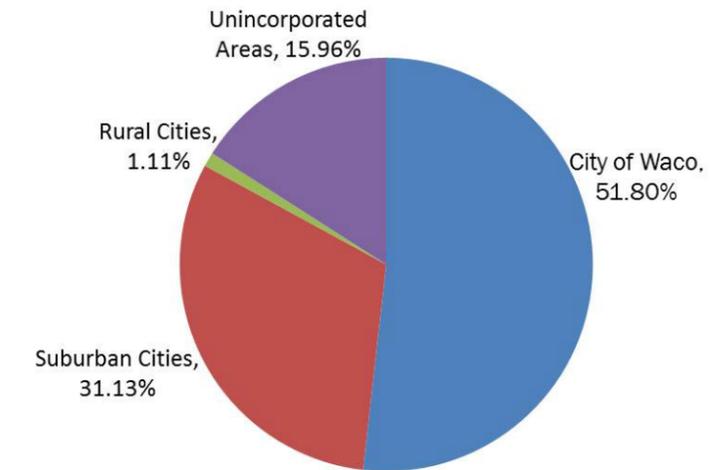


chart 4.2 – percent of metropolitan growth: 2010



4.2.2 – population forecasts

According to the Texas Data Center 0.5 growth scenario, McLennan County is forecasted to experience moderate growth during the period between 2010 and 2040 with an increase of 50,583 persons or 21.5%. This rate is approximately half of that expected for the State of Texas during the same period. MPO staff, with the assistance of the MPO Technical Committee, then estimated the distribution of that population by traffic analysis zone using two scenarios.

The first scenario, referred to as the ‘Trend Scenario’, assumes that population distribution will approximately follow that of the trends observed between 1990 and 2010. The second scenario, referred to as the ‘Alternative Scenario’, distributes population more closely to the urban center scenario described under Section 4.1.4, forecasted land use. The resulting population distribution for each scenario can be found in maps 4-5 and 4-6 respectively. For a description of traffic analysis zones, refer to section 6.1.2 projected highway level of service.

Table 4.9 shows the estimated population distribution for the region’s municipalities and the proportion of population anticipated to reside within unincorporated areas under each scenario. Note that projections for municipal populations were made under the assumption that no significant annexations would occur during the planning period.

table 4.9 – 2040 population forecasts for the waco metropolitan area: trend and alternative scenario

Geography	City of Waco	Suburban Cities*	Rural Cities**	Unincorporated Areas	County Total
2010 Population	124,805	57,573	11,774	40,754	234,906
2040 Population Trend Scenario	131,256	65,870	12,049	76,314	285,489
Change	6,451	8,297	275	35,560	50,583
Percent Change	+5.2%	+14.4%	2.3%	+87.3%	+21.5%
Percent of Metro Growth	12.8%	16.4%	0.5%	70.3%	100.0%
2040 Population Alternative Scenario	152,270	66,041	13,143	54,034	285,489
Change	27,465	8,468	1,369	13,280	50,583
Percent Change	+22.0%	+14.7%	+11.6%	+32.6%	+21.5%
Percent of Metro Growth	54.3%	16.7%	2.7%	26.3%	100.0%
Difference between Scenarios	+21,014	+171	+1,094	-22,280	0

*Includes the Cities of Bellmead, Beverly Hills, Hewitt, Lacy-Lakeview, Lorena, McGregor, Robinson and Woodway.

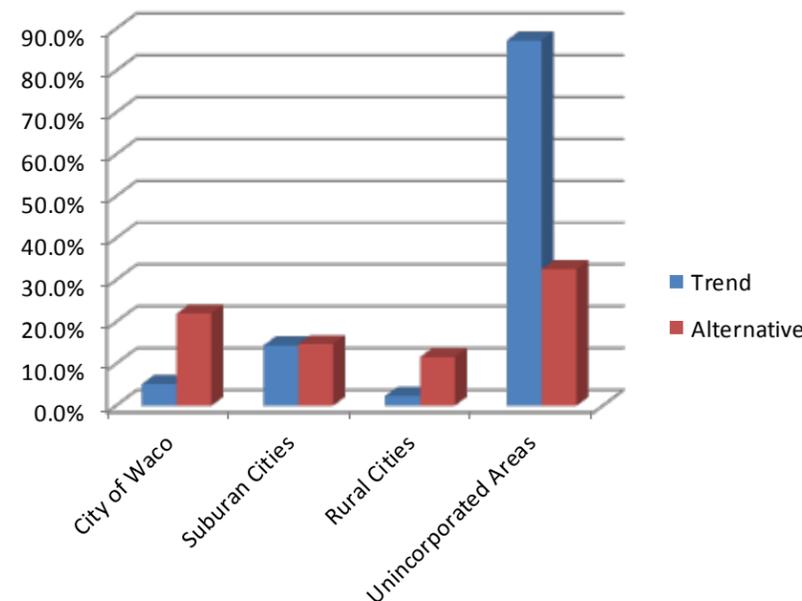
**Includes the Cities of Bruceville-Eddy, Crawford, Gholson, Hallsburg, Leroy, Mart, Moody, Riesel, Ross and West.

Note: Numbers or percentages may not add due to round off errors.

An analysis of the trend scenario anticipates an impact to the transportation network creating significantly more demand for highway infrastructure within the suburban and unincorporated areas. Suburban areas are generally developed with single-family dwellings on lot sizes of at least 0.25 acres. Within the unincorporated areas, residential lots generally do not have access to municipal sewers and thus require the use of septic systems.

Lots developed with septic systems are required to have a minimum lot size of 0.5 acres according to requirements set by McLennan County. Depending upon soil type and depth, lot sizes may need to be greater than 0.5 acres. The result is that development within the suburban and unincorporated areas are at densities that make transit service, bicycling and walking unfeasible as transportation modes. The result is anticipated to be that nearly all residents within these high growth zones would from a practical perspective be required to utilize an automobile for all trip purposes. With anticipated transportation revenues projected to be at historic lows (see section 7), the population distribution projected under the trend scenario is considered unsustainable as the region will be unable to address the increased mobility demand within the newly developing zones.

chart 4.3 – 2040 population change by growth scenario



One of the guiding principles adopted under this plan is to maximize the use of existing infrastructure, primarily due to the lack of resources for system expansion (see section 3). The alternative scenario better accomplishes this principle as a result of focusing new population within or near existing development. In addition to better utilizing additional infrastructure, the increased population

densities accomplished through the alternative scenario makes other transportation modes, such as public transit, biking or walking, more feasible. Thus, the MTP adopts the alternative scenario as the basis for many of the recommendations identified within this plan (see section 8).

4.2.3 – current employment

The MPO staff also analyzes the location of regional employment as a method of identifying the destination end points for regional trips. Since travel patterns vary depending upon business activities, the staff analysis breaks out employment by retail, service, basic (manufacturing or industrial), and educational sectors.

For 2010, the estimated total labor force within the Waco Metropolitan Area was 100,456. This is slightly less than that estimated in 2005 (1.3% decline). This decline is estimated to be as a result of the economic downturn of the Great Recession. In general terms, employment follows population although employment centers appear sometime after residential development occurs. Currently most employment is concentrated within the City of Waco and immediately adjacent suburbs where access to infrastructure and municipal services is the greatest. Map 4.7 shows how regional employment has changed since 2005 by traffic analysis zone.

Employment location, unlike population, tends to be clustered in certain areas due to zoning restrictions and the need for more robust municipal infrastructure than residential development (highways, water, sewer, storm drainage, etc.). For 2010, MPO staff identified 7 primary clusters of employment activity, which employs nearly half of the workforce within McLennan County. The territories covered by these clusters can be viewed on Map 4.9.

cluster 1 – downtown waco / baylor university

Downtown Waco, once the center of economic activity for the metropolitan area, remains a major center of employment. Much of the employment of downtown are services such as finance, government, law offices or accounting firms. Limited retail has been making a comeback since 2000 focusing on serving the daytime employment, tourists and Baylor University students. Baylor University, with 15,600 students and 1,400 employees, lies just east of IH-35 and significantly contributes to the activity within downtown.

Loft apartment construction, which began after 2000, has picked up momentum and significantly increased the permanent residential population of downtown. This increase in population, however, has primarily attracted Baylor University students who utilize a much different set of services than other residents. As a result, many retail services such as groceries or clothing have yet to be attracted to downtown. Industrial uses, which were concentrated along the Union Pacific railroad tracks, have generally moved out of downtown in favor of industrial parks near Loop 340.

cluster 2 – texas state technical college

The TSTC campus, located approximately seven miles north of downtown Waco, serves 5,200 students with 800 employees. The campus is also the location of many aviation-related industries, the largest of these is L-3 Communications with approximately 2,000 employees. L-3 is also the largest single employer within the Waco Metropolitan Area.

cluster 3 – bellmead / lacy-lakeview

The intersection of IH-35 and Loop 340 / Lake Shore Drive continues to attract a significant amount of new development as a result of the Bellmead industrial and commercial park, northeast of the intersection, and the redevelopment of the shopping center northwest of the intersection. These developments have offset many of the recent employment declines due to the economy. As a result, most of the employment within this cluster is either retail or service sector based with little from the basic sector.

cluster 4 – north valley mills drive

Valley Mills Drive has, since the late 1950s, been a strong cluster of retail and commercial activity. This activity has continued a slow decline from recent years with the opening of new retail centers along State Highway 6 and Hewitt Drive. This cluster, however, continues to represent a significant center of commercial development.

cluster 5 – richland / north highway 6

The development of Richland Mall and relocation of Providence Hospital to the Highway 6 corridor in the late 1970s and 1980s have since attracted many retail and service sector developments to the corridor. Since 2005, some of the retail employment has been siphoned off to the Central Texas Marketplace located within

the marketplace / industrial cluster. Providence Hospital and associated services, with approximately 3,000 employees represents one of the largest concentrations of employment within the region. Due to the number of employees, this cluster, along with the adjacent North Valley Mills Drive cluster effectively represents the central business district of the region.

cluster 6 – marketplace / industrial

The Texas Central Industrial Park is located southwest of the IH-35 interchange with West Loop 340 and represents the largest area devoted to industrial development within the Waco Urban Area. Central Texas Marketplace, which opened in 2003, has also created a significant cluster of retail employment. Some of the retail previously located in the vicinity of Richland Mall (cluster 5) has relocated to this cluster, however, much of the retail activity is new to the region.

cluster 7 – hewitt / west waco

This cluster has, since 2000, become a major center of retail activity following the significant residential growth in the corridor since 1990. In 2010, this corridor represented an equal concentration of retail activity to the North Valley Mills cluster. In addition, the growth of the Midway ISD campuses have added significant educational employment to the corridor.

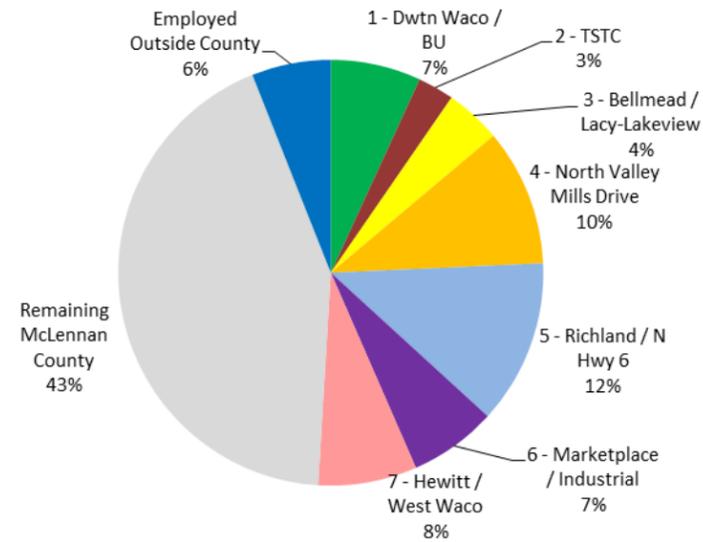
Note that in previous plans, the MPO identified an employment cluster in the vicinity of Hillcrest and MacArthur Drives in association with Hillcrest Hospital. Hillcrest hospital relocated to the IH-35 and Loop 340 intersection in 2009 and thus much of the employment associated with the hospital also relocated. Despite some limited redevelopment of the old hospital site (Waco Police headquarters for instance), this location no longer represents a significant cluster of employment.

table 4.10 – workforce employment by clusters: 2010

Geography	Total Employment	Percent of Workforce	Change from 2005
Cluster 1 – Downtown Waco / Baylor University	7,338	6.9%	-7.3%
Cluster 2 – Texas State Technical College	2,945	2.8%	+2.3%
Cluster 3 – Bellmead / Lacy-Lakeview	4,550	4.3%	-0.7%
Cluster 4 – North Valley Mills Drive	11,129	10.4%	+1.3%
Cluster 5 – Richland / N Hwy 6	13,349	12.5%	-8.7%
Cluster 6 – Marketplace / Industrial	7,121	6.7%	+3.0%
Cluster 7 – Hewitt / West Waco	8,031	7.5%	-0.6%
Total All Clusters			
	54,463	51.0%	-2.7%
Remaining McLennan County			
	45,993	43.0%	-6.6%
Total McLennan County			
	100,456	94.0%	-1.3%
Employed outside of McLennan County*			
	6,431	6.0%	-6.7%
Total Workforce			
	106,887	100.0%	+6.3%

Source: Texas Workforce Commission; *US Dept of Commerce; Bureau of the Census

chart 4.4 – employment by clusters: 2010



4.2.4 – forecasted employment

Total employment is anticipated to grow slightly faster than growth of population during the planning period. This is primarily due to the recovery of the regional economy within the next 5 to 10 years after the loss of employment due to the Great Recession. Afterwards it is anticipated that employment growth should closely approximate population growth. The result is an estimated county employment total of 125,713 in 2040.

Employment location is expected to closely follow the patterns of population growth, a trend observed nationally. Based upon recent trends, the service and retail employment sectors are anticipated to significantly increase their share of the workforce relative to other sectors. Basic employment is anticipated to significantly reduce its share of the workforce, but despite this, the absolute number of employees with the basic sector is expected to slightly increase by 2040.

Similar to population distribution, MPO staff developed 2 scenarios for employment location: a Trend Scenario approximating trends observed between 1990 and 2010, and an Alternative Scenario which more closely approximates the distribution under the urban

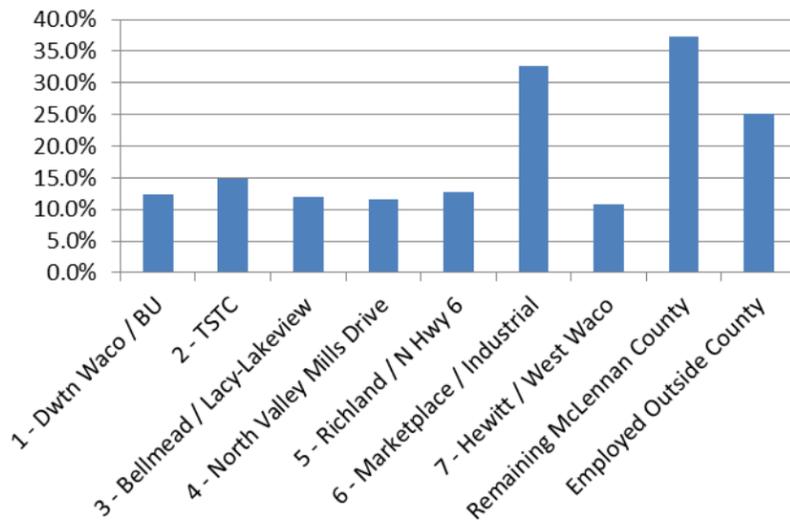
center scenario described under Section 4.1.4, forecasted land use. For similar reasons as described for population distribution, the MPO has chosen to use the Alternative Scenario as the basis for many of the recommendations identified within this plan (see section 8). Map 4.8 shows the projected change in employment distribution anticipated using the Alternative Scenario.

The distribution of employment is anticipated to become significantly more dispersed by 2040 with nearly 2 out of every 3 new jobs being located outside of the 7 clusters identified in section 4.2.3. With the exception of cluster 6, this results in each of these employment clusters being projected to decrease their percentage of the county workforce during the planning period. This dispersion is projected to be somewhat less with the alternative scenario than the trend. Nevertheless the alternative scenario still represents two continuing challenges in addressing regional mobility: 1.) For those with limited or low incomes employment opportunities continue to move further from their place of residence thus increasing regional reliance on the automobile for employment and 2.) Employment location is projected to continue to be located in areas with limited infrastructure to support the resultant increases in traffic volume.

table 4.11 – projected workforce employment location by clusters: 2040

Geography	Total Employment	Percent of Workforce	Change from 2010
Cluster 1 – Downtown Waco / Baylor University	8,240	6.2%	+12.3%
Cluster 2 – Texas State Technical College	3,380	2.5%	+14.8%
Cluster 3 – Bellmead / Lacy-Lakeview	5,095	3.8%	+12.0%
Cluster 4 – North Valley Mills Drive	12,415	9.3%	+11.6%
Cluster 5 – Richland / N Hwy 6	15,062	11.3%	+12.8%
Cluster 6 – Marketplace / Industrial	9,445	7.1%	+32.6%
Cluster 7 – Hewitt / West Waco	8,895	6.6%	+10.8%
Total All Clusters	62,532	46.7%	+14.8%
Remaining McLennan County	63,181	47.2%	+37.4%
Total McLennan County	125,713	94.0%	+25.1%
Employed outside of McLennan County*	8,048	6.0%	+25.1%
Total Workforce	133,761	100.0%	+25.1%

chart 4.5 – projected change in employment by clusters: 2010-2040



4.3 – title vi analysis

A primary goal of the Waco MPO is to ensure that the transportation needs of all people are met and that no one population group must endure a disproportional share of the burdens in meeting those needs. In order to accomplish this goal, the Waco MPO performs an analysis of its plans and programs in order to assess the mobility of traditionally underrepresented groups and to provide an assessment of the impacts of proposed projects upon these groups. The following sections of this section quantify the traditionally underrepresented groups and describe their distribution within the Waco Metropolitan Area. Specific analysis regarding the mobility of these groups and plan recommendations to improve their mobility can be found within the sections dealing with each transportation mode.

4.3.1 – race and ethnicity

Minority populations within the Waco Metropolitan Area are primarily represented by two people groups: Blacks and Hispanics with 15.0% and 17.9% of the population respectively. These groups are generally concentrated within the urban core. Blacks reside predominantly east of Downtown Waco and within Bellmead and Lacy-Lakeview. Hispanics reside predominantly south of Downtown Waco. An area bounded by the Brazos River, Waco Dr (US 84), New

Rd and Herring Ave have a greater than average concentration of both minorities. In addition to these, there exists a higher than average concentration of Blacks in the Mart area and a higher than average concentration of Hispanics in the McGregor area.

These two people groups have traditionally been underrepresented in the transportation planning process. Section 9 outlines the MPO public involvement procedures and how the MPO involved these two minorities.

table 4.12 – minority population: 2010

Geography	Percent Non-Hispanic White	Percent Non-Hispanic Black	Percent Non-Hispanic Other	Percent Hispanic
City of Waco	45.8%	21.0%	3.6%	29.6%
Suburban Cities*	65.8%	9.3%	3.2%	21.6%
Rural Cities**	78.0%	7.9%	1.7%	12.3%
Unincorporated Areas	83.4%	3.4%	1.9%	11.3%
McLennan County	58.9%	14.4%	3.1%	23.6%

*Includes the Cities of Bellmead, Beverly Hills, Hewitt, Lacy-Lakeview, Lorena, McGregor, Robinson and Woodway.

**Includes the Cities of Bruceville-Eddy, Crawford, Gholson, Hallsburg, Leroy, Mart, Moody, Riesel, Ross and West.

travel time analysis

In order to estimate whether the existing transportation system meets the goals of Title VI of the Civil Rights Act, in 2007 the MPO staff performed an analysis of travel times by traffic analysis zones to estimate access to the most basic necessary services. The analysis compared average travel times using the MPO travel demand model between both ‘Protected’ and ‘Non-Protected’ TAZs and the closest grocery stores, retail centers and medical facilities. For purposes of this analysis ‘Protected’ zones consisted of TAZs with either Non-Hispanic Black or Hispanic populations greater than the McLennan County average. Map 4.10 identifies the protected zones used within this analysis.

Table 4.13 identifies the results of the travel time analysis. In general, the protected populations had lower travel times to the 3 basic services evaluated than the non-protected populations. This analysis, however, concentrated on automobile travel times. Many of the protected zones have a significant percent of the population dependent upon public transportation or non-automotive modes for mobility. These modes generally have longer one-way travel times than the automobile. Public transportation, in particular, may have one-way travel times of up to 90 minutes between the protected zones and several of the more significant regional centers of employment. In addition, urban public transportation services do not operate after 7 pm or prior to 6 am within McLennan County. Table 4.14 and chart 4.6 further emphasize this disparity in that greater than 1 in 4 transit commuters have a one-way travel time greater than 60 minutes whereas this percentage is approximately 3% for all other modes combined. Improving these travel times and hours of operation for public transportation is a primary focus of the proposed recommendations identified in section 8.

table 4.13 – automobile travel time in minutes to selected destinations for protected populations: 2007

Destination	Non-Hispanic Black	Hispanic	Non-Protected	All Persons
Nearest Grocery Store	3.96	3.45	8.17	6.36
Nearest Retail Center	9.57	10.10	12.19	11.21
Nearest Medical Facility	4.98	4.56	8.56	6.97
McLennan County Courthouse	10.05	10.98	18.73	16.46

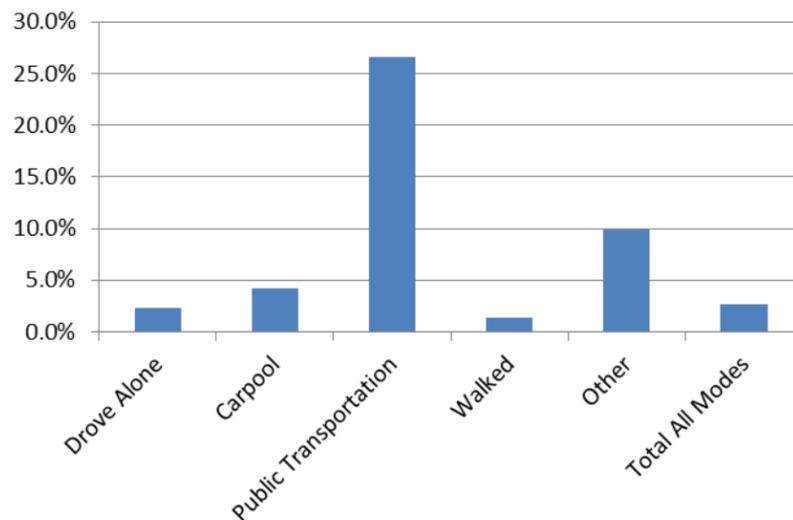
table 4.14 – mclennan county travel time to work or school* by mode: 2008-2012

Mode	Percent of Total	Less than 20 minutes	20 to 60 minutes	Greater than 60 minutes
Drove Alone	82.5%	60.0%	37.7%	2.3%
Carpool	13.3%	53.6%	42.3%	4.1%
Public Transportation	0.5%	35.3%	38.2%	26.5%
Walked	2.9%	89.7%	9.0%	1.3%
All others	0.8%	55.6%	34.4%	10.0%
Total All Modes	100.0%	59.8%	37.5%	2.7%

*Persons age 16 or older who did not work at home

Source: US Dept. of Commerce; Bureau of the Census – American Community Survey

chart 4.6 – percent of workers with travel times greater than 60 minutes by mode: 2008 -2012



4.3.2 – persons living in poverty

McLennan County is significantly above the state average for persons living below the census defined poverty level. When compared to peer regions of similar population in Texas, the Waco Metropolitan Area has a higher poverty level and lower incomes than all except those along the Rio Grande Valley. Despite this, most census tracts within the region have poverty rates well below the state average. Several tracts within the urban core, North Waco and South Waco in particular, have extreme poverty rates with 50% or more of the population living at or below the census defined poverty level. Many adjacent census tracts have poverty rates in excess of 25%.

The tracts with extreme poverty also correlate well with a lack of access to automobiles (see section 4.3.3). As income decreases, the ability to afford an automobile also decreases. The result is that these areas are more heavily dependent upon public transportation and bicycle / pedestrian facilities than other segments of the population. An additional challenge is that many of the same areas with low incomes and high poverty are also the same areas identified as protected zones for Black and Hispanic populations. This provides a further emphasis for the public transportation recommendations identified in section 8.

table 4.15 – poverty and income statistics: 2008-2012

Geography	Per Capita Income	Percent Living in Poverty
City of Waco	\$17,846	30.1%
Suburban Cities*	\$24,877	13.6%
Rural Cities**	\$20,524	18.9%
Unincorporated Areas	\$27,964	10.0%
McLennan County	\$21,459	21.8%
State of Texas	\$26,327	17.5%

*Includes the Cities of Bellmead, Beverly Hills, Hewitt, Lacy-Lakeview, Lorena, McGregor, Robinson and Woodway.

**Includes the Cities of Bruceville-Eddy, Crawford, Gholson, Hallsburg, Leroy, Mart, Moody, Riesel, Ross and West.

4.3.3 – automobile availability and affordability

Approximately one in 12 households in the Waco region have no access to an automobile (table 4.16). This statistic is slightly above the Texas average of 6.0% of households with no automobile access. Within McLennan County, access to automobiles is well correlated to income and poverty with lower income areas having less access and higher income areas having greater. In contrast to the low income areas, households in Woodway and the Highway 84 corridor have an average of more than 3 automobiles per household.

table 4.16 – occupied housing units with no automobiles: 2008-2012

Geography	Percent of Occupied Housing Units with No Automobiles	Change Since 2000
City of Waco	9.9%	-9.9%
Suburban Cities*	4.8%	+23.6%
Rural Cities**	4.5%	-36.2
Unincorporated Areas	2.0%	-35.8%
McLennan County	7.1%	-9.0%

*Includes the Cities of Bellmead, Beverly Hills, Hewitt, Lacy-Lakeview, Lorena, McGregor, Robinson and Woodway.

**Includes the Cities of Bruceville-Eddy, Crawford, Gholson, Hallsburg, Leroy, Mart, Moody, Riesel, Ross and West.

Owning and operating an automobile is expensive with average costs of an inexpensive car being between \$5,000 and \$7,000 per year. These costs include the initial purchase, registration, insurance, maintenance, fuel and in some cases parking. A common estimate of affordability is combining housing costs with the cost of transportation and comparing this to the median household income. A combined housing and transportation percentage of less than 50% is generally considered affordable. Table 4.17 makes this comparison for the Waco Metropolitan Area for households with 1 and 2 cars and households with no cars but using public transportation.

table 4.17 – affordability index calculation: 2008-2012

Geography	Median Rent	Median Household Income	Percent of Households at or above Affordability Index†		
			No Cars*	1 Car**	2 Cars**
City of Waco	\$735	\$32,239	69.1%	56.6%	43.5%
Suburban Cities*	\$861	\$58,382	83.2%	73.8%	63.4%
Rural Cities*	\$721	\$41,368	n/a	69.3%	55.5%
Unincorporated Areas	\$745	\$47,501	n/a	80.7%	72.2%
McLennan County*	\$756	\$41,589	75.8%	65.4%	53.6%

Source: US Census Bureau; American Community Survey – 2008 to 2012

†Calculated as combined housing + transportation costs being less than 50% of household income.

*Assumes that public transportation is available within 0.75 miles of residence. For McGregor, Lorena, rural cities and unincorporated areas, fixed route public transportation is not currently available. For this analysis, McGregor and Lorena were included as rural cities.

**Annual cost of car ownership estimated at \$5,000 per year per vehicle.

4.3.4 – elderly population and ambulatory disabilities

High concentrations of elderly within the metropolitan area are strongly correlated with the presence of either assisted living or nursing facilities. Each of the 4 census tracts with more than 20% of persons over age 65 have one or more of these facilities located within the tract (Map 4.17). Many of these persons residing in such facilities have limited to no ability to independently move from location to location, the definition of ambulatory difficulty. Thus these same tracts have higher than average percentages of persons with such difficulty (Map 4.18). Additionally, these same tracts also have relatively higher percentages of households with no automobiles (Map 4.15).

For assisted living or nursing home facilities, the level of independent mobility varies depending upon the type of care being provided. Nursing homes provide 24 hour care to persons unable to care for themselves, thus independent mobility is extremely limited to non-existent. Assisted living facilities, however, provide varying degrees of care and persons may have significant ability to

move from location to location, although this population is generally more transit dependent than the population as a whole.

The primary challenge in meeting the mobility needs of the elderly is similar to that of the population in general, the increasing dispersion of population into very low density developments that are entirely dependent upon the automobile. Table 4.18 shows significant increases in this age group within unincorporated areas of McLennan County. This shift in population for this age group represents a particular challenge in that they represent persons who have retired when healthy and likely have children living elsewhere. Often this population group then has a significant medical event at some point in the future that either limits or eliminates their ability to operate an automobile. These areas have already strained rural public transportation services being provided by HOTCOG and are anticipated to further stretch these services in the future as this service effectively represents the only mobility for these persons (refer to 2011 Regional Transportation Coordination Plan).

table 4.18 – elderly population and persons with ambulatory difficulty*: 2008-2012

Geography	Percent Over Age 65	Change since 2000 in Persons Over Age 65	Percent with Ambulatory Difficulty*
City of Waco	11.2%	-10.6%	8.3%
Suburban Cities**	14.1%	+3.4%	8.0%
Rural Cities***	16.9%	+0.08%	10.4%
Unincorporated Areas	13.3%	+40.6%	8.0%
McLennan County	12.5%	+5.9%	8.3%
State of Texas	10.5%	+27.5%	6.7%

*The Census Bureau changed the definition of a disability in 2007.

**Includes the Cities of Bellmead, Beverly Hills, Hewitt, Lacy-Lakeview, Lorena, McGregor, Robinson and Woodway.

***Includes the Cities of Bruceville-Eddy, Crawford, Gholson, Hallsburg, Leroy, Mart, Moody, Riesel, Ross and West.

4.3.5 – environmental mitigation activities

Prior to MAP-21, SAFETEA-LU (the Safe, Accountable, Flexible and Efficient Transportation Efficiency Act: A Legacy for Users) included in its requirements an accounting of potential environmental mitigation activities which may be necessary as a result of impacts imposed by the transportation system upon the environment. Specific activities are usually identified as part of the development of an Environmental Impact Statement, typically performed during the design phase of a project. The identification of potential environmental impacts during the planning process has consistently been identified as a method to expedite the environmental review process and to move projects towards construction faster. This consideration would have a two-fold effect: 1.) Projects with significant environmental impacts would be identified sooner, allowing policy makers to better weigh the benefits of the project against these impacts as well as the anticipated delays from potential mitigation of these impacts, and 2.) Projects with little or no significant impacts can develop more quickly as an accounting of these impacts has been made prior to the design phase.

Analysis by the MPO focused on 3 general categories: 1.) Hazardous Material storage areas or generation facilities, 2.) Lands identified as part of Section 4(F) of the 1966 Transportation Act, and 3.) Land use takings. Generally speaking, recommended alignments or proposed right of way boundaries have not been identified at the long range planning level, thus the MPO staff has chosen to evaluate projects based upon the chance that mitigation for one or more factors may be necessary as the project develops.

A “likely” chance is defined as a feature being located within 250 feet of the centerline of an existing highway and for new construction on a new alignment, a “likely” chance is defined as a feature being located within 500 feet of the center of the corridor. A “somewhat likely” chance is applied when it appears that a design alternative could be implemented which completely avoids impacting a feature within the 250 or 500 foot “likely” zone. Such an instance would be where a project could avoid a feature by acquiring right of way completely from one side of the existing right of way. A “not likely” chance is defined as no features exist within the 250 or 500 foot “likely” zone.

hazardous materials

The Texas Commission on Environmental Quality issues permits for businesses or individuals that generate, store or transport materials that could be hazardous to human health. These locations do not necessarily represent places with soil or ground water contamination; however, the acquisition of these sites may require special procedures that would significantly increase the right of way and site preparation costs for proposed projects.

4f lands

4F refers to section 4(f) of the Federal Transportation Act of 1966 which identifies several land uses that federal aid transportation projects must avoid impacting unless no other feasible alternative exists. If a significant impact were necessary upon one or more 4F lands, a mitigation of those impacts would be necessary to offset any impacts, usually at a very high cost. Lands included within section 4(F) are wetlands (as classified by the US Army Corps of Engineers), wildlife and waterfowl refuges, historic or religious sites and park or recreation areas.

In McLennan County, the only areas officially classified as a wetland are lakes or other permanent water features. However, the 100 year flood plain does represent riparian habitats in McLennan County that provide unique habitats for wildlife and waterfowl not found elsewhere in the County

This is in large part due to the fact that most other lands in the County are devoted to either developed or agricultural land uses. Therefore, the MPO has decided to use the 100 year flood plain, as defined by the Federal Emergency Management Agency, as a substitute for wetlands in our analysis of potential environmental mitigation activities. All officially defined wetlands within McLennan County are included within the 100 year flood plain.

There are no officially designated wildlife or waterfowl refuges located within McLennan County. With that said, however, several endangered or threatened species have been identified within the County and potential habitats for these species exist throughout the county. One of the challenges with this form of analysis is that the Texas Parks and Wildlife Department usually does not reveal specific locations of endangered or threatened species habitats within a public forum for fear of some type of disturbance or destruction by humans. Therefore, the MPO has chosen to identify

all highway projects requiring additional right of way and with a rural component as having a “somewhat likely” impact on endangered or threatened species habitat.

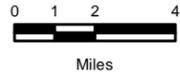
land use takings

Although partly accounted for within the right of way costs, this analysis provides some information regarding potential impacts to the built or human environment. One part of the analysis is the identification of the number of residential or commercial / industrial structures within the 250 or 500 foot “likely” zone. This provides some approximate quantification of impacts to the built environment.

analysis

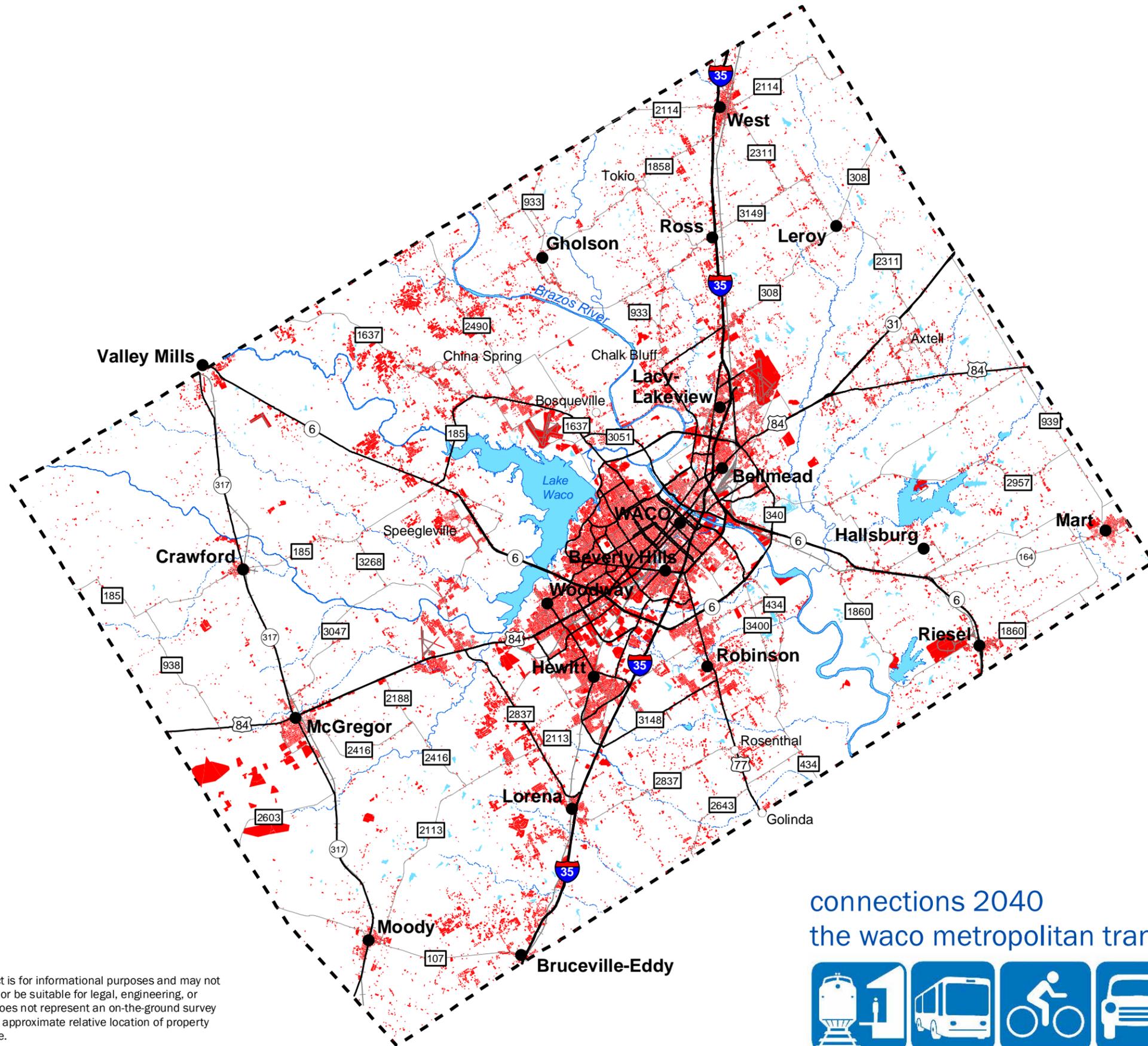
Tables 8.16, 8.17 and 8.18 review the potential for mitigation for highway project recommendations identified in Section 8. As a general rule, most projects will require some review of underground storage tank location and floodplain / wetlands impacts as most projects of any length will encounter these features. With the possible exception of IH-35 projects, which will require more significant reviews due to its length and significant development adjacent to the corridor, most other projects will generally avoid significant environmental impacts.

 land developed in 2013
 waco metropolitan area



september, 2014

map 4.1
developed land uses - 2013



connections 2040
the waco metropolitan transportation plan



Waco MPO: Metropolitan Transportation Plan 2040

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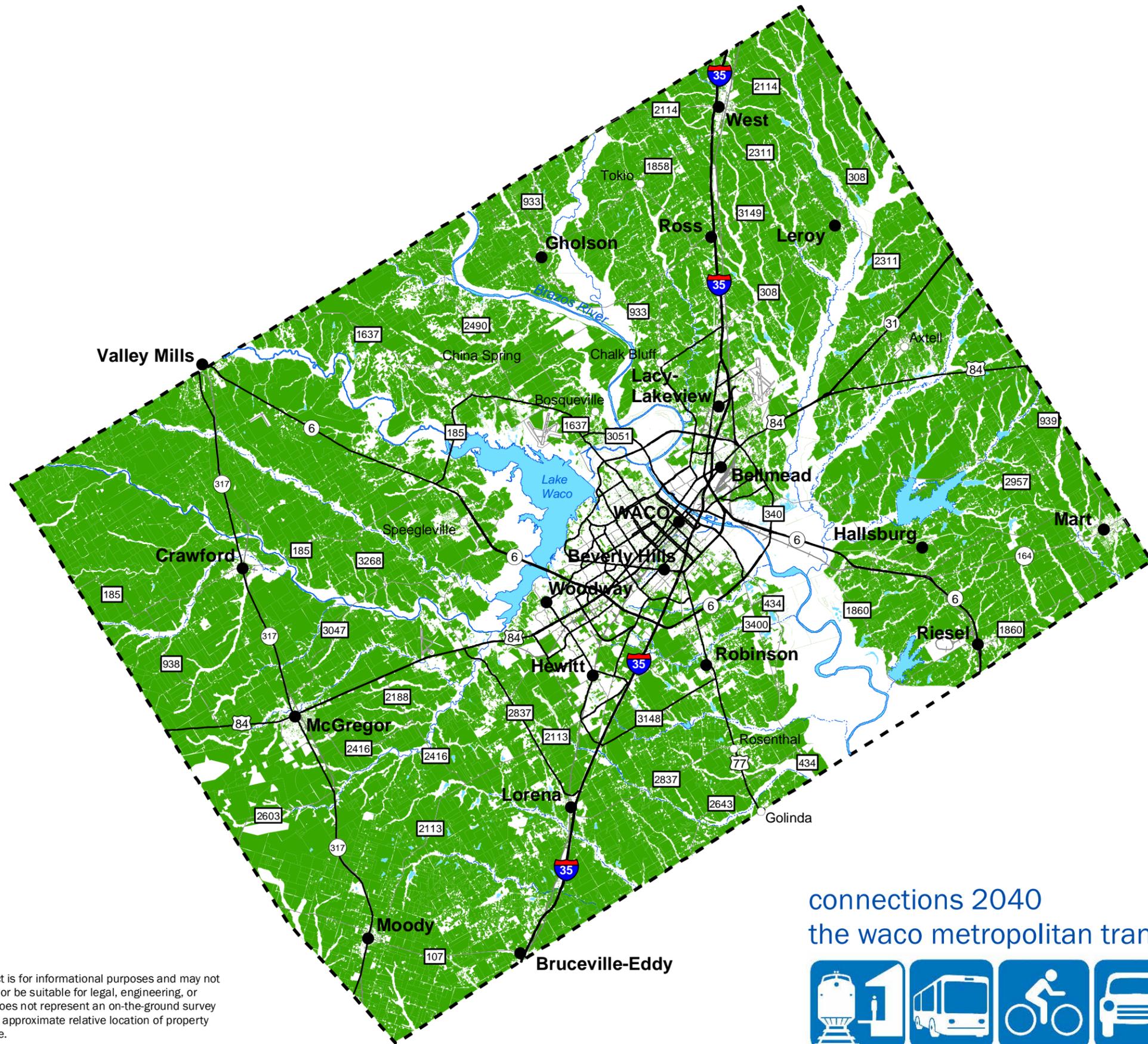


 Developable Land
 waco metropolitan area



september, 2014

map 4.2
land without development constraints - 2013



connections 2040
the waco metropolitan transportation plan



Waco MPO: Metropolitan Transportation Plan 2040

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