Southern Dallas County Infrastructure Analysis

North Central Texas Council of Governments
City of Dallas
City of Ferris
City of Hutchins
City of Lancaster
City of Wilmer
Dallas County

Final Report

October 2012

Southern Dallas County Infrastructure Analysis

Final Report

Prepared For:

North Central Texas Council of Governments
City of Dallas
City of Ferris
City of Hutchins
City of Lancaster
City of Wilmer
Dallas County

Prepared By:

CDM Smith

In Association With:

Arredondo, Zepeda & Brunz
Baker Consulting Associates
Halff Associates
Insight Research Corporation
Weinstein, Clower & Associates

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CDM Smith

8140 Walnut Hill Lane, Suite 1000
Dallas, TX 75231
tel: 214 346-2800
fax: 214 987-2017

October 22, 2012

Karla Weaver, AICP
Program Manager
North Central Texas Council of Governments
616 Six Flags Drive
Centerpoint Two
Arlington, TX 76011

Subject: Southern Dallas County Infrastructure Analysis

Dear Ms. Weaver:

CDM Smith is pleased to submit to you the final report for the Southern Dallas County Infrastructure Analysis project. The report summarizes the results of the study, which included development of infrastructure recommendations for future water, wastewater, stormwater, transportation and private utilities needs in the Southern Dallas County area.

Our project team, including Halff Associates, Arredondo, Zepeda & Brunz, Baker Consulting Associates, Insight Research Corporation, Weinstein, Clower & Associates and others, gratefully acknowledge the assistance and cooperation received from NCTCOG and the Project Advisory Committee as well as others contacted during the course of the study. CDM Smith sincerely appreciates the opportunity to have participated in this important project.

Respectfully submitted,

Michael W Copeland

Michael W. Copeland, AICP
Group Leader
CDM Smith, Inc.

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Signatures

Section 3 – Water Infrastructure Assessment and Section 4 – Wastewater Infrastructure Assessment	Section 5 – Stormwater Infrastructure Assessment
STATE OF TEXAS JAYSON D. MELCHER 94839 LICENSED PROFESSIONAL ENGINEER OCTOBER 11, 2012	STATE OF TEXAS RUSSELL P. ERSKINE 102027 LICENSED PROFESSIONAL ENGINEER 10/11/2012
Section 6 – Transportation Infrastructure Assessment STATE OF TEXAS JUSTIN R. WINN 108964 LICENSED PROFESSIONAL ENGINEER 10-11-12	

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Southern Dallas County Infrastructure Analysis

Executive Summary

There has been significant development activity in the Southern Dallas County area during the past ten years, including Union Pacific's Dallas Intermodal Terminal and other industrial and light-industrial facilities. Much of this activity can be attributed to the areas proximity to several major transportation facilities including interstate highways 20, 35 and 45, as well as both the Union Pacific and BNSF rail lines. Several jurisdictions are affected by each of these developments. A critical planning element for high-quality growth is the provision of adequate and well-planned infrastructure.

PROJECT PURPOSE

The cities of Dallas, Ferris, Hutchins, Lancaster, and Wilmer, along with Dallas County and the North Central Texas Council of Governments (NCTCOG), partnered to conduct the Southern Dallas County Infrastructure Analysis (SDCIA). The goal of this analysis is to review the current infrastructure in the area and develop implementation recommendations which will produce a high-quality well-integrated Inland Port in Southern Dallas County that spurs additional high-quality and orderly commercial, industrial, and residential development. The project study area is shown in **Figure ES-1**.

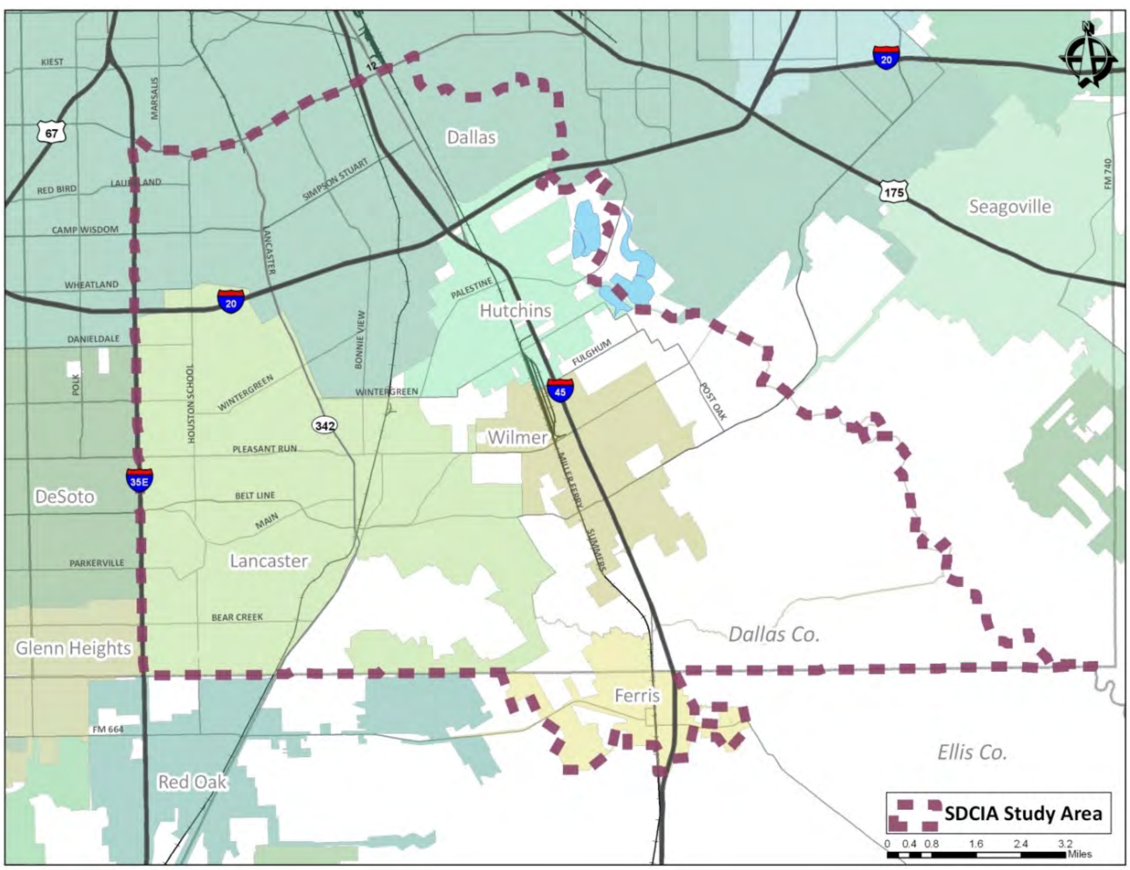

Figure ES-1. Southern Dallas County Study Area

This infrastructure needs assessment of the study area will facilitate regionally-coordinated infrastructure planning and sound development. The analysis focused on infrastructure related to transportation, water supply, sanitary sewer, stormwater/drainage, and private/franchise utilities. The study covers approximately 77,300 acres and is located within the major impact area of the International Inland Port of Dallas (IIPOD). The IIPOD concept envisions international freight and intermodal logistics facilities which provide processing of containerized cargo from domestic and international suppliers; customs preclearance for goods bound for Mexico or Canada; a Foreign Trade Zone (which may receive special state and local tax treatment), and an airport which can handle smaller cargo (primarily consumer goods). An intermodal freight terminal is a facility specifically designed to efficiently transfer freight between modes (i.e., rail, truck, and air).

HISTORICAL DOCUMENT REVIEW

The first major task of the project was a comprehensive review of the existing infrastructure plans and studies in the SDCIA project area. Existing plans and studies were provided by project partners and by stakeholders. A majority of the existing plans and studies have direct applicability to the current and future infrastructure needs of the study area.

The purpose of historical document review was to review available plans and studies for the study area to determine if current plans and studies are sufficient to guide future development. This analysis included evaluating the following:

1. The contents of pertinent plans and studies regarding their relationship and applicability to this study
2. The assessment of whether or not existing plans and studies satisfactorily identify the infrastructure needs of the study area to support its future growth

The study team's review of existing documents indicated that there are several existing plans and studies that cover the entire SDCIA project study area. These plans include Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area, 2009 Amendment, the 2005 Update to the City of Dallas Long Range Water Supply Plan, and the Final Report (Study Commission on Region C Water Supply). These documents address regional transportation and water supply needs which include the study area. Due to being regional in geographic coverage, they do not provide significant local roadway improvements necessary to meet access needs for the proposed density of light industrial, logistics, and other uses within the study area and the water plans do not provide adequate information on the water distribution system needs to serve the anticipated development through 2030. No single, comprehensive wastewater collection, stormwater/drainage, or private/franchise utility plans were found which address the infrastructure needs to support the anticipated growth in the entire study area. However, there are detailed infrastructure plans for specific municipalities and/or proposed developments within the study area. In some cases these plans do provide adequate analysis and detail of needed improvements within the study area to support the anticipated future growth. In aggregate, these plans do not cover the entirety of the study area.

Collectively, this research concluded that there is no comprehensive infrastructure framework or plan that addresses the growth needs of the entire study area. The existing documents have:

- different horizon years
- varied geographic limits

- varied level of detail for needed improvements
- conflicting recommendations in overlapping areas in some cases
- gaps in study boundaries, in some cases, leaving portions of the study area out of any current infrastructure plan
- inconsistent methods of estimating proposed infrastructure costs
- no prioritization of the proposed improvements throughout the study area
- no recommendations for phasing or sequencing of improvements
- limited discussion of available funding sources

Without a consistent infrastructure improvement framework in the study area for transportation, water supply, wastewater, stormwater/drainage, and private/franchise utilities, development will likely occur in a piecemeal manner. This lack of coordination will lessen the economic benefits of the anticipated growth for the entire region. For these reasons, it was determined that the existing plans and studies were inadequate to guide future development for the entire study area through the planning period of 2010 through 2035. The conclusion of the historical document review was to proceed with the detailed analysis of the SDCIA area, including a demographic and economic review as well as a future needs assessments for potable water, wastewater, storm water, transportation and private utilities.

INFRASTRUCTURE NEEDS ASSESSMENT

The second major task of the project was to perform a detailed infrastructure needs assessment for the SDCIA area. This effort included a review of the current SDCIA infrastructure as well as a determination of future needs in the area. Based on anticipated demographic growth and demand for public services, the future infrastructure improvements that will be needed in the SDCIA area were evaluated.

DEMOGRAPHIC AND ECONOMIC ANALYSES

The first step of the infrastructure needs assessment was a demographic and economic review of the SDCIA project study area. The focus of the review was to develop demographic, labor force, and housing forecasts that would be used to analyze the need for various transportation, potable water, sewer, stormwater, drainage, and private/franchise utility infrastructure through the planning horizon of year 2035.

Demographic Baseline and Future Trends

Using the historical document review, two population and household forecasts for the year 2035 were developed for comparison with NCTCOG's official 2035 population forecast. The two forecasts, a linear forecast and a projection with added infrastructure, are shown in **Figure ES-2** along with NCTCOG's 2035 forecast. These supplemental forecasts were used to augment available information, supporting infrastructure planning efforts addressing the potential development in the SDCIA area.

Current and historical population and household information sources were assembled for each community and for the SDCIA area as a whole, including historical annual NCTCOG reports on regional population and housing. This included single-family and multi-family unit mix which was also used in the housing profile section of this analysis. Additional demographic information was obtained from NCTCOG's 2012 and 2035 forecast as well as the results of the American Community Survey (ACS) information (2010) by city. Land use information was obtained using the available data compiled in Phase 1 of this analysis, including acreages, supplementary land use plans and community information. Population and household forecasts augmented by GIS-supported land use analysis of developable land area from each community in the SDCIA area were also used.

Housing-Workforce Balance Assessment

A key component of the demographic and economic analysis was an assessment and recommendations for achieving a reasonable balance between workforce and housing development in the study area. For the anticipated southern Dallas County labor force, assessment found that while some occupations will be able to find affordable housing, there will be many employees that will have home-ownership limitations and may find challenges in the residential rental markets. However, there is an important caveat to this conclusion. While it may be desirable to have housing options for all workers within close proximity to key employment areas of southern Dallas County, there are other options. Observational research suggests that areas of Navarro, Ellis and Kaufman counties have a more extensive range of housing options while still offering easy access to employers located in the study area. Still, as cities in the study area develop their land use plans and zoning maps, they should consider prevailing labor rates for area jobs and have a balanced approach to residential property development. This could include single- and multi-family ownership units, rental properties, and support of the inclusion of subsidized properties designed for working lower income households.

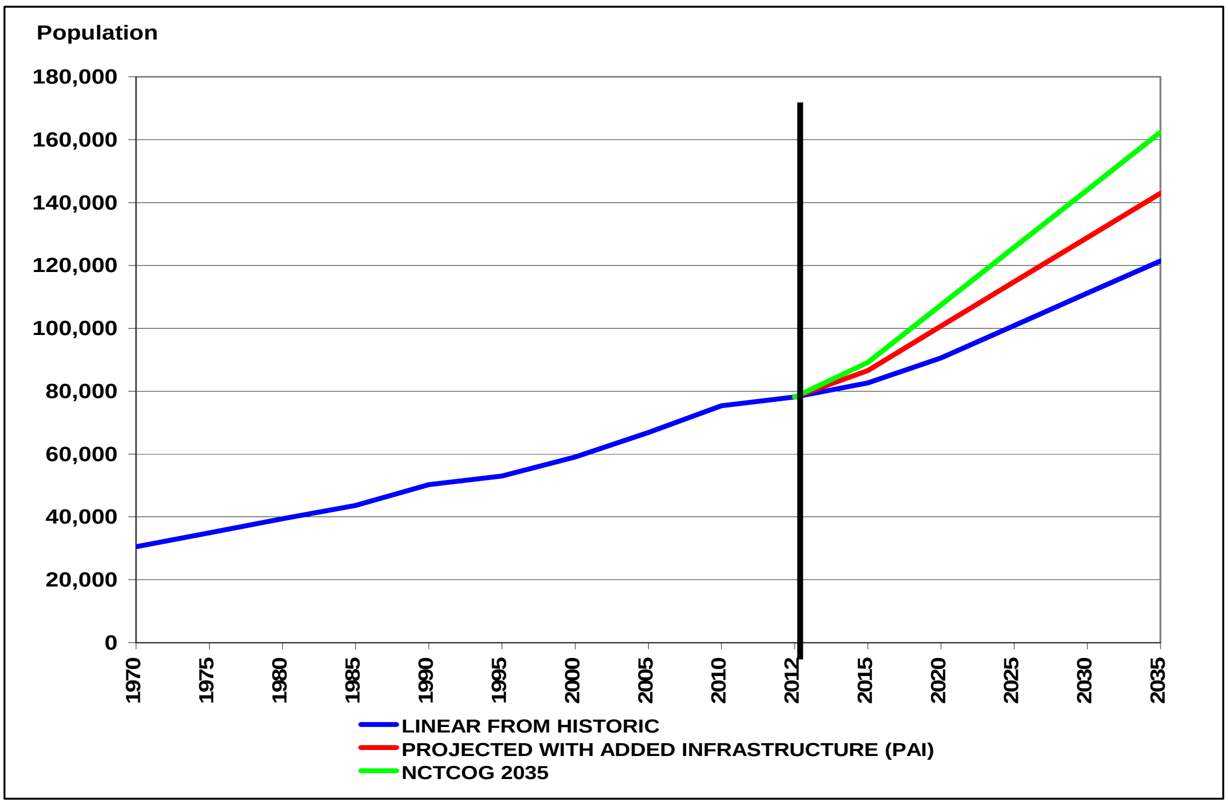

Figure ES-2. Historical and Forecasted Population Growth (Linear, PAI and NCTCOG 2035 Analysis Trend Comparison)

Labor Force Analysis

A labor force analysis was conducted to assess the ability of the study area to supply the workforce needed to support the growth scenarios described in the demographic and employment forecast for 2035. Based on the target industries identified, the occupations that will be the most highly demanded will be well-supported by the southern Dallas County labor market. There are particular existing competitive advantages in the study area for distribution-related activities and occupations. Other manufacturing occupations such as assemblers and machinists are not as well represented. However, there are relatively low barriers of entry into these occupations based on education and training requirements. Moreover, existing higher education institutions in the southern Dallas County market have professional programs and already work with local businesses and economic development organizations to develop targeted training programs to meet the needs of local employers. Although we did not specifically address management occupations and jobs that require specialized training, existing programs at area colleges and university will provide for that component of the labor market as well.

WATER INFRASTRUCTURE ASSESSMENT

A capacity and needs assessment for potable water infrastructure in the SDCIA study area was completed based on updated demographic forecasts, previous infrastructure studies performed for the municipalities in the study area, and additional data collected during the course of this project.

Each municipality in the SDCIA study area will require additional water supply infrastructure to meet future demands. This study analyzed supplying Dallas Water Utilities (DWU) water to each municipality in the study area to meet long term water supply need understanding that the appropriate agreements and mechanisms would need to be in place, especially for the City of Ferris which is not currently a DWU client. Ferris, Hutchins and Wilmer will need additional water supply capacity to meet new demands within five years based on the assessment results. Therefore, increasing water supply capacity should be considered a priority for the wholesale water customer cities in the SDCIA Study Area.

Priorities for water distribution infrastructure should be considered on a city-by-city basis according to the particular needs of each system. This study included time-of-need estimates for recommended infrastructure based on straight-line demand projections between 2010 and 2035. It is recommended that water storage and pumping projects be given funding priority by each city since these components make up the foundation of a water distribution system. The need to install distribution pipe will follow as development occurs; the cost to install distribution pipes is often shared between municipalities and property owners/developers.

Two water transmission main alternatives have been developed to meet the projected 2060 maximum day demands of Hutchins, Wilmer, Lancaster and Ferris. Each alternative provides the cities with at least two separate points of connection for redundancy; the transmission main assumes Lancaster receives an additional point of connection in the southeast part of its City to augment its two existing connections. Alignment Alternative #2, along the city limit lines, is recommended over Alignment #1, adjacent to the railroad right-of-way. Alignment #2 has more potential to be phased, meaning the initial capital cost to provide the water supply line will be lower. The total project cost is higher relative to Alignment #1, but a significant portion of the total project cost can be deferred to Phase 2.

Further, the future booster pump station required with Alignment #2 could be incorporated into an existing or currently proposed DWU pump station, potentially reducing the alternative's Phase 2 cost.

Each city in the SDCIA study area has independently assessed their water distribution systems, and many of the cities have capital improvements plans that identify new infrastructure needed to meet future water demands. These plans were evaluated against state of Texas minimum water system requirements, an assumed emergency demand, and the number of days of average demand stored. Recommendations for new infrastructure were developed for the cities that did not have plans, or where deficient infrastructure capacity was identified. **Table ES-1** summarizes the total estimated cost for water infrastructure needed to meet the anticipated future demand. Detailed engineering studies are recommended for all proposed water infrastructure improvements in each city to verify capacity and locations prior to design and construction.

A more detailed discussion of the water infrastructure assessment can be found in Section 3 of this report.

Table ES-1. Summary of SDCIA Recommended Water Infrastructure

Municipality	Improvement	Total Cost
Dallas	New transmission main, pump station and storage	$129,400,000*
Ferris	Additional pumping and storage facilities	$36,500,000
Hutchins	Additional pumping and storage facilities	$28,600,000
Lancaster	Additional pumping and storage facilities	$62,100,000
Wilmer	Additional pumping and storage facilities	$21,100,000

*Funds for all Dallas water infrastructure improvements have been planned and programmed, excluding the Wintergreen pump station which is planned with a cost estimate of approximately $44M, but will not be programmed until closer to the project date

WASTEWATER INFRASTRUCTURE ASSESSMENT

Wastewater infrastructure capacity and needs were assessed for the SDCIA study area based on the updated demographic forecasts, previous infrastructure studies performed for the municipalities in the study area, and additional data collected during the course of this project.

Each utility in the SDCIA study area has assessed its wastewater collection system, and many of the utilities have capital improvement plans that identify new infrastructure needed to meet anticipated future wastewater flows. These plans were evaluated against existing and projected flows. Where the planned capacity was found to exceed the calculated 2035 peak flows, the recommendations in this report reflect the planned capacity. This report provides additional recommendations for infrastructure upgrades where the infrastructure was estimated to be insufficient for the projected 2035 flows. Each utility in the SDCIA study area will require additional wastewater infrastructure to meet future flow rates. **Table ES-2** summarizes the recommended and/or planned infrastructure needed to meet future flows. Trinity River Authority infrastructure is included in the analysis because Lancaster and Ferris are wholesale customers to TRA for wastewater collection, treatment and disposal.

A more detailed discussion of the wastewater infrastructure assessment can be found in Section 4 of this report.

Table ES-2. Summary of SDCIA Recommended Wastewater Infrastructure

Municipality	Improvement	Total Cost
Dallas	Interceptor	$3,400,000*
Ferris	Interceptor	$2,920,000
Hutchins	Lift Station Upgrade, Force Main	$3,520,000
Lancaster	5 Interceptors	$25,400,000
TRA	9 Interceptors, Lift Station Upgrade, Force Main	$88,400,000
Wilmer	Lift Station Upgrades	$940,000

*Funds for all Dallas wastewater infrastructure improvements have been planned and programmed

STORMWATER INFRASTRUCTURE ASSESSMENT

Stormwater and drainage infrastructure capacity and needs were assessed for the SDCIA area based on the following:

- Current floodplain/stormwater/drainage ordinances and drainage manuals
- Current Federal Emergency Management Agency (FEMA) maps and Flood Insurance Study stream profiles
- Previous planning studies developed for the cities in the project area
- Information obtained previously for the demographic alternative analysis

All members of the SDCIA area have adopted the minimum required floodplain regulations in order to be a part of the Nation Flood Insurance Program. Dallas and Lancaster have taken their floodplain ordinance and stormwater ordinances a step further than the minimum and require more stringent conditions for developments in order to limit impacts to adjacent properties and communities. Based on the assessment, adopting similar floodplain regulations by the other members of the SDCIA area is recommended for consistency in all communities.

Existing information on storm sewers, detention/retention ponds, ditches, and curb and gutters is lacking except in the areas where new construction has occurred. Field surveys are highly recommended to document the locations and sizes of existing infrastructure and to assess its condition. This information is critical to the process of determining what new infrastructure is needed as future development occurs. The cost of such an investigation can range from $50,000 per community (for a limited investigation) to as much as $100,000 per square mile for a detailed investigation.

As for floodplain related information, a significant number of streams in the area have been studied and mapped. However, a review of the FEMA flood profiles and maps reveal that there are several instances where discrepancies exist. An update of the hydrology and hydraulics of the streams in the SDCIA area is recommended. Updating the models would allow for the correction of inaccuracies shown in the current Flood Insurance Study and FEMA floodplain maps, and allow the communities to better manage their floodplains as development occurs. The cost of such a study is estimated at $2,000,000 for all streams in the SDCIA area. Additionally, as the area develops, communities need to make sure that Letters of Map Revision (LOMR) are submitted to FEMA so that FEMA profiles and maps are updated.

Even before the area develops further, the communities in the SDCIA should consider reconstructing those bridges and culverts that are overtopped by the one percent annual chance of exceedance (100-year) floodplain for the safety of the public. Replacement of these structures should start with those listed as having a priority of “1”, and then followed by those having a priority of “2” and”3”, respectively, unless future development dictates differently. The total estimated cost of reconstructing all the structures inundated is $48,200,000. A summary of the preliminary cost estimates for replace those structures is shown by municipality in **Table ES-3**.

Table ES-3. Summary of SDCIA Recommended Stormwater Improvements

Municipality	Improvement	Total Cost
Dallas	Bridge and Culvert Replacements	$8,400,000
Hutchins	Bridge and Culvert Replacements	$6,860,000
Lancaster	Bridge Replacements	$24,322,000
Wilmer	Bridge Replacements	$8,008,000
Dallas County	Bridge Replacements	$574,000

A master drainage study for the entire SDCIA area should also be considered. This will allow for consistency across the entire SDCIA area. This effort will develop a floodplain management plan that includes a detailed evaluation of alternatives for channelization, structure improvements, detention, diversions, water quality issues, and nonstructural alternatives. The cost associated with such a study is approximately $1,800,000, which would be performed subsequent to the recommended hydrology and hydraulic model updates mentioned previously.

A more detailed discussion of the stormwater infrastructure assessment can be found in Section 5 of this report.

TRANSPORTATION INFRASTRUCTURE ASSESSMENT

This effort included an evaluation of the current and planned transportation infrastructure in the SDCIA area. To determine the available capacity on the ground today, the current roadway network in Southern Dallas County was reviewed. The future year transportation/thoroughfare plans of NCTCOG and the individual municipalities within the Southern Dallas County area were also reviewed to inventory the planned improvements (both funded and unfunded) that lie within the study area boundaries. Based on forecasted 2035 travel demand in the study area, the future infrastructure needed to ensure a smoothly-operating and efficient transportation network was assessed.

As the Southern Dallas County area continues to grow, the most pressing transportation infrastructure need will be additional roadway capacity to meet the growing demand from both passenger vehicles as well as truck freight movements across the SDCIA area. A summary of the proposed roadway capacity improvements is shown in **Table ES-4**. Among the key improvements that will be needed earlier in the development of Southern Dallas County is the widening of multiple east-west arterials to provide connectivity between the freight centers and IH 45. These include Wintergreen Road, Pleasant Run Road and Belt Line Road. Additionally, expansions of north-south arterials such as Bonnie View Road and Lancaster-Hutchins Road that provide connectivity to IH 20 will be needed. A new alignment connecting the IIPOD area to Lancaster Airport and the City of Ferris is also recommended to accommodate north-south traffic in the area. As demand for transportation infrastructure continues to grow and expand in the Southern Dallas County area, the implementation of these roadway recommendations can help ensure a smooth, efficient transportation network to service the community.

A more detailed discussion of the transportation infrastructure assessment can be found in Section 6 of this report.

Table ES-4. Recommended Roadway Capacity Improvements

Municipality	Improvement	Cost (Low)	Cost (High)
Regional	Loop 9	$5,756,200,000	
Dallas	Arterial expansions	$23,500,00	$36,400,00
Hutchins	Arterial expansions	$37,400,000	$58,200,000
Lancaster	Arterial expansions, new alignment	$111,000,000	$172,300,000
Wilmer	Arterial expansions	$24,100,000	$37,400,000
Dallas County	Arterial expansions, new alignment	$62,300,000	$92,100,000

PRIVATE UTILITIES INFRASTRUCTURE ASSESSMENT

A capacity and needs assessment was completed for private sector utilities in the SDCIA area, including electricity, natural gas, telecommunication services and municipal solid waste disposal. Unlike the infrastructure components discussed in previous sections, these utility providers are primarily private business entities that provide service with the intent of generating profits for the company owners. Because private funds are required to finance improvements, there must be an economic justification for the project. Factors that will determine the feasibility of the project or utility enhancement include long-term demand and revenue generating potential, construction costs and operational costs. The development of utility projects is also driven by existing contracts or tariffs in place that require utilities such as natural gas and electricity to provide service to new residents and businesses as long as the customers follow the provisions of the filed tariff.

Private sector utilities provide important services for that are critical to future developments in the region. Electricity, natural gas, telecommunications and municipal solid waste services are all vital to serve an increasing population and additional business development. These utility providers are supportive of expanded business development in the region as growth contributes to greater sales of their services. Each of the utility providers has staff that can assist local planners in demonstrating that utility services can be provided. However, it is important to note that early planning for specific projects should include utility representatives so that specific new system improvements that may be required are adequately planned and financed so they are ready when needed. There must also be a strong commitment on the part of a project developer to move forward as it is often necessary to demonstrate to utility regulators that the investment is economically justifiable.

Some of the key findings of private utilities analysis are the following:

- Electricity, natural gas, telecommunication and municipal solid waste services are available throughout the region. However in areas with low population density, the level of telecommunication services is not at the same level of quality found in more densely populated areas.
- The availability of electricity and natural gas is shaped by franchise agreements and state regulations. Oncor is the provider of electricity to the region, and Atmos provides natural gas. There are instances such as home heating and certain industrial processes where these two services are in competition with each other and this competition can have an impact on pricing.
- Demand for electricity state-wide in Texas continues to grow and the need for future generation is continuously being examined by the Electric Reliability Council of Texas (ERCOT). It is important to initiate early planning for major facilities with Oncor so that infrastructure can be put in place when it is needed. New facilities such as substations are going to be determined by the location of new demand and whether other existing facilities located outside the region can possibly serve this demand.
- Current and projected natural gas service can be met with the current infrastructure.
- Telecommunication services including wireless phone, internet services, Wi-Fi are available in the region, but according to a state-wide survey, areas with low population-density have much less access to quality service than areas with high population-density. Expansion of telecommunication services will be driven by demand.

Municipal solid waste is the one service that has significant public sector involvement. With the combined capacities of both public and private facilities, there is long-term available disposal capacity in the region well into the future.

A more detailed discussion of the private utilities infrastructure assessment can be found in Section 7 of this report.

PUBLIC INVOLVEMENT

The involvement of the public in the SDCIA project has been a priority of the Project Advisory Committee (PAC) since the project's inception. To facilitate this effort, four public meetings were held at key points in the project's progress. The meetings were attended by the project team, PAC members, public officials and residents of the southern Dallas County area. The following public meetings were held as part of the SDCIA project (all meetings took place on the campus of the University of North Texas at Dallas):

- Public Meeting #1: October 21, 2010
  - This meeting had a total of 69 attendees
  - The purpose of this meeting was to present the public with an overview of the project purpose, scope and schedule and highlight how they could be involved
- Public Meeting #2: February 8, 2011
  - This meeting had a total of 26 attendees
  - The purpose of the second public meeting was to present the findings of the historical document review (Phase 1) and discuss the upcoming demographic assessment and infrastructure analysis (Phase 2)
- Public Meeting #3: September 27, 2011
  - This meeting had a total of 51 attendees
  - The focus of this meeting was the presentation of the results of the demographic analysis and economic review for the SDCIA area and a discussion of the upcoming final portion of the project, a comprehensive infrastructure needs assessment for the area
- Public Meeting #4: June 21, 2012
  - This meeting had a total of 85 attendees, including 5 elected officials
  - The purpose of the final public meeting was to present the results of the infrastructure capacity and needs assessment for the SDCIA project area. This included a review of existing infrastructure and project team recommendations for water, wastewater, stormwater, transportation and private utilities

A more detailed discussion of public involvement efforts can be found in Appendix B.

SUMMARY

The Southern Dallas County Infrastructure Analysis consisted of three primary tasks:

- Historical Document Review
- Demographic and Economic Analyses
- Infrastructure Needs Assessment

The historical document review of existing plans and studies concluded that a detailed infrastructure analysis of the SDCIA area was needed to properly identify the key infrastructure components that will be needed to support the growth of the Southern Dallas County area. The first step of the analysis was to develop demographic forecasts for the study area that could be used to determine the infrastructure that will be needed to support future anticipated population and employment growth. The resulting demographic forecasts were then used in an infrastructure needs assessment that identified the currently planned and future needs in the areas of potable water, wastewater, stormwater, transportation and private utilities.

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Southern Dallas County Infrastructure Analysis

Section 1: Introduction

There has been significant development activity in the Southern Dallas County area during the past ten years, including Union Pacific's Dallas Intermodal Terminal and other industrial and light-industrial facilities. Much of this activity can be attributed to the areas proximity to several major transportation facilities including interstate highways 20, 35 and 45, as well as both the Union Pacific and BNSF rail lines. Several jurisdictions are affected by each of these developments. A critical planning element for high-quality growth is the provision of adequate and well-planned infrastructure.

PROJECT PURPOSE

The cities of Dallas, Ferris, Hutchins, Lancaster, and Wilmer, along with Dallas County and the North Central Texas Council of Governments (NCTCOG), partnered to conduct the Southern Dallas County Infrastructure Analysis (SDCIA). The goal of this analysis is to review the current infrastructure in the area and develop implementation recommendations which will produce a high-quality well-integrated Inland Port in Southern Dallas County that spurs additional high-quality and orderly commercial, industrial, and residential development. This infrastructure needs assessment of the study area (see **Figure 1-1**) will facilitate regionally-coordinated infrastructure planning and sound development. The analysis focused on infrastructure related to transportation, water supply, sanitary sewer, stormwater/drainage, and private/franchise utilities. The study covers approximately 77,300 acres and is located within the major impact area of the International Inland Port of Dallas (IIPOD). The IIPOD concept envisions international freight and intermodal logistics facilities which provide processing of containerized cargo from domestic and international suppliers; customs preclearance for goods bound for Mexico or Canada; a Foreign Trade Zone (which may receive special state and local tax treatment), and an airport which can handle smaller cargo (primarily consumer goods). An intermodal freight terminal is a facility specifically designed to efficiently transfer freight between modes (i.e., rail, truck, and air).

PROJECT TASKS

The project was comprised of three primary tasks. The first major task of the project was a comprehensive review of the existing infrastructure plans and studies in the SDCIA project area. Existing plans and studies were provided by project partners and by stakeholders. A majority of the existing plans and studies have direct applicability to the current and future infrastructure needs of the study area. A report summarizing the results of this historical document review can be found in Appendix A.

The second major task was a demographic and economic review of the SDCIA project study area. The focus of the review was to develop demographic, labor force, and housing forecasts that would be used to analyze the need for various transportation, potable water, sewer, stormwater, drainage, and private/franchise utility infrastructure through the planning horizon of year 2035.

The third major task of the project was to perform a detailed infrastructure needs assessment for the SDCIA area. This effort included a review of the current SDCIA infrastructure as well as a determination of future needs in the area. Based on anticipated demographic growth and demand for public services, the future infrastructure improvements that will be needed in the SDCIA area were evaluated.

The involvement of the public in the SDCIA project has been a priority of the Project Advisory Committee (PAC) since the project's inception. To facilitate this effort, four public meetings were held at key points in the project's progress. The meetings were attended by the project team, PAC members, public officials and residents of the southern Dallas County area. A summary of the public involvement efforts of this project can found in Appendix B.

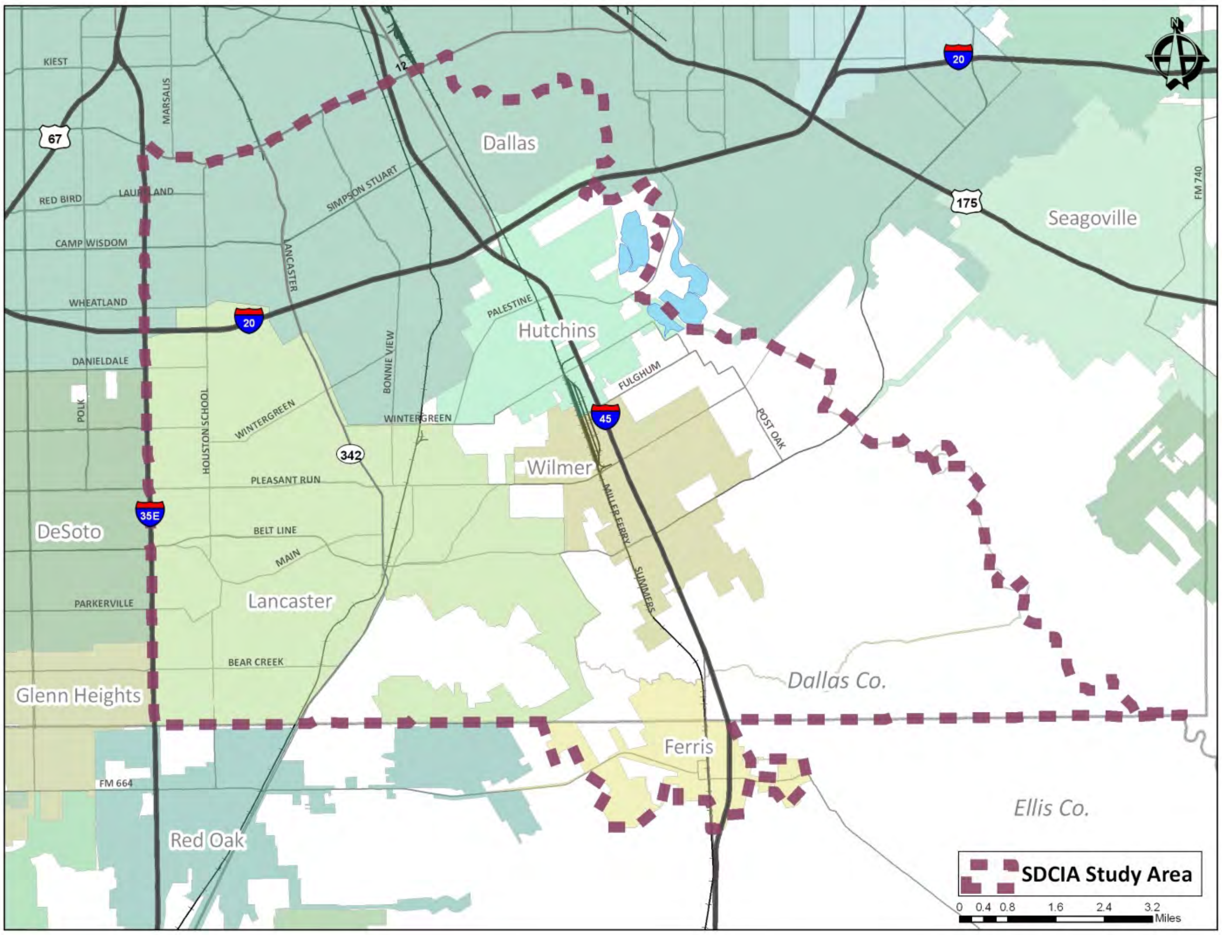


Figure 1-1. Southern Dallas County Study Area

Southern Dallas County Infrastructure Analysis

Section 2: Demographic and Economic Analyses

This section documents the background, supporting data, methodology, and results related to the demographic, labor force, and housing forecasts that were used to analyze the need for various transportation, potable water, sewer, stormwater, drainage, and private/franchise utility infrastructure that will be required in the year 2035.

PROJECT AREA

The SDCIA area is located south of Loop 12, west of the Trinity River, north of the Dallas/Ellis county line, and east of I-35E. Included are all of the cities of Lancaster, Hutchins, Wilmer and the incorporated city limits of Ferris, The City of Dallas south of Loop 12, and the as well as the balance of the unincorporated areas of southeastern Dallas County as noted in **Figure 2-1**.

SUMMARY OF SDCIA AREA ADVANTAGES AND CHALLENGES

An economic analysis of the study area was conducted as a part of Phase 2, Task 3, to augment information about the distinct characteristics of the NCTCOG 2035 population and employment forecasts by Traffic Survey Zone (TSZ) for the SDCIA Area. This analysis reviewed and incorporated the historic work prepared in Phase 1 and included contemporary field research and current analysis of development plans and patterns in the SDCIA area.

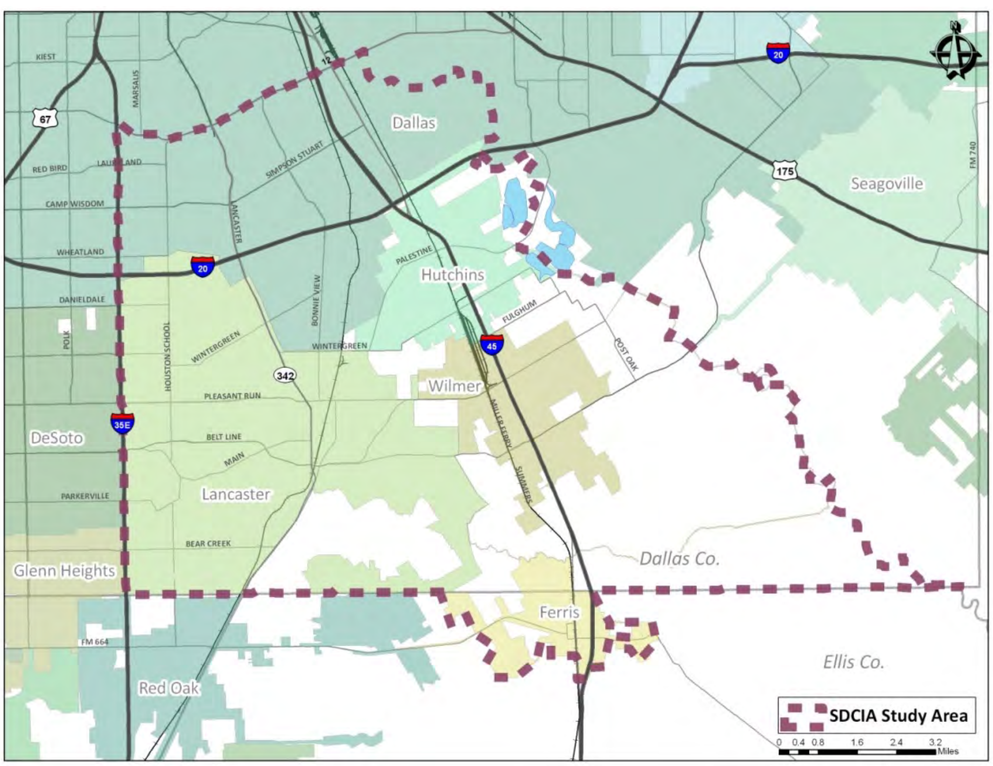


Figure 2-1. Southern Dallas County Infrastructure Analysis Study Area

The analysis concurs with key factors important to achieving the development potential of the SDCIA area related to its market positioning and competitive background, and include the following, each of which is summarized in the following paragraphs:

1) Transportation Advantages,
2) Industrial Market Advantages,
3) DFW MSA Economic Benefits, and
4) Future Marketing Competitiveness of the SDCIA Area.

THE IMPACT OF EXISTING AND FUTURE TRANSPORTATION ADVANTAGES

Highway Access

The extraordinary access provided to the SDCIA area via the existing I-20, I-35E, and I-45 corridors will continue to be critical for freight movement through the United States. An additional benefit to the SDCIA area is the potential for achieving the completion of the long-planned Loop 9. Combined with the availability of land and flexible parcel size, the SDCIA area is expected to increasingly benefit from the twelve-county Dallas Fort Worth Metropolitan Statistical Area's (DFW MSA) trade growth and state-of-the-art logistics improvements.

Rail Intermodal Benefit

The continuing growth of the SDCIA area and national freight rail intermodal capacity provides substantial advantages and support for local industrial activity. The American Railroad Association reports that the intermodal portion of U.S. rail industry's growth averages 13% per year as cost structures favor rail shipping for long-haul transportation (generally defined as 300+ miles) of commodities and finished goods.

Following this national trend, two Class 1 rail carriers, Union Pacific (UP) and Burlington Northern Santa Fe (BNSF), continue to compete for business and plan future capital investments in rail and rail intermodal infrastructure in the SDCIA area.

FUTURE INDUSTRIAL DEVELOPMENT ADVANTAGES

Industrial Inventory

As DFW MSA businesses continue to develop and occupy industrial space, both land and building inventories in existing industrial parks are depleted. As acknowledged by the extensive studies of the area and formation of the International Inland Port of Dallas (IIPOD), the SDCIA area is recognized as being one of the region's best long-term resources for industrial development close to the region's consumer population where large industrial sites are still available for development.

Industrial Potential

The DFW MSA industrial market is a maturing one, with excellent local information on both current and historic trends. Current industrial performance information used in all parts of this analysis has been compiled and made uniform continuously from 1970 through 2012. These trends demonstrate that while the SDCIA area is an "emerging" industrial market, currently experiencing just less than 8% of the new DFW MSA industrial growth, could reach a greater percentage of the new regional industrial construction if supported with adequate infrastructure.

Favorable Business Climate of Texas

According to multiple federal monthly reporting sources including the US Bureau of Labor Statistics, the US Bureau of Economic Analysis, and the private sector Consumer Confidence Board, Texas has consistently out-performed the nation and competes well for new business with other industrial centers, offering a lower cost-of-living than many, favorable right-to-work laws, and no personal state income tax among other attractions for business and industry, all benefiting the SDCIA area's growth opportunities. These issues are also regularly monitored by the State of Texas and local economic development professionals, including the Dallas Regional Chamber and the North Texas Commission.

ECONOMIC BENEFITS TO THE DFW MSA

Regional economic, employment, and tax revenue benefits will result from making infrastructure investments in the SDCIA area rather than losing new industrial development to locations outside of the DFW MSA. Broad public, private, civic, and stakeholder commitment has been expressed in this portion of Dallas County, and continues to be needed to achieve regional industrial development potential. Direct basic jobs, plus accompanying spin-off retail and service jobs, will see increases as the SDCIA area's industrial development is realized, yielding job growth in the wider DFW MSA area as well.

COMPETITIVE IMPORTANCE: OWNERSHIP PATTERNS, BRANDING, DESIGN QUALITY AND CENTRALIZED MARKETING

Recently settled bankruptcy restructurings in the SDCIA area have produced rapidly changing land ownership patterns. These changes emphasize the need to address competitive factors for the SDCIA area as compared to other regional and national industrial parks. These include recognizing the short term benefits of land prices and safeguarding the long term benefits of development quality.

DEMOGRAPHIC BASELINE AND FUTURE TRENDS: POPULATION, HOUSEHOLDS, AND EMPLOYMENT

Using the historic document review from Phase 1, two forecasts for the year 2035 were developed for population and household growth comparison to those of NCTCOG 2035. The two forecasts, (1) A Linear and a (2) Projection with Added Infrastructure, are to augment information used to support for large scale infrastructure planning needs for meeting the development potential of the SDCIA area.

SOURCE DOCUMENTS

Current and historic population and household information sources were assembled for each community and for the SDCIA area as a whole, including:

- Historic annual NCTCOG reports on regional population and housing, including single-family and multi-family unit mix, also used in the Housing Profile section of this analysis
- The NCTCOG 2012 and 2035 forecast, provided by NCTCOG to the consultant team and detailed by traffic survey zone (TSZ)
- The most recent American Community Survey (ACS) information (2010) by city, and Nielsen-Claritas ZIP code profiles. This data was used as cross checks (reasonableness testing) for the six ZIP codes in the SDCIA area

- Available data compiled in Phase 1 of this analysis, including acreages, supplementary land use plans and community information. Median income by TSZ was also provided by NCTCOG
- Population and household forecasts were augmented by GIS-supported land use analysis of developable land area from each community in the SDCIA area

POPULATION FORECAST

In Task 3, two alternative population forecasts developed for comparison to the current NCTCOG 2035 forecast as follows:

Linear Projection

A linear projection of population growth in the SDCIA area was prepared using more than 40 years of historic population and household records (1970 through 2011) from the ACS and annual publications from the NCTCOG. Assuming that growth trends continue as they have from 1970 to the present time, the linear forecast results in a study area population total of 121,437 for the year 2035, nearly 41,000 less than the 162,380 forecast of NCTCOG 2035.

Projections Based on Future Land Use Plans with Added Infrastructure (PAI)

A second projection made extensive use of the future land use plans provided by each city which define the expected use for development or re-development through to the city's eventual build-out. The specific "horizon" year for these build-out scenarios will vary from city to city and will certainly be affected by local policy and market forces. Nevertheless, these uses were converted from land use to population counts using residential density ratios under allowed zoning to establish a reference point against which to compare NCTCOG's 2035 population and employment forecasts.

In the detailed examination by TSZ, some future land use plans did not have adequate residentially designated areas to support the population results in the NCTCOG 2035 forecast. Incorporating land availability, allowable densities, plus community and PAC comments, these differences resulted in a PAI 2035 population forecast of nearly 143,000, roughly 20,000 persons lower than NCTCOG 2035.

Results of the Linear and PAI projections for 2035 as compared to the NCTCOG 2035 projection are shown in **Figure 2-2** and **Table 2-1**.

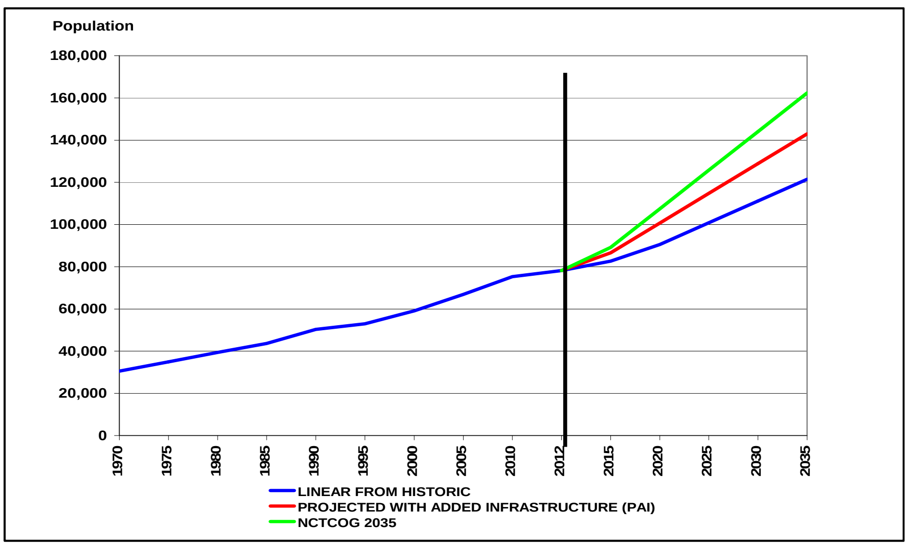


Figure 2-2. SDCIA Area - Historical and Forecasted Population Growth Linear, PAI and NCTCOG 2035 Analysis Trend Comparison

Table 2-1. SDCIA Area - Historic and Forecast Population Growth
Linear, Projected with Added Infrastructure Investments (PAI) and NCTCOG 2035 Analysis Trend Comparison

Year	Linear From Historic	5 Yr% Change	Projected with Added Infrastructure (PAI)	5 Yr % Change	NCTCOG 2035	5 Yr % Change	
1970	30,546						
1975	34,914	14.3%					
1980	39,418	12.9%					
1985	43,668	10.8%					
1990	50,303	15.2%					
1995	53,027	5.4%					
2000	59,070	11.4%					
2005	66,857	13.2%					
2010	75,327	12.7%					
2012	78,154	3.8%	78,154		78,154		*Historic*
2015	82,613	5.7%	86,605	10.8%	89,140	14.1%	*Projected*
2020	90,585	9.6%	100,690	16.3%	107,450	20.5%	
2025	100,869	11.4%	114,776	14.0%	125,760	17.0%	
2030	111,153	10.2%	128,861	12.3%	144,070	14.6%	
2035	121,437	9.3%	142,946	10.9%	162,380	12.7%	

Sources - Linear and PAI, NCTCOG's Demographic Forecast Data – 2035 Projections

HOUSEHOLD FORECAST, HOUSEHOLD SIZE AND MEDIAN INCOME

Applying the current NCTCOG forecast ratio of 2.79 persons per household, the population projections were reduced to household counts for the Linear and PAI 2035 scenarios. The current linear household forecast from 1970 to 2012 uses as its source data the annually produced NCTCOG housing reports for the SDCIA area compared as shown in **Table 2-2**.

SDCIA Age, Occupation and Income Profile

As of the 2010 American Community Survey and additionally detailed by Nielsen-Claritas, the median age for the study area was reported as 32.7 years old, with the average age slightly older at 34.7 years. Pre-school, elementary and high school aged residents (ages birth to 17), represented 29.1% of the population. College-aged and workforce population (ages 18 to 64) made up 60.1% of the SDCIA population. The retirement age population (65 years and older) made up the remaining 10.8%.

The 2010 occupational classifications for the SDCIA area, also from ACS, reported 31.1% blue collar employment, 49.8% white collar, and 19.1% service and farm employment. The workforce participation rate was 64.7%, with 8.5% of these workers reported as unemployed as of the 2010 data.

As cited in baseline TSZ data initially provided by NCTCOG, 2012 median household income is shown for each community in **Table 2-3**. Median incomes for Dallas and Dallas County include only the specific TSZs in the SDCIA area. Median household income for the SDCIA area as a whole is $41,332, with the average household income at $50,561.

Table 2-2. SDCIA Household Forecast under Each Scenario: Linear, PAI and NCTCOG

Year	Linear From Historic	5 Yr% Change	Projected with Added Infrastructure (PAI)	5 Yr % Change	NCTCOG 2035	5 Yr % Change	
1970	10,948						
1975	12,514	14.3%					
1980	14,128	12.9%					
1985	15,652	10.8%					
1990	18,030	15.2%					
1995	19,006	5.4%					
2000	21,172	11.4%					
2005	23,963	13.2%					
2010	26,999	12.7%					
2012	28,012	3.8%	28,012		28,012		*Historic*
2015	29,610	5.7%	31,041	10.8%	31,950	14.1%	*Projected*
2020	32,468	9.6%	36,090	16.3%	38,513	20.5%	
2025	36,154	11.4%	41,138	14.0%	45,075	17.0%	
2030	39,840	10.2%	46,187	12.3%	51,638	14.6%	
2035	43,526	9.3%	51,235	10.9%	58,201	12.7%	

Sources - Linear and PAI, NCTCOG's Demographic Forecast Data – 2035 Projections

Table 2-3. SDCIA Area Median Household Income by Jurisdiction

Area	Income
Dallas (SDCIA Area Only)	$31,196
Dallas County (Unincorporated SDCIA Area)	$35,962
Ferris	$43,975
Hutchins	$36,233
Lancaster	$43,751
Wilmer	$33,375

Source: Derived from NCTCOG 2012 TSZ data

EMPLOYMENT IN THE SDCIA AREA: BASIC, RETAIL AND SERVICE

Beyond access roads, infrastructure support is not ordinarily needed to achieve population growth as developers typically include the cost of infrastructure within the cost of homes in the residential development. However, available infrastructure is critical for achieving competitive site readiness for industrial development, large scale retail and service employers, including medical and office uses. Sites are often selected on a competitive basis for location, available infrastructure and speed-to-market capability.

Among local economic development officials in the four cities making up the SDCIA study area it is widely agreed that industrial space will be the driver of economic, population and employment growth. The unique availability and transportation positioning of the SDCIA area is supported by the individual cities' land use plans as well as by market expectations. Industrial space, tracked historically for real estate sales purposes and as used for detailed employment forecasts in this analysis, includes warehouse/distribution, manufacturing, and office/warehouse/tech or "flex space." Flex space is defined in the industrial real estate industry as typically having a higher percent of office finish than traditional warehousing, frequently 15% of building square footage or more.

Information Sources and Methodology for Employment Forecasts

As applied in the population forecast, the same two projection methods, Linear and PAI, were used for SDCIA area employment. The Linear 2035 forecast produces a trend line using historic performance, while the PAI 2035 forecast of employment is dependent upon current market information and on the expectations of achieving competitive industrial positioning for the SDCIA area. Both are discussed in further detail in this section.

Additional background and detail on market forces and industrial market information used as the basis of assumptions of the PAI 2035 employment forecast is provided in "Further DFW MSA Industrial Market Background," a discussion in Section 5, pages 17 through 20.

Historic growth in employment in the SDCIA area was compiled from NCTCOG historic employment reports as the best local source for "jobs in the city." This information is available in paper copy from 1970 and currently online for more recent data, with starting points for 2012 provided by NCTCOG in its baseline data. As in the land use examination for the area's capacity to develop population and households, each city's land use plans were again reviewed for the adequacy of land availability to accommodate the future commercial and industrial growth assumed in the NCTCOG 2035 employment forecast. As for population, differences found were reviewed with the cities, and agreed upon changes incorporated into the TSZ level employment forecast data.

The same two projection approaches were used to estimate the SDCIA area's future employment potential for comparison with the NCTCOG 2035 forecast, including:

1) Linear Projection: The Linear forecast uses historic employment data from the NCTCOG as trended to 2035, and assumes that employment growth in the SDCIA area would continue as it has since 1970.

2) Projected with Added Infrastructure (PAI): The current market capture rate for new industrial development in the SDCIA area (as a distinct submarket) is 8% of the total new DFW MSA industrial construction at year end 2011, and could be expected to grow to 25% assuming available infrastructure to meet the area's industrial growth potential.

PAI Sources and Methodology

The PAI forecast for basic employment in the SDCIA area incorporates current industrial market information compiled annually from 1970 through 2011 for the purposes of analyzing economic cycle impact on various markets. The database is updated annually from the research departments of major industrial real estate brokerage houses active in the DFW MSA, including CBRichard Ellis, Cushman & Wakefield and Jones Lange LaSalle.

Commercial real estate source data also used in this analysis included activity reports from daily and weekly business journals, development announcement reviews from the NCTCOG, on-line marketing brochures for specific sites, and historic proprietary databases by submarket for industrial, retail, and office markets in the SDCIA area.

The resulting economic forecast for industrial growth through 2035 in the 12-county DFW MSA is illustrated in **Figure 2-3**, which depicts the economic volatility of historic construction and absorption patterns for industrial space. As for all private sector real estate investment, new development and absorption is shown to be highly correlated with economic cycles of available capital.

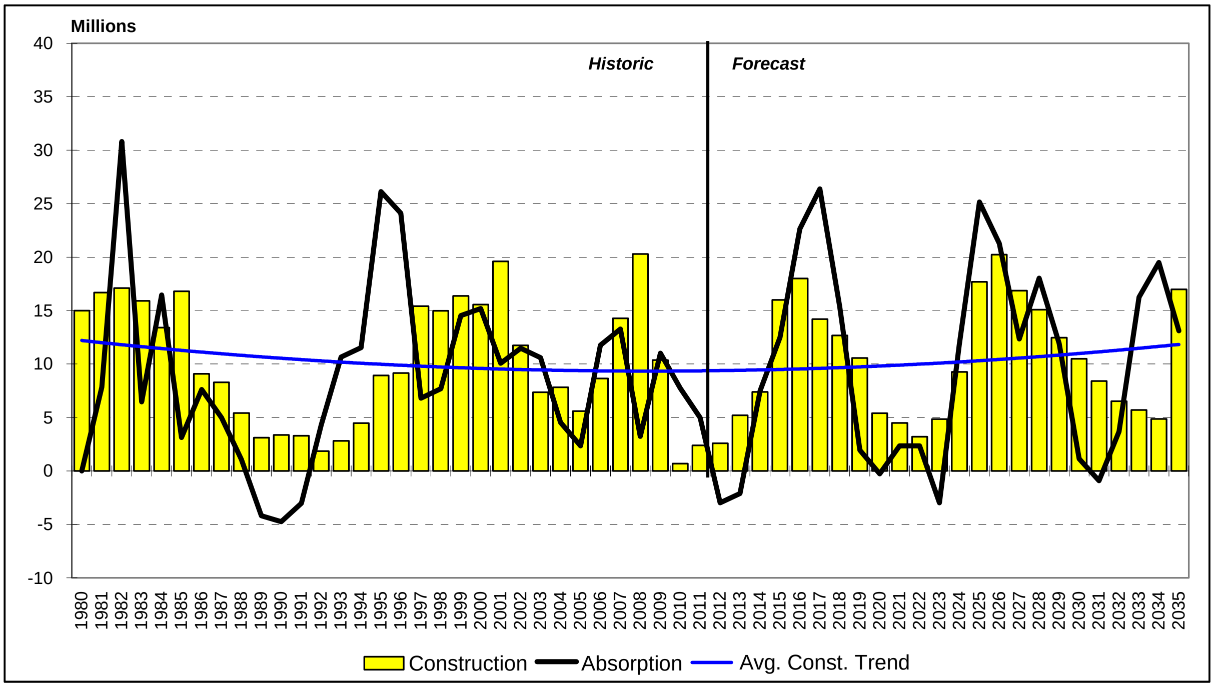


Figure 2-3. Twelve-County DFW MSA Square Feet of Industrial Absorption and Construction Historic 1980 - 2011; 2012 -2035 Forecast

Source: Multiple, see above description

Based on its history of site location and industrial development analysis, it has been observed that industrial space users frequently buy more land than is needed for their own use in order to provide for future expansion of the site, as well as to manage the impact of and to the site's immediate neighbors. This calculation assumes 0.25 floor-to-land area (FAR), or twice as much land area as would be required under most local zoning provisions for industrial facilities.

SDCIA Area Industrial Forecast

Table 2-4 provides the projected PAI forecast of market capacity in the SDCIA area as square feet of new industrial space and acreage, assuming available infrastructure.

Table 2-4. SDCIA Infrastructure Planning Area Percent of Future Industrial Market Share Potential PAI Scenario, 2012 through 2035

Area	Square Feet of Industrial Construction
DFW MSA Average: Annual Industrial Construction *High growth experience: 15.9 million, Low: 5.7 million*	10,378, 833
SDCIA Planning Area Potential, PAI Scenario: Annual Average Industrial Growth As an increasing percent of market share, currently 8%, growing to 25% by 2035, or 24 years	2,075,767
Maximum SDCIA Area Forecast Total over 24 Years Assuming Added of Infrastructure (PAI)	49,818,400
Industrial Square Feet Needed for this Growth by 2035	199,287,000
Total DFW MSA Forecast: DFW Industrial Space Forecast 2012 through 2035	249,092,000

Using the Basic Employment Forecast to Project Total Employment 2035

A basic employment forecast of new jobs in the SDCIA area was prepared using industry-specific ratios of employees per square foot of projected industrial space to obtain retail and service employment. To the basic employment ratios of retail and service job growth to basic employment were applied, as in the NCTCOG 2035 forecast. These ratios were compared to local U.S. Bureau of Economic Affairs Regional Input-Output Modeling System (US BEA RIMS II) employment multipliers as well as to historic employment growth by NAICS labor category in the DFW MSA. As in prior analysis steps, land use to accommodate forecast retail and service growth was compared to the NCTCOG 2035 forecast by TSZ.

Analysis showed that service sector baseline data for NCTCOG 2012 (for which NCTCOG uses DFW MSA-wide, standardized ratios) appeared to be high for the largely undeveloped SDCIA area, and was modified for this localized forecast. Based on a further comparison of employment ratios for retail and service employment to basic (industrial) employment in similar, heavily industrialized development areas in the U.S, the NCTCOG 2012 estimate of service employment used for the starting point for both the Linear and PAI scenarios was adjusted to use the standard ratio of 0.44 retail jobs and a customized 0.84 service jobs to each one new basic job for the SDCIA area.

The industrial-to-service sector employment ratio applied is typical as compiled from the proprietary database of more than 300 North American industrial studies throughout the U.S. and Canada. Applying this customized ratio results in a more conservative estimate of current and future total employment at 2035 in the specific SDCIA area TSZs than is achieved using generalized MSA-wide ratios.

While additional service jobs beyond the 0.84 ratio may be created from the basic employment pool, some of this employment is likely to occur outside the SDCIA area TSZs for which the forecast was required in Task 3. Results of the SDCIA total employment forecast for Linear, PAI and NCTCOG 2035 are shown in **Table 2-5** and **Figure 2-4**.

Table 2-5. SDCIA Area Total Employment Forecast Alternatives: Linear, PAI and NCTCOG 2035 Scenarios

Linear	Basic	Retail	Service	Total
2012	12,033	5,106	10,196	27,335
2035	4,940	2,023	4,062	11,025
Total	**16,973**	**7,129**	**14,258**	**38,360**
PAI	**Basic**	**Retail**	**Service**	**Total**
2012	12,033	5,106	10,196	27,335
2035	11,733	4,876	9,767	26,376
Total	**23,766**	**9,982**	**19,963**	**53,711**
NCTCOG	**Basic**	**Retail**	**Service**	**Total**
2012	12,033	5,106	20,392	37,531
2035	13,116	2,861	23,295	39,272
Total	**25,149**	**7,967**	**43,687**	**76,803**

Note: 2012 Service Baseline counts in red adjusted as part of this analysis
Source: NCTCOG's Demographic Forecast Data – 2035 Projections.

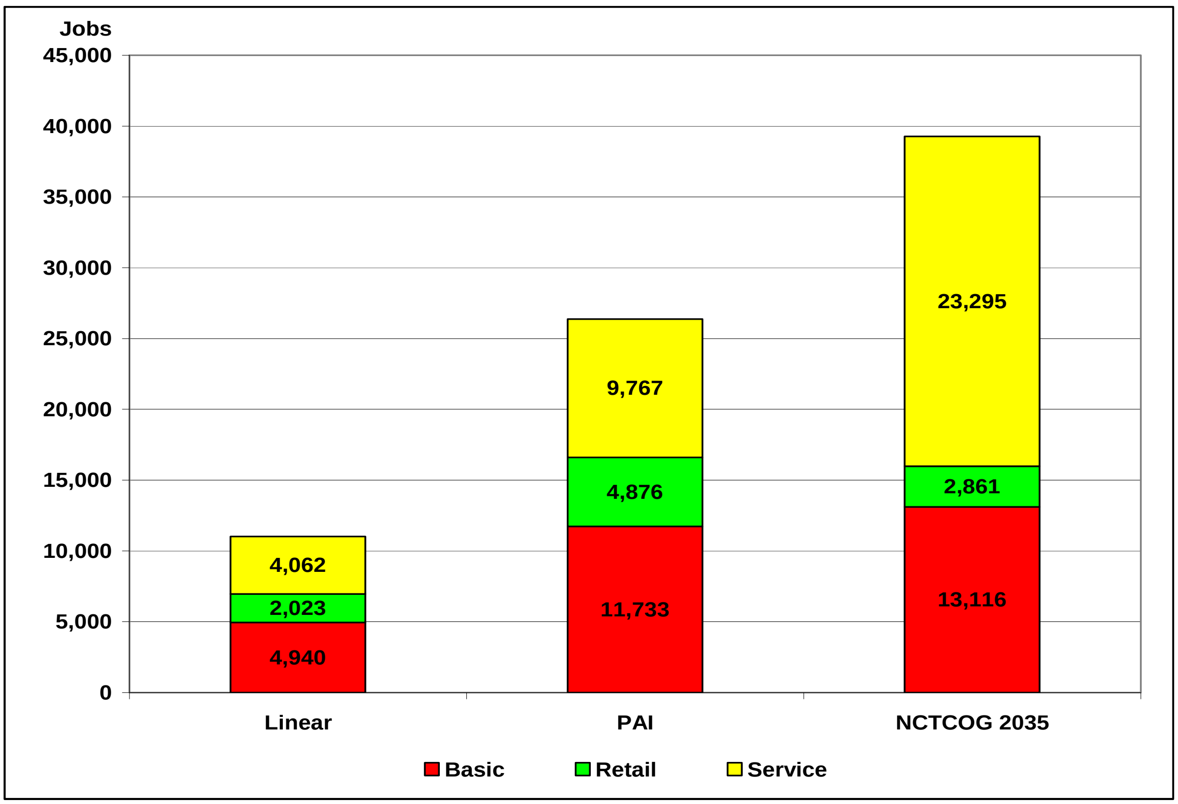


Figure 2-4. Employment Forecast Comparisons by Employment Type Linear, PAI and NCTCOG 2035
Sources – Linear and PAI, NCTCOG's Demographic Forecast Data – 2035 Projections

Total Employment Low-Probable-High Forecast

Task 3 also included preparation of "low-probable-high" risk factors to the employment forecast, which estimates the variation in employment growth that might occur under different circumstances in the future, and may be used in some engineering and financing strategies. The risk factor inherent in the probable forecast is based on historic DFW MSA total employment performance from 1970 through 2011, and results in a high variable of +2.77 from the probable base line, and a low variable of -1.91 from the probable base line, as illustrated in **Figure 2-6**.

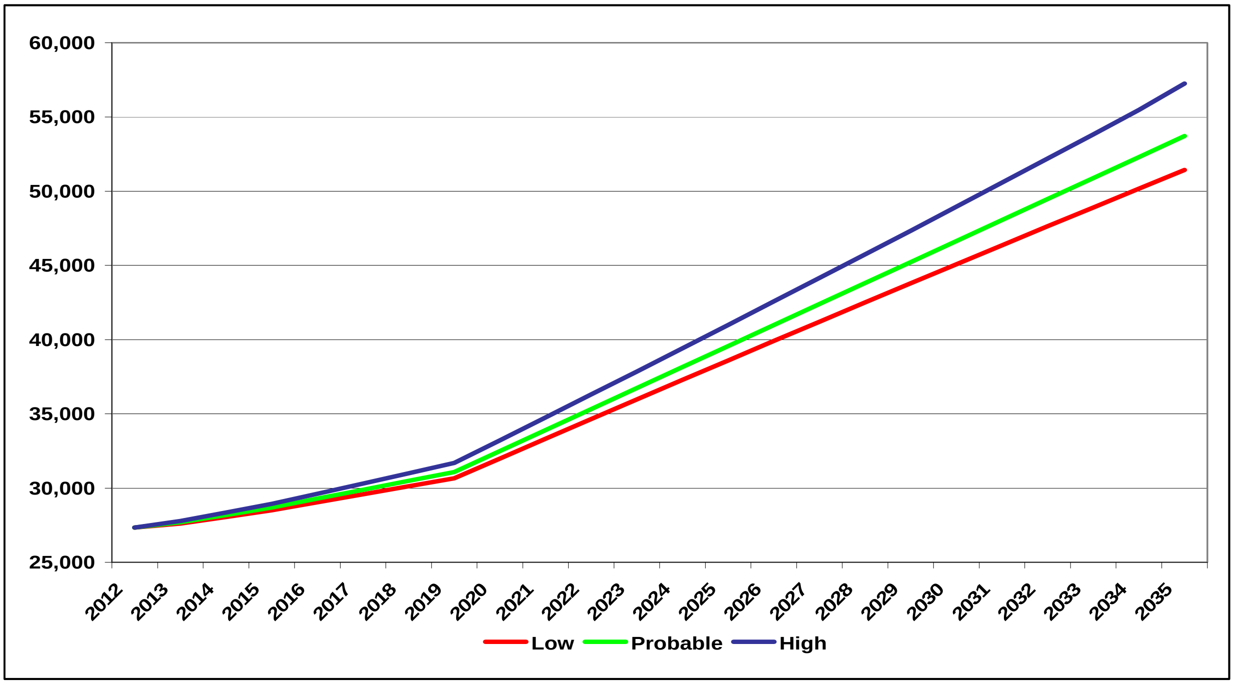


Figure 2-5. SDCIA Area PAI Total Employment Forecast
Range of Forecast Variation: Low-Probable-High
Source: US BLS DFW MSA Labor Force data 1970 – 2011

Table 2-6 summarizes a variety of market conditions that could influence the level of future employment. Conservative factors will tend to pull the forecasts towards the "low" forecast, while optimistic factors will tend to pull the forecasts towards the "high" forecast.

Table 2-6. Factors Potentially Influencing Employment (and Population) Change

Factor	Conservative	Most-likely	Optimistic
Water Availability	Delayed reservoir development and extended drought cause moratoriums on development	Rainfall patterns return to "norm" for past 50 years, municipally enforced water conservation measures decrease average consumption, new reservoirs are developed, no impact on development.	Substantial rainfall combined with reservoir development and conservation measures provide sufficient water resources while other areas of the southwest (AZ, CA) lose water dependent industries to Texas.
Immigration policy	Illegal immigration largely stopped with stringent limits on legal migration from south of the border. Result is lower population growth, lower demand for goods and services, higher building costs, and higher cost of living impacting business attraction.	Immigration enforcement no more effective than current efforts and/or guest worker program keeps a flow of low cost labor intact. Economy continues to grow at current levels.	Immigration enforcement somehow favors Texas allowing for expansion of regional market.
Immigration Policy/ Growth in Hispanic Households Impact Population Age	Fewer Hispanic households, rising median age leading to lower workforce participation due to retirement lower employment growth rates.	Relatively young Hispanic households slows the "aging" of the population, but still a slight decline in workforce participation due to retirement rate.	Young Hispanic households combined with delayed retirement balances workforce participation and rise in population median age.
Fuel Prices	High fuel prices, above $4 per gallon, affects household spending and impacts shipping modes resulting in lower related distribution employment in the study area.	Gasoline prices remain at $3.25-$3.75 range. Urban sprawl continues pushing firms and residents outside of historically developed areas.	Gasoline prices will decline as normal demand and supply factors outweigh speculative commodity investment resulting in higher spending for other goods than increases demand for distribution activities.
Transit Oriented Development	High levels of transit oriented development create population nodes inside of IH-20.	Some transit oriented development, but capacity of transit system does not allow a meaningful impact on population or employment.	No expansion of current transit service plans with no impact on population and employment in the study area.
City Government	Substantial political in-fighting for resources interfering with coordinated development/redevelopment efforts. Poor service levels in development services and planning.	Slight improvement over current city planning and development support services.	Effective and efficient near-terms and long range strategic development planning across study area cities.
Global /Regional Competition	Dallas/Fort Worth area lags other regions of the US in growth.	Remains competitive with other US regions and is a regional hub of global enterprise.	Becomes a major hub of international commerce on par with New York, London.

FURTHER DFW MSA INDUSTRIAL MARKET BACKGROUND

Additional background on the DFW MSA's industrial market and the changes that are influencing industrial space development and use are provided in the following section, recapped from the national level, the DFW MSA (regional) level and the SDCIA area.

THE NATIONAL INDUSTRIAL MARKETPLACE AND THE SDCIA AREA

The location of major distribution hubs is a key factor in containing transportation costs for businesses of all types in management of the supply chain of commodities, manufacturing materials, consumer products of all types, construction materials and the like. Access to these hubs is important for retailers, but critical for "basic" employers, including manufacturing, warehousing and distribution facilities.

National and international changes in logistics have continued to influence industrial growth potential affecting the SDCIA area. Developing from the 1970s, freight rail intermodal transportation has grown in importance, providing significant reduction of shipping cost. In response to the demand, intermodal facilities have been rapidly developed across the United States incorporating continuous facility management and cargo handling improvements.

Spurred by changes in distribution patterns in the United States that occurred in the early 2000's when China joined the World Trade Organization, trade distribution patterns are likely to see additional change with larger container ships moving through an enlarged Panama Canal in 2015. Positioned along key interstates, and with a rapidly growing consumer population, the DFW MSA and the SDCIA area in particular, has become increasingly prominent in national logistics patterns.

INDUSTRIAL GROWTH IN NORTH TEXAS

Growth in the North Texas logistics continues in all directions, with rail intermodal service on both its western (BNSF Alliance) and eastern entry points (UP's Dallas Intermodal Terminal or DIT – referred to internally at Union Pacific as its Hutchins facility), receiving containerized shipments directly from the Ports of Los Angles and Long Beach as well as the balance of the United States.

Union Pacific's DIT-Hutchins, completed in 2005 in the SDCIA area, has a current capacity of 365,000 lifts per year, and is positioned for future growth. Burlington Northern Santa Fe (BNSF) has also targeted the SDCIA area as an area of interest for potential expansion of its regional intermodal service. The continuing the expansion of Norfolk Southern's (NS) existing, direct Meridian Speedway route linking Dallas and the NS facilities in Meridian, Mississippi, is also important to cargo movement as NS partners frequently with both BNSF and Kansas City Southern (KCS). The route serves to expedite rail traffic between the eastern seaboard and the western markets directly through North Texas.

As previously noted in the summary comments, the SDCIA area also benefits from the existing interstate highway systems of I-20, I-30, I-35E, and I-45 – as does the balance of the region -- providing well-established truck transportation routes in all directions serving North America. Heightened interest in the I-45 corridor leading from the coastal ports of Texas will continue to augment the north-south containerized shipping demand. The future Loop 9 transportation corridor will add further access and value to the SDCIA area once funding commitments are secured.

THE SDCIA AREA – AN EMERGING INDUSTRIAL MARKET

The SDCIA area is already established as a logistics center, with the UP DIT-Hutchins facility and FedEx Ground facilities, among others, and has vital existing and developing characteristics to continue to achieve an increasing logistics role for North Texas. The past two decades have produced a growing awareness of the potential for this area among its public and private sector leadership as evidenced by the establishment of the area's designation of as portion of the SDCIA area as the International Inland Port of Dallas (IIPOD), also previously noted.

As the DFW MSA continues to build new state-of-the-art warehousing and consume its inventory of available industrial property, the SDCIA area will continue to garner interest as a major industrial development resource, an additional future employment center, and a future source of tax base growth. Current interest is demonstrated by the number of major industrial developers and investors who have invested in SDCIA area sites with planned industrial potential, including Industrial Developments International (IDI), ProLogis, Duke Realty and the California State Teachers Retirement System (CalSTRS), among others.

INDUSTRIAL MARKETING IN THE SDCIA AREA

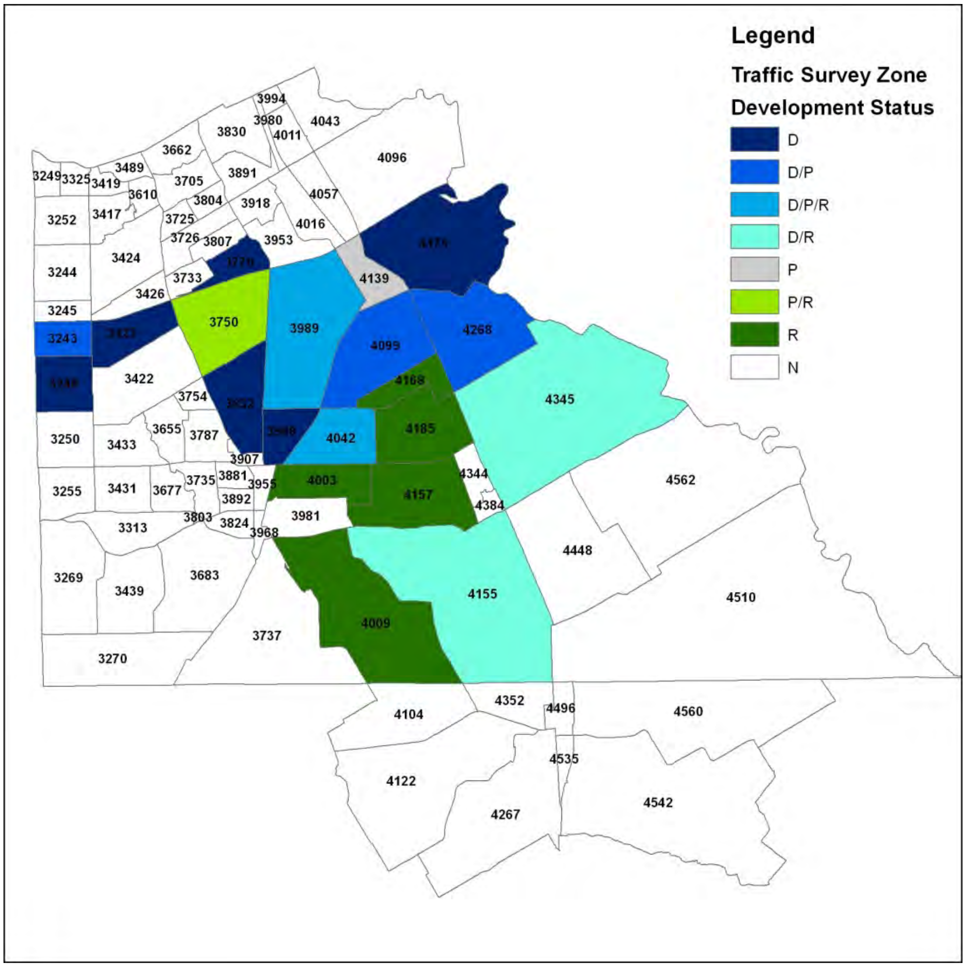
An important assessment of future infrastructure needs of the SDCIA area is the current market activity, with land speculation, exchanges, and land purchase activity are now occurring at a renewed pace. Industrial construction in the SDCIA area is constrained by two important factors: (1) the current economic cycle and (2) the lack of supporting infrastructure.

With the individual cities' comprehensive land use plans as a guide, land area readily available and currently being marketed for industrial development in the SDCIA area was calculated to total approximately 8,800 acres. These 8,800 acres are a partial inventory, but were found to have sufficient information to assess their readiness for development, important to planning for needed infrastructure.

Based on broker and owner representations of their sites, proximity to water and sewer service, just over one quarter (2,288 acres) of these 8,800 industrial acres are ready to begin development, nearly one quarter of these acres (2,034 acres) have some infrastructure access although are not fully served, and the remaining acres (4,488 acres) are raw land or currently in agricultural use.

Figure 2-6 depicts the relative location of infrastructure (i.e., water, sewer, road access) as reported by industrial property sales offering profiles from owners, brokers, internet brochures or economic development organizations. These marketing representations offer only a rough general comparison with official infrastructure location maps from each community.

Marketing representations do not necessarily correlate with actual infrastructure availability, but reflect a general pattern of industrial development being actively marketed in 2012.



Legend: (Combined letters indicate a mix of infrastructure characteristics)
D = Developed and construction ready
P = Partially developed, some infrastructure
R = Undeveloped, raw or agricultural land
N = Residential or very limited formally advertised industrial property

Figure 2-6. 2011 Market Reports of Infrastructure Status by TSZ

Sources: Industrial Property Sales Literature and Offerings, Court Documents, Owner and Broker Web Sites

SDCIA AREA HOUSING PROFILE

Task 3 also included providing information on baseline housing to anticipate the SDCIA area's growth. Housing data was prepared from several sources including historic annual NCTCOG Housing Profiles, 2010 American Community Survey and American Housing Survey reports, plus locally specific proprietary market information purchased for SDCIA area TSZs from Residential Strategies Inc. (RSI).

As reported from Nielsen-Claritas data based upon the 2010 American Housing Survey, the average age of the housing stock in the SDCIA area was thirty years. Reported age of residential properties indicates that 26.4% of the housing units were built after 2000, 11.7% built between 1990 and 1999, 13.9% built between 1980 and 1989, and the balance, or 52.0%, reported as constructed earlier than 1979.

The SDCIA area has shown new home sales as noted in **Table 2-7**, reflecting the local impact on the SDCIA area of the U.S housing slowdown. In the SDCIA area, new home values from the 48 subdivisions with recent activity now indicate an average new home price of $135,000.

Table 2-7. SDCIA Area, New Home Purchases

Year	Purchases
2006	1,065
2007	740
2008	368
2009	165
2010	158
2011 (estimate)	155

Source: RSI, Third Quarter 2011

In 2011, NCTCOG reports that single family and multi-family residential characteristics are as shown in **Figure 2-7**. While City of Dallas' portion of the SDCIA area has 52% of its housing stock as multi-family, as reported by Nielsen-Claritas from a zip code report of this partial portion of the City, the four suburbs that make up the balance of the SDCIA area have less multi-family housing as a percent of each community's housing stock, ranging from 3% to 9% of the total housing units.

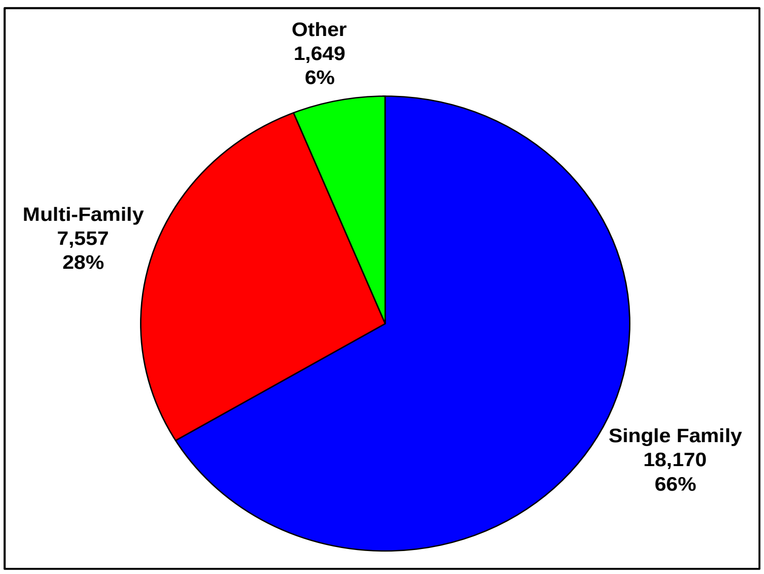


Figure 2-7. 2012 SDCIA Area Residential Units: Single-Family, Multi-Family and Other
Sources – NCTCOG 2011 Annual Housing Analysis, Nielsen-Claritas, 2011

The Texas market in general has demonstrated less volatility in home prices and fewer foreclosures as compared to the rest of the U.S. However, as reported by the Roddy Report in Dallas Morning News articles, the SDCIA area has experienced a higher number of single-family foreclosures than the MSA, more closely conforming to the national trend than the regional one. These trends are depicted in **Figure 2-8**, which anticipates that the residential recovery for the U.S., and likely for the SDCIA area as well, may have lingering effects until 2017 with a potential for foreclosures peaking in 2013. **Figure 2-9** reflects the monthly U.S. foreclosure percentages from 2006 through 2011 and a trend line as compared to those in the State of Texas. National trends in foreclosures have slowed slightly in 2011 with some lenders exercising more flexible renegotiation strategies for borrowers who may be at risk for default.

The net result for SDCIA housing is likely to be a somewhat slower recovery than in the twelve-county DFW MSA and suggest a housing market recovery period of about five years based on these trends and specific SDCIA area new home construction data from RSI.

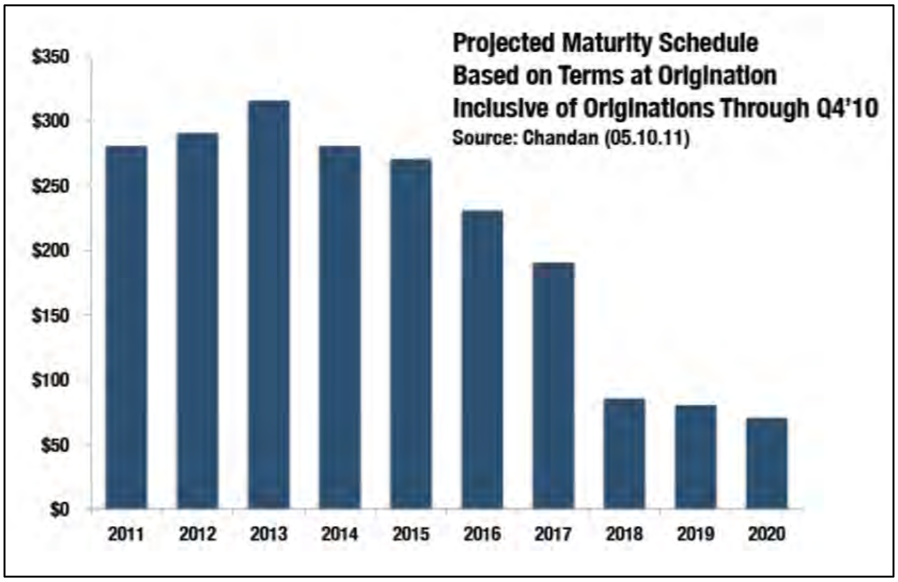


Figure 2-8. U.S. Outstanding Residential Mortgage Maturities

Source: Chandon Economics

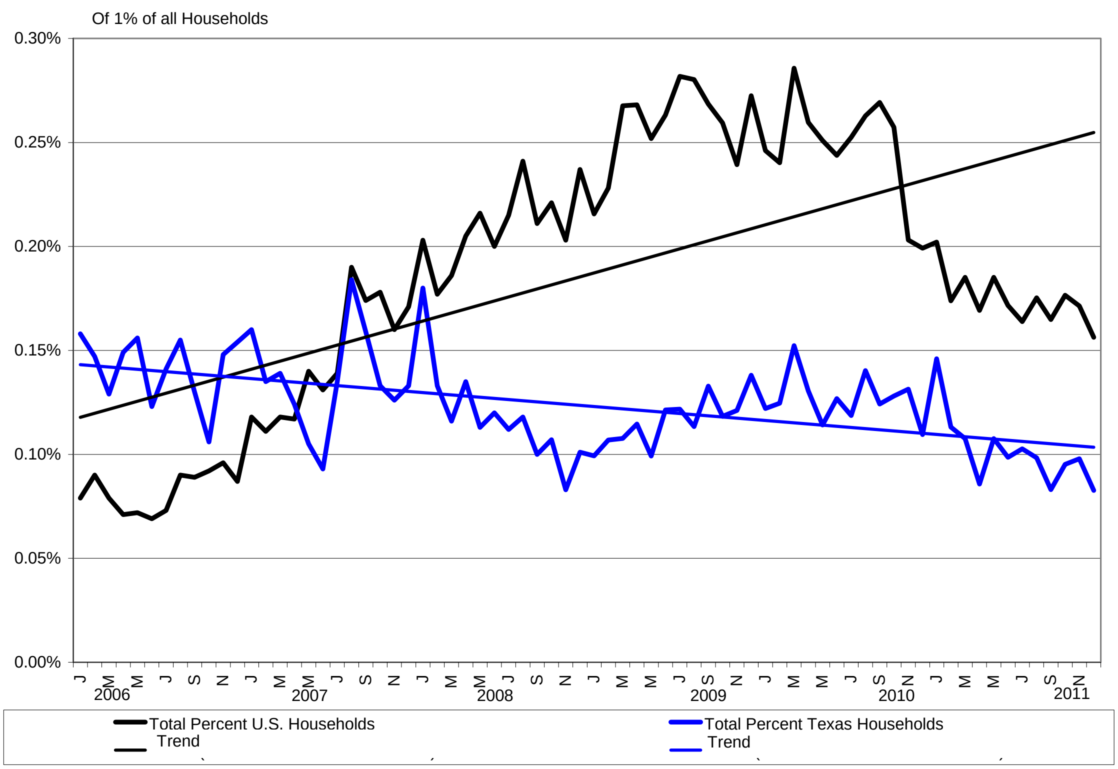


Figure 2-9. Residential Foreclosure Activity, US to Texas

Source: Realty Trac, June 2011

HOUSING-WORKFORCE BALANCE ASSESSMENT

This section of this technical report offers an assessment and recommendations for achieving a reasonable balance between workforce and housing development in the study area. The goal is to provide housing options that meet the needs of area workers at a price point fitting relevant local wage scales. Achieving this goal will lead to economically and environmentally sustainable development contributing to overall economic growth and providing necessary conditions for community growth and development.

The Housing-Workforce Balance Assessment provides an overall qualitative assessment of the availability of affordable workforce housing in the study area, a review of data on housing prices in selected sub-markets in the study area, and an examination of wage levels for the occupations that are expected to grow the most over the next 25 years. The assessment concludes with recommendations for development guidelines that will promote a balance of housing availability for the local labor market, while allowing for fiscally-sustainable growth.

MARKET OVERVIEW

Southern Dallas County offers a wide range of housing options including middle income homes, starter homes, and rental single family properties. Unincorporated areas of the county also offer relatively low-cost housing alternatives in mobile home communities and older country properties.

Table 2-8 offers data about average prices of single family homes in individual developments within the study area. At the time of this report's preparation, detailed location descriptions for each development were not available, therefore only the city name is shown. Nonetheless, the reported average values for the properties included in this data show housing options ranging from an average of $78,000 to $213,000. Importantly, while most of the vacant lots shown in **Table 2-8** are associated with housing prices in the $130,000 to $170,000 range, there are a number of lots in the sub-$100,000 market.

Anticipated future housing developments, especially those that may occur along the future Loop 9, are also project to be in the $130,000 plus category in today's dollars. However, there are affordability concerns when assessing the potential for home ownership among the workers who will have the large majority of jobs that are being projected to develop during the study period.

As shown in **Table 2-9**, many of the occupations that represented the vast majority of jobs in the target industries have relatively low wage rates. **Table 2-10** offers a rough assessment of housing affordability for each of these occupations with certain assumptions. The first assumption is that the wage earner represented is the primary household wage earner. The second assumption is that the secondary earner in the household earns 50 percent of the primary earner's wage. This assumption is meant to account for one-earner households. Housing payments are calculated using a 7% FHA interest rate with 5% down since it is unlikely that current mortgage interest rates will remain at historic lows. Housing payments include an allowance for insurance and taxes that would be held in escrow by the mortgage servicer. Affordable housing costs are assumed to be 25% of gross household income.

Table 2-8. Housing Prices and Lot Availability in Current Development in SDCIA Area

Development Location	Average Price (000's)	Occupied Count	Preliminary Lot Count	Vacant Lot Count	Future Lot Count
City of Dallas-Southwest	99	193	0	75	0
City of Dallas-Southwest	104	73	0	37	0
City of Dallas-Southwest	109	447	0	0	0
City of Dallas-Southwest	114	140	0	0	0
City of Dallas-Southwest	125	0	36	0	17
City of Dallas-Southwest	129	38	0	0	0
City of Dallas-Southwest	130	7	0	4	0
City of Dallas-Southwest	133	26	0	0	0
City of Dallas-Southwest	135	271	327	56	0
City of Dallas-Southwest	135	264	0	44	0
Ferris	137	91	200	110	0
Ferris	213	16	0	30	0
Hutchins	139	118	0	0	0
Lancaster	78	270	0	0	0
Lancaster	81	208	0	0	0
Lancaster	89	245	0	0	0
Lancaster	95	83	0	7	0
Lancaster	99	28	0	0	0
Lancaster	107	200	0	0	0
Lancaster	110	21	0	3	0
Lancaster	113	48	0	0	0
Lancaster	114	160	0	0	0
Lancaster	116	101	0	0	0
Lancaster	125	13	0	4	0
Lancaster	127	197	0	159	0
Lancaster	131	351	0	0	0
Lancaster	132	409	0	37	0
Lancaster	138	79	0	0	0
Lancaster	142	39	0	0	107
Lancaster	143	225	0	29	95
Lancaster	144	806	0	0	0
Lancaster	145	147	0	0	74
Lancaster	145	40	0	61	96
Lancaster	147	82	0	0	0
Lancaster	147	212	0	111	159
Lancaster	150	89	0	7	0
Lancaster	153	167	0	0	0

Development Location	Average Price (000's)	Occupied Count	Preliminary Lot Count	Vacant Lot Count	Future Lot Count
Lancaster	155	213	0	376	0
Lancaster	155	0	0	0	271
Lancaster	155	0	0	0	50
Lancaster	167	223	0	97	164
Lancaster	168	24	0	157	0
Lancaster	172	88	0	0	0
Lancaster	175	12	0	0	0
Lancaster	180	0	0	0	297
Lancaster	189	112	0	0	0
Lancaster	193	246	0	25	167
Wilmer	98	94	0	50	0

Source: RSI Data

Table 2-9. Earnings by Occupation: Southern Dallas County Labor Market

SOC Code	Description	2011 Hourly Earnings
13-1111	Management analysts	$37.53
43-3071	Tellers	$12.11
43-4051	Customer service representatives	$15.32
43-5071	Shipping, receiving, and traffic clerks	$13.49
43-5081	Stock clerks and order fillers	$11.46
51-2022	Electrical & electronic equip. assemblers	$13.98
51-2092	Team assemblers	$11.47
51-4041	Machinists	$17.49
53-3032	Truck drivers, heavy and tractor-trailer	$20.82
53-7051	Industrial truck and tractor operators	$12.97
53-7062	Laborers, freight, stock, material movers, hand	$11.42
53-7064	Packers and packagers, hand	$10.28

Source: EMSI Complete Employment

As shown in **Table 2-9**, some of the targeted occupations earn sufficient income to afford existing housing stock. It should be noted again that these estimates are for two-earner households. Single parents and individuals would not be able to afford the same level house given an earnings profile. The analysis presented in **Table 2-9** is illustrative, but not definitive. What it clearly shows is that the projected industrial development envisioned for southern Dallas County will require a mix of affordable ownership units, which are present to some extent, and multifamily rental properties.

Table 2-10. Housing Affordability for Selected Occupations

Description	2011 Hourly Earnings	Annual Household Earnings	Monthly Housing Costs	Affordable House Value
Management analysts	$37.53	$117,094	$2,439	$338,428
Tellers	$12.11	$37,783	$787	$77,052
Customer service representatives	$15.32	$47,798	$996	$110,120
Shipping, receiving, and traffic clerks	$13.49	$42,089	$877	$91,292
Stock clerks and order fillers	$11.46	$35,755	$745	$70,407
Electrical & electronic equip. assemblers	$13.98	$43,618	$909	$96,355
Team assemblers	$11.47	$35,786	$746	$70,565
Machinists	$17.49	$54,569	$1,137	$132,428
Truck drivers, heavy and tractor-trailer	$20.82	$64,958	$1,353	$166,604
Industrial truck and tractor operators	$12.97	$40,466	$843	$85,913
Laborers, freight, stock, material movers	$11.42	$35,630	$742	$69,932
Packers and packagers, hand	$10.28	$32,074	$668	$58,224

Sources: EMSI, Clower and Associates

HOUSING BALANCE CONCLUSIONS AND RECOMMENDATIONS

In this preliminary assessment of the availability of housing for the labor force that will be working in southern Dallas County, it is found that while some occupations will be able to afford ownership housing, there will be many employees that will not have ownership issues and may find challenges in the residential rental markets. However, there is an important caveat to this conclusion. While it may be desirable to have housing options for all workers within close proximity to key employment areas of southern Dallas County, there are other options. The effective labor shed for employers in southern Dallas County is much larger than the primary study area of this project; see **Figure 2-10**. Observational research suggests that areas of Navarro, Ellis, and Kaufman counties have a more extensive range of affordable housing, and still offer easy access to employers located in the study area. Still, as cities in the study area develop their land use plans and zoning maps, they should consider prevailing labor rates for area jobs and have a balanced approach to residential property development. This could include single- and multi-family ownership units, rental properties, and support the inclusion of subsidized properties designed for working lower income households.

LABOR FORCE ANALYSIS

The final section of this Technical Memorandum present the project team's assessment of the ability of the study area to supply the workforce needed to support the growth scenarios described in the demographic and employment forecast for 2035. In the following section describes the effective labor shed from which employers in southern Dallas County are likely to draw workers. The target industries and occupations section presents the industries that are projected to develop in southern Dallas County and describes the analytical techniques and data sources used for this analysis. The findings section reports research results and then offers conclusions regarding short and long term labor availability to support projected growth.

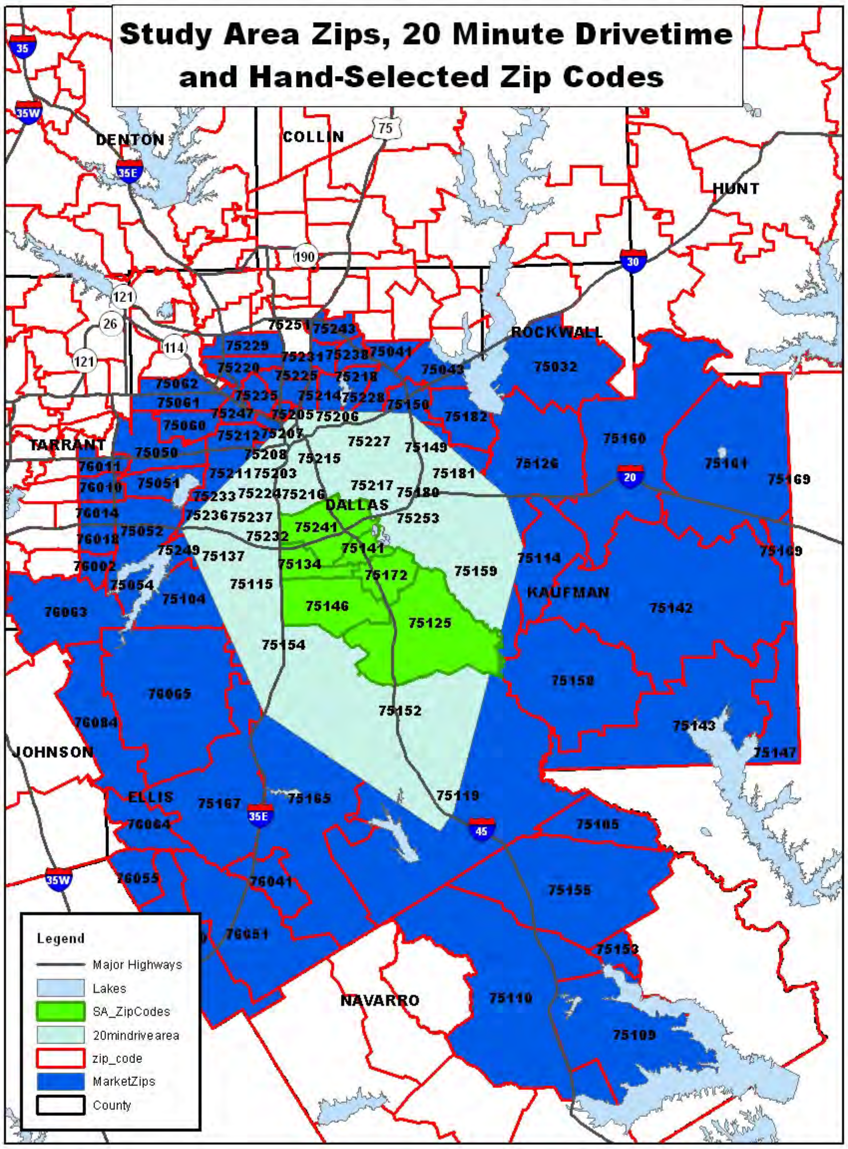


Figure 2-10. Southern Dallas County Labor Shed

SDCIA AREA LABOR SHED

The rule of thumb used in site location analysis is that an effective, sustainable labor shed is within a 30-minute commute. This does not mean that employees will refuse longer commutes, but that willingness to commute diminishes beyond 30 minutes. Of course, the geographic distance that may be covered in a thirty minute commute varies substantially based on location, transportation options, and traffic congestion. Using drive time data, existing commuter patterns, and our experience in workforce research, zip code areas that likely form the primary southern Dallas County labor shed were identified. The choice of zip codes for geographic boundaries is based on labor market data availability. The labor market study area used for this analysis is the same as that used for the housing balance (see **Figure 2-10**) and **Table 2-11** lists the included zip code areas. This labor shed was reviewed and revised by the Project Advisory Committee.

Table 2-11. Zip Codes Areas in the Southern Dallas County Labor Shed

Dallas Co.			Ellis Co.	Johnson Co.	Navarro Co.
75051	75172	75216	75101	76084	75105
75052	75181	75217	75119		75110
75104	75182	75218	75125	**Kaufman Co.**	75155
75115	75205	75223	75152	75114	
75134	75206	75227	75154	75126	**Tarrant Co.**
75137	75207	75228	75165	75142	76002
75141	75208	75232	75167	75157	76010
75146	75211	75236	76041	75158	76014
75149	75212	75241	76064	75160	76018
75150	75214	75249	76065		76063
75159	75215	75253	76651		

Source: Weinstein, Clower and Associates

TARGET INDUSTRIES AND OCCUPATIONS

In preceding sections of this technical memorandum, the project team assumed that 87.5% of basic employment in the study area will be in physical distribution related land uses such as warehouses and distribution centers. The remaining 12.5% is assumed be rail-serve industries. While this labor force analysis, however, has been informed by these assumptions, based upon a review of target industry studies prepared for this area, there are other potential industries that could be targets for industrial recruitment. In addition, two service industries have been included in this analysis. The banking industry represents a development opportunity tied both to residential and non-residential growth. Management, Scientific and Technical Consulting Services represents a wide range of business services that would be included in a comprehensive economic development strategy. Businesses in this industrial sector will occupy a variety of commercial buildings from loft-type offices in transit-oriented developments to mid-rise office buildings. Rail transportation services are not included in this list because the overall level of employment to operate the rail yards is not substantial.

Once a preliminary list of target industries was identified, industry outlook projections from the US Bureau of Labor Statistics were reviewed. One industry, chemical products and preparation manufacturing, is expected to be in substantial decline over the next several years; therefore, this industry was removed from the target list. The industry outlooks for the target industries are attached to this report as Appendix 1. **Table 2-12** shows the industries included in this analysis.

Table 2-12. Target Industries for Southern Dallas County

NAICS Code*	Description
484000	Truck Transportation
493100	Warehousing and Storage
334500	Navigational, Measuring, Electromedical, Control Instruments Manufacturing
333000	Machinery Manufacturing
522100	Depository Credit Intermediation (Banking)
541600	Management, Scientific, and Technical Consulting Services

** North American Industrial Classification System*

Using data from the Bureau of Labor Statistics (BLS) the occupations that are most highly demanded by each of the target industries were identified. For purposes of this analysis, the occupations within each industry were ranked by percentage of total employment required and included all occupations that represented the top 70% of total occupations in that industry. A weight based on our assessment of the relative size of the target industry was then applied. In this way those occupations that are relatively important for their industries, but also represent substantial job growth opportunity, were identified. (Full listings of occupations by industry are available in Appendix 2). For example, the laborers and material handler occupation represents a substantial share of total employment in the warehousing and storage industry. In addition, the highest weight was assigned to this industry since it is expected to dominate industrial employment growth over the next 20 years.

Importantly, retail or personal services industries were not included in this analysis, though they will have substantial job growth. The employees of retail and personal services businesses will be drawn from the same population that is these businesses' customers. In addition, while management occupations are required in each of the target industries, these do not represent a large portion of total employment. It is assumed that companies will be able to attract or develop their management personnel.

Based on this analysis, the top 12 occupations represent the largest new job opportunities. These occupations are shown in **Table 2-13**.

Table 2-13. Labor Market Study Occupations

SOC Code	Occupation	Weighted Score
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	124.97
53-7051	Industrial Truck and Tractor Operators	59.40
51-2092	Team Assemblers	55.78
13-1111	Management Analysts	43.29
43-5081	Stock Clerks and Order Fillers	40.25
43-4051	Customer Service Representatives	36.96
43-5071	Shipping, Receiving, and Traffic Clerks	35.31
53-7064	Packers and Packagers, Hand	30.50
43-3071	Tellers	29.17
51-2022	Electrical and Electronic Equipment Assemblers	28.44
51-4041	Machinists	26.36
53-3032	Heavy and Tractor-Trailer Truck Drivers	25.30

Source: US Bureau of Labor Statistics, Clower and Associates Estimates

Once the occupations for further study were identified, the degree to which the labor market is currently able to supply labor for the target industries was examined. This examination uses data from Economic Modeling Specialists Incorporated (EMSI), one of the nation's leading providers of labor market and workforce training data. To examine the strength of the local labor market, location quotients and the regional component of shift share analyses for each occupation were calculated.

The location quotient offers a quantitative measure of the relative presence of a given occupation at a particular time. A location quotient greater than 1.0 indicates that the area is comparatively strong for that occupation, while a location quotient substantially less than 1.0 may indicate labor market weakness and/or the need to develop additional resources to support these occupations. The shift share analysis provides another measure of relative strength of a given labor market related to specified occupations. However, the shift share analysis looks at changes over time. In this case, the data for the 2001 through 2011 period was examined.

As shown in **Table 2-14**, some occupations in the targeted list have seen employment gains over the past ten years, while others have struggled. Much of this change can be associated with the recent recession and the overall slow pace of economic recovery since the recession ended in June of 2009.

Table 2-14. Job Counts and Earnings by Occupation: Southern Dallas County Labor Market

SOC Code	Description	2001 Jobs	2011 Jobs	2011 Hourly Earnings
13-1111	Management analysts	1,912	2,860	$37.53
43-3071	Tellers	1,229	1,467	$12.11
43-4051	Customer service representatives	7,236	7,558	$15.32
43-5071	Shipping, receiving, and traffic clerks	3,216	2,768	$13.49
43-5081	Stock clerks and order fillers	7,474	7,092	$11.46
51-2022	Electrical & electronic equip. assemblers	538	277	$13.98
51-2092	Team assemblers	3,583	2,695	$11.47
51-4041	Machinists	1,321	1,070	$17.49
53-3032	Truck drivers, heavy and tractor-trailer	12,800	13,453	$20.82
53-7051	Industrial truck and tractor operators	2,739	3,053	$12.97
53-7062	Laborers, freight, stock, material movers, hand	11,214	10,330	$11.42
53-7064	Packers and packagers, hand	2,674	2,394	$10.28
	Total	**55,937**	**55,016**	**$15.91**

Source: EMSI Complete Employment

Table 2-15 provides location quotients for 2001 and 2011 for each target occupation. While showing exceptional strength in truck drive and material handler occupations, there are several target occupations that will likely require some recruitment effort. Of particular note are electronic equipment assemblers and management analysts, both of which are under-represented in the existing labor market.

The shift-share analysis reveals that there is comparative local weakness in the stock takers and order fillers occupation, but that truck driving and material handling occupations have grown more in southern Dallas County compared to national trends (see **Table 2-16**). Overall, these data point to substantial existing labor market representation in the occupations that will grow the most during the forecast period. **Figure 2-11** offers a graphical representation of local trends in the occupations examined in the analysis, again showing particular strength in distribution related occupations.

Table 2-15. Location Quotients by Occupation

SOC Code	Description	2001 Jobs	2001 LQ	2011 LQ
53-3032	Truck drivers, heavy and tractor-trailer	12,800	2.14	2.21
53-7062	Laborers and freight, stock, and material movers, hand	11,214	1.46	1.53
43-5081	Stock clerks and order fillers	7,474	1.32	1.24
43-4051	Customer service representatives	7,236	1.11	1.09
51-2092	Team assemblers	3,583	0.90	0.85
43-5071	Shipping, receiving, and traffic clerks	3,216	1.25	1.30
53-7051	Industrial truck and tractor operators	2,739	1.45	1.76
53-7064	Packers and packagers, hand	2,674	1.03	1.09
13-1111	Management analysts	1,912	0.73	0.78
51-4041	Machinists	1,321	0.92	0.89
43-3071	Tellers	1,229	0.72	0.85
51-2022	Electrical and electronic equipment assemblers	538	0.63	0.47
	Total	**55,937**	**1.29**	**1.31**

Source: EMSI Complete Employment - 2011.3

Table 2-16. Shift Share Analysis for Southern Dallas County Labor Market: Selected Occupations

SOC Code	Description	Number of Jobs				
		Job Change	Occ Mix	Nat Growth	Exp Change	Competitive Effect
13-1111	Management analysts	948	584	98	682	**266**
43-3071	Tellers	238	-69	63	-6	**245**
43-4051	Customer service representatives	322	-75	370	295	**27**
43-5071	Shipping, receiving, and traffic clerks	-448	-788	164	-624	**176**
43-5081	Stock clerks and order fillers	-382	-472	382	-90	**-292**
51-2022	Electrical and electronic equipment assemblers	-261	-209	28	-181	**-80**
51-2092	Team assemblers	-888	-1,004	183	-821	**-67**
51-4041	Machinists	-251	-308	68	-240	**-10**
53-3032	Truck drivers, heavy and tractor-trailer	653	-713	655	-58	**710**
53-7051	Industrial truck and tractor operators	314	-432	140	-292	**606**
53-7062	Laborers and freight, stock, and material movers, hand	-884	-2,117	574	-1,543	**659**
53-7064	Packers and packagers, hand	-280	-602	137	-465	**185**
	Total	**-919**	**-6,206**	**2,861**	**-3,345**	**2,424**

Source: EMSI Complete Employment

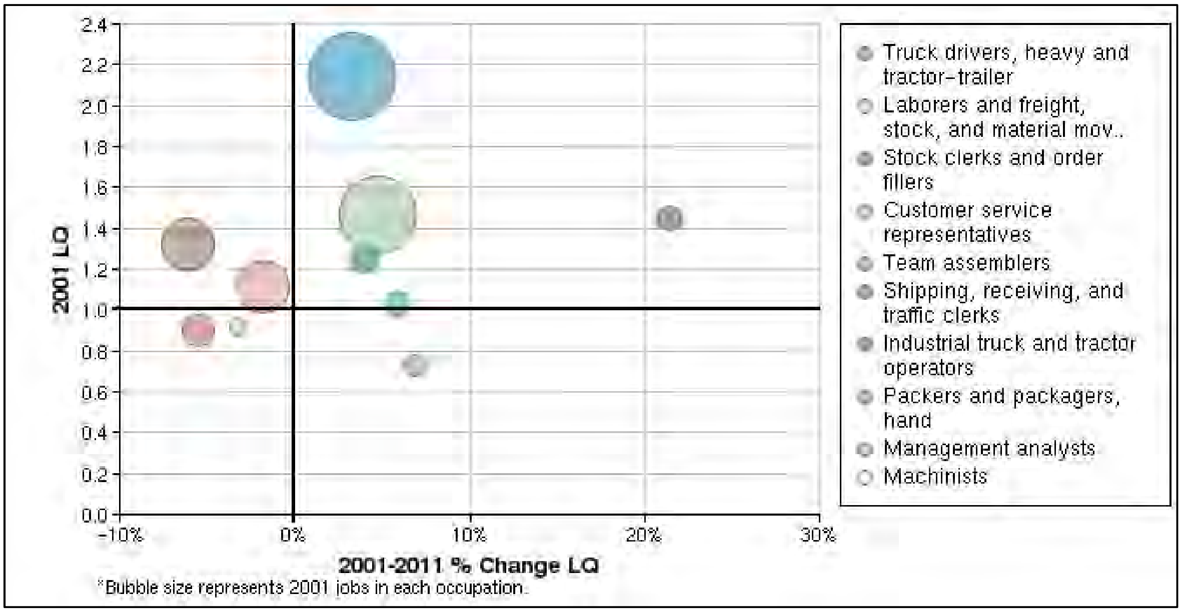


Figure 2-11. Location Quotients, Change and Employment Size for Selected Occupations Southern Dallas County Labor Market

EDUCATION AND JOB TRAINING

Table 2-17 shows the education/training level needed for the target occupations identified in our analysis. Only one occupation, management analysts, requires a post-secondary degree. The rest require varying levels of on-the-job training and some specialized training, such as truck drivers.

Table 2-17. Education and Job Training Requirements by Occupation

Occupation	Education Level
Management analysts (13-1111)	Degree plus work experience
Tellers (43-3071)	Short-term on-the-job training
Customer service representatives (43-4051)	Moderate-term on-the-job training
Shipping, receiving, and traffic clerks (43-5071)	Short-term on-the-job training
Stock clerks and order fillers (43-5081)	Short-term on-the-job training
Electrical and electronic equipment assemblers (51-2022)	Short-term on-the-job training
Team assemblers (51-2092)	Moderate-term on-the-job training
Machinists (51-4041)	Long-term on-the-job training
Truck drivers, heavy and tractor-trailer (53-3032)	Moderate-term on-the-job training
Industrial truck and tractor operators (53-7051)	Short-term on-the-job training
Laborers, freight, stock, & material movers, hand (53-7062)	Short-term on-the-job training
Packers and packagers, hand (53-7064)	Short-term on-the-job training

Source: EMSI Complete Employment

Local training and educational programs are essential to the creation and maintenance of a quality labor market. Workers with skill sets tailor-made for a region's employment opportunities only increase the possibilities of matching potential employees with employer demand. Many local colleges and universities in the southern Dallas area are striving to integrate educational programs that will benefit the current and future workforce. These institutions have collaborated with local chambers of commerce, economic development organizations, community development corporations, professional trade organizations, and state workforce entities to meet goals designed to positively impact the local community. The University of North Texas at Dallas (UNT Dallas) and the Dallas County Community College District (DCCCD) both have instituted workforce development programs to help meet the training needs of employees in order to serve the business community.

UNT Dallas offers both a Bachelor of Science degree and Certification in Logistics and Supply Chain Management. Focus in this field includes internal consulting or corporate research, inventory planning or control activities, materials handling operations, traffic or transportation management and warehouse operations or management. UNT Dallas' curriculum has been developed in conjunction with the region's leading Logistics organizations including the Dallas/Fort Worth Roundtable of the Council of Supply Chain Management Professionals, the North Texas Commission's Logistics Development and Marketing Committee, and the Center for Logistics Education and Research. Internships are required to earn a B.S. degree.

Two of DCCCD's seven campuses, Cedar Valley College and Mountain View College, offer a comprehensive workforce development program designed to give local residents job-specific training in many different career fields. With financial assistance from the Texas Workforce Commission (TWC), Cedar Valley and Mountain View have implemented comprehensive curriculum in myriad of business skills. The manufacturing technology program offers classes in computer-aided manufacturing software techniques, as well as others in programmable logic controllers and troubleshooting. In addition to manufacturing technology, Cedar Valley and Mountain View offer trade-oriented programs in machinery and milling, electrical technology, construction/contracting, and welding, as well as professional curriculum in human resources, business management and marketing, and leadership and management development.

Given the industries that are projected to grow in the study area, there are sufficient, on-target education resources in southern Dallas County to meet any training and education requirements of the labor force.

LABOR FORCE CONCLUSION

Based on the target industries identified, the occupations that will be the most highly demanded will be well-supported by the southern Dallas County labor market. There are particular existing competitive advantages in the study area for distribution-related activities and occupations. Other manufacturing occupations such as assemblers and machinists are not as well represented. However, there are relatively low barriers of entry into these occupations based on education and training requirements. Moreover, existing higher education institutions in the southern Dallas County market have professional programs and already work with local businesses and economic development organizations to develop targeted training programs to meet the needs of local employers. In addition, though we did not specifically address management occupations and jobs that require specialized training, existing programs at area colleges and university will provide for that component of the labor market.

The southern Dallas County labor market is well positioned to support near-term and long-term employment growth in the target industries.

Section 3: Water Infrastructure Assessment

This section presents the infrastructure capacity and needs assessment for potable water infrastructure in the Southern Dallas County Infrastructure Analysis (SDCIA) Study Area. The assessment is based on the results of the demographic and economic analysis, previous infrastructure studies performed for the municipalities in the Study Area, and additional data collected during the course of this project.

Each municipality in the Study Area owns and operates its own Public Water System (PWS) and holds a Certificate of Convenience and Necessity (CCN). A CCN is issued by the Texas Commission on Environmental Quality (TCEQ) and authorizes a utility to provide water (and/or sanitary sewer) to a specific service area. A water CCN obligates the water retail public utility to provide continuous and adequate service to all customers within the CCN boundaries. A CCN also prevents outside providers from serving customers within the CCN boundaries. **Table 3-1** lists each municipality in the Study Area and identifies their PWS and CCN numbers. The CCN and Extraterritorial Jurisdiction (ETJ) boundaries of each municipality are shown in **Figure 3-1**. Rockett Special Utility District (SUD) is shown in **Figure 3-1** even though they are not part of the Study Area; public water systems owned by the municipalities in the Study Area will not be able to expand into Rockett's CCN boundaries without prior approval from Rockett.

Table 3-1. Public Water Systems in the Study Area

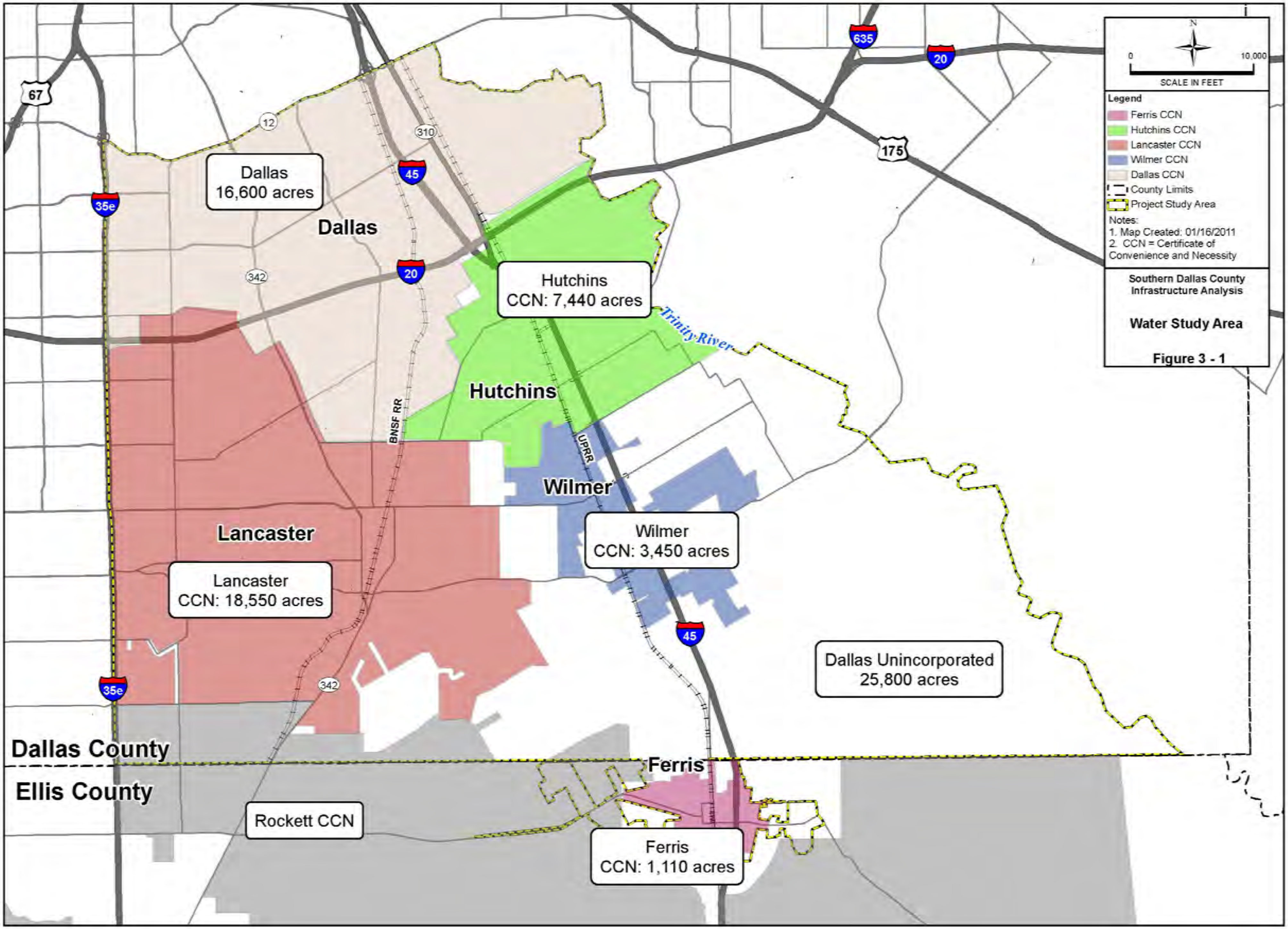
Municipality	PWS ID#	CCN#
Dallas	0570004	P0001
Ferris	0700002	10886
Hutchins	0570012	10097
Lancaster	0570013	10098
Wilmer	0570018	10100

Source: TCEQ Water Utility Database, 2012

Currently, the majority of unincorporated areas of Dallas County are not connected to a public water system. Residents and businesses in unincorporated areas typically use private groundwater wells for water supply. This study assumes that unincorporated areas will be annexed by the municipalities in the Study Area; water system infrastructure needs are not developed for unincorporated Dallas County.

EXISTING INFRASTRUCTURE INVENTORY

Water infrastructure is categorized in terms of water supply and water distribution for this report. Water supply includes source water, water treatment, and transmission capacity. Water distribution includes the pumping, storage, and pipe infrastructure within each municipality to deliver the treated source water to the customers. **Figure 3-2** shows how a typical water system functions conceptually.



Dallas
16,600 acres
Dallas
Hutchins
CCN: 7,440 acres
Hutchins
Trinity River
Wilmer
Wilmer
CCN: 3,450 acres
Lancaster
Lancaster
CCN: 18,550 acres
Dallas Unincorporated
25,800 acres
Ferris
Ferris
CCN: 1,110 acres
Rockett CCN
Dallas County
Ellis County
BNSF RR
UPRR
67
12
310
342
35e
45
20
635
175
N
0
10,000
SCALE IN FEET
Legend
Ferris CCN
Hutchins CCN
Lancaster CCN
Wilmer CCN
Dallas CCN
County Limits
Project Study Area
Notes:
1. Map Created: 01/16/2011
2. CCN = Certificate of Convenience and Necessity
Southern Dallas County Infrastructure Analysis
Water Study Area

Figure 3 - 1

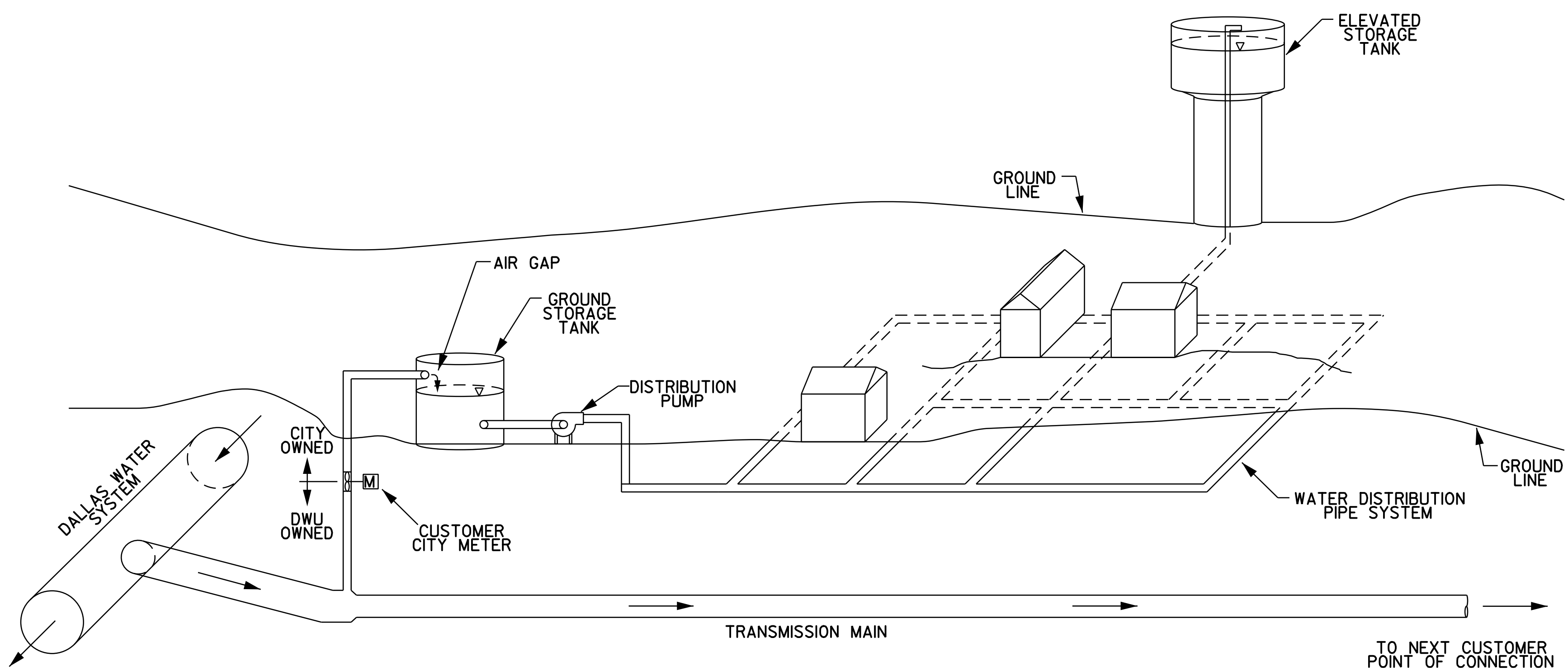


FIGURE 3-2
CONCEPTUAL WATER SYSTEM
SDCIA

Water system operations are generally described as follows:

- Raw surface water is processed at a water treatment plant to make it potable. Groundwater can often be distributed for potable use with minimum treatment. All water is disinfected prior to distribution.
- Potable water is typically pumped from the treatment plant to ground storage tanks within the distribution system via transmission mains.
- Ground tanks store water for use within the distribution systems. The volume of ground storage provided must be sufficient to make up the difference between the flow rate into the tank, which is typically sufficient for maximum day demands only, and the higher flow rates pumped out of the tanks to meet peak domestic and emergency demands.
    - Ground storage tanks are typically required at each connection point to water suppliers for systems that purchase wholesale treated water. Water suppliers typically do not provide water at sufficient pressure to be utilized in the distribution system.
- Distribution pumps move water from the ground tanks to the distribution system at the necessary volume and pressure to meet system demands.
- Elevated water tanks ensure that appropriate pressures are maintained while pumps are not running, either under normal operating conditions or during power outages. Elevated storage tanks are also used to store a portion of demands needed in peak domestic and emergency demand conditions.
- Distribution pipe acts as conduit for the conveyance of water from the pump stations and elevated tank to the customers in the water systems. Water distribution pipe networks are looped to minimize pressure loss in the system.

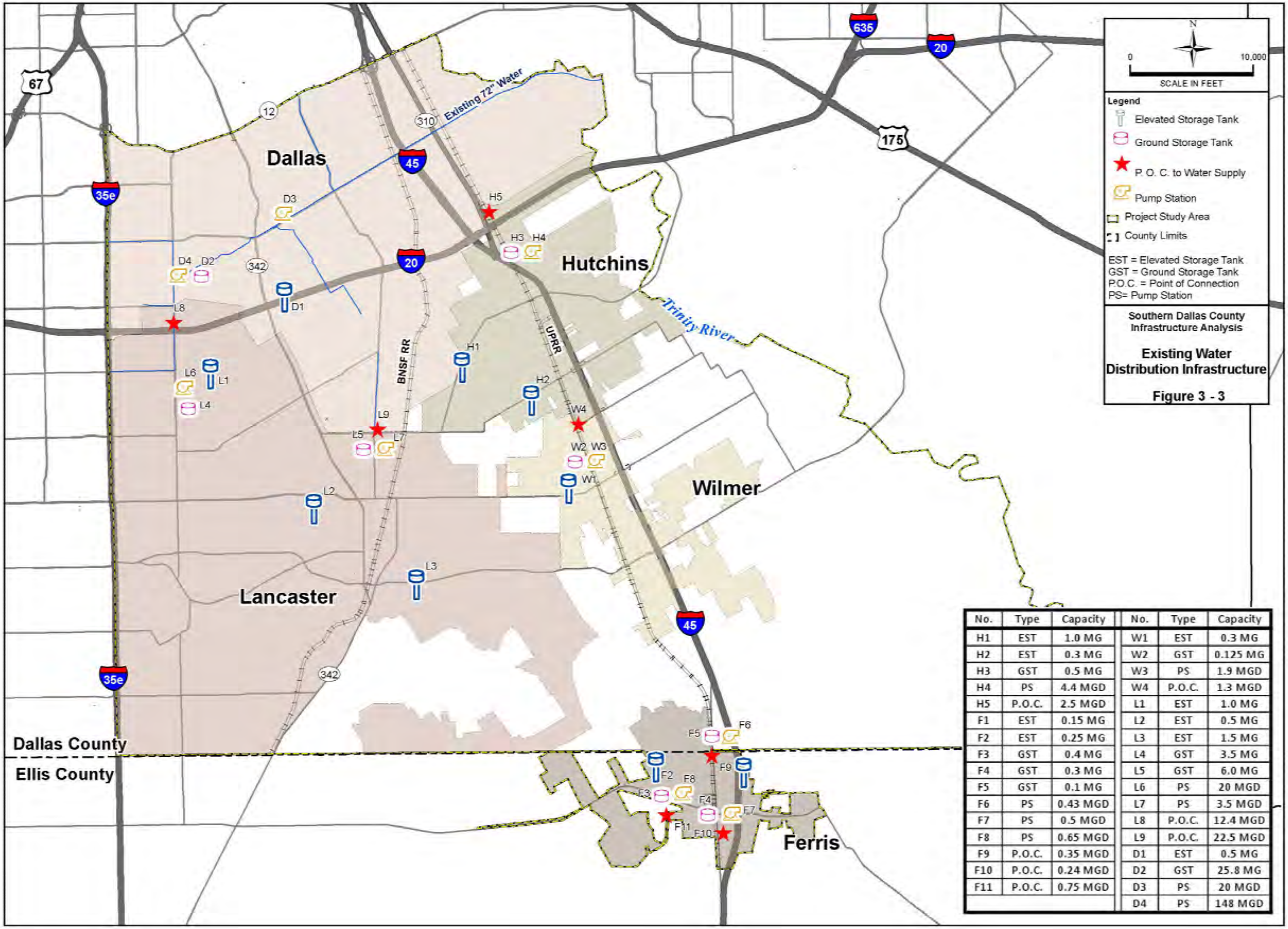
The existing infrastructure in each municipality is shown in **Figure 3-3** and described in this section.

WATER SUPPLY AND TREATMENT

The City of Dallas currently owns surface water rights for 1.8 million acre-feet per year (1,618 million gallons per day, mgd), although not all of the reservoirs in which it holds rights are currently connected to their system. According to Dallas' 2005 Long Range Water Supply Plan, the connected firm yield was approximately 502 mgd in 2010. Firm yield is defined as the water available for withdrawal from a reservoir annually during a long-term drought. Lake Palestine is expected to be connected to the Dallas system by 2030. Combined with multiple planned water recycle projects, the total 2030 water supply capacity will be over 700 mgd. The 2060 firm yield is anticipated to be approximately 1,000 mgd assuming two new water supply reservoirs are connected to the system. Dallas will be updating their long range water supply plan within the next three years.

Dallas operates three water treatment plants with a combined permitted capacity of 900 mgd. None of the other municipalities in the SDCIA Study Area treat water, other than to add disinfectant in the distribution systems.

Lancaster, Hutchins, and Wilmer purchase wholesale potable water from Dallas for distribution within their public water systems. Prior to 2010, Wilmer's primary water source was groundwater pumped from two wells in the city. However, the wells began to fail and were recently abandoned; Wilmer now purchases Dallas water wholesale from Hutchins.



No.	Type	Capacity	No.	Type	Capacity
H1	EST	1.0 MG	W1	EST	0.3 MG
H2	EST	0.3 MG	W2	GST	0.125 MG
H3	GST	0.5 MG	W3	PS	1.9 MGD
H4	PS	4.4 MGD	W4	P.O.C.	1.3 MGD
H5	P.O.C.	2.5 MGD	L1	EST	1.0 MG
F1	EST	0.15 MG	L2	EST	0.5 MG
F2	EST	0.25 MG	L3	EST	1.5 MG
F3	GST	0.4 MG	L4	GST	3.5 MG
F4	GST	0.3 MG	L5	GST	6.0 MG
F5	GST	0.1 MG	L6	PS	20 MGD
F6	PS	0.43 MGD	L7	PS	3.5 MGD
F7	PS	0.5 MGD	L8	P.O.C.	12.4 MGD
F8	PS	0.65 MGD	L9	P.O.C.	22.5 MGD
F9	P.O.C.	0.35 MGD	D1	EST	0.5 MG
F10	P.O.C.	0.24 MGD	D2	GST	25.8 MG
F11	P.O.C.	0.75 MGD	D3	PS	20 MGD
			D4	PS	148 MGD

The primary water source for the City of Ferris is groundwater wells, which produce up to 0.74 mgd combined. Ferris also purchases wholesale water from the Rockett SUD[1] to augment their groundwater and meet minimum TCEQ requirements for water supply. **Table 3-2** shows the capacity of each water supply connection for those cities in the SDCIA Study Area who purchase wholesale water.

Table 3-2. Water Supply Sources and Capacities

Water System	Source	Point of Connection	Capacity (mgd)
Ferris	Groundwater	Two Wells	0.74
	Rockett SUD	FM 644	0.65
Hutchins	Dallas	Millers Ferry Road	2.50
Lancaster	Dallas	Ames Road	12.00
	Dallas	Bonnie View Road	18.00
Wilmer	Dallas (via Hutchins)	North Wilmer	1.30

* mgd = million gallons per day

Source: Data provided by each city, 2012

WATER DISTRIBUTION INFRASTRUCTURE

Figure 3-3 shows the existing water distribution systems and supply connections in each city. **Table 3-3** shows existing infrastructure capacities in each city's water system. Pump station capacities are given in units of million gallons per day or gallons per minute (gpm), and storage is stated in terms of million gallons (MG) at each water storage site. Infrastructure shown for Dallas includes only those components physically located within the Study Area, which includes a small portion of the complete Dallas water distribution system. Significant Dallas water infrastructure exists outside of the SDCIA Study Area that directly or indirectly serves the Dallas distribution system within the Study Area.

Table 3-3. Existing Capacities of Water Distribution Infrastructure

Municipality	Pumping	Ground Storage	Elevated Storage
Dallas	• Alta Mesa Booster PS - 20 mgd • Southcliff PS - 148 mgd	• Southcliff - 25.8 MG	• Cedardale - 0.5 MG
Ferris	• PS #1 - 300 gpm • PS #2 - 350 gpm • PS #3 - 450 gpm • Total - 1.58 mgd (1,100 gpm)	• GST #1 - 0.3 MG • GST #2 - 0.4 MG • GST #3 - 0.1 MG • Total - 0.8 MG	• EST #1 - 0.15 MG • EST #3 - 0.25 MG • Total - 0.40 MG
Hutchins	• Chapman Road PS - 4.4 mgd (3,060 gpm)	• Chapman Road - 0.5 MG	• Lancaster-Hutchins Road – 1.0 MG • Wintergreen Road - 0.3 MG • Total - 1.3 MG
Lancaster	• Ames Rd & Houston School PS - 20 mgd • Bonnie View & Wintergreen PS – 3.5 mgd • Total – 23.5 mgd (16,300 gpm)	• Ames Road - 3.5 MG • Bonnie View Road - 6.0 MG • Total - 9.5 MG	• Ames Road - 1.0 MG • Wintergreen Road - 0.5 MG • Beltline Road - 1.5 MG • Total - 3.0 MG
Wilmer	• North Wilmer, 2-650 gpm • Total - 1.9 mgd (1,300 gpm)	• North Wilmer - 0.125 MG • Total - 0.125 MG	• North Wilmer - 0.3 MG • Total - 0.3 MG

* mgd = million gallons per day, MG = million gallons, gpm = gallons per minute

Source: Data provided by each city, 2012

PROJECTED WATER DEMANDS

Water demand projections establish the needed capacity of future infrastructure. For this study, population projections and equivalent per capita water usage rates are used to estimate future demands. Water demands related to land uses are not used for this analysis because the methodology is no more accurate than using populations and per capita demands to project total city demands.

Table 3-4 presents the 2035 populations by City, which is based upon NCTCOG's approved demographic projections at the time of this study. The projections provide the baseline future condition as determined in the demographic analysis. The 2035 projected demands are used to identify the needed distribution system capacity through year 2035, in accordance with the project scope. However, a 25-year outlook is insufficient for water supply planning where long-term growth is anticipated. Demand projections for 2060 are used to estimate the required water supply capacity for each city. The year 2060 is selected because a 50-year outlook approximates the useful life of the water supply pipeline. Furthermore, the Texas Water Development Board (TWDB) performs long-range water supply studies based on a 50-year planning horizon and have developed population projections for 2060. **Table 3-4** includes 2060 population projections, which are based on the following:

- Dallas County – Unincorporated Dallas County's 2060 population is calculated assuming 1.3 percent annual growth between 2035 and 2060.
- Ferris – Ferris 2060 population is calculated assuming 1.3 percent annual growth between 2035 and 2060.
- Hutchins and Wilmer – 2060 populations are from the TWDB.
- Lancaster – 2060 populations are from Lancaster's master plan.

The 2010 populations for the cities in Table 3-4 are based on the 2010 U.S. Census. The 2010 unincorporated Dallas County population is based on the NCTCOG population estimate as determined in the demographic analysis. Population growth and projected water demands in unincorporated Dallas County are included for the determination of water supply options in this assessment. The Dallas County population is assumed to become incorporated into the various cities by 2035, thus no water distribution infrastructure is planned for unincorporated areas.

Table 3-4. Population Projections

Municipality	Population		
	2010	2035	2060
Dallas Co.	1,811	6,232	8,700
Ferris	2,436	14,578	20,000
Hutchins	5,338	11,297	14,000
Lancaster	36,361	71,329	93,514
Wilmer	3,682	10,680	22,000

Source: 2010 – U.S. Census Data; 2035 – SDCIA Demographic Analysis

This analysis does not assess the adequacy of existing water infrastructure or necessary future infrastructure in the City of Dallas. The SDCIA Study Area comprises a small portion of Dallas's total water system, making meaningful assessment of Dallas infrastructure in the Study Area difficult. Further, the City of Dallas regularly performs a detailed assessment of its water infrastructure needs to serve the demands of its retail and wholesale customers. Therefore, population and demand projections for the portion of Dallas inside the SDCIA Study Area are not included in this report. Planned Dallas water infrastructure inside the SDCIA Study Area is described later in this report.

A questionnaire was sent to the cities in the Study Area to obtain current information regarding Average Annual Daily Demands (AADD), Maximum Day Demands (MDD), per capita demands, and other data. **Table 3-5** shows the current equivalent per capita rates and the MDD: AADD ratios. The per capita demands equal the AADD divided by the current population, and thus they reflect the total water demand of all uses (residential, commercial, industrial, and other) on a per-person basis. Typically, equivalent per-capita demand rates increase when the proportion of non-residential water demand to residential demand increases. For instance, Hutchins has a high percentage of industrial development compared to residential, which is reflected in their high equivalent per capita demand rate relative to the other cities. For this assessment, the future per capita demand rate is assumed to increase by 50 percent regionally to account for the expected increase in the amount of industrial and commercial development.

Table 3-5. Equivalent Per Capita Rates and Maximum Day Demand Factors

Municipality	Per Capita Equivalent Demand (gpcd)		MDD:AADD Ratios	
	Existing	Future	Existing	Future
Dallas Co.	NA	175	NA	2.50
Ferris	133	200	2.95	2.50
Hutchins	188	282	2.15	2.50
Lancaster	116	174	2.15	2.50
Wilmer	102	153	1.62	2.50

* NA: Data Not Available, gpcd = gallons per capita per day, MDD = Maximum Day Demand, AADD = Average Annual Daily Demands
Source: Existing – Data provided by each city, 2012

Water demands fluctuate seasonally; higher demands are typical in the summer months when irrigation demands are high. Water demands also vary over the course of a 24-hour period. Water infrastructure is designed to meet the maximum and peak demand rather than the average demand. **Table 3-5** shows the current Maximum: Average Day demand ratios for each city. A consistent MDD : AADD ratio of 2.5 is assumed for future demand projections in this analysis. A Peak Hour Demand (PHD) : MDD factor of 2.0 is assumed for 2035 demand projections. **Table 3-6** shows existing and projected demands for each city.

Table 3-6. Existing and Projected Water Demands

Municipality	2010 Demand (mgd)		2035 Demand (mgd)			2060 Demand (mgd)	
	AADD	MDD	AADD	MDD	PHD	AADD	MDD
Dallas Co.	0.00	0.00	1.10	2.70	NA	1.50	3.80
Ferris	0.32	0.96	2.90	7.30	15.00	4.00	10.00
Hutchins	1.00	2.20	3.20	8.00	16.00	3.90	9.90
Lancaster	4.20	9.10	12.4	31.0	62.00	16.3	40.7
Wilmer	0.38	0.61	1.60	4.10	8.20	3.40	8.40
Totals	5.90	13.00	21.20	53.10	106.20	29.1	72.8

* NA: Data Not Available, gpcd = gallons per capita per day, MDD = Maximum Day Demand, AADD = Average Annual Daily Demands

**Peak hour demands are only needed to determine distribution infrastructure. Distribution infrastructure is assumed to serve only incorporated areas.

Source: 2010 – Data provided by each city, 2012

WATER REUSE AND CONSERVATION

This study considers the potable water demands of the Study Area. However, some types of water demands do not require that water be treated to a potable level. Non-potable water is suitable for many uses, including:

- Agriculture
- Irrigation of commercial land, golf courses, public parks, etc.
- Industrial uses such as cooling and natural gas exploration

Non-potable water can be obtained from the same raw water sources used for potable water, i.e. groundwater or surface water. A landowner in Texas can withdraw groundwater from his or her property without limitation under the “right of capture” doctrine. All surface water belongs to the state, except for stormwater runoff before it leaves a property; the use of surface water requires acquisition of the appropriate water rights. Another source of non-potable water is treated effluent from wastewater treatment plants. This water has been treated sufficiently to discharge to the environment but not to drinking water standards. Treated effluent contains low concentrations of nutrients, making its reuse particularly beneficial for agricultural and irrigation purposes.

The use of treated effluent is becoming increasingly popular as wastewater utilities begin to install infrastructure to distribute the water from the treatment plant to customers. The water is typically sold by assessing user charges in the same way that drinking water is sold, although treated effluent is often less expensive than potable water. DWU’s Southside Wastewater Treatment Plant and the Trinity River Authority (TRA) Ten Mile Creek Wastewater Treatment Plant are potential sources of significant volumes of treated effluent. DWU currently has an agreement in place with the North Texas Municipal Water District for the use of a majority of its treated effluent. TRA is currently conducting a master plan of its Ten Mile Creek plant that includes a feasibility study for water reuse. Preliminary results from the ongoing master plan, anticipated to be complete by September 2012, indicate that TRA will have a surplus supply of treated effluent that could benefit municipalities and their customers in the SDCIA Study Area.

The development of new water supplies to meet increasing demands is a critical issue throughout the state of Texas. Water conservation and reuse of treated effluent are important factors in long range water supply plans that reduce the need for new water supplies. Stakeholders in the SDCIA Study

Area should likewise consider conservation and water reuse as they continue planning for water infrastructure to meet future demands.

WATER SUPPLY AND TREATMENT INFRASTRUCTURE NEEDED TO MEET FUTURE DEMANDS

Each municipality in the Study Area will require additional water infrastructure to meet future demands. This section assesses the future water supply needs in the SDCIA Study Area. The following three primary options typically exist for a municipal water supply.

1. Obtain surface water rights and treat the water for potable consumption.
2. Drill wells and pump groundwater for consumption. Groundwater typically requires minimal treatment.
3. Purchase treated wholesale water.

Option 3 is the only alternative feasible for the SDCIA Study Area. Dallas Water Utilities and Rockett SUD currently provide wholesale water in the area. This study analyzes supplying DWU water to each municipality in the SDCIA Study Area since all of the cities except Ferris already purchase DWU water. DWU does not have an existing contractual relationship or plans to provide Ferris with wholesale, raw, or treated water. Coordination and approval by the Cities of Ferris and Dallas, DWU, Rockett SUD, and Tarrant Regional Water District are required before DWU can supply Ferris with wholesale water. If a water supply agreement between Ferris and DWU is not executed, then Ferris can continue to augment their well water with Rockett SUD water. In this event, the same supply capacity assumed to be provided by DWU will be necessary from Rockett SUD.

WATER TREATMENT NEEDS

The City of Dallas is currently expanding its Eastside Water Treatment Plant by 100 MGD. Upon completion, the total water treatment capacity in the City of Dallas will be approximately 1,000 mgd. The other cities in the SDCIA Study Area do not currently treat water; water treatment facilities are not needed for the other cities if they purchase wholesale water. Dallas Water Utilities regularly assesses its long term water supply needs to meet the demands of all of its retail and wholesale customers. This study does not assess the long term treatment needs of Dallas to serve its entire system; Dallas Water Utilities regularly assesses its long term water supply needs to meet the demands of all of its retail and wholesale customers.

WATER SUPPLY NEEDS

Table 3-7 shows the total capacities of existing water supply points of connection in each city that purchases wholesale water. This capacity is compared to the projected maximum day demands currently, in 2035 and in 2060. All cities have sufficient capacity to serve existing demands. The capacity deficit for future demands is the additional capacity needed by each city. An approximation for the time in which supply point expansions are necessary is based on a linear demand growth assumption.

A water transmission pipeline is necessary to convey treated water to those cities not currently connected to the DWU water system. Direct connections with DWU are preferable relative to purchasing DWU water through an intermediate city; an intermediate city can charge a fee to recoup their costs associated with storing and pumping the DWU water in their distribution systems before conveying it to the customer. This typically makes the customer city's water rates higher than what they would be if they purchased the water directly from DWU. **Figures 3-4** and **3-5** depict two water transmission pipeline alternatives to provide DWU wholesale water directly to each municipality. Both options are developed using the following assumptions.

- The transmission main is sized to serve the combined 2060 maximum day demands from Hutchins, Wilmer and Ferris.
- The transmission pipe will be used to ensure each of these cities has at least two points of connection.
    - Hutchins will have one connection to the new transmission main to augment their existing connection with Dallas.
    - Wilmer will have two points of connection to the new transmission main. Wilmer's existing connection from Hutchins should remain as an emergency connection.
    - Ferris will have two points of connection to the new water transmission main. Ferris' wells and/or their connection to Rockett could be used during emergency situations.
    - Lancaster is assumed to connect to the new transmission main to augment their two existing connections with Dallas.

Table 3-7. Additional Water Supply Capacity Needed at Connection Points

Municipality	2010 Supply Capacity (mgd)	MDD (mgd)			Additional Capacity Needed (mgd)	Approximate Time of Need
		2010	2035	2060		
Ferris	1.4	0.96	7.3	10	8.60	Prior to 2017
Hutchins	2.5	2.2*	8.0	9.9	7.40	Prior to 2017
Lancaster	30	9.1	31	41	11	2030 to 2035
Wilmer	1.3	0.61	4.1	8.4	7.1	Prior to 2017

MDD = Maximum Day Demand, mgd = million gallons per day

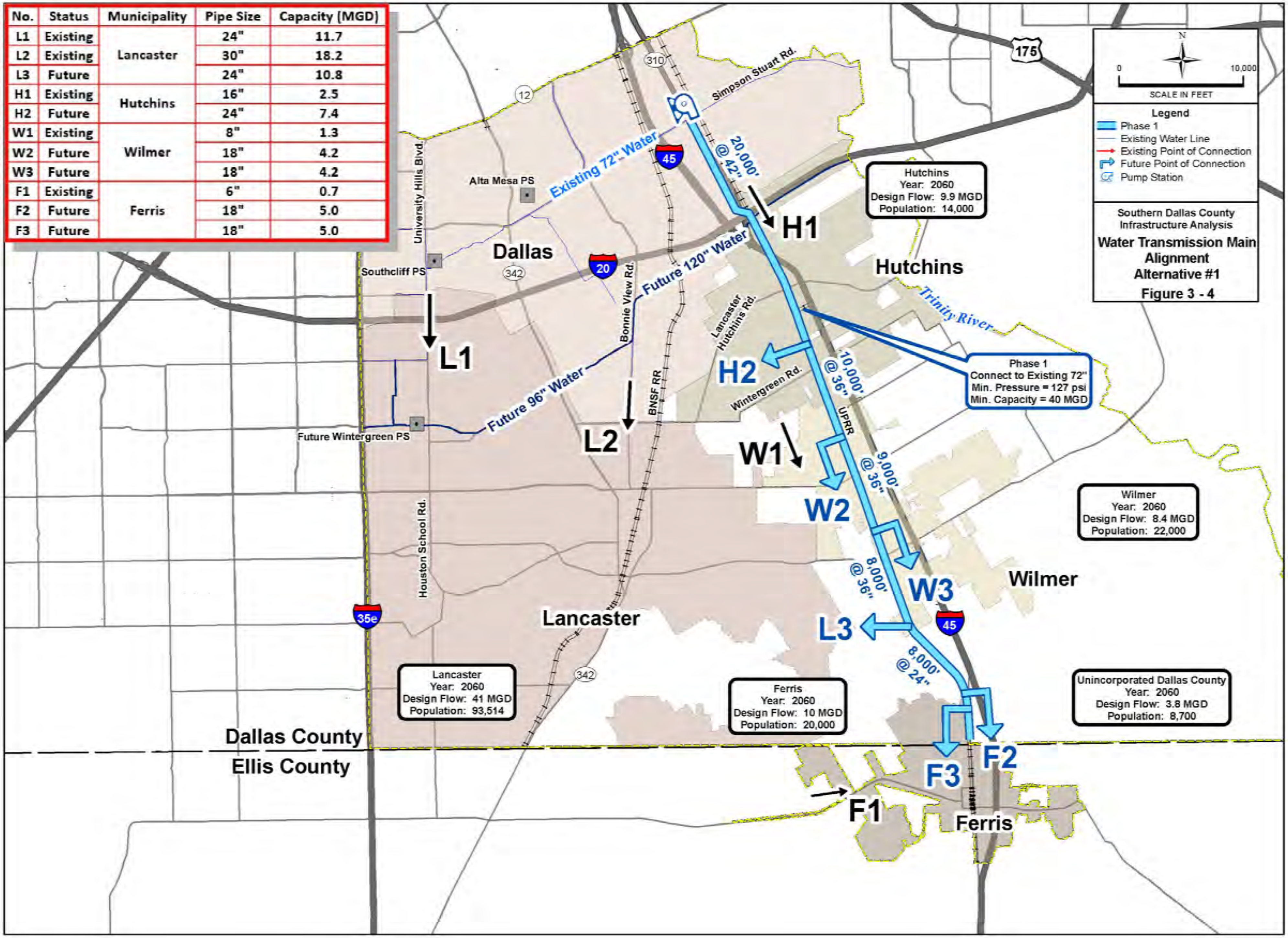
*Hutchins' 2010 MDD includes Wilmer's demands since Hutchins sells water to Wilmer. Additional water supply capacity in Hutchins would still be required prior to 2017 if it did not provide water to Wilmer.

Source: Data provided by each city, 2012; Assumptions: Approximate time of need assumes a straight-line growth from 2010 to 2035

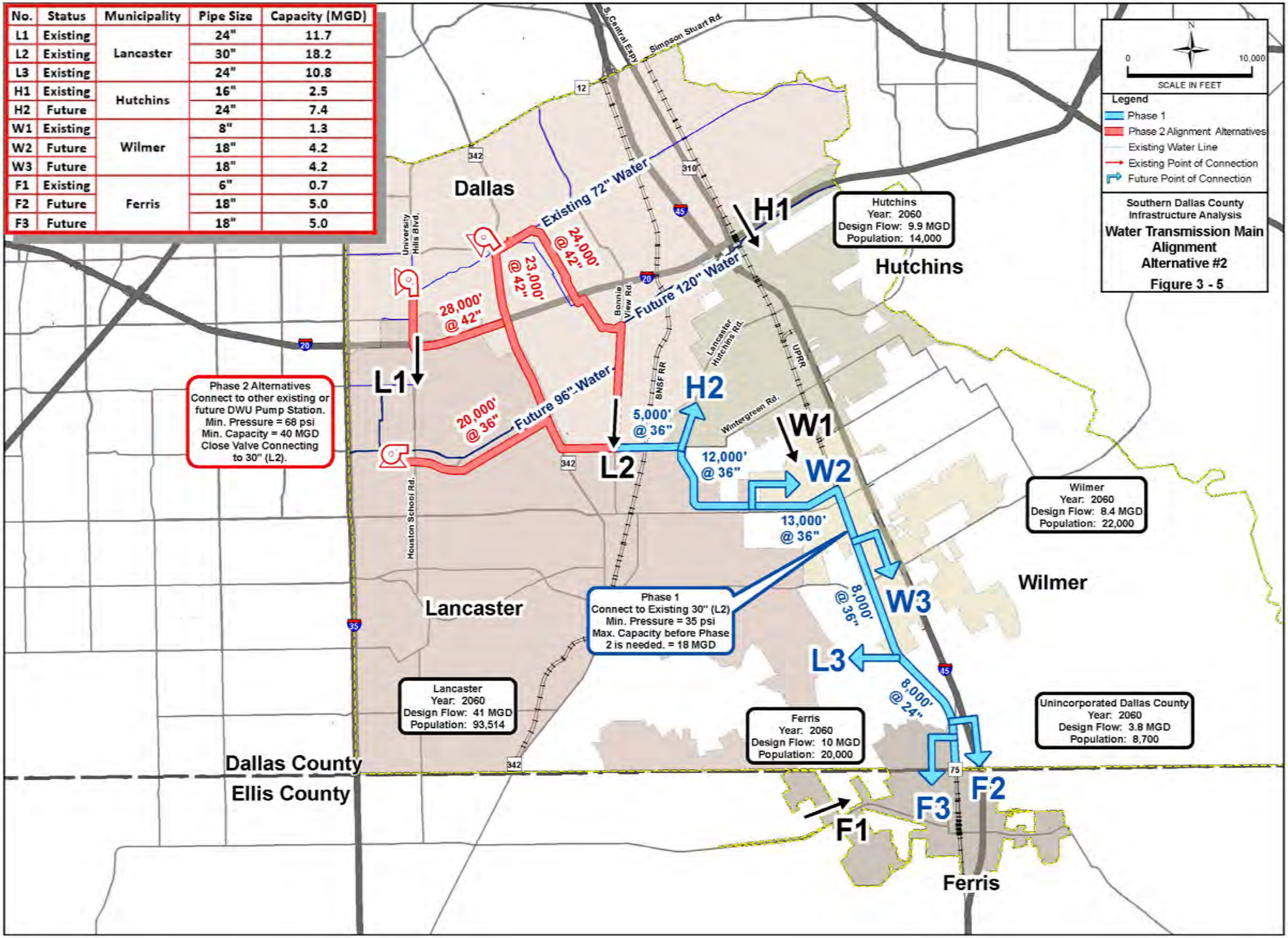
Alignment Alternative #1 parallels railroad right-of-way for a majority of its length as shown in **Figure 3-4**; the pipeline is assumed to be aligned inside a newly acquired easement or right-of-way adjacent to and outside of the railroad right-of-way. The transmission main originates at a connection with a 72-inch Dallas main in Simpson Stuart Road near the intersection with South Central Expressway. This connection will be in Dallas's Central Low pressure plane. Due to the elevation and expected pressure at this location, insufficient hydraulic grade is available to deliver the required flowrate to all points of connection without a booster pump station. The booster station would require an ultimate capacity of approximately 30 to 40 mgd. Further analysis of the 72-inch Dallas main is required to determine if the main can meet the southern Dallas County demand requirements.

The phasing potential of Alignment #1 will primarily involve the booster pump station. The booster station could be constructed with an initial capacity of 11 mgd, which would be sufficient for approximately 10 years.

No.	Status	Municipality	Pipe Size	Capacity (MGD)
L1	Existing	Lancaster	24"	11.7
L2	Existing		30"	18.2
L3	Future		24"	10.8
H1	Existing	Hutchins	16"	2.5
H2	Future		24"	7.4
W1	Existing	Wilmer	8"	1.3
W2	Future		18"	4.2
W3	Future		18"	4.2
F1	Existing	Ferris	6"	0.7
F2	Future		18"	5.0
F3	Future		18"	5.0



No.	Status	Municipality	Pipe Size	Capacity (MGD)
L1	Existing	Lancaster	24"	11.7
L2	Existing		30"	18.2
L3	Existing		24"	10.8
H1	Existing	Hutchins	16"	2.5
H2	Future		24"	7.4
W1	Existing	Wilmer	8"	1.3
W2	Future		18"	4.2
W3	Future		18"	4.2
F1	Existing	Ferris	6"	0.7
F2	Future		18"	5.0
F3	Future		18"	5.0



Alignment Alternative #2, as shown in **Figure 3-5,** offers more phasing options than Alignment #1. The initial phase is proposed to originate at an existing 30-inch supply main at Bonnie View and Wintergreen Roads in Lancaster. The supply main currently serves as one of Lancaster's connections with DWU. Excess capacity is temporarily available in this main that can be used to supply water to the other Study Area municipalities. As area demands increase, the proposed transmission main will need to be extended to another supply source within the Dallas water distribution system to ensure that Lancaster's water supply capacity continues to be sufficient for its own customer demands. This extension is anticipated to be necessary in approximately 6 to 10 years.

Multiple options exist for the required extension in the second phase. Four potential alignments are shown on **Figure 3-5**. Two options involve expanding the transmission capacity between the Dallas Alta Mesa pump station and the Bonnie View point of connection (Options 2.1 and 2.2). Some additional pump capacity may be required at this station, although it recently underwent a significant expansion to 20 mgd to serve future demands in Dallas and Lancaster. A third option (Option 2.3) connects to the future Wintergreen pump station, which will be constructed with the Dallas Southwest Transmission Main (see Dallas Water Distribution Infrastructure to Meet Future Demands section in this report). The pipe back to the Bonnie View point of connection follows the 96-inch Southwest Transmission Main alignment for most of its length. A fourth option (Option 2.4) connects to the Southcliff pump station in Dallas. A formal analysis for the most favorable Phase 2 alignment for Alignment Alternative #2 will be necessary if this transmission main option is considered further. A general evaluation of the alignments is provided in **Table 3-8**.

Regardless of the alignment alternative selected, Dallas Water Utilities will own, operate and maintain the transmission main up to and including the flow meter at each customer city connection point. However, DWU may not participate in funding the project's construction. The estimated costs of the supply transmission main alternatives are provided in the Budgetary Cost Estimates section.

Table 3-8. General Evaluation of Pipe Alignments for Alternative #2, Phase 2

Alignment Alternative 2, Phase 2 Options		Pros	Cons
2.1	24,000 LF to Alta Mesa PS	• No significant apparent benefits over alternate alignments	• May require expansion of existing PS
2.2	23,000 LF to Alta Mesa PS	• No significant apparent benefits over alternate alignments	• May require expansion of existing PS
2.3	20,000 LF to Future Wintergreen PS	• Shortest Pipe Length • Future PS design could incorporate pumps for transmission main • Could share ROW with the proposed 96-inch Southwest Transmission main	• Wintergreen PS construction schedule is uncertain
2.4	28,000 LF to Southcliff PS	• Southcliff pumps to a higher pressure plane • PS has 148 mgd of existing capacity, so expansion may not be required	• Longest Pipe Length

* PS = Pump Station, LF = linear feet, mgd = million gallons per day

WATER DISTRIBUTION INFRASTRUCTURE NEEDED TO MEET FUTURE DEMANDS

Minimum water distribution system capacity requirements are established in Title 30 of the Texas Administrative Code, Chapter 290, Subchapter D: Rules and Regulations for Public Water Systems. These requirements include:

- Total water storage:
  - 200 gallons per connection
- Elevated water storage:
  - 100 gallons per connection
- Pump Capacity:
  - 0.6 gpm per connection if more than 200 gallons per connection of elevated storage volume is provided, or the lesser of:
  - 2.0 gpm per connection, or
  - A firm pump capacity sufficient to meet peak hour demands. Firm capacity is the available capacity with the largest pump out of service in each pressure plane or service area.
- Pipe:
  - 8-inch minimum diameter for systems serving more than 250 connections
- Pressure:
  - 35 pounds per square inch (psi) throughout the system during all domestic demand conditions.
  - 20 psi residual pressure during emergency conditions.

System pressures have not been considered in this analysis. Also, layouts and sizes of distribution pipe are not considered. In general, 8-inch pipe is sufficient to meet domestic and fire demands in residential areas, while 12-inch minimum pipe is recommended in commercial and industrial areas where the required fire flow demands are higher. Larger arterial water mains will be necessary to convey water from pump stations and elevated storage to the distribution system. These determinations should be based on more detailed analyses that consider each city, and areas within each city, individually.

A connection is defined as a single family residential unit or each commercial or industrial establishment to which drinking water is supplied from the system. As an example, the number of service connections in an apartment complex would be equal to the number of individual apartment units. **Table 3-9** presents the current number of connections in each city and the projected 2035 residential and total connections in each city.

Table 3-9. Projected 2035 Water System Connections

Municipality	Existing Connections	2035 Projected Households	2035 Projected Connections
Ferris	981	5,100	6,000
Hutchins	1,554	4,100	4,900
Lancaster	15,168	26,000	31,000
Wilmer	1,350	3,800	4,500

Source: Existing connections are based on the most recent water system inspections performed and published by TCEQ (dates vary by city). 2035 Projected Households are from SDCIA population projections.
Assumptions: The 2035 projected connections column assumes 18% of connections are non-residential.

Each city in the SDCIA Study Area has undertaken an assessment of their water system through a master plan, impact fee study, or other similar analysis. Many of the cities have capital improvements plans (CIPs) that identify new infrastructure needed to meet future water demands. This section discusses each city's infrastructure for which they have already planned and evaluates it based on the following criteria:

- Does the infrastructure meet the minimum state requirements?
- For storage infrastructure, how long could the city be self sufficient if its water supply were disrupted?
    - This is important since each city is assumed to continue purchasing wholesale water from an outside entity. Service disruption is possible if the proposed water transmission main were to fail, or if there was a failure to a significant main in the Dallas distribution system serving the transmission main.
- Is the infrastructure likely to be sufficient to meet an assumed emergency demand?

The emergency demand assumed for the purposes of this study includes a 3,500 gpm required fire flow over a three-hour duration (total volume of 630,000 gallons). One-third of this demand is assumed to be met by elevated storage volume, and the remaining two-thirds of the demand is assumed to be supplied by ground storage and pumping capacity. Therefore, the following recommended capacities are assumed to be necessary.

- Pump Capacity – 3.4 mgd, in addition to the pump capacity needed to meet maximum day demands
- Ground Storage Capacity – 0.42 MG assuming the ground storage tanks are less than half full at the beginning of the emergency demand
- Elevated Storage Capacity – 0.21 MG assuming the elevated storage tanks are less than half full at the beginning of the emergency demand

In the infrastructure capacity tables in the subsequent sections, the "Minimum Required" capacity is the capacity needed to be in compliance with state regulations. While a municipality may meet these minimum requirements, they may lack sufficient capacity to meet the emergency demand criteria described above. The infrastructure's ability to meet the assumed emergency demand criteria is categorized as sufficient, marginal or insufficient in the "Emergency Storage Provided" column of the capacity tables. The categories are explained as follows:

- "Sufficient" – The infrastructure capacity is believed to be sufficient to meet the emergency demand criteria assumed in combination with maximum domestic demands.
- "Marginal" – The infrastructure capacity appears sufficient to meet the emergency demand alone, but not when combined with the expected domestic demands.
  - In the case of storage capacity, "Marginal" may also mean that the storage tank(s) may be at risk of emptying during the emergency demands.
- "Insufficient" – The infrastructure capacity appears insufficient to meet the assumed emergency demand criteria.

Recommendations for additional infrastructure are quantified based on planned infrastructure capacities as stated in each city's CIP where possible and reasonable. Otherwise, recommended infrastructure is quantified to meet current demands (where applicable) and at least five years of subsequent demand growth. **Figure 3-6** shows the total capacity of water facilities planned prior to 2035. Where cities do not have infrastructure plans for 2035, the future capacity is that which is recommended based on the assessment performed in this study.

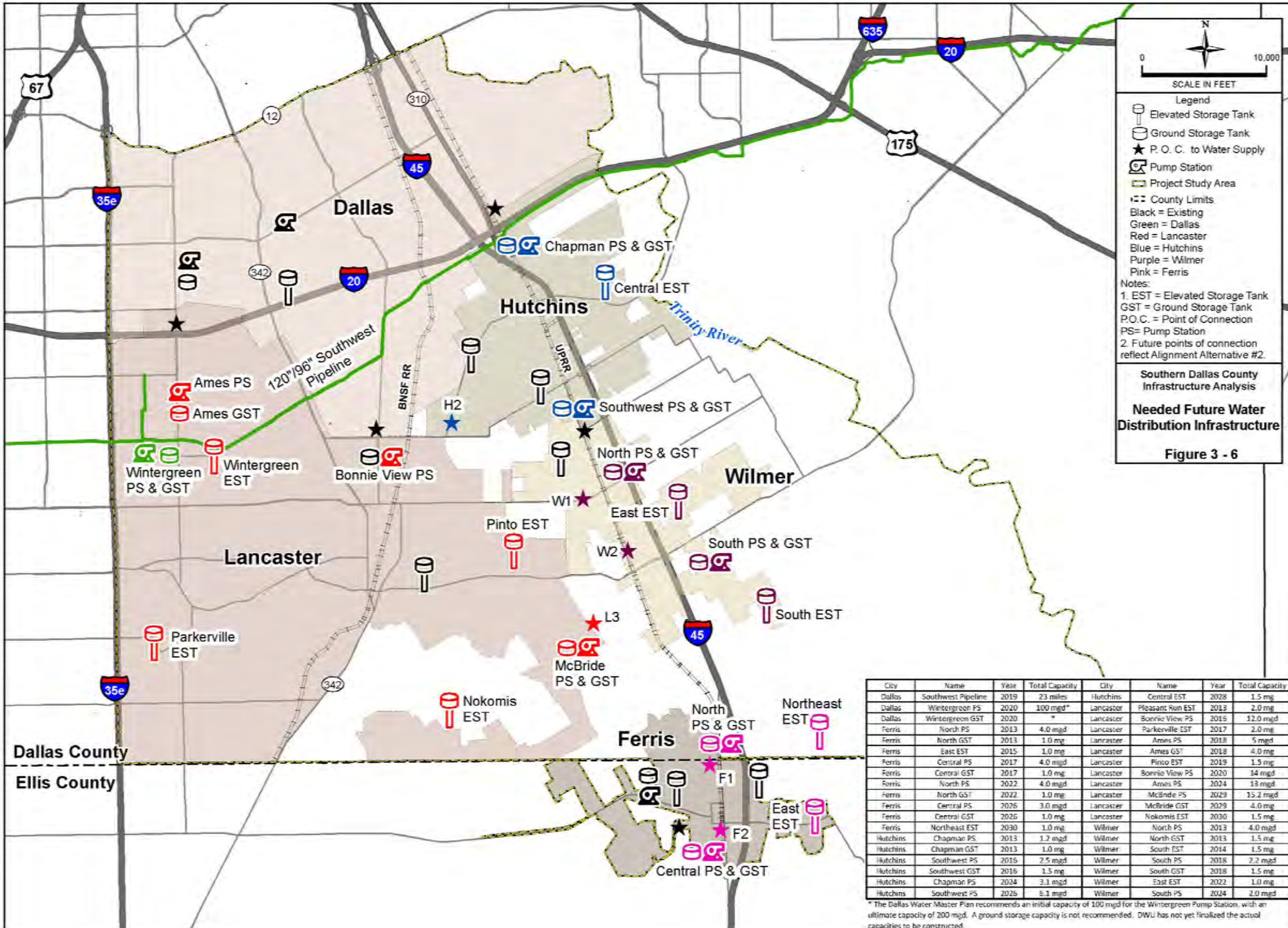
Dallas

The following list includes Dallas planned infrastructure inside the SDCIA Study Area as identified by Dallas Water Utilities.

- Dallas Southwest Transmission Main – A 120-inch/96-inch transmission pipeline to convey treated potable water from the Dallas Water Utilities (DWU) East Side Water Treatment Plant to the south Dallas area. The pipeline alignment crosses through Dallas, Hutchins and Lancaster within the Study Area. Initial design and right-of-way acquisition for the pipeline is ongoing, but construction is not anticipated to be complete until 2019. The transmission main is projected to cost approximately $82 million.
- Wintergreen Pump Station and Reservoir, total capacity yet to be finalized, projected to cost approximately $44 million.
- Hutchins water supply connection – The 16-inch pipe serving Hutchins from Dallas is planned to be replaced by DWU. The supply capacity of the connection is 2.5 mgd, in accordance with the water supply contract. The pipe replacement project is currently in the design phase. The pipe is projected to cost approximately $3 million.
- 12-inch water main along Bonnieview Rd. The pipe is projected to cost approximately $400,000.

Ferris

The City of Ferris Planning Studies, 2007 – 2027 do not recommend specific capacities for future water distribution infrastructure. **Table 3-10** shows the existing water storage capacity in Ferris in terms of ground, elevated and total storage. The Total Volume column indicates the total volume of each type of storage that exists. The minimum required storage is based on the state requirement of 100 gallons per connection. The actual gallons per connection provided is shown, as well as the number of days of average water demand stored assuming all tanks are full if the supply is disrupted. Finally, the available capacity is evaluated to estimate if sufficient capacity exists to meet the emergency demand criteria assumed for this Study.



City	Name	Year	Total Capacity	City	Name	Year	Total Capacity
Dallas	Southwest Pipeline	2019	23 miles	Hutchins	Central EST	2028	1.5 mg
Dallas	Wintergreen PS	2020	100 mgd*	Lancaster	Pleasant Run EST	2013	2.0 mg
Dallas	Wintergreen GST	2020	*	Lancaster	Bonnie View PS	2016	12.0 mgd
Ferris	North PS	2013	4.0 mgd	Lancaster	Parkerville EST	2017	2.0 mg
Ferris	North GST	2013	1.0 mg	Lancaster	Ames PS	2018	5 mgd
Ferris	East EST	2015	1.0 mg	Lancaster	Ames GST	2018	4.0 mg
Ferris	Central PS	2017	4.0 mgd	Lancaster	Pinto EST	2019	1.5 mg
Ferris	Central GST	2017	1.0 mg	Lancaster	Bonnie View PS	2020	14 mgd
Ferris	North PS	2022	4.0 mgd	Lancaster	Ames PS	2024	13 mgd
Ferris	North GST	2022	1.0 mg	Lancaster	McBride PS	2029	15.2 mgd
Ferris	Central PS	2026	3.0 mgd	Lancaster	McBride GST	2029	4.0 mg
Ferris	Central GST	2026	1.0 mg	Lancaster	Nokomis EST	2030	1.5 mg
Ferris	Northeast EST	2030	1.0 mg	Wilmer	North PS	2013	4.0 mgd
Hutchins	Chapman PS	2013	1.2 mgd	Wilmer	North GST	2013	1.5 mg
Hutchins	Chapman GST	2013	1.0 mg	Wilmer	South EST	2014	1.5 mg
Hutchins	Southwest PS	2016	2.5 mgd	Wilmer	South PS	2018	2.2 mgd
Hutchins	Southwest GST	2016	1.5 mg	Wilmer	South GST	2018	1.5 mg
Hutchins	Chapman PS	2024	3.1 mgd	Wilmer	East EST	2022	1.0 mg
Hutchins	Southwest PS	2026	6.1 mgd	Wilmer	South PS	2024	2.0 mgd

* The Dallas Water Master Plan recommends an initial capacity of 100 mgd for the Wintergreen Pump Station, with an ultimate capacity of 200 mgd. A ground storage capacity is not recommended. DWU has not yet finalized the actual capacities to be constructed.

Table 3-10. Ferris Existing Storage Capacity

	Total Volume	Minimum Required	gal/connection provided	Days Stored	Emergency Storage Available
Ground	0.80	-	815	2.5	Marginal
Elevated	0.40	0.10	408	1.3	Marginal
Total Storage	1.20	0.20	1,220	3.8	Marginal

Source: City of Ferris Planning Study, 2007

Ferris appears to have marginal storage capacity to meet the demands of the assumed required fire flow; the system's ability to meet emergency demands without emptying the tank will depend on the tank levels when the emergency demand begins and the refill rate. An additional one million gallons of ground storage capacity is recommended to be installed within five years. An additional one million gallons of elevated storage may also be necessary; the Ferris system should be analyzed in more detail to determine when additional elevated storage would be necessary after installation of the recommended ground storage.

The storage values shown in **Table 3-11** are recommended capacities for 2035 since Ferris does not have specific plans for future capacity. These recommendations are based on Ferris's current level of service and the level of service similar to that provided by the other cities in the Study Area.

Table 3-11. Ferris Recommended Storage Capacity

	Total Volume	Minimum Required	gal/connection planned	Days Stored	Emergency Storage Available
Ground	4.0	-	670	1.4	Sufficient
Elevated	2.4	0.60	400	0.8	Sufficient
Total Storage	6.4	1.20	1,070	2.2	Sufficient

The following number and sizes of tanks are recommended.

- Ground Storage – two 1 MG tanks each at two separate pump station sites.
- Elevated Storage – two 1 MG elevated tanks at separate locations.

Table 3-12 shows Ferris' existing pump capacities, and recommended pump capacities based on the assessment performed in this study.

Table 3-12. Ferris Existing and Planned Pump Capacity

	Total Capacity (mgd)	Minimum Required (lesser of)		Additional Required Capacity	Emergency Capacity Available
		0.6 gpm/ connection	Peak Hour Demand		
2011	1.58	0.85	1.90	None	Insufficient
2035	NA	5.20	15.00	NA	Sufficient

mgd = million gallons per day, gpm = gallons per minute

Source: 2011 – City of Ferris Planning Study, 2007

The existing pump capacity in Ferris is insufficient to meet the assumed emergency demand. An additional 4.0 mgd of pump capacity is recommended to be installed within five years. An estimate for required future pump capacity was not found in Ferris's Planning Studies. A total 2035 pump capacity of 15 mgd is recommended to meet the projected peak demands.

Hutchins

Hutchins' CIP includes the following proposed water distribution infrastructure. Currently, none of the planned infrastructure is under design or funded for construction.

- Ground Storage:
  - An addition of 2.5 million gallons at the City's pump station
  - Total planned, including existing ground storage (0.5 MG) = 3.0 MG
- Elevated Storage:
  - A new 1.5 million gallon tank
  - Total planned, including existing elevated storage (1.3 MG) = 2.8 MG
- Pump Capacity:
  - A 12.9 mgd expansion at the City's pump station
  - Total planned, including existing pump capacity (4.4 mgd) = 17.3 mgd

Table 3-13 shows Hutchins' existing water storage and **Table 3-14** evaluates the 2035 planned storage volume. The planned storage volume is the capacity shown in the City's 2006 Master Plan.

Table 3-13. Hutchins' Existing Storage Capacity

	Total Volume	Minimum Required	gal/connection provided	Days Stored	Emergency Storage Provided
Ground	0.5	-	322	0.5	Marginal
Elevated	1.3	0.16	837	1.3	Sufficient
Total Storage	1.8	0.32	1,160	1.8	Sufficient

Source: City of Hutchins Capital Improvements Plan, 2009

Emergency ground storage is currently considered to be insufficient in Hutchins based on the criteria established in this report. The 0.5 MG of existing ground storage exceeds the assumed emergency ground storage required, but the ground storage tank may be at risk of emptying depending on its level when an emergency demand begins and the refill rate. An additional one million gallons of ground storage is recommended to be installed within the next two years to reduce the risk of emptying the ground storage tank during an emergency demand.

Table 3-14. Hutchins Planned Storage Capacity

	Total Volume	Minimum Required	gal/connection planned	Days Stored	Emergency Storage Provided
Ground	3.0	-	612	0.9	Sufficient
Elevated	2.8	0.49	571	0.9	Sufficient
Total Storage	5.8	0.98	1,180	1.8	Sufficient

Hutchins appears to have sufficient storage volume planned for future demands. **Table 3-15** shows Hutchins' existing and planned pump capacities.

Table 3-15. Hutchins Existing and Planned Pump Capacity

	Total Capacity (mgd)	Minimum Required (lesser of) 0.6 gpm/ connection	Peak Hour Demand	Additional Required Capacity	Emergency Capacity Available
2011	4.4	1.3	4.4	None	Marginal
2035	17.3	4.2	16.0	None	Sufficient

* mgd = million gallons per day, gpm = gallons per minute

Source: 2011 – City of Hutchins Capital Improvement Plan, 2009

Emergency pump capacity is currently considered to be marginal in Hutchins. The 4.4 mgd of existing pump capacity is insufficient for the 3.4 mgd assumed emergency pump capacity required plus Hutchins' maximum daily demand of 2.2 mgd (**Table 3-6**). Hutchins' maximum daily demand assuming the city did not provide water to Wilmer would be approximately 1.6 mgd; Hutchins' existing pump capacity would still be marginal relative to the assumed emergency criteria. A minimum pump expansion of 1.2 MGD is recommended within the next two years to improve the City's ability to meet emergency demands.

Lancaster

Lancaster's master plan includes the following proposed water distribution infrastructure.

- Ground Storage:
  - An addition of four million gallons at the Ames Road pump station
  - Four million gallons at a new pump station on South Dallas Avenue
  - Total planned = eight million gallons
  - Total planned, including existing ground storage (9.5 MG) = 17.5 MG
- Elevated Storage:
  - A new two million gallon tank on Wintergreen Road
  - A new two million gallon tank on Parkerville Road
  - A new 1.5 million gallon tank on Pinto Road
  - A new 1.5 million gallon tank on Nokomis Road
  - Total planned – seven million gallons
  - Storage to be abandoned – 1.5 million gallons
  - Total, including existing elevated storage to remain (1.5 MG) = 8.5 MG
- Pump Capacity:
  - A 24 mgd expansion at the Ames Road pump station in three phases
  - A 44 mgd expansion at the Bonnie View Road pump station
  - A new pump station on South Dallas Avenue
  - Total planned – 72 mgd
  - Total, including existing pump capacity (23.5) = 91.5 mgd

The two million gallon elevated tank proposed on Wintergreen Road is currently funded and anticipated to be constructed by 2013. When operational, the one million gallon Ames Road elevated tank will be abandoned. No additional water infrastructure is currently funded.

Table 3-16 shows Lancaster's existing water storage capacity. **Table 3-17** evaluates the 2035 planned storage volume as shown in the City's 2006 Master Plan. Lancaster is assumed to reach a near build-out condition in the 2030 to 2035 timeframe, meaning all of their master plan infrastructure would be in place by 2035.

Table 3-16. Lancaster's Existing Storage Capacity

	Total Volume	Minimum Required	gal/connection provided	Days Stored	Emergency Storage Provided
Ground	9.5	-	626	2.3	Sufficient
Elevated	3.0	1.6	198	0.7	Sufficient
Total Storage	12.5	3.2	824	3.0	Sufficient

Source: City of Lancaster Water Master Plan, 2006

Table 3-17. Lancaster's Planned 2035 Capacity

	Total Volume	Minimum Required	gal/connection planned	Days Stored	Emergency Storage Provided
Ground	17.5	-	565	1.5	Sufficient
Elevated	8.5	3.1	274	0.7	Sufficient
Total Storage	26	6.2	839	2.2	Sufficient

Lancaster appears to have sufficient storage volume currently and planned for future demands. Over 250 gallons per connection of elevated storage will be provided when the new Wintergreen Road elevated tank is completed in 2013.

Table 3-18 shows Lancaster's existing and planned pump capacities and evaluates them against the state minimum requirements and the ability to meet the assumed fire demand. Based on **Table 3-18**, Lancaster appears to meet the minimum state requirements for pump capacity.

Table 3-18. Lancaster's Existing and Planned Pump Capacity

Year	Total Capacity (mgd)	Minimum Required (lesser of)		Additional Required Capacity	Emergency Capacity Available
		0.6 gpm/ connection	Peak Hour Demand		
2011	23.5	NA	18.2	None	Sufficient
2035	82.7	26.8	62.0	None	Sufficient

* mgd = million gallons per day, gpm = gallons per minute

** The 0.6 gpm/connection requirement is not applicable since Lancaster does not currently provide 200 gallons per connection of elevated storage.

Source: 2011 – City of Lancaster Water Master Plan, 2006

Wilmer

Wilmer's 2030 Community Plan includes the following proposed water distribution infrastructure. Currently, none of the planned infrastructure is under design or funded for construction.

- Ground Storage:
  - An addition of three million gallons
  - Total planned, including existing ground storage (0.125 MG) = 3.1 MG
- Elevated Storage:
  - An addition of two million gallons
  - Total planned, including existing elevated storage (1.3 MG) = 3.3 MG

Additional pump capacity is recognized as required in Wilmer's Community Plan, but a recommended capacity is not evident. **Table 3-19** shows Wilmer's existing water storage and **Table 3-20** evaluates the 2035 planned storage volume.

Table 3-19. Wilmer's Existing Storage Capacity

	Total Volume	Minimum Required	gal/connection provided	Days Stored	Emergency Storage Provided
Ground	0.125	-	92	0.33	Insufficient
Elevated	0.300	0.14	222	0.79	Marginal
Total Storage	0.425	0.27	314	1.10	Insufficient

Source: City of Wilmer Community Plan 2030, 2009

Wilmer does not have sufficient storage capacity to meet emergency demands. An additional 1.5 MG of ground storage is recommended immediately. Even though the 0.3 MG of existing elevated storage exceeds the assumed emergency elevated storage required, the elevated storage tank may be at risk of emptying depending on its level when an emergency demand begins. An additional one million gallons minimum of elevated storage is recommended to be installed within the next two years to reduce the risk of emptying the elevated storage tank during an emergency demand. Wilmer appears to have sufficient storage volume planned for future demands.

Table 3-20. Wilmer's Planned Storage Capacity

	Total Volume	Minimum Required	gal/connection planned	Days Stored	Emergency Storage Provided
Ground	3.1	-	689	1.9	Sufficient
Elevated	2.8	0.45	622	1.7	Sufficient
Total Storage	5.9	0.90	1,310	3.6	Sufficient

Table 3-21 shows Wilmer's existing and planned pump capacities.

Table 3-21. Wilmer's Existing and Planned Pump Capacity

Year	Total Capacity (mgd)	Minimum Required (lesser of)		Additional Required Capacity	Emergency Capacity Available
		0.6 gpm/ connection	Peak Hour Demand		
2011	1.9	1.2	1.2	None	Insufficient
2035	NA	3.9	8.2	NA	Sufficient

* mgd = million gallons per day, gpm = gallons per minute

Source: 2011 – City of Wilmer Community Plan 2030, 2009

Existing pump capacity in Wilmer is insufficient to meet the assumed emergency demand. Approximately 4.0 mgd of additional pump capacity is recommended to be installed with the recommended ground storage volume. The total 2035 pump capacity recommended for Wilmer based on projected peak demands is 8.2 mgd.

BUDGETARY COST ESTIMATES

This section includes estimates of probable construction costs for water infrastructure. The order-of-magnitude estimates are for preliminary budgetary purposes. A 25 percent contingency factor is included, commensurate with the current planning stage of the project. The estimates are based on the conceptual sizes recommended in this study and general unit cost rates compiled from similar projects in the North Texas region. Professional services fee estimates are included assuming 15 percent of construction costs. The cost estimates exclude financing costs. Projects constructed in future years include a four percent inflation factor. Property and right-of-way acquisition costs are excluded from distribution system infrastructure, but included in the water supply transmission main estimates.

WATER SUPPLY COSTS

Cost estimates for the water transmission pipelines shown in **Figures 3-3** through **3-5** are provided in **Table 3-22.** The cost breakdown of the individual alignments and phases can be seen in Appendix C.

Table 3-22. Water Supply Transmission Mains, (2012 $)

Item	Total Cost
Alignment Alternative #1	$36,100,000
Alignment Alternative #2, Phase 1	$17,100,000
Alignment Alternative #2, Phase 2	$27,300,000

Table 3-23 provides a preliminary estimate for the cost of each transmission main option attributable to each City served. These figures are calculated based on the cost to oversize the pipe to accommodate each successive downstream City. In other words, Hutchins will require a 24-inch pipe if Wilmer, Lancaster, and Ferris are not served. Wilmer's portion of the total cost is calculated based on the additional pipe length to extend to Wilmer plus the differential cost to oversize the pipe through Hutchins. Similarly, Lancaster's and Ferris's portions of the total cost are calculated based on the additional pipe length to extend the pipe plus the differential cost to oversize the pipe through Wilmer and Hutchins.

Table 3-23. Preliminary Cost Sharing Estimate

City	Alignment			
	Alternative #1		Alternative #2	
Ferris	23.6%	$8,500,000	32.5%	$14,400,000
Hutchins	26.8%	$9,700,000	28.5%	$12,700,000
Lancaster	21.2%	$7,700,000	17.1%	$7,600,000
Wilmer	28.3%	$10,200,000	21.9%	$9,700,000
Total	100%	$36,100,000	100%	$44,400,000

As stated previously, Dallas Water Utilities will own, operate and maintain the transmission main up to and including the flow meter at each customer city connection point regardless of the alignment alternative selected. However, DWU may not participate in funding the project's construction.

DISTRIBUTION SYSTEM COSTS

Cost estimates for water distribution facilities are shown for each city in **Tables 3-24** through **3-28**. As mentioned previously, these costs include a 25 percent contingency factor and 15 percent for professional services. An inflation rate of four percent per year was added to the estimates. The estimates exclude property costs and finance costs. The capacities and locations of the various projects are based on each city's current infrastructure plans where possible. Specific sites for water facilities have not been identified as part of this assessment. Pump stations and their associated ground storage tanks will be located at or near the point of connection to the water supply pipeline. Elevated storage tanks are typically located on high ground to reduce the height of the tank and their construction costs; all tanks in the same pressure plane must have maximum water levels at the same elevation. Other factors affect the location of water facilities; more detailed analysis will be necessary to specifically locate the required facilities.

Table 3-24. Dallas Water Infrastructure Estimated Construction Costs

Year (Estimate)	Infrastructure*	Total Project Cost	Infrastructure Identified In:
2013	12" Bonnie View pipeline (4300 LF)	$400,000*	Dallas Water Utilities Plans
2016	16" S Central Expressway pipeline (~6000 LF)	$3,000,000*	
2013-2019	120"/96" Southwest Pipeline (~23 miles)	$82,000,000*	
2020	Wintergreen Pump Station	$44,000,000**	
	Total (2012 $)	$129,000,000	

* Funds have been planned and programmed

** Funds have been planned but will not be programmed until closer to the project date

Table 3-25. Lancaster Water Infrastructure Estimated Construction Costs (2013-2035)

Year (Estimate)	Infrastructure*	Capacity		Estimated Cost	Total Project Cost	Infrastructure Identified In:
2013	Wintergreen EST	2.0 MG	New	$5,820,000	$5,820,000	Lancaster Master Plan
2016	Bonnie View PS	12.0 mgd	Expansion	$931,000	$931,000	
2017	Parkerville EST	2.0 MG	New	$6,810,000	$6,810,000	
2018	Ames PS	5.0 mgd	Expansion	$833,000	$5,080,000	
	Ames GST	4.0 MG	Addition	$4,250,000		
2019	Pinto EST	1.5 MG	New	$5,530,000	$5,530,000	
2020	Bonnie View PS	14.0 mgd	Expansion	$1,140,000	$1,140,000	
2024	Ames PS	13.0 mgd	Expansion	$1,300,000	$1,300,000	
2029	McBride PS	15.2 mgd	New	$12,810,000	$19,360,000	
	McBride GST	4.0 mg	New	$6,550,000		
2030	Nokomis EST	1.5 MG	New	$8,510,000	$8,510,000	
				Total (2012 $)	$54,500,000	

* EST = Elevated Storage Tank, PS = Pump Station, GST = Ground Storage Tank, mgd = million gallons per day, MG = million gallons

Table 3-26. Hutchins Water Infrastructure Estimated Construction Costs (2013-2035)

Year (Estimate)	Infrastructure	Capacity		Estimated Cost	Total Project Cost	Infrastructure Identified In:
2013	Chapman PS	1.2 mgd	Expansion	$608,000	$1,480,000	Hutchins' CIP
	Chapman GST	1.0 MG	Addition	$874,000		
2016	Southwest PS	2.5 mgd	New	$2,910,000	$4,390,000	SDCIA Project
	Southwest GST	1.5 MG	New	$1,480,000		
2024	Chapman PS	3.1 mgd	Expansion	$995,000	$995,000	Hutchins' CIP
2026	Southwest PS	6.1 mgd	Expansion	$1,180,000	$1,180,000	SDCIA Project
2028	Central EST	1.5 MG	New	$7,870,000	$7,870,000	Hutchins' CIP
				Total (2012 $)	$15,900,000	

* EST = Elevated Storage Tank, PS = Pump Station, GST = Ground Storage Tank, mgd = million gallons per day, MG = million gallons

Table 3-27. Wilmer Water Infrastructure Estimated Construction Costs (2013-2035)

Year (Estimate)	Infrastructure	Capacity		Estimated Cost	Total Project Cost	Infrastructure Identified In:
2013	North PS	4.0 mgd	Expansion	$664,000	$1,970,000	SDCIA Project
	North GST	1.5 MG	Addition	$1,310,000		
2014	South EST	1.5 MG	New	$4,540,000	$4,540,000	
2018	South PS	2.2 mgd	New	$3,020,000	$4,330,000	
	South GST	1.5 MG	New	$1,310,000		
2022	East EST	1.0 MG	New	$4,150,000	$4,150,000	
2024	South PS	2.0 mgd	Expansion	$960,000	$960,000	
				Total (2012 $)	$16,000,000	

* EST = Elevated Storage Tank, PS = Pump Station, GST = Ground Storage Tank, mgd = million gallons per day, MG = million gallons

Table 3-28. Ferris Water Infrastructure Estimated Construction Costs (2013-2035)

Year (Estimate)	Infrastructure	Capacity		Estimated Cost	Total Project Cost	Infrastructure Identified In:
2013	North PS	4.0 mgd	New	$3,090,000	$3,960,000	SDCIA Project
	North GST	1.0 MG	New	$874,000		
2015	Northeast EST	1.0 mgd	New	$3,150,000	$3,150,000	
2017	Central PS	4.0 mgd	New	$3,610,000	$4,630,000	
	Central GST	1.0 MG	New	$1,020,000		
2022	North PS	4.0 mgd	Expansion	$945,000	$2,185,000	
	North GST	1.0 MG	Addition	$1,240,000		
2026	Central PS	3.0 mgd	Expansion	$1,070,000	$2,530,000	
	Central GST	1.0 MG	Addition	$1,460,000		
2030	East EST	1.0 mgd	New	$5,670,000	$5,670,000	
				Total (2012 $)	$22,100,000	

* EST = Elevated Storage Tank, PS = Pump Station, GST = Ground Storage Tank, mgd = million gallons per day, MG = million gallons

Distribution system layouts and pipe sizes are not considered in this report for the same reasons water facilities are not sited. More detailed analysis is needed to size and configure distribution pipe networks to meet the demands of specific areas within each city. For budgetary planning purposes, the following general rule-of-thumb costs are provided for installation of water distribution pipe.

- Residential - $23,000 per acre
- Industrial/Commercial - $15,000 per acre

The density of pipe is higher in residential areas than in industrial areas, resulting in a higher cost per acre, even though pipe can be smaller in residential areas. As discussed in Appendix F, developers frequently fund the construction of infrastructure needed to serve their sites, such as wastewater collectors and water distribution lines.

SUMMARY AND RECOMMENDATIONS

Each municipality in the SDCIA Study Area will require additional water supply infrastructure to meet future demands. This study analyzes supplying DWU water to each municipality in the Study Area to meet long term water supply needs. Ferris, Hutchins and Wilmer will need additional water supply capacity to meet new demands within five years based on the assessment results. Therefore, increasing water supply capacity should be considered a regional priority. DWU does not have an existing contractual relationship or plans to provide Ferris with wholesale, raw, or treated water. Coordination and approval by the Cities of Ferris and Dallas, DWU, Rockett SUD, and Tarrant Regional Water District are required before DWU can supply Ferris with wholesale water. If a water supply agreement between Ferris and DWU is not executed, then Ferris can continue to augment their well water with Rockett SUD water.

Two water transmission main alternatives have been developed to meet the projected 2060 maximum day demands of Hutchins, Wilmer, Lancaster and Ferris as shown in **Figures 3-4** and **3-5.** Each alternative provides the cities with at least two separate points of connection for redundancy; the transmission main assumes Lancaster receives an additional point of connection in the southeast part of its City to augment its two existing connections.

Alignment Alternative #2, along the city limit lines, is recommended over Alignment #1, adjacent to the railroad right-of-way. Alignment #2 has more potential to be phased, meaning the initial capital cost to provide the water supply line will be lower. The total project cost is higher relative to Alignment #1, but a significant portion of the total project cost can be deferred to Phase 2. Further, the future booster pump station required with Alignment #2 could be incorporated into an existing or currently proposed DWU pump station, potentially reducing the alternative's Phase 2 cost.

Priorities for water distribution infrastructure should be considered on a city-by-city basis according to the particular needs of each system. This study includes time-of-need estimates for recommended infrastructure based on straight-line demand projections between 2010 and 2035. It is recommended that water storage and pumping projects be given funding priority by each city since these components make up the foundation of a water distribution system. The cost to install distribution pipe is often at least shared by developers.

Each city in the SDCIA Study Area has undertaken an assessment of their water distribution system, and many of the cities have capital improvements plans that identify new infrastructure needed to meet future water demands. These plans were evaluated against state minimum water system requirements, an assumed emergency demand, and the number of days of average demand stored. Recommendations for new infrastructure were developed for the cities that did not have plans, or where infrastructure capacity deficiencies were identified. **Table 3-29 and 3-30** summarize the recommended and planned infrastructure needed to meet future demands. Detailed engineering studies are recommended for all proposed water infrastructure in each city to verify capacity and locations prior to design and construction.

Table 3-29. Overall Summary of New Water Distribution Infrastructure Needs

	Infrastructure Needed/Planned Within 3 Years			New Infrastructure Needed/Planned by 2035		
City	Ground Storage (MG)	Elevated Storage (MG)	Pump Capacity (mgd)	Ground Storage (MG)	Elevated Storage (MG)	Pump Capacity (mgd)
Ferris	**1.0**	**1.0**	**4.0**	**4.0**	**2.0**	**15.0**
Hutchins	**1.0**	0.0	**1.2**	*2.5*	*1.5*	*12.9*
Lancaster	0.0	*2.0*	0.0	*8.0*	*7.0*	*65.4*
Wilmer	**1.5**	**1.5**	**4.0**	*3.0*	*2.5*	**8.2**

*mgd = million gallons per day, MG = million gallons

**Note: Capacity needed to supplement existing deficits, and future infrastructure capacity recommended based on the results of this Study, are shown bold. Infrastructure currently planned by each municipality is italicized.

Assumptions: Time of need based on straight-line growth from 2010-2035.

Table 3-30. Detailed Summary of SDCIA Recommended Water Infrastructure

Municipality	Upgrade	Approximate Construction Date	Cost	Infrastructure Identified In:
Dallas	12” Bonnieview pipeline (4300 LF)	2013	$400,000*	Dallas Water Utilities Plans
	16” S Central Expressway pipeline (~6000 LF)	2016	$3,000,000*	
	120”/96” Southwest Pipeline (~23 miles)	2013-2019	$82,000,000*	
	Wintergreen Pump Station	2020	$44,000,000**	
Ferris	Alternative Alignment #2	2013	$14,400,000	SDCIA Project
	4.0 mgd North PS	2013	$3,090,000	
	1.0 mg North GST	2013	$874,000	
	1.0 mg Northeast EST	2015	$3,150,000	
	4.0 Central PS	2017	$3,610,000	
	1.0 mg Central GST	2017	$1,020,000	
	4.0 mgd North PS Upgrade	2022	$945,000	
	1.0 mg North GST Expansion	2022	$1,240,000	
	3.0 mgd Central PS Upgrade	2026	$1,070,000	
	1.0 mg Central GST Expansion	2026	$1,460,000	
	1.0 mg East EST	2030	$5,670,000	
		Total	$36,500,000	

Table 3-30, Continued. Detailed Summary of SDCIA Recommended Water Infrastructure

Municipality	Upgrade	Approximate Construction Date	Cost	Infrastructure Identified In:
Hutchins	Alternative Alignment #2	2013	$12,700,000	SDCIA Project
	1.2 mgd Chapman PS Upgrade	2013	$608,000	Hutchins' CIP
	1.0 mg Chapman GST Upgrade	2013	$874,000	Hutchins' CIP
	2.5 mgd Southwest PS	2016	$2,910,000	SDCIA Project
	1.5 mg Southwest GST	2016	$1,480,000	SDCIA Project
	3.1 mgd Chapman PS Upgrade	2024	$995,000	Hutchins' CIP
	6.1 mgd Southwest PS Upgrade	2026	$1,180,000	SDCIA Project
	1.5 mg Central EST	2028	$7,870,000	Hutchins' CIP
		Total	$28,600,000	
Lancaster	Alternative Alignment #2	2013	$7,600,000	SDCIA Project
	2.0 mg Wintergreen EST	2013	$5,820,000*	Lancaster Master Plan
	12.0 mgd Bonnie View PS Upgrade	2016	$931,000	
	2.0 mg Parkerville EST	2017	$6,810,000	
	5.0 mgd Ames PS Upgrade	2018	$833,000	
	4.0 mg Ames GST Expansion	2018	$4,250,000	
	1.5 mg Pinto EST	2019	$5,530,000	
	14.0 mgd Bonnie View PS Upgrade	2020	$1,140,000	
	13.0 mgd Ames PS Upgrade	2024	$1,300,000	
	15.2 mgd McBride PS	2029	$12,810,000	
	4.0 mg McBride GST	2029	$6,550,000	
	1.5 mg Nokomis EST	2030	$8,510,000	
		Total	$62,100,000	
Wilmer	Alternative Alignment #2	2013	$9,700,000	SDCIA Project
	4.0 mgd North PS Upgrade	2013	$664,000	
	1.5 mg North GST Expansion	2013	$1,310,000	
	1.5 mg South EST	2014	$,4,540,000	
	2.2 mgd South PS	2018	$3,020,000	
	1.5 mg South GST	2018	$1,310,000	
	1.0 mg East EST	2022	$4,150,000	
	2.0 mgd South PS Upgrade	2024	$960,000	
		Total	$21,100,000	

NA = Not Applicable – No Project Name

* Funds have been planned and programmed

** Funds have been planned but will not be programmed until closer to the project date

[1] Rockett SUD obtains raw water from multiple sources, including Tarrant Regional Water District and the Cities of Waxahachie and Midlothian.

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Section 4: Wastewater Infrastructure Assessment

This section presents the infrastructure capacity and needs assessment for wastewater infrastructure in the Southern Dallas County Infrastructure Analysis (SDCIA) Study Area. The assessment is based on the results of the Population, Households and Employment Analysis (Task 2.3), previous infrastructure studies performed for the municipalities in the Study Area, and additional data collected during the course of this project.

EXISTING INFRASTRUCTURE INVENTORY

Ferris, Hutchins, Lancaster, and Wilmer have CCNs which establish their existing wastewater service areas as shown in **Figure 4-1**. Each municipality has their own individual wastewater collection system consisting of pipelines and lift stations. The municipalities in the Study Area rely on either Dallas Water Utilities (DWU) or Trinity River Authority (TRA) to treat and dispose of wastewater. Wastewater generated from homes or businesses either flows by gravity or is pumped through a force main downstream to a collector main or wastewater interceptor. Collector mains collect wastewater discharged from individual customers (i.e. residences, businesses, etc.) and are typically 21-inches in diameter and smaller. Wastewater interceptors are larger diameter pipes, typically 24-inches and larger, that intercept flow from collector mains. Interceptors typically follow creeks and convey flow to a wastewater treatment plant (WWTP). **Figure 4-2** schematically shows a wastewater system. The existing inventory is categorized in terms of wastewater treatment by plant and wastewater infrastructure by utility for this report. The existing wastewater infrastructure in each municipality is shown in **Figure 4-3** and described in this section.

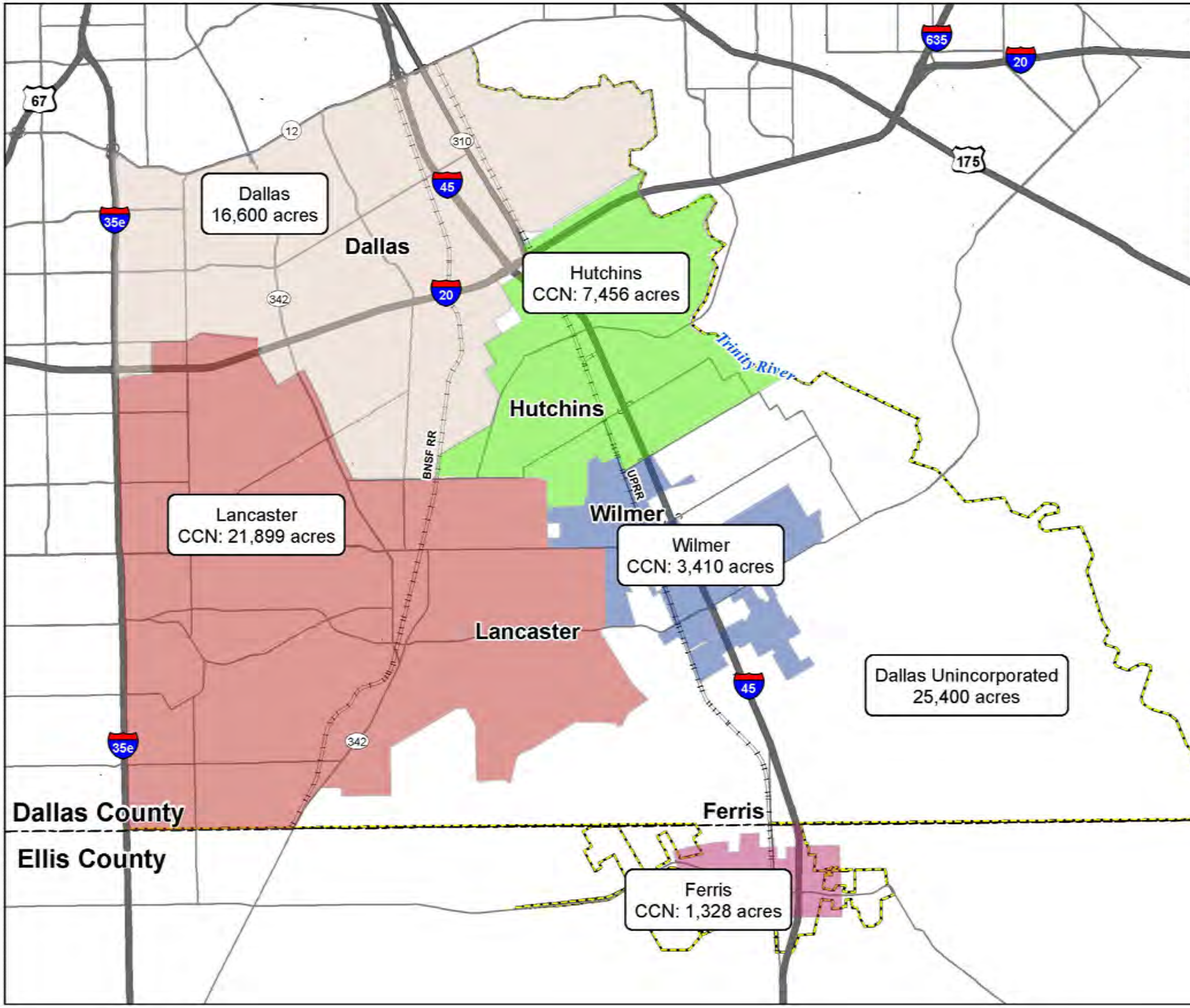
WASTEWATER TREATMENT

Three existing wastewater treatment plants serve the Study Area:

- Southside WWTP (DWU)
- Ten Mile Creek WWTP (TRA)
- Red Oak Creek WWTP (TRA)

Dallas is the only city in the SDCIA Study Area that treats its own wastewater. The DWU Southside WWTP provides service to the Cities of Dallas, Hutchins, and Wilmer in addition to customers outside of the study area. Wastewater for all of Hutchins, Wilmer and the portion of the City of Dallas within the Study Area is delivered to the Southside WWTP. According to The Dallas 2007 Comprehensive Wastewater Collection System Assessment, Southside WWTP was last upgraded in the 1990's to a current treatment capacity of 110 mgd, with the capability for future expansions up to 240 mgd.

TRA's Ten Mile Creek WWTP (Ten Mile) provides service to the Cities of Lancaster and Ferris in addition to customers outside of the Study Area. All of Ferris's wastewater flow and a portion of the Lancaster wastewater flow are conveyed to Ten Mile. According to its master plan, Ten Mile has an existing treatment capacity of 24 mgd. TRA's Red Oak WWTP (Red Oak) provides service to a portion of the City of Lancaster and additional customers outside of the Study Area. According to TRA, Red Oak has an existing treatment capacity of 4.6 mgd.



Southern Dallas County Infrastructure Analysis

Wastewater Study Area

Figure 4 - 1

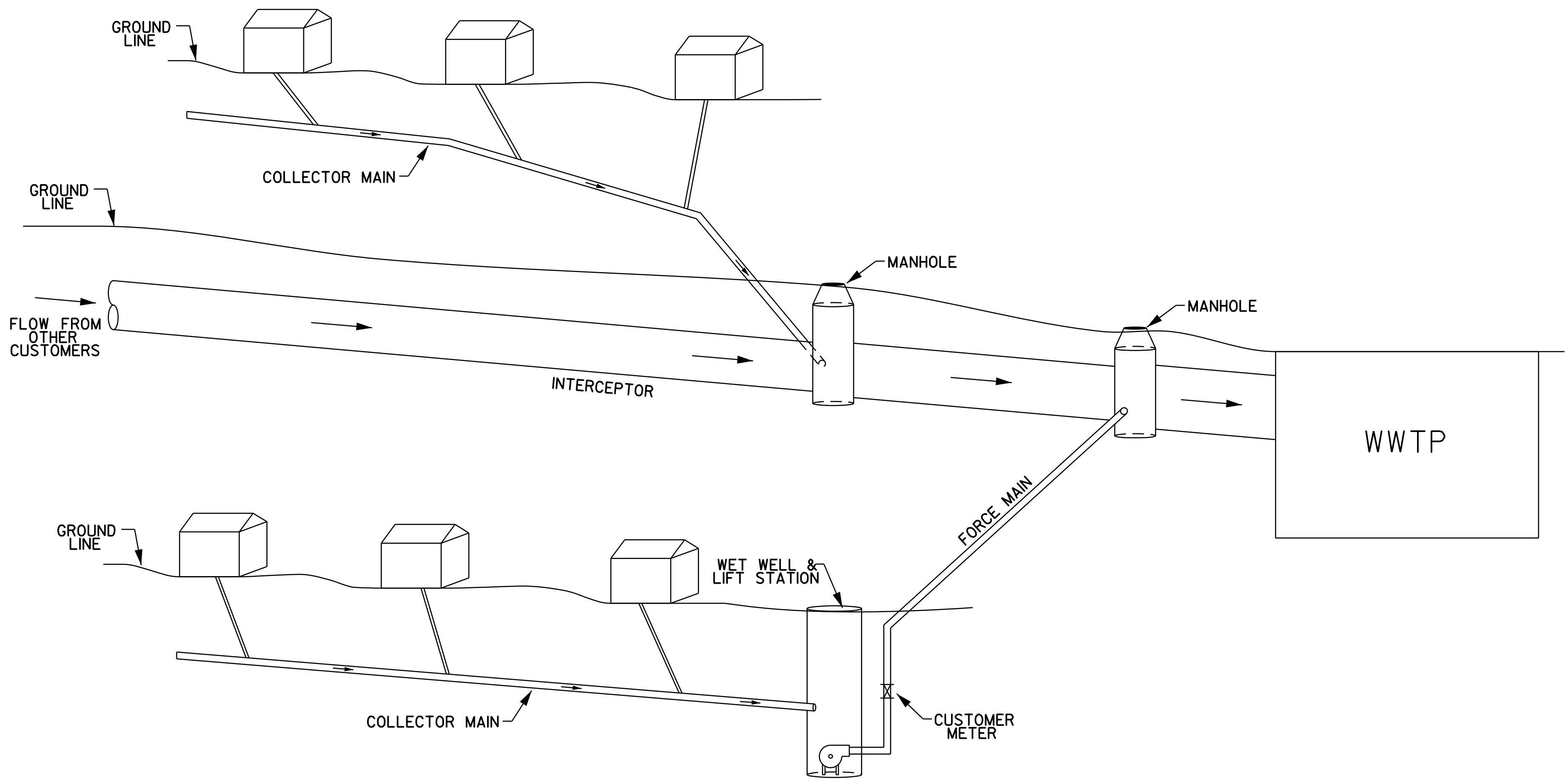
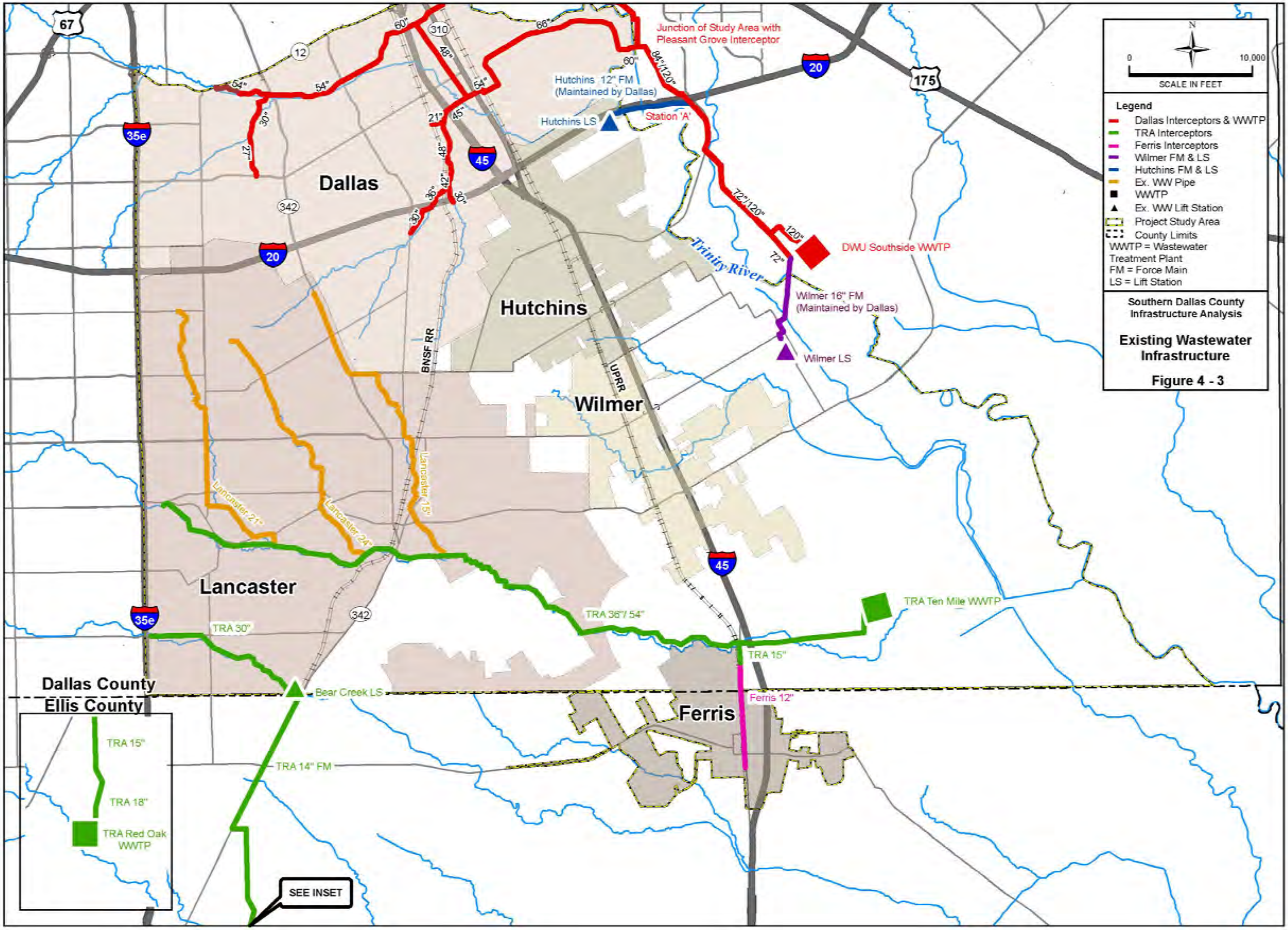


FIGURE 4-2
CONCEPTUAL WASTEWATER SYSTEM
SDCIA


Legend
Dallas Interceptors & WWTP
TRA Interceptors
Ferris Interceptors
Wilmer FM & LS
Hutchins FM & LS
Ex. WW Pipe
WWTP
Ex. WW Lift Station
Project Study Area
County Limits
WWTP = Wastewater Treatment Plant
FM = Force Main
LS = Lift Station
SCALE IN FEET
0
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Southern Dallas County Infrastructure Analysis
Existing Wastewater Infrastructure
Figure 4 - 3
Dallas
Hutchins
Wilmer
Lancaster
Ferris
Dallas County
Ellis County
Junction of Study Area with Pleasant Grove Interceptor
Hutchins 12" FM (Maintained by Dallas)
Hutchins LS
Station 'A'
DWU Southside WWTP
Wilmer 16" FM (Maintained by Dallas)
Wilmer LS
Trinity River
TRA Ten Mile WWTP
TRA 36"/ 54"
TRA 15"
Ferris 12"
TRA 30"
Bear Creek LS
TRA 14" FM
SEE INSET
TRA 18"
TRA Red Oak WWTP
Lancaster 21"
Lancaster 24"
Lancaster 15"
BNSF RR
UPRR
84"/120"
72"/120"
120"
72"
66"
60"
54"
48"
45"
42"
36"
30"
27"
21"
67
12
310
342
20
35e
45
175

WASTEWATER INFRASTRUCTURE

Each municipality is located within one or two drainage areas. Drainage areas are divided by physically higher elevations that separate the direction in which runoff flows. For a wastewater system to flow by gravity, the pipeline will predominantly follow the creeks associated with the drainage area. **Figure 4-4** shows the drainage areas within the Study Area. Lift stations (LS) are utilized to pump wastewater across the drainage area divides to downstream pipes that flow by gravity. The existing wastewater collection systems for each city are summarized in this section. The pump capacities itemized in this section reflect the total capacity instead of the firm capacity unless implicitly stated. The firm capacity is the capacity of the lift station with the largest pump out of service. The lift station is required to have a firm capacity capable of pumping the peak two-hour flow.

Dallas

The portion of Dallas within the Study Area is located in the Five Mile Creek and Pleasant Grove Sewer Basins. Peak flows from the Five Mile Creek Interceptor are diverted to Central WWTP at the Five Mile Diversion Structure north. Dry-weather (base) flow from the Five Mile Creek Interceptor combines with flows from the Newton Creek Interceptor and flow into the Pleasant Grove interceptor. The Pleasant Grove interceptor ranges in diameter from 72-inches to 84-inches and parallels the 120-inch Southside Diversion interceptor. The two interceptors convey flow to Southside WWTP.

Ferris

Ferris is located in the Ten Mile Creek and Bear Creek drainage areas. The Ferris collection system flows to a 12-inch gravity main, which extends from the south side of town to the Ten Mile Creek Interceptors north of the town. The Ten Mile Creek Interceptors flow to the Ten Mile WWTP.

Hutchins

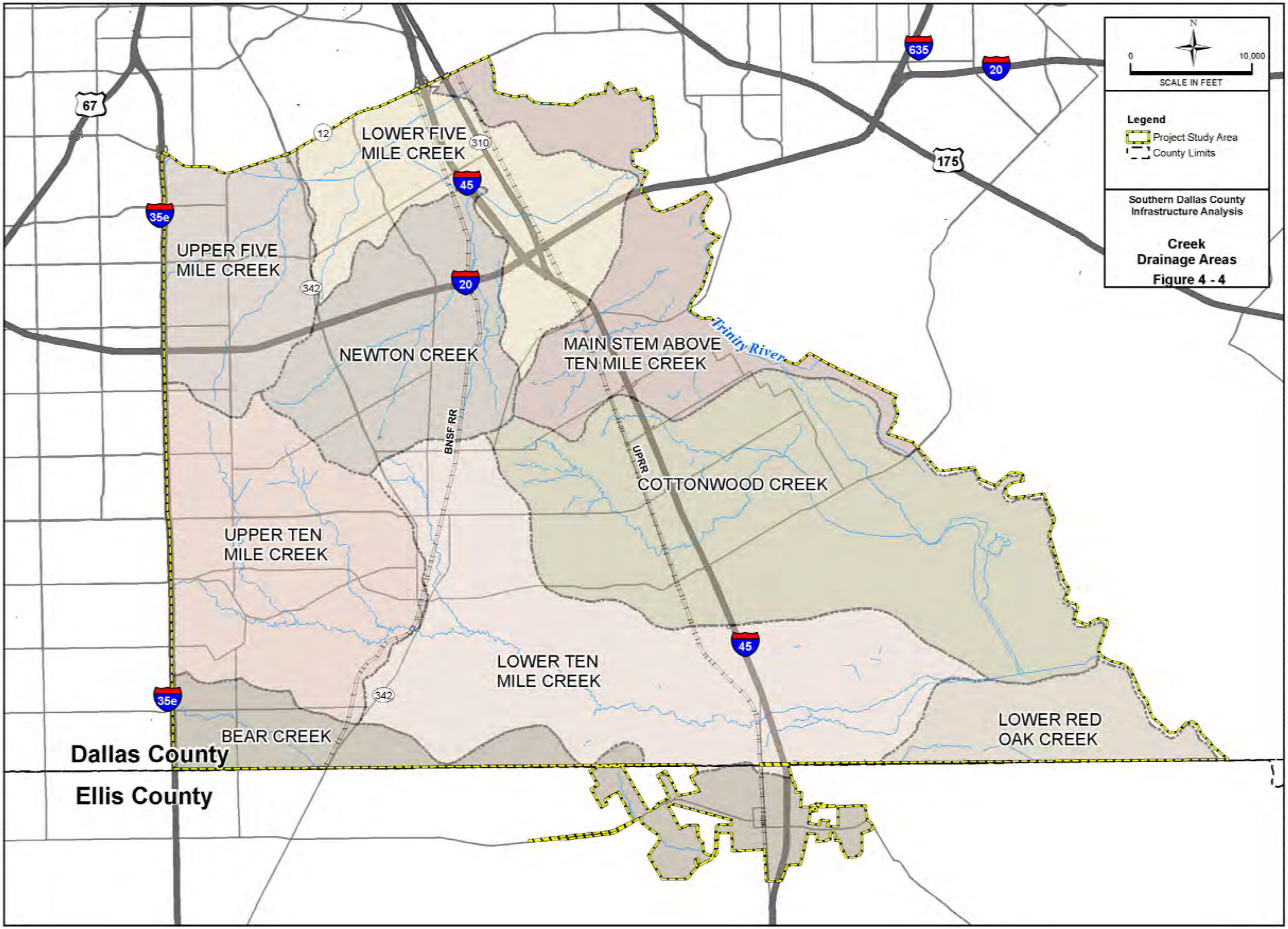
Hutchins is located in the Lower Five Mile Creek (a main stem above Ten Mile Creek) and Cottonwood Creek drainage areas. Hutchins' collection system flows to the convergence of the main stem above Ten Mile Creek and Lower Five Mile Creek drainage areas in the northeast part of town. Hutchins wastewater is pumped from the Old WWTP Lift Station across the Trinity River through an existing 12-inch force main. DWU owns and maintains the Hutchins 12-inch force main, which discharges to the Pleasant Grove and Southside Diversion interceptors via the Station 'A' control structure shown in **Figure 4-3**. . Hutchins owns and maintains the Old WWTP Lift Station. The lift station has an existing total primary capacity of 5.18 mgd (two pumps at 1,800 gpm each) and a backup capacity of 3.60 mgd (three pumps at 500 gpm each and one pump at 1,000 gpm).

Lancaster

Lancaster is located in the Upper Five Mile Creek, Newton Creek, Ten Mile Creek, and Bear Creek drainage areas. Developed areas within the Ten Mile Creek drainage area flow by gravity to the TRA 36-inch and 54-inch interceptors. The southerly part of town in the Bear Creek drainage area flows by gravity to the TRA 30-inch interceptor along Bear Creek. Approximately 11 percent of Lancaster's existing land area lies within the Bear Creek drainage area. The interceptors collect Lancaster flow from multiple points in the collection system prior to flowing to their respective WWTPs.

Wilmer

Wilmer is located mostly in the Cottonwood Creek drainage area. Wilmer's existing collection system flows to the northeast part of town. Wilmer's wastewater flow is pumped through a 16-inch force main across the Trinity River. DWU owns and maintains the 16-inch force main. Wilmer owns and maintains the lift station, which has an existing capacity of 0.648 mgd (450 gpm).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SCALE IN FEET
Legend
Project Study Area
County Limits
Southern Dallas County
Infrastructure Analysis
Creek
Drainage Areas
Figure 4 - 4
LOWER FIVE
MILE CREEK
UPPER FIVE
MILE CREEK
NEWTON CREEK
MAIN STEM ABOVE
TEN MILE CREEK
COTTONWOOD CREEK
UPPER TEN
MILE CREEK
LOWER TEN
MILE CREEK
BEAR CREEK
LOWER RED
OAK CREEK
Trinity River
BNSF RR
UPRR
67
12
310
45
35e
20
342
635
175
Dallas County
Ellis County

PROJECTED WASTEWATER FLOWS

Wastewater demand projections establish the needed capacity of future infrastructure. A questionnaire was sent to the cities in the Study Area to obtain current information regarding the daily wastewater flows. **Table 4-1** shows the existing average and peak daily flows as reported by each city.

Table 4-1. Existing Wastewater Flows

Municipality	2010 Flow (mgd)	
	AADF	PDF
Dallas	2.7	11
Ferris	0.28	1.4
Hutchins	0.54	NA
Lancaster	5.1	15
Wilmer	0.20	0.37

AADF = Average Annual Daily Flow, PDF = Peak Daily Flow
NA = Not Applicable (No peak daily flow reported)
Source: Data provided by each city, 2012

For this study, water projections and equivalent wastewater usage rates are used to estimate future flows. For this assessment, the projected wastewater flow is assumed to be approximately 70 percent of the future water demand. **Table 4-2** shows the future average water demand and the future average wastewater flows for the Study Area.

Table 4-2. Future Water Flows and Future Wastewater Flow Rates

Municipality	2035	
	Water AADD (mgd)	Wastewater AADF (mgd)
Dallas	9.0	6.3
Ferris	2.9	2.0
Hutchins	3.2	2.3
Lancaster	12	9.3
Wilmer	1.6	1.2

AADD = Average Annual Daily Demands

Flowrates vary in a wastewater system over a 24-hour period as a function of domestic water demand fluctuations. **Table 4-3** displays the Peak Flow to AADF (PF:AADF) ratios. A consistent PF:AADF ratio of 3.0 is assumed for future flow projections in this analysis.

Table 4-3. Peak Flow Rate Factors

Municipality	PF:AADF Ratio	
	Existing	Future
Dallas	3.0	3.0
Ferris	2.5	3.0
Hutchins	NA	3.0
Lancaster	3.0	3.0
Wilmer	NA	3.0

NA = Not Applicable (No peak flows reported) Source:
Existing - Data provided by each city, 2012

Peak wet weather flows represent the greatest flow through wastewater pipes and are used for design. Inflow and infiltration (I&I) occurs in wastewater systems due to leaking pipes, open manhole lids, seepage, etc. An I&I component is added to the peak flows to calculate the peak wet weather flows. An I&I flowrate component of 750 gpd per acre[1] was multiplied by the developed acreages shown in **Table 4-4** to determine the I&I flow. **Table 4-5** shows existing and projected flows for each city. The 2035 projected flows are used to estimate the required wastewater collection, pumping, and transmission capacity for each city.

Table 4-4. Developed Acreage Projections

Municipality	Developed Acreage	
	2010	2035
Dallas	4,400	8,600
Ferris	900	2,500
Hutchins	2,000	3,000
Lancaster	11,000	16,000
Wilmer	900	2,200

Source: 2010 - Sewershed delineation performed by Halff Associates, 2012; 2035 - Task 2.3 results

Table 4-5. Projected Wastewater Flows

Municipality	2010 Flow (mgd)		2035 Flow (mgd)	
	AADF	Peak Flow	AADF	Peak Flow
Dallas	2.7	11	6.3	25
Ferris	0.28	1.4	2.0	8.0
Hutchins	0.54	3.1*	2.3	9.0
Lancaster	5.1	15	9.3	39
Wilmer	0.20	0.37	1.2	5.2

* AADF = Average Annual Daily Flow

Source: 2010 – Data provided by each city, 2012

WASTEWATER INFRASTRUCTURE NEEDED TO MEET FUTURE FLOWS

Each municipality in the Study Area will require additional wastewater infrastructure to meet future flows. This section assesses the future wastewater infrastructure needs in the SDCIA Study Area. The treatment facilities, interceptors, and major lift stations to meet the projected 2035 flows is shown in **Figure 4-5**.

Each city in the SDCIA has undertaken an assessment of their individual wastewater system through a master plan, impact fee study, or similar analysis. Many of the cities have capital improvements plans (CIP) that identify new infrastructure needed to meet future wastewater flows. This section discusses each city's wastewater interceptors and major lifts stations for which they have already planned. The recommendations are based on the following criteria:

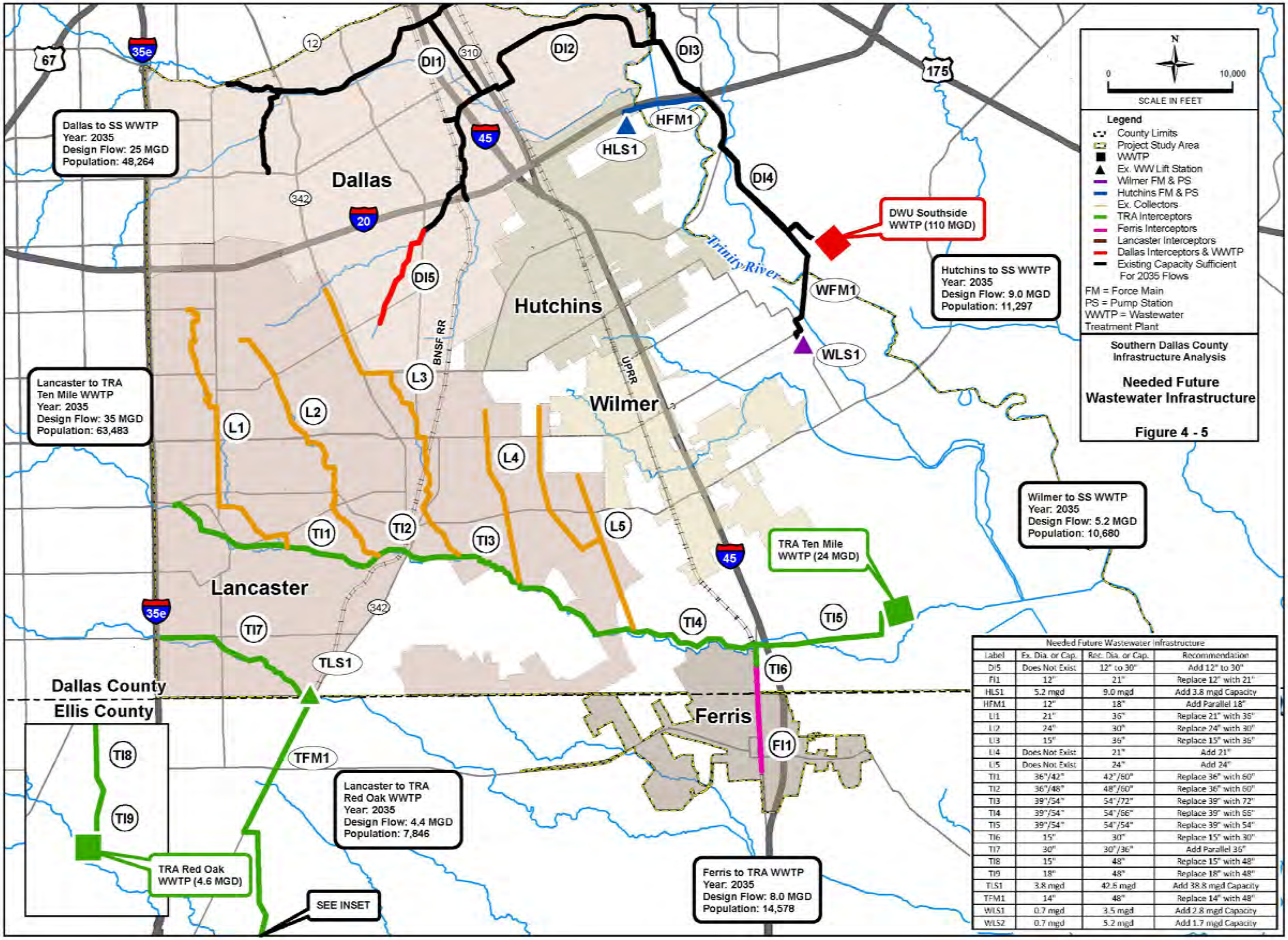
- Lift Station Capacity – the required firm pump capacity must meet peak hour wet-weather flows (TCEQ Subchapter C, Rule §217.61).
- Force Main Capacity –the pipe diameters for force mains are sized for a velocity between two and six feet per second (TCEQ Subchapter C, Rule §217.67).
- Gravity Main Capacity – the diameters for gravity pipes are sized to meet peak hour wet-weather flows at a minimum velocity of two feet per second flowing full (TCEQ Subchapter C, Rule §217.53).

The capacity recommendations in this study reflect the recommended capacities from the utilities' prior CIPs where the planned capacity exceeds this project's projected 2035 peak flows .

The majority of the flow going to the three Study Area wastewater treatment plants originates from outside the Study Area. Therefore, recommendations for additional capacity at the treatment plants are not provided. DWU and TRA regularly assess their long-term wastewater treatment capacity needs. The assumption is made that adequate treatment capacity will be provided by DWU and TRA to serve the needs of the Study Area through 2035.

DALLAS

The Dallas interceptors within the Study Area were evaluated and their existing capacities were compared to the ultimate wastewater flows projected in the DWU wastewater master plan. Some of the Dallas interceptors within the Study Area appear to have insufficient capacity to convey projected flows. However, the Five Mile Diversion Structure provides DWU with operational flexibility to divert peak flows from the Five Mile Creek Interceptor to Central WWTP, thereby relieving interceptors that appear undersized. The DWU wastewater master plan confirms that no pipe capacity increases are needed in the Study Area. **Table 4-6** compares the capacities of existing interceptors to Dallas' ultimate wastewater flows from the Study Area.



Needed Future Wastewater Infrastructure			
Label	Ex. Dia. or Cap.	Rec. Dia. or Cap.	Recommendation
DI5	Does Not Exist	12" to 30"	Add 12" to 30"
FI1	12"	21"	Replace 12" with 21"
HLS1	5.2 mgd	9.0 mgd	Add 3.8 mgd Capacity
HFM1	12"	18"	Add Parallel 18"
LI1	21"	36"	Replace 21" with 36"
LI2	24"	30"	Replace 24" with 30"
LI3	15"	36"	Replace 15" with 36"
LI4	Does Not Exist	21"	Add 21"
LI5	Does Not Exist	24"	Add 24"
TI1	36"/42"	42"/60"	Replace 36" with 60"
TI2	36"/48"	48"/60"	Replace 36" with 60"
TI3	39"/54"	54"/72"	Replace 39" with 72"
TI4	39"/54"	54"/66"	Replace 39" with 66"
TI5	39"/54"	54"/54"	Replace 39" with 54"
TI6	15"	30"	Replace 15" with 30"
TI7	30"	30"/36"	Add Parallel 36"
TI8	15"	48"	Replace 15" with 48"
TI9	18"	48"	Replace 18" with 48"
TLS1	3.8 mgd	42.6 mgd	Add 38.8 mgd Capacity
TFM1	14"	48"	Replace 14" with 48"
WLS1	0.7 mgd	3.5 mgd	Add 2.8 mgd Capacity
WLS2	0.7 mgd	5.2 mgd	Add 1.7 mgd Capacity

Table 4-6. Existing Dallas Wastewater Interceptor Capacity

Project	Infrastructure	Future Peak Flow (mgd)	Existing Capacity (mgd)	Sufficient Capacity in 2035?
DI1	48-inch	50	19.8	Yes*
DI2	60-inch	50	37.7	Yes*
DI3	Parallel 84-inch/120-inch	247	305	Yes
DI4	Parallel 74-inch/120-inch	272	292	Yes

Source: Dallas Wastewater GIS

*Sufficient capacity exists in DI1 and DI2 according to the DWU wastewater master plan because of the existence of the Five Mile Diversion Structure.

While existing Dallas interceptors serving the SDCIA study area have sufficient capacity, some Dallas land in the study area does not have direct access to a gravity collection system. Therefore, DWU plans to extend the Newton Creek interceptor to provide sewer service to the currently unserved area. **Figure 4-5** shows the interceptor extension and **Table 4-7** shows the required interceptor capacity as estimated in this Study. According to DWU, the design of this extension is underway and planned for construction in 2013.

Table 4-7. Recommended Dallas Wastewater Interceptor Capacity

Project	Recommended Interceptors	Ultimate Peak Flow (mgd)	Recommended Capacity (mgd)	Approximate Time of Need
DI5	12” to 30” Newton Creek Interceptor Extension			2013

FERRIS

Ferris wastewater flows through a 12-inch gravity main and discharges to parallel 54-inch and 36-inch TRA Ten Mile Creek interceptors. Ferris’ portion of the gravity main ends at the Ferris metering station, which is approximately 2,300 linear feet upstream of the discharge point to the Ten Mile Creek interceptors. TRA owns the 12-inch gravity main between the metering station and the interceptors. TRA’s segment of the 12-inch gravity main is discussed later in this report. **Table 4-8** compares the capacity of the existing 12-inch main to Ferris’ projected 2035 wastewater flows.

Table 4-8. Existing Ferris Infrastructure Capacity

Project	Infrastructure	2035 Peak Flow (mgd)	Existing Capacity (mgd)	Sufficient Capacity in 2035?
FI1	12-inch	8.0	2.3	No

Source: City of Ferris Planning Study, 2007

Ferris' 2010 peak day flow is 1.46 mgd. Ferris' planning study recommends obtaining funding to replace deteriorated portions of the 12-inch gravity main between 2017 and 2027, but the study makes no mention of increasing the pipe's capacity. An increase in capacity is recommended to convey future flows to the TRA Ten Mile interceptors. The 12-inch gravity main reaches 63 percent of its existing capacity during 2010 peak day flows. **Table 4-9** compares the capacity of the recommended interceptor to Ferris' projected 2035 wastewater flows.

Table 4-9. Recommended Ferris Wastewater Interceptor Capacity

Project	Recommended Infrastructure	2035 Peak Flow (mgd)	Recommended Capacity (mgd)	Approximate Time of Need
FI1	21-inch	8.0	10.0	2014

HUTCHINS

The City of Hutchins' wastewater is pumped through a lift station at their old WWTP and 12-inch force main to the parallel 120-inch and 72-inch Dallas interceptors that flow to Southside WWTP. **Table 4-10** compares the capacity of the existing lift station and force main to Hutchins' 2035 wastewater flows.

Table 4-10. Existing Hutchins Wastewater Infrastructure Capacity

Project	Infrastructure	2035 Peak Flow (mgd)	Existing Capacity (mgd)	Sufficient Capacity in 2035?
HLS1	Lift Station	9.0	5.2	No
HFM1	12-inch FM	9.0	3.0	No

Source: City of Hutchins Capital Improvements Plan, 2009

Hutchins' 2010 average day flow is 0.536 mgd. The peak day flow is approximately 1.61 mgd. Hutchins' 2009 Impact Fee Update shows a lift station upgrade to 15.8 mgd and an ultimate force main diameter of 27 inches. This planned infrastructure is sufficient to meet the projected 2035 wastewater flows.

Hutchins' 2035 wastewater flow will require the capacity of their primary lift station (HLS1) to be increased. The recommended capacity increase to approximately nine mgd is anticipated to be necessary around 2022 (**Table 4-11)**. However, the Hutchins force main (HFM1) is expected to reach its capacity limit by 2015. The Hutchins CIP recommends installation of a 27-inch force main, but this pipe size will likely be too large to maintain the minimum TCEQ velocity requirements of two feet per second until the lift station capacity is also increased. The force main should be phased to maintain a velocity between two and six feet per second. A new 18-inch pipe is recommended to be installed parallel to the existing 12-inch pipe and operated as a parallel force main system.

Table 4-11. Recommended Hutchins Wastewater Infrastructure Capacity

Project	Recommended Infrastructure	2035 Peak Flow (mgd)	Recommended Capacity (mgd)	Approximate Time of Need
HLS1	Lift Station Upgrade	9.0	9.0	2022
HFM1	Parallel 18-inch FM	9.0	9.0	2022

LANCASTER

Lancaster wastewater flows to interceptors in two separate drainage areas: the 30-inch interceptor to the TRA Red Oak WWTP and the parallel interceptors to the TRA Ten Mile Creek WWTP. Lancaster currently makes multiple connections to each interceptor. **Table 4-12** compares the capacity of Lancaster's existing interceptors to the 2035 peak wastewater flows. Lancaster's master plan shows multiple future pipes connecting to the TRA interceptors in addition to capacity upgrades of some existing pipes. **Table 4-12** also compares these future interceptors based on their existing capacities to Lancaster's 2035 wastewater flows.

Table 4-12. Existing Lancaster Wastewater Interceptor Capacity

Project	Infrastructure	2035 Peak Flow (mgd)	Existing Capacity (mgd)	Sufficient Capacity in 2035?
LI1	21-inch	7.0	2.2	No
LI2	24-inch	4.4	3.4	No
LI3	15-inch	7.4	1.7	No

Source: City of Lancaster Wastewater Master Plan, 2006

The Lancaster capital improvements plan recommends upsizing existing interceptors or building new interceptors to meet the 2035 wastewater flows. The recommendations are sufficient to meet the projected flows; constructing the new interceptors per Lancaster's capital improvements plan is recommended to serve the future flows. The recommended capacities compared to the projected 2035 wastewater flows are shown in **Table 4-13**.

Table 4-13. Recommended Lancaster Wastewater Infrastructure Capacity

Project	Recommended Infrastructure	2035 Peak Flow (mgd)	Recommended Capacity (mgd)	Approximate Time of Need
LI1	21-inch - 36-inch	7.0	9.2	2013
LI2	21-inch to 30-inch	4.4	6.2	2021
LI3	21-inch to 36-inch	7.4	17.7	2013
LI4	21-inch	2.9	5.8	2013
LI5	21-inch to 24-inch	4.5	6.6	2013

Source: City of Lancaster Wastewater Master Plan, 2006

TRA

The parallel 54-inch and 36-inch TRA Ten Mile Creek interceptors convey flow from Duncanville, Cedar Hill, Desoto, Lancaster, and Ferris to TRA's Ten Mile WWTP. Ferris is the most downstream flow contributor to the interceptors. Based on the Ten Mile inflow and infiltration study (Ten Mile Creek Regional Wastewater System Phase II Inflow/Infiltration Assessment, 2006), the projected 2035 peak flow generated upstream of the Study Area is approximately 88.2 mgd. Based on this study, Lancaster is projected to contribute 35.4 mgd and Ferris is projected to contribute 8.0 mgd to the Ten Mile interceptors. **Table 4-14** reflects the TRA Ten Mile interceptors' (TI1-TI5) minimum capacities versus their projected 2035 wastewater flows. TRA also owns the most downstream portion of the 12-inch Ferris gravity main, which is shown in **Table 4-14** as TI6.

The TRA Red Oak Creek WWTP also serves the southern portion of Lancaster. Lancaster is projected to contribute approximately 4.4 mgd to the Red Oak WWTP. The flow is currently conveyed through a 30-inch gravity main, a lift station at the intersection of Bear Creek and SH 342, a 14-inch force main, a 15-inch gravity main, and an 18-inch gravity main. Future flow data to Red Oak WWTP from other customers outside of the Study Area (Cedar Hill, Glenn Heights, Desoto, and Ovilla) was not available at the time in which this report was written. The projected 2035 flows shown in **Tables 4-14 and 4-15** are based on the Dallas Long Range Water Supply Planning, Ten Mile I&I Assessment, and TWDB projections. **Table 4-14** reflects to the TRA Red Oak infrastructure's (TI7-TI9, TLS1, & TFM1) minimum capacities versus their projected 2035 wastewater flows.

Table 4-14. Existing TRA Wastewater Infrastructure Capacity

Project	Infrastructure	2035 Peak Flow (mgd)	Existing Capacity (mgd)	Sufficient Capacity in 2035?
TI1	Parallel 36-inch/42-inch	96.2	49.7	No
TI2	Parallel 36-inch/48-inch	102	57.3	No
TI3	Parallel 39-inch/54-inch	114	75.7	No
TI4	Parallel 39-inch/54-inch	124	74.6	No
TI5	Parallel 39-inch/54-inch	132	94.2	No
TI6	15-inch	8.0	3.7	No
TI7	30-inch	56.9	18.4	No
TI8	15-inch	76.1	4.5	No
TI9	18-inch	76.1	6.9	No
TLS1	Lift Station	56.9	3.8	No
TFM1	14-inch Force Main	56.9	4.1	No

Source: TRA Inflow/Infiltration Assessment, 2006

The TRA Ten Mile 2005 peak wet-weather flow was 93.9 mgd according to the TRA 2006 I&I assessment. The TRA Red Oak 2005 peak flow was approximately 66.0 mgd. An increase in capacity is recommended for the existing TRA infrastructure for both the Ten Mile and Red Oak wastewater systems to meet projected wastewater flows. **Table 4-15** compares the recommended infrastructure capacities to the projected 2035 wastewater flows.

Table 4-15. Recommended TRA Wastewater Infrastructure Capacity

Project	Recommended Infrastructure	2035 Peak Flow (mgd)	Recommended Capacity (mgd)	Approximate Time of Need
TI1	Parallel 42-inch/60-inch	96.2	107	2013
TI2	Parallel 48-inch/60-inch	102	110	2013
TI3	Parallel 54-inch/72-inch	114	124	2013
TI4	Parallel 54-inch/66-inch	124	142	2013
TI5	Parallel 54-inch/54-inch	132	133	2013
TI6	30-inch	8.0	23.6	2014
TI7	Parallel 30-inch/36-inch	42.6	78.3	2013
TI8	48-inch	74.6	100	2013
TI9	48-inch	74.6	94.9	2013
TLS1	Lift Station	42.6	42.6	2013
TFM1	48-inch Force Main	42.6	84.7	2013

The timing in which the upgrades in **Table 4-15** are needed is contingent on growth from outside of the Study Area. Further analysis on the growth outside of the Study Area is needed to provide an accurate construction date. The approximate construction date shown in the table assumes a linear growth of all of TRA's customers from 2005 to 2040.

WILMER

Wilmer wastewater is pumped through a lift station and 16-inch force main to Southside WWTP. **Table 4-16** compares the capacity of the existing lift station and force main to Wilmer's 2035 projected wastewater flows.

Table 4-16. Existing Wilmer Wastewater Infrastructure Capacity

Project	Infrastructure	2035 Peak Flow (mgd)	Existing Capacity (mgd)	Sufficient Capacity in 2035?
WLS1	Lift Station	5.20	0.65	No
WFM1	16-inch FM	5.20	5.40	Yes

Source: City of Wilmer Community Plan 2030, 2009

Wilmer's 2010 peak flow is estimated to be 0.37 mgd. Wilmer's lift station capacity is insufficient to meet the projected 2035 flows. A capacity upgrade of the existing lift station is recommended. The lift station capacity increase can be constructed in two phases to meet future flows. The second phase would only require additional pumps. The existing force main capacity is capable of meeting the projected 2035 wastewater flows from Wilmer. **Table 4-17** shows the recommended infrastructure upgrades versus the 2035 peak day flows.

Table 4-17. Recommended Wilmer Wastewater Infrastructure Capacity

Project	Recommended Infrastructure	2035 Peak Flow (mgd)	Recommended Capacity (mgd)	Approximate Time of Need
WLS1	Lift Station	5.20	3.50	2013
WLS2	Lift Station	5.20	5.20	2025

Wilmer's geographic location offers the flexibility to potentially utilize both DWU's Southside WWTP and TRA's Ten Mile WWTP as treatment providers. Connecting to TRA to serve the southern part of Wilmer's service area offers several benefits:

- The need for new lift stations in Wilmer to pump wastewater across the Cottonwood Creek/Ten Mile Creek drainage divide is reduced,
- Fewer lift stations and force mains results in lower operation and maintenance costs for the wastewater system,
- Smaller capacity upgrades will be necessary at Wilmer's primary lift station that pumps to Southside WWTP.

However, connecting to TRA will also require separate billing rates because of different treatment providers and initial costs to provide a metered connection to TRA's wastewater system. The TRA infrastructure recommendations presented in this report and their associated costs do not reflect a flowrate increase as a result of Wilmer connecting to their system.

BUDGETARY COST ESTIMATES

This section includes estimates of probable construction costs for wastewater infrastructure. The order-of-magnitude estimates are for preliminary budgetary purposes. A 25 percent contingency factor is included, commensurate with the current planning stage. The estimates are based on the conceptual sizes recommended in this study and general unit cost rates compiled for similar projects. Professional services fee estimates are included assuming 15 percent of construction costs. An inflation rate of four percent per year was added to the estimates. The cost estimates exclude financing costs for projects constructed in future years. The itemized line costs of each project are tabulated in Appendix D.

The cost estimates reflect the cost of the recommendations for each municipality. Collection system upgrades are not considered in this report. More detailed analysis is needed to size and configure collection pipe networks to meet the flows of specific areas within each city. For budgetary planning purposes, the following general rule-of-thumb costs are provided for installation of wastewater collection pipe.

- Residential - $18,000 per acre
- Industrial/Commercial - $11,000 per acre

The density of pipe is higher in residential areas than in industrial areas, resulting in a higher cost per acre. As discussed in Appendix F, developers frequently fund the construction of infrastructure needed to serve their sites, such as wastewater collectors and water distribution lines.

Dallas: Table 4-18 shows DWU's estimate of probable construction cost to extend the Newton Creek interceptor in Dallas (Project DI5) to serve currently unserved area.

Table 4-18. Dallas Wastewater Interceptor Cost Estimate

Item	Total Cost
30" to 12" Interceptor (DI5)	$3,400,000*

*Funds have been planned and programmed

Ferris: Table 4-19 shows an estimate of probable construction cost to upgrade the Ferris interceptor to meet their projected 2035 flows.

Table 4-19. Ferris Wastewater Interceptor Cost Estimate

Item	Total Cost
21" Wastewater (FI1)	$2,920,000

Hutchins: Table 4-20 shows the estimated costs to upgrade Hutchins' primary lift station and force main to meet projected 2035 flows.

Table 4-20. Hutchins Wastewater Infrastructure Cost Estimate

Item	Total Cost
Lift Station Upgrade (HLS1)	$930,000
18" Force Main (HFM1)	$2,590,000
Total	**$3,520,000**

Lancaster: Table 4-21 shows estimates of probable construction cost for required interceptor upgrades in Lancaster to meet projected 2035 flows.

Table 4-21. TRA Wastewater Infrastructure Cost Estimates

Item	Total Cost
21" to 36" Wastewater (LI1)	$7,470,000
21" to 30" Wastewater (LI2)	$7,120,000
21" to 36" Wastewater (LI3)	$6,950,000
21" Wastewater (LI4)	$1,320,000
21" to 24" Wastewater (LI5)	$2,510,000
Total	**$25,370,000**

TRA: **Table 4-22** shows estimates of probable construction cost for TRA infrastructure required to meet projected 2035 flows.

Table 4-22. TRA Wastewater Infrastructure Cost Estimates

Item	Total Cost
60" Wastewater (TI1)	$12,700,000
60" Wastewater (TI2)	$11,535,000
72" Wastewater (TI3)	$17,235,000
66" Wastewater (TI4)	$11,560,000
54" Wastewater (TI5)	$9,383,000
30" Wastewater (TI6)	$773,000
36" Wastewater (TI7)	$4,828,000
48" Wastewater (TI8 & TI9)	$6,645,000
Lift Station Upgrade (TLS1)	$5,650,000
48" Force Main (TFM1)	$8,055,000
Total	**$88,364,000**

Wilmer: **Table 4-23** shows estimates of probable construction cost to upgrade Wilmer's primary lift station at each recommended phase.

Table 4-23. Wilmer Lift Station Cost Estimate

Item	Total Cost
Lift Station Upgrade (WLS1)	$660,000
Lift Station Upgrade (WLS2)	$280,000
Total	**$940,000**

SUMMARY

Each utility in the SDCIA Study Area has undertaken an assessment of its wastewater collection system, and many of the utilities have capital improvements plans that identify new infrastructure needed to meet future wastewater flows. These plans were evaluated against existing and projected flows. Where the planned capacity exceeds the calculated 2035 peak flows, the recommendations in this report reflect the planned capacity. This report provides additional recommendations for infrastructure upgrades where the infrastructure was estimated to be insufficient for the 2035 flows projected in this Study. Each utility in the SDCIA Study Area will require additional wastewater infrastructure to meet future flow rates. **Table 4-24** summarizes the recommended and/or planned infrastructure needed to meet future and 2035 flows.

Table 4-24. Summary of SDCIA Recommended Wastewater Infrastructure

Utility	Project	Upgrade	Approximate Time of Need	Cost	Infrastructure Identified In:
Dallas Water Utilities	DI5	12" to 30" Newton Creek Interceptor Extension	2013	$3,400,000*	Dallas Water Utilities
Ferris	FI1	21-inch Interceptor	2014	$2,920,000	SDCIA Project
Hutchins	HLS1	3.8 mgd Lift Station Upgrade	2015	$930,000	Hutchins' CIP
	HFM1	18-inch Parallel Force Main	2015	$2,590,000	Hutchins' CIP
			Total	$3,520,000	
Lancaster	LI1	21" to 36" Interceptor	2013	$7,470,000	Lancaster Master Plan
	LI2	21" to 30" Interceptor	2021	$7,120,000	Lancaster Master Plan
	LI3	21" to 36" Interceptor	2013	$6,950,000	Lancaster Master Plan
	LI4	21" Interceptor	2013	$1,320,000	Lancaster Master Plan
	LI5	21" to 24" Interceptor	2013	$2,510,000	Lancaster Master Plan
			Total	$25,400,000	
TRA	TI1	60-inch Parallel Interceptor	2013	$12,700,000	TRA Master Plan
	TI2	60-inch Parallel Interceptor	2013	$11,535,000	TRA Master Plan
	TI3	72-inch Parallel Interceptor	2013	$17,235,000	TRA Master Plan
	TI4	66-inch Parallel Interceptor	2013	$11,560,000	TRA Master Plan
	TI5	54-inch Parallel Interceptor	2013	$9,383,000	TRA Master Plan
	TI6	30-inch Interceptor	2013	$773,000	TRA Master Plan
	TI7	36-inch Parallel Interceptor	2013	$4,828,000	SDCIA Project
	TI8	48-inch Interceptor	2013	$1,470,000	SDCIA Project
	TI9	48-inch Interceptor	2013	$5,175,000	SDCIA Project
	TLS1	38.8 mgd Lift Station Upgrade	2013	$5,650,000	SDCIA Project
	TFM1	48-inch Force Main	2013	$8,055,000	SDCIA Project
			Total	$88,400,000	
Wilmer	WLS1	3.5 mgd Lift Station Upgrade	2013	$660,000	SDCIA Project
	WLS2	1.7 mgd Lift Station Upgrade	2025	$280,000	SDCIA Project
			Total	$940,000	

*Funds have been planned and programmed

[1] 750 gpd per acre is based on the reported inflow and infiltration rate of the City of Lancaster in the City of Lancaster 2006 Wastewater Master Plan.

Section 5: Stormwater Infrastructure Assessment

This section presents the infrastructure capacity and needs assessment for stormwater and drainage infrastructure in the project area. This assessment is based on the following:

- Current floodplain/stormwater/drainage ordinances and drainage manuals
- Current Federal Emergency Management Agency (FEMA) maps and Flood Insurance Study stream profiles
- Previous planning studies developed for the cities in the project area
- Information obtained previously for the demographic alternative analysis (Task 2.3)

Conveyance of stormwater can be achieved by several different means. These include: curb and gutter, ditches, detention/retention structures, closed conduits (storm sewers), open channels, and culverts and bridges. Detention/retention structures are included in this list due to their ability to reduce flood flows back to predevelopment conditions.

With the goal of this infrastructure project to promote growth in the southern sector of Dallas County, having a basis of where the area currently stands on infrastructure needs plays an important role on how future infrastructure projects are implemented before development occurs. For the stormwater and drainage infrastructure section of this study, this means having an understanding of what floodplain and stormwater policies have been adopted by each of the member cities and recommending policies that would be beneficial to all. It means developing an inventory of existing mapped streams, structures and other stormwater related features, determining areas of deficiencies, and understanding what planning studies have been previously developed and how to apply them as development occurs.

Categories on which this assessment is based include: floodplain ordinance and regulations, stormwater ordinances, existing inventory, and planning studies. To distinguish between the two: floodplain ordinances are those policies which the member cities have adopted when it pertains to flooding along a mapped stream, and stormwater ordinances are those policies the member cities have adopted when it pertains to drainage associated with storm sewers, street drainage, and ditches.

ADOPTED FLOODPLAIN ORDINANCES AND REGULATIONS

Each community in the project area is a member of the National Flood Insurance Program (NFIP). In order to be eligible for flood insurance, member communities are required to adopt and enforce floodplain management regulations that meet or exceed the criteria established under Section 1361 (c) of the 1968 National Flood Insurance Act. **Table 5-1** shows the level of adopted regulations for the cities in the project area.

Section 1361(c) is intended to protect lives and property from flood-prone areas. The minimum requirements include:

- Permit for all proposed construction
- Review proposed developments
- Review permit applications
- Review subdivision proposals and all new development
- Require new and replacement water supply systems to minimize infiltration of floodwaters
- Require sanitary sewage and on-site disposal systems be protected
- Require elevation of lowest floor to or above Base Flood Elevation for residential
- Require elevation or floodproofing to or above Base Flood Elevation for commercial
- Certification by registered engineer
- Fully enclosed areas below elevated lowest floor automatically equalize (vents)
- Manufactured homes lowest floor elevated to or above Base Flood Elevation or the chassis 36 inches above grade and anchored
- Until Floodway is designated, permit no development within Zones A or AE unless it is demonstrated that water surface elevations will not increase by more than one foot.
- Require that recreational vehicles placed in a Special Flood Hazard Area be there for less than 180 days and be fully licensed and road ready
- Adopt floodways
- Prohibit encroachments within floodway unless engineering study shows no rise in water surface elevations.

Table 5-1. Floodplain Management Regulations

City/County	NFIP Criteria
City of Dallas	Exceeds Minimum Required
City of Ferris	Meets Minimum Required
City of Hutchins	Meets Minimum Required
City of Lancaster	Exceeds Minimum Required
City of Wilmer	Meets Minimum Required
Dallas County	Meets Minimum Required

Source: Current Adopted Floodplain Ordinance and Drainage Manuals.

CITIES OF FERRIS, HUTCHINS, WILMER AND DALLAS COUNTY

While the cities of Ferris, Hutchins, and Wilmer and Dallas County are not required to adopt a higher standard of floodplain regulations under NFIP, it is recommended that they do adopt more stringent floodplain rules similar to those of Dallas and Lancaster as the area develops. By adopting similar rules, it will ensure that all cities are following the same criteria when it comes to development. It will also ensure that as development occurs, hydraulic impacts to adjacent property owners and/or upstream and downstream communities are not created. Another added benefit of going with higher standards is that the communities can receive a discount on flood insurance premiums.

CITY OF DALLAS

The Dallas floodplain ordinance exceeds FEMAs criteria. Dallas requires that all stream corridor studies be based on fully developed watershed condition discharges. However, FEMA studies are based on existing watershed condition discharges. Preservation of the natural condition of stream corridors is preferred, but development within the floodplain is allowed as long as the development abides by the city's ordinance for filling in the floodplain. These criteria include:

- Except for detention basins, an increase in the design flood water surface elevations is not allowed upstream, downstream, or through the project area.
- Project may not create or increase erosive velocities.
- Water surface elevations must be determined using existing and proposed public and private improvements.
- No loss in valley storage is permitted for those projects which have contributing drainage areas of more than three square miles. For project located between three square miles and 130 acres, valley storage loss shall not exceed 15 percent. No limit exists on the amount of valley storage loss for projects located in contributing drainage areas less than 130 acres.
- Before relocation or alteration of a natural stream, an environmental impact study must be prepared for the project.
- The toe of the fill placed in the floodplain must parallel the flow of the channel.
- Fill slopes should be 4:1 for half of the distance and 6:1 for the other half. Vertical walls are allowed as long as they do not cause hydraulic issues.
- Excavation in the overbank areas is allowed as long as the depth of excavation does not exceed one-third the depth of the natural stream, and is at least 50 feet away from the natural stream.
- A landscape and erosion control plan must be submitted and approved.
- Projects that remove areas from the floodplain shall not cause additional expenses on existing or proposed public improvements.

The City of Dallas is currently in the process of changing its floodplain management criteria to correlate better with the Integrated Stormwater Management (ISWM) program developed by the North Central Texas Council of Governments.

CITY OF LANCASTER

The City of Lancaster floodplain ordinance also exceeds FEMAs criteria. Lancaster requires that all stream corridor studies must be based on fully developed watershed condition discharges. Preservation of natural channels and floodplains is encouraged due to the benefits this approach provides. Lancaster allows all future developments as long as they adhere to the following criteria:

- The receiving drainage system or natural stream can convey the design storm runoff without adverse impacts to structures, property, or receiving water quality, and there is no significant increase in shear stress or erosion potential.
- Detailed erosion control plans must be provided prior to construction.
- Detailed engineering and technical analysis shall be performed before any development is allowed in a basin which contains a regional detention/retention pond.
- Proposed detention/retention ponds must comply with Texas Commission on Environmental Quality dam safety requirements.
- Design storages of detention/ retention ponds must be maintained.
- Reclamation from the floodplain is allowed as long as water surface elevations do not increase, valley storage is not decreased, and velocities are maintained.
- Finished floors of residential and nonresidential structures shall be a minimum of one foot above the design flood (100-year fully developed) elevation.
- Low beam of new bridges shall be a minimum of one foot above the design flood elevation.

- Encroachments into a designated floodway are prohibited unless it is demonstrated through a detailed hydrologic and hydraulic analysis that the encroachment will not increase flood elevations during a design or base flood storm event.

CORRIDOR DEVELOPMENT CERTIFICATE (CDC) CRITERIA

Proposed developments that will be located in the City of Dallas or in the unincorporated portion of Dallas County, and within the Trinity River floodplain must follow a set of regional criteria and procedures for development which exceed the minimum floodplain criteria required by FEMA. The criteria include:

- Based on anticipated fully developed watershed conditions (year 2050 discharges), proposed projects cannot increase water surface elevations for the Regulatory Flood (100-year) and Standard Project Flood events.
- Maximum allowable valley storage loss for the 100-yr and SPF is zero percent and five percent, respectively.
- Floodplain alterations may not create or increase erosive velocities either on-site or off-site.

Determination of whether a proposed site must adhere to CDC criteria is dependent on the site location within the one percent Annual Chance of Exceedance (ACE) or 100-year floodplain as shown on FEMA regulatory maps for the Trinity River.

STORMWATER ORDINANCES

Of the cities located in the study area, availability of storm sewer information (ordinance, design requirements, and inventory) was only found for Dallas, Lancaster, Ferris, and Wilmer. It is recommended that further investigation be conducted in determining the existing inventory in the area and determining the future inventory needs of the area.

CITY OF DALLAS

Dallas requires all storm sewers to be designed to convey the 100-year frequency storm event, or the storm of record, whichever is greater. Gutters and inlets must be designed in a way that prevents the 100-year storm from overtopping the curb or being greater than six inches in depth, and allowing for one lane of traffic in each direction to remain open.

CITY OF LANCASTER

Both the projected ultimate land use condition within a watershed and the 100-year frequency storm event is required for design of stormwater infrastructure in the City of Lancaster, except for enclosed pipe systems. For enclosed pipe systems that do not drain to sump or detention areas, a 25-year storm frequency with one foot of freeboard (at throat of inlet) is required. Curbs and gutters must be designed using a 25-year storm event and ensure that the 100-year event does not overtop the curbs on each side of the roadway. For major streets, one lane of traffic in both directions should remain open, and for minor streets, one lane of traffic should remain open.

STORMWATER INVENTORY

CITY OF DALLAS

Figure 5-1 shows the location of the existing storm sewer infrastructure located in the study area for the City of Dallas. The storm sewers in this area consist of 21 inch to 78 inch diameter reinforced concrete pipe. Information on whether these lines are designed to the proper size according to City of Dallas requirements is not known or available. Further investigation is recommended.

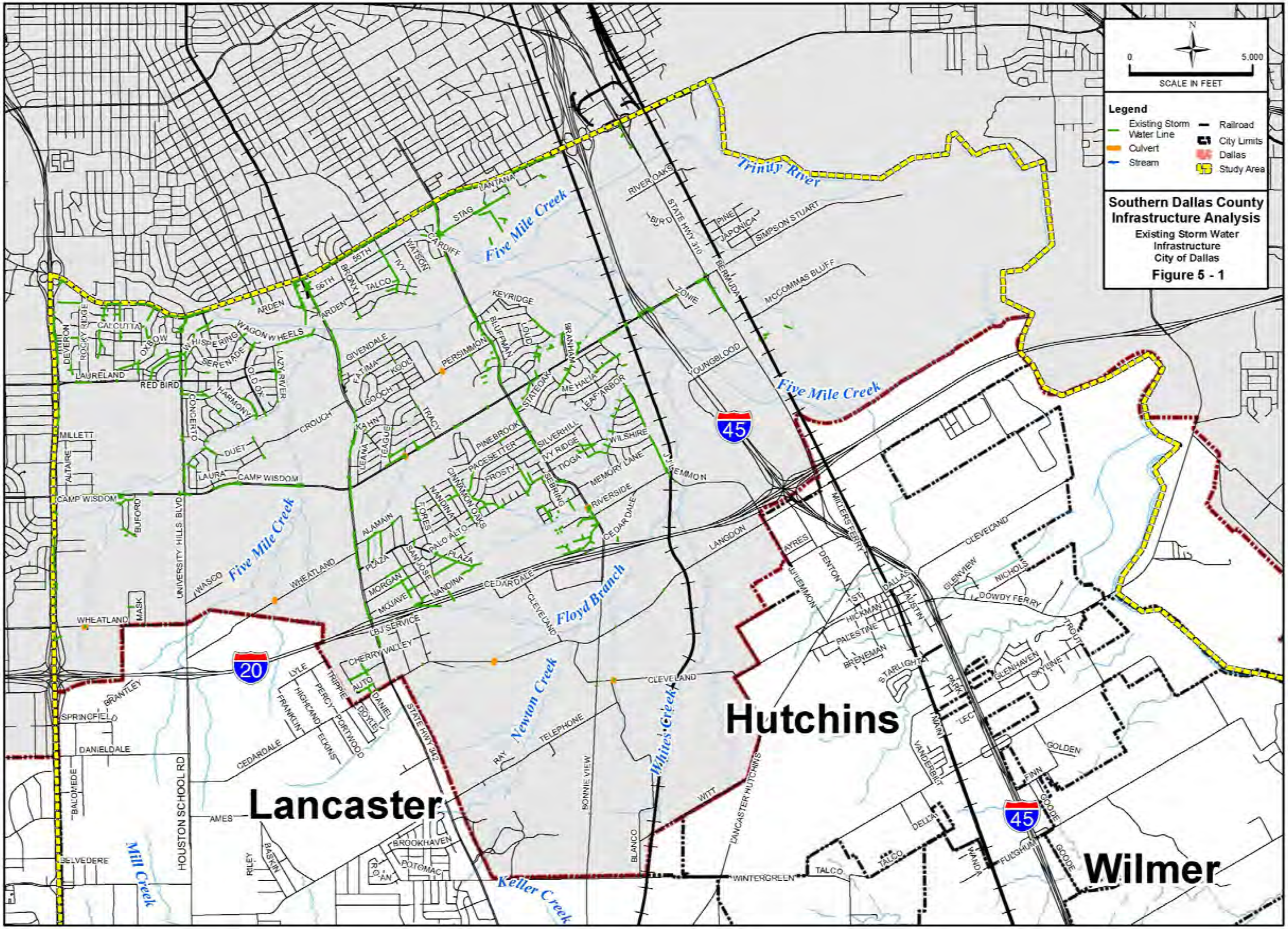
CITY OF FERRIS

An inventory of existing drainage structures was developed as part of a 2007 planning study for the City of Ferris. This study quantifies culverts that the city is responsible for and the number of culverts that other entities (TxDOT and County) are responsible for. The condition of these structures and the cost to repair or replace these culverts was also discussed. Estimated cost to the City of Ferris to repair the seven culverts was estimated at $15,000 in the study. The study further states that Ferris has approximately 132,500 linear feet of curb and gutter that works well in removing stormwater from the streets. However, the study states that repairs or replacements are needed in the central business district. The study estimates the cost for these repairs or replacements at $100,000. The location of these structures requiring repair was not provided. **Table 5-2** lists the existing storm sewer infrastructure within the City of Ferris.

Table 5-2. Existing Stormwater Inventory – Ferris

Total Count		Maintenance Responsibility		Number Damaged (within City Limits)
		City	TxDOT/County	
Corrugated Metal Pipe	34	17	17	3
Reinforced Concrete Pipe	61	46	15	4
Reinforced Concrete Box Culvert	25	10	15	0
Total	**120**	**73**	**47**	**7**

Source: City of Ferris Planning Studies, 2007


Southern Dallas County
Infrastructure Analysis
Existing Storm Water
Infrastructure
City of Dallas
Figure 5 - 1
Legend
Existing Storm Water Line
Culvert
Stream
Railroad
City Limits
Dallas
Study Area
N
0
5,000
SCALE IN FEET
Hutchins
Lancaster
Wilmer
Trinity River
Five Mile Creek
Floyd Branch
Newton Creek
Whites Creek
Keller Creek
Mill Creek
45
20
UNIVERSITY HILLS BLVD
HOUSTON SCHOOL RD
STATE HWY 310
STATE HWY 342
CAMP WISDOM
WHEATLAND
CEDARDALE
CLEVELAND
LANGDON
MILLERS FERRY
LANCASTER HUTCHINS
WINTERGREEN
BONNIE VIEW
TELEPHONE

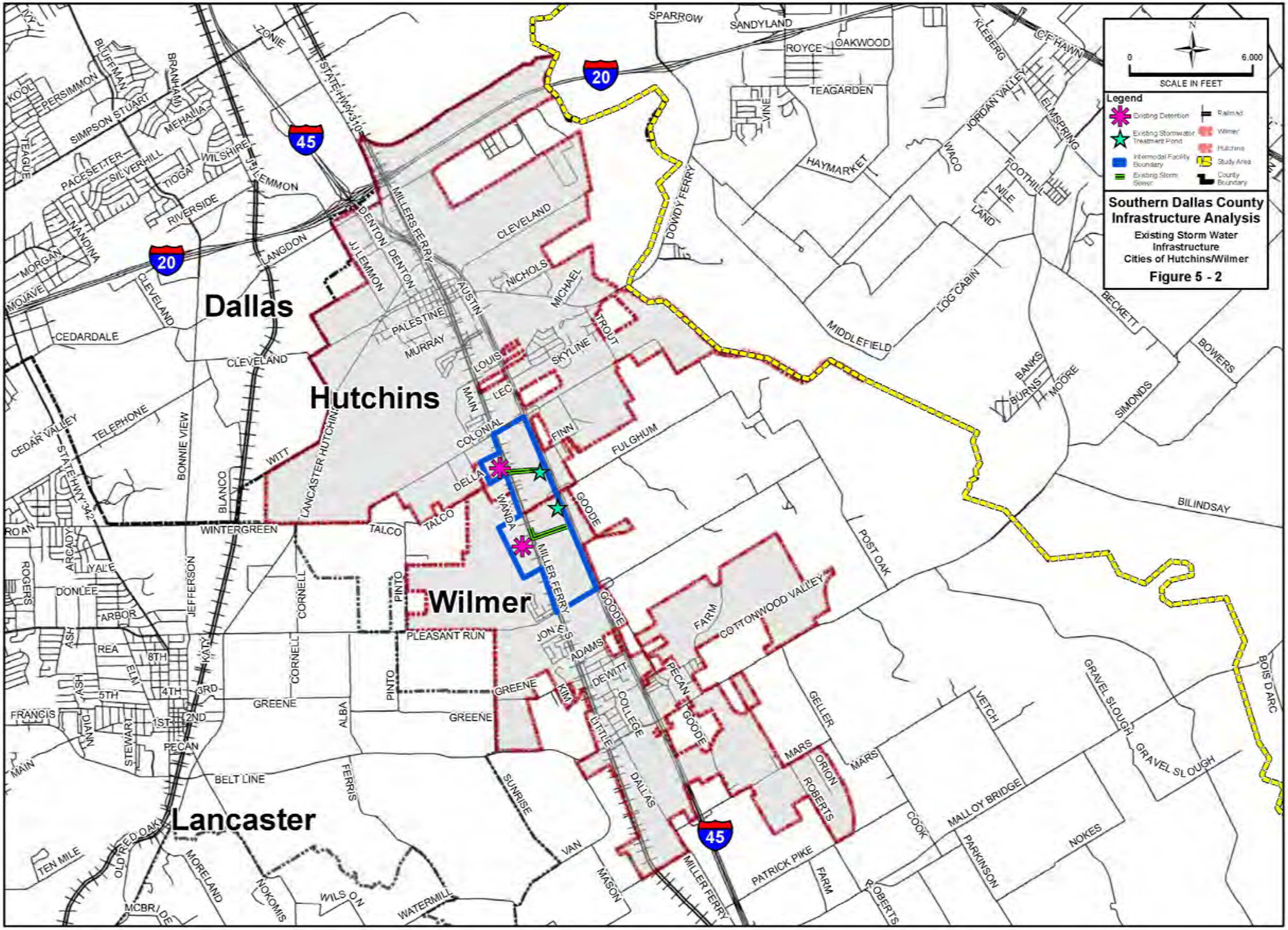
CITY OF HUTCHINS, CITY OF WILMER

Existing stormwater infrastructure information in Hutchins and Wilmer was limited to the Kissell Street Bridge and the Union Pacific Intermodal Facility. The Kissell Street Bridge over the Cottonwood Creek tributary of Tenmile Creek in Wilmer was rebuilt in 1997. The new structure was designed to pass the one hundred year (1% Annual Chance of Exceedance) storm event without the structure overtopping. Current FEMA floodplain mapping and existing Flood Insurance Study (FIS) profile for Cottonwood Creek tributary of Tenmile Creek still reflects the original pre-1997 steel truss bridge. The Union Pacific Intermodal Facility next to Interstate Highway 45 includes several detention ponds, stormwater treatment ponds, and storm sewers. All features were designed to either convey the one hundred year (1% Annual Chance of Exceedance) storm event or detain back to predevelopment discharges in order to prevent increased discharges on downstream properties. **Table 5-3** lists the existing infrastructure features in the intermodal facility. **Figure 5-2** shows a map of these features. Other existing stormwater infrastructure in Hutchins and Wilmer has not been inventoried due to a lack of available information. Further investigation and the development of a plan for each city is recommended. The cost to develop such a plan can range from $50,000 per community for a limited investigation to as much as $100,000 per square mile for a detailed investigation.

Table 5-3. Existing Stormwater Inventory – Union Pacific Intermodal Facility

Stream	Infrastructure	Size
4A4	Detention Pond	29 acre-ft
	Stormwater Treatment Pond	17 acre-ft
	Storm Sewer	72" RCP
4A5	Detention Pond	100 acre-ft
	Stormwater Treatment Pond	22 acre-ft
	Storm Sewer	60" RCP

Source: November 2005 Request for a Letter of Map Revision for a portion of a 342 Acre Tract on Stream 4A4 and Stream 4A5, tributaries of the Trinity River, City of Hutchins, TX and City of Wilmer, TX.



Southern Dallas County Infrastructure Analysis
Existing Storm Water Infrastructure
Cities of Hutchins/Wilmer
Figure 5 - 2
Legend
Existing Detention
Existing Stormwater Treatment Pond
Intermodal Facility Boundary
Existing Storm Sewer
Railroad
Wilmer
Hutchins
Study Area
County Boundary
SCALE IN FEET
0
6,000
N
Dallas
Hutchins
Wilmer
Lancaster
20
45
MILLERS FERRY
MILLER FERRY
GOODE
COLONIAL
WANDA
DELLA
TALCO
CLEVELAND
LANCASTER HUTCHINS
WINTERGREEN
PLEASANT RUN
BELT LINE
COTTONWOOD VALLEY
FULGHUM
BILINDSAY
GRAVEL SLOUGH
MALLOY BRIDGE
PATRICK PIKE
STATE HWY 310
STATE HWY 342

CITY OF LANCASTER

Existing stormwater information was provided by the City of Lancaster in addition to available information for the ProLogis Park I20/I35. ProLogis Park I20/I35 is a private development located just south of IH20 and east of Houston School Road. A list of the detention ponds for this project is shown in **Table 5-4**. All structures were designed according to the City of Lancaster's Stormwater Design Manual. A list of the other detention ponds located in Lancaster is shown in **Table 5-5.** The surface area covered by these ponds is listed; however, volume for these ponds is unknown. Whether these other ponds are designed according to the City of Lancaster's Stormwater Design Manual is unknown. **Figure 5-3** shows a map of the area and includes storm sewers. The storm sewers shown in the area consist of 8 inch to 84 inch diameter reinforced concrete pipe. Information on whether these lines are designed to the proper size according to City of Lancaster requirements is not known or available. Further investigation is recommended.

Table 5-4. Existing Stormwater Inventory – ProLogis Park I20/I35

Stormwater Feature	Size
Detention Pond 1	27 acre-feet
Detention Pond 2	28.8 acre-feet
Detention Pond 3	17.1 acre-feet

Source: May 2008 Request for a Letter of Map Revision for ProLogis Park I20/I35 on Barney Branch and Runyon Springs Tributary 1, Lancaster, TX

Table 5-5. City of Lancaster Existing Stormwater Inventory

Location	Area (acres)
Pleasant Run and Rawlings	0.37
East side along Beckley Avenue between Gateway Drive and Muttick Lane	0.05
East side along Beckley Avenue between Gateway Drive and Muttick Lane	0.04
Southwest of Cedar Valley Drive and State Highway 342	0.14
East side along Beckley Avenue between Gateway Drive and Muttick Lane	0.46
Near Riley Drive and Myrtle Street	0.80
Southeast of Wintergreen Road and Houston School Road	0.51
Southeast of Chapman Drive at Randolph Street	1.00
South of Cedardale Road near Elkins Avenue	4.15
Northwest of Telephone Road and Wintergreen Road	2.12
East of the intersection of Shasta Drive and Sherwood Avenue	0.85
Southeast of the intersection of Shasta Drive and Sherwood Avenue	1.78
Southeast of the intersection of Shasta Drive and Sherwood Avenue	0.24
North of Spring Hill Lane and Wild Grove Lane	3.28

Source: City of Lancaster, TX GIS data. Pond volume is unknown.
This does not include ponds from ProLogis Park

MAPPED/STUDIED STREAMS

Sixty Five streams within the study area have been studied and/or mapped for FEMA purposes. Of the 65 streams, approximately 62 percent of the streams are Zone AE while approximately nine percent are Zone A streams (see **Table 5-6** below). Zone AE streams are streams in which Base Flood Elevations (100-year) and inundation maps showing the one percent Annual Chance of Exceedance (100-year) floodplain have been determined. Flood insurance and floodplain management is required in these areas. Zone A streams are those streams in which a study has been done using approximate methods and Base Flood Elevations have not been determined. Zone X (shaded) areas are defined as: an area located between the 100-year and 500-year flood limits, protected by a levee, depth of flooding less than 1 foot, or having drainage areas less than 1 square mile. Zone X (unshaded) areas are defined as an area located above the 500-year flood level. FEMA policy is to only map those streams which have a drainage area of one square mile or larger. Therefore, there will be those streams that exist on a map or aerial that has less than a square mile in drainage area and will be shown on a FEMA map as either Zone A or Zone X. **Figures 5-4** through **5-8** show the location of these streams in the study area.

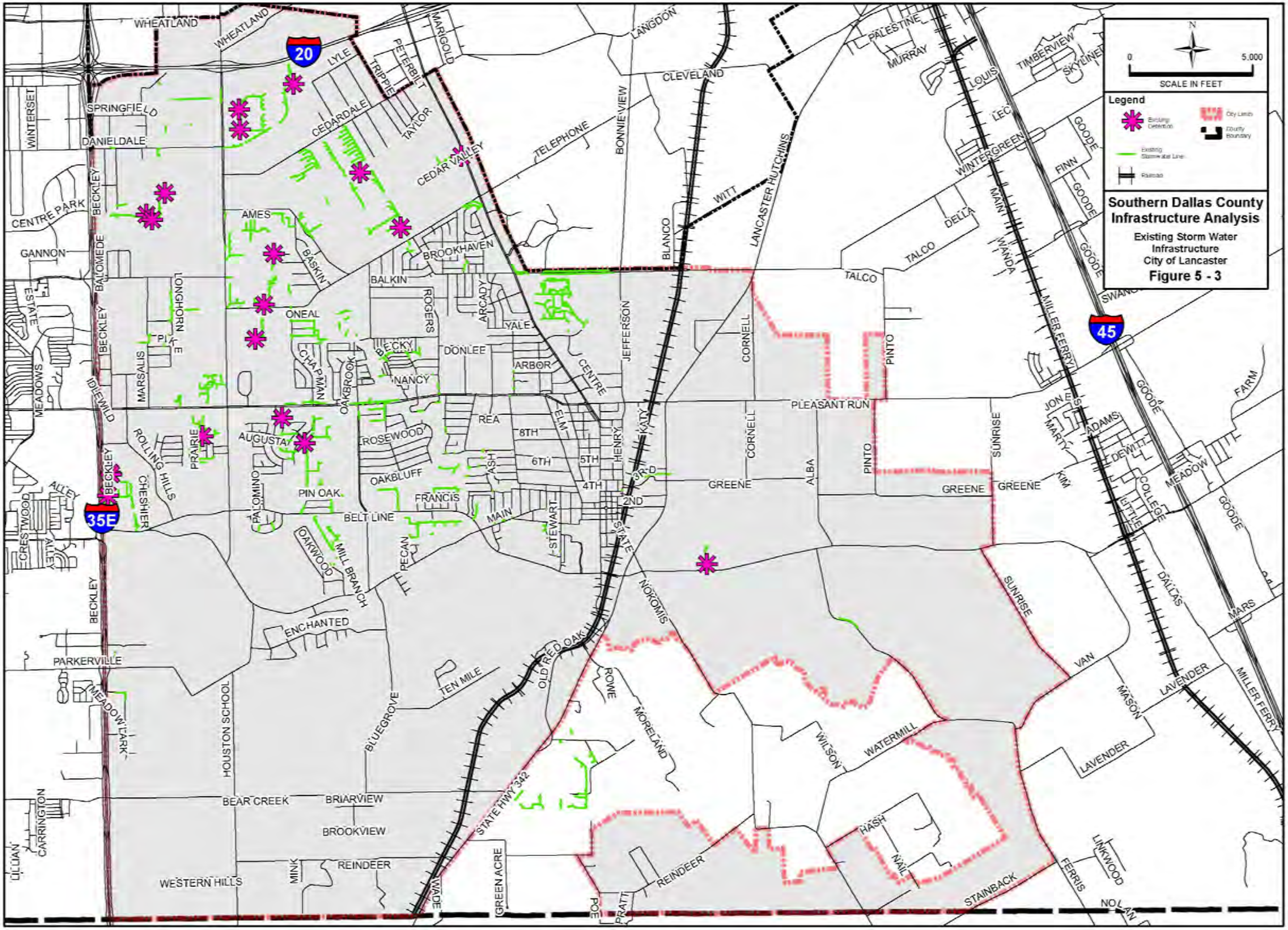
Table 5-6. Percent of Streams Mapped Per Zone

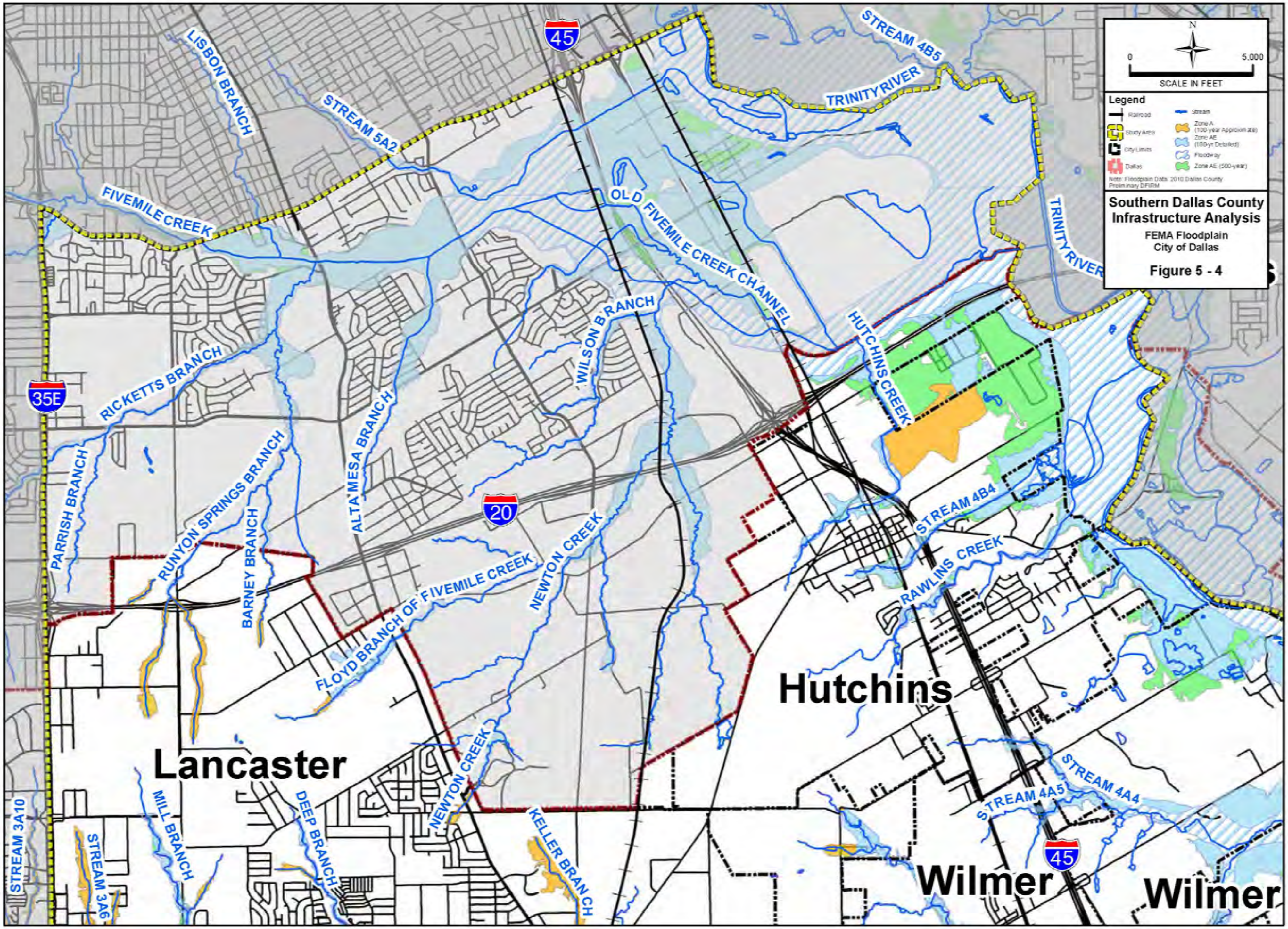
Zone	Feet	Percent of Total
Zone A	106,018	9.14
Zone AE	714,870	61.66
Zone X	338,477	29.20

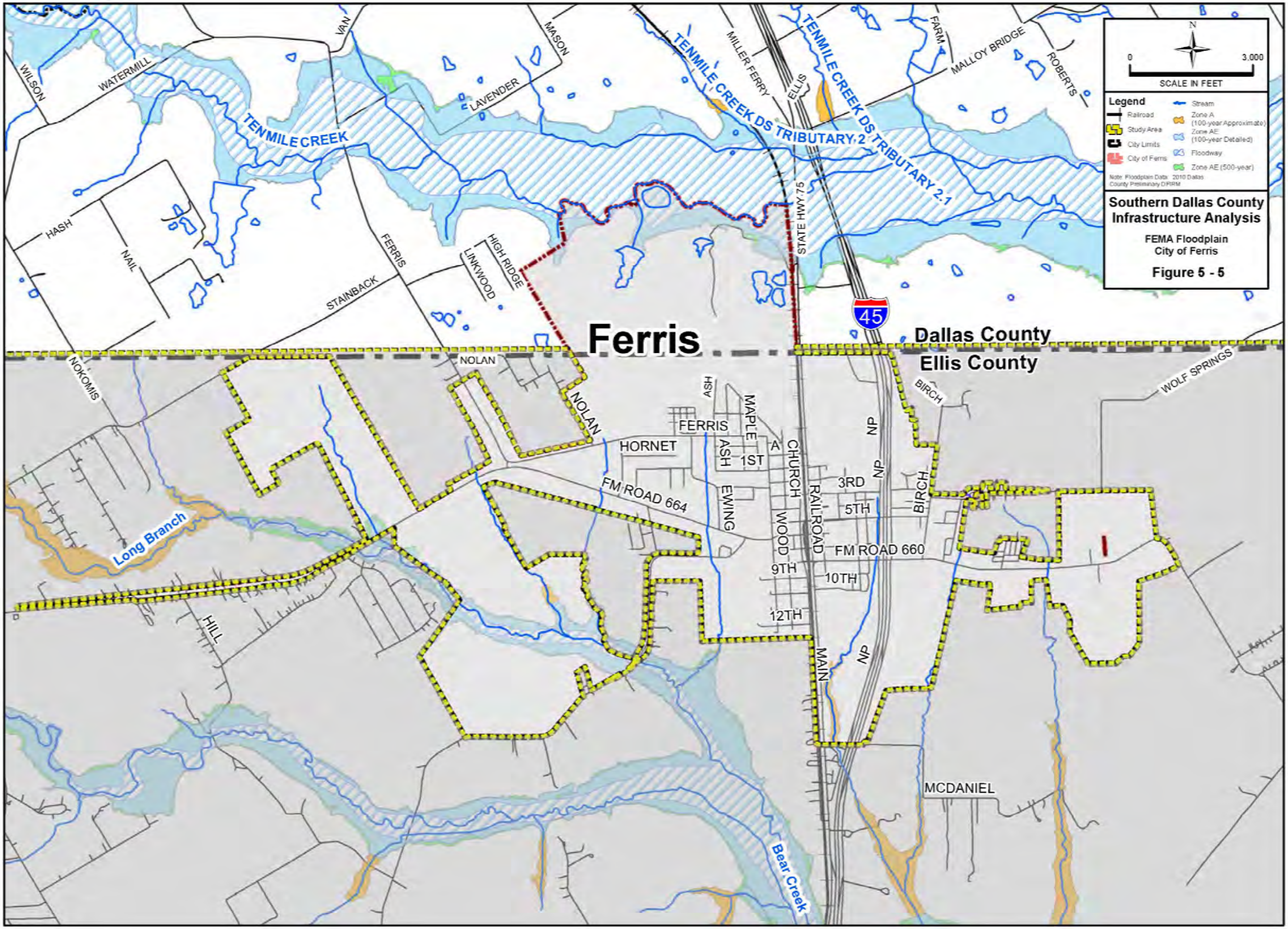
Source: 2010 Dallas County Preliminary DFIRM and 2010 Ellis County Preliminary DFIRM

During the review of the FEMA flood profiles and floodplain maps several discrepancies between the two sources were noticed. In most cases, structures shown in the FEMA flood profiles do not exist any longer compared to aerial mapping. To correct these inaccuracies, it is recommended that a hydrology and hydraulic models of these streams in the south Dallas County area be restudied. Estimated cost of this restudy is approximately $2,000,000.

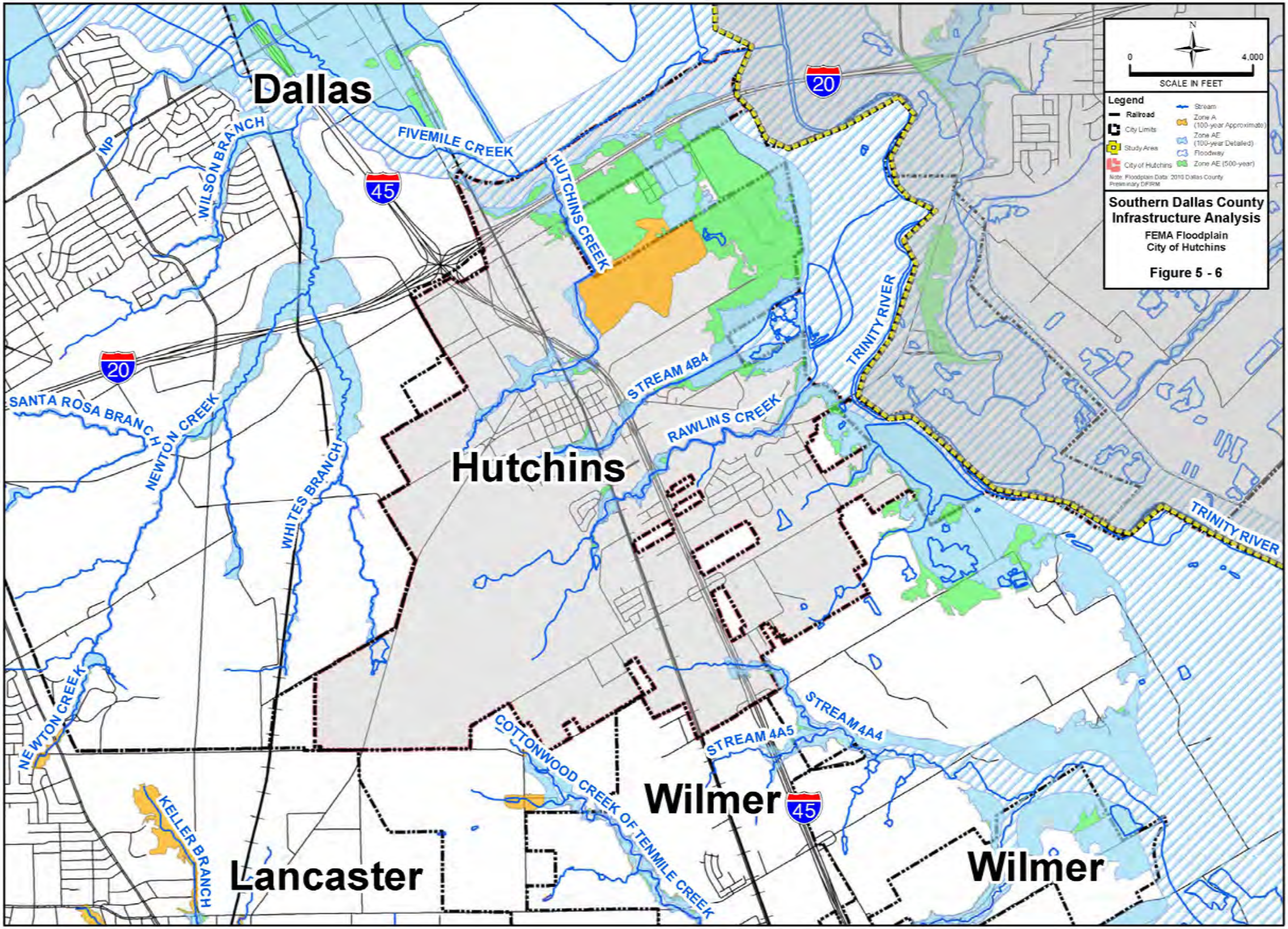
An existing infrastructure inventory of bridges and culverts was developed using current Flood Insurance Study (FIS) profiles for the mapped/studied streams. Furthermore, based on the profiles of these streams an assessment was developed showing the storm frequency for the bridge or culvert that it passes before overtopping occurs. Each city is broken out individually (see **Tables 5-7** to **5-12**) and structures that cross streams which also serve as community boundaries are only listed once. **Figures 5-9** through **5-13** show structures that do not pass the one percent Annual Chance of Exceedance (100-year) storm event.


Southern Dallas County
Infrastructure Analysis
Existing Storm Water
Infrastructure
City of Lancaster
Figure 5 - 3
Legend
Railroad
SCALE IN FEET
0
5,000
N
WHEATLAND
LYLE
CEDARDALE
TAYLOR
CEDAR VALLEY
TELEPHONE
BONNIE VIEW
CLEVELAND
LANGDON
LANCASTER HUTCHINS
WITT
BLANCO
TALCO
PINTO
CORNELL
JEFFERSON
PLEASANT RUN
SUNRISE
GREENE
ALBA
KATY
STATE
NOKOMIS
BELT LINE
MAIN
BECKLEY
HOUSTON SCHOOL
BEAR CREEK
BRIARVIEW
BROOKVIEW
REINDEER
WESTERN HILLS
STATE HWY 342
MILLER FERRY
GOODE
LAVENDER
MASON
VAN
WATERMILL
WILSON
STAINBACK
FERRIS
LINKWOOD
DALLAS
MARS
PARKERVILLE
MEADOW LARK
ENCHANTED
TEN MILE
BLUEGROVE
OLD RED OAK
ROWE
MORELAND

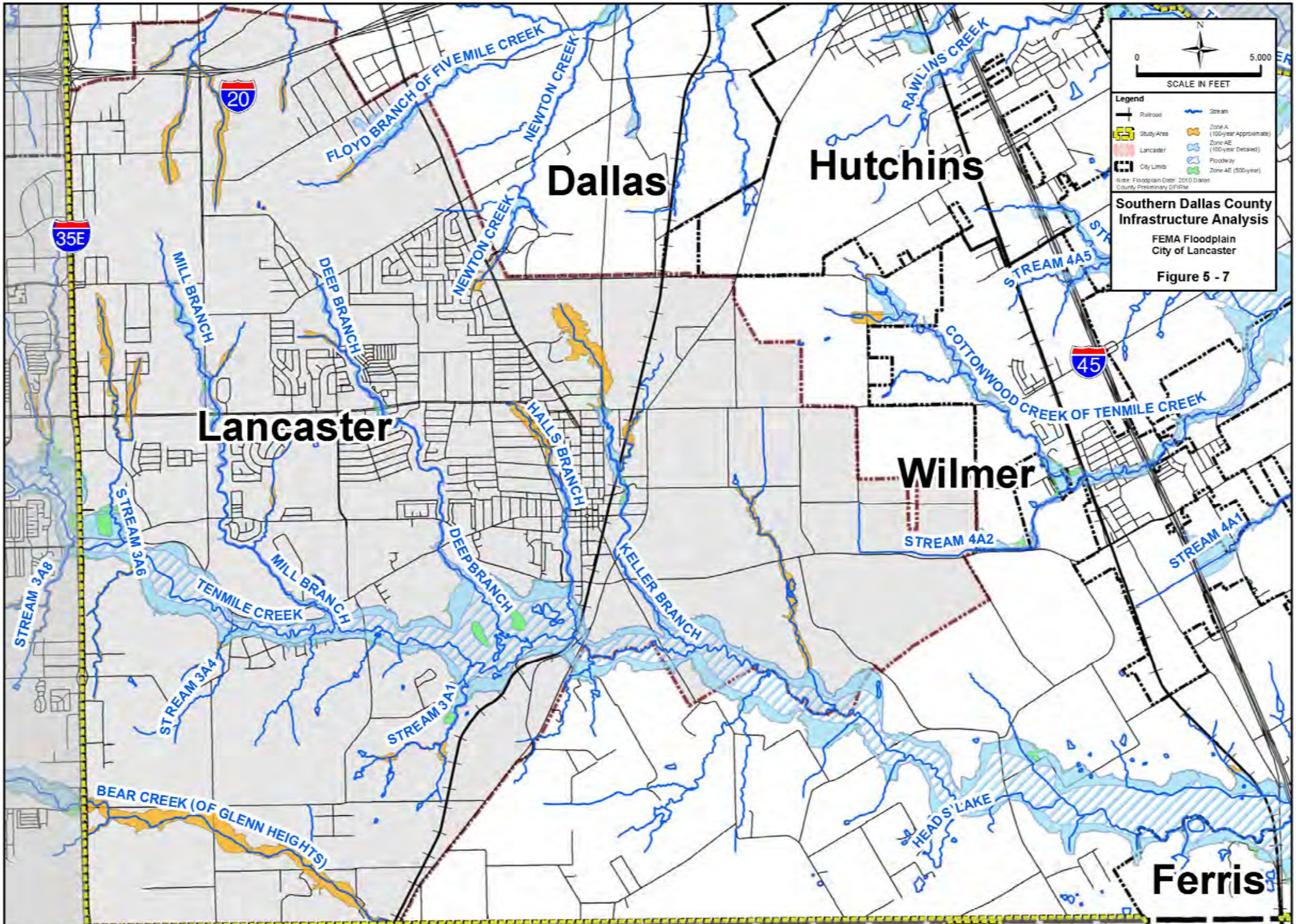

N
0
5,000
SCALE IN FEET
Legend
Railroad
Study Area
City Limits
Dallas
Stream
Zone A (100-year Approximate)
Zone AE (100-yr Detailed)
Floodway
Zone AE (500-year)
Note: Floodplain Data: 2010 Dallas County Preliminary DFIRM
Southern Dallas County Infrastructure Analysis
FEMA Floodplain
City of Dallas
Figure 5 - 4
LISBON BRANCH
STREAM 5A2
FIVEMILE CREEK
STREAM 4B5
TRINITY RIVER
OLD FIVEMILE CREEK CHANNEL
HUTCHINS CREEK
WILSON BRANCH
RICKETTS BRANCH
ALTA MESA BRANCH
PARRISH BRANCH
RUNYON SPRINGS BRANCH
BARNEY BRANCH
NEWTON CREEK
FLOYD BRANCH OF FIVEMILE CREEK
STREAM 4B4
RAWLINS CREEK
Hutchins
Lancaster
STREAM 4A4
STREAM 4A5
KELLER BRANCH
DEEP BRANCH
MILL BRANCH
STREAM 3A10
STREAM 3A6
Wilmer
45
35E
20



Southern Dallas County Infrastructure Analysis
FEMA Floodplain
City of Ferris
Figure 5 - 5
0
3,000
SCALE IN FEET
N
Legend
Railroad
Study Area
City Limits
City of Ferris
Stream
Zone A (100-year Approximate)
Zone AE (100-year Detailed)
Floodway
Zone AE (500-year)
Note: Floodplain Data: 2010 Dallas County Preliminary DFIRM
Ferris
Dallas County
Ellis County
TENMILE CREEK
TENMILE CREEK DS TRIBUTARY 2
TENMILE CREEK DS TRIBUTARY 2.1
Long Branch
Bear Creek
45
WILSON
WATERMILL
VAN
MASON
LAVENDER
MILLER FERRY
ELLIS
FARM
MALLOY BRIDGE
ROBERTS
HASH
NAIL
FERRIS
STAINBACK
LINKWOOD
HIGH RIDGE
STATE HWY 75
NOKOMIS
NOLAN
ASH
MAPLE
HORNET
1ST
A
CHURCH
RAILROAD
NP
3RD
5TH
BIRCH
FM ROAD 664
EWING
WOOD
FM ROAD 660
9TH
10TH
12TH
MAIN
HILL
MCDANIEL
WOLF SPRINGS



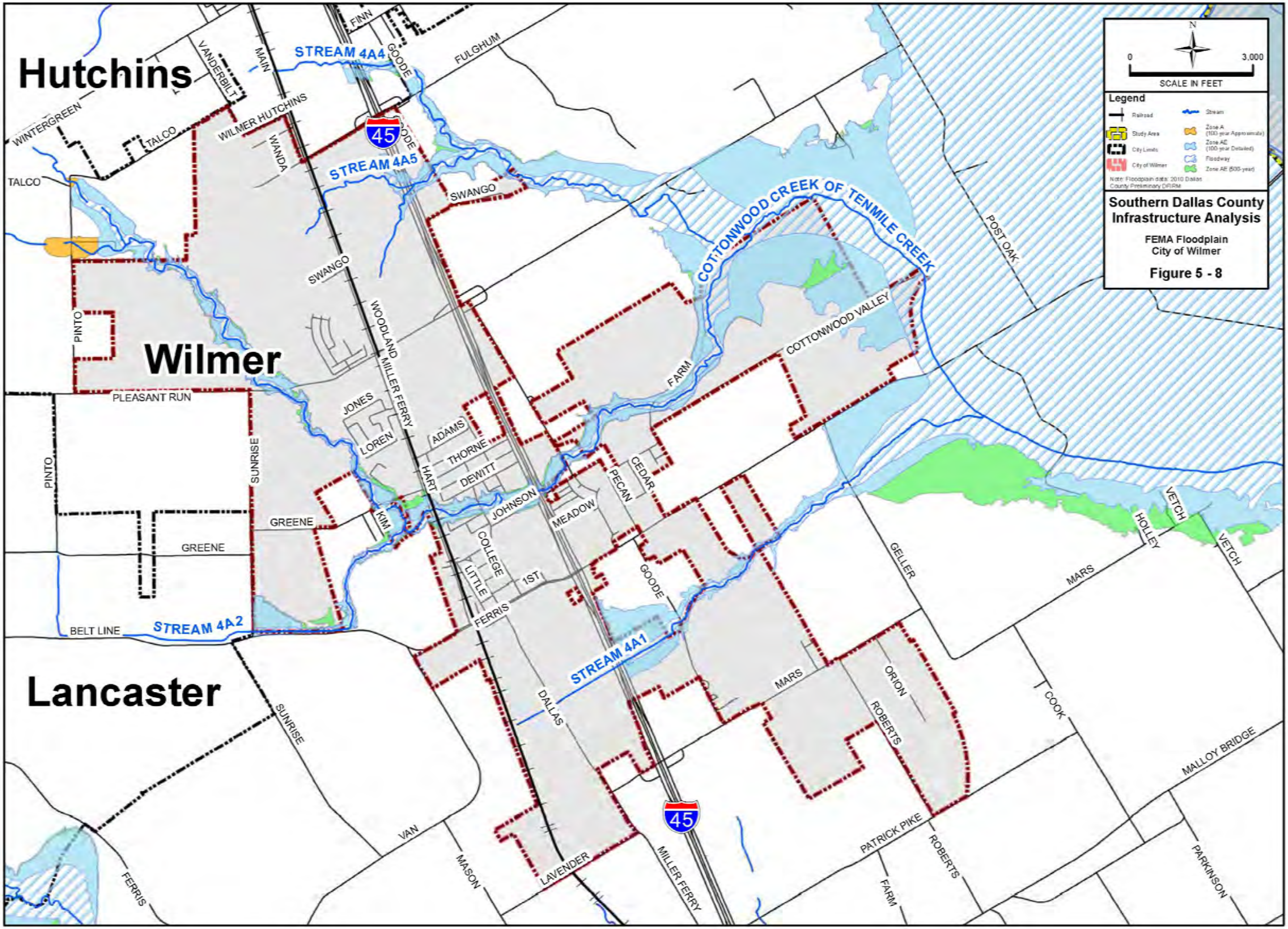
Southern Dallas County
Infrastructure Analysis
FEMA Floodplain
City of Hutchins
Figure 5 - 6
N
0
4,000
SCALE IN FEET
Legend
Railroad
City Limits
Study Area
City of Hutchins
Stream
Zone A (100-year Approximate)
Zone AE (100-year Detailed)
Floodway
Zone AE (500-year)
Note: Floodplain Data: 2010 Dallas County Preliminary DFIRM
Dallas
Hutchins
Wilmer
Wilmer
Lancaster
20
20
45
45
FIVEMILE CREEK
HUTCHINS CREEK
TRINITY RIVER
TRINITY RIVER
STREAM 4B4
RAWLINS CREEK
STREAM 4A4
STREAM 4A5
COTTONWOOD CREEK OF TENMILE CREEK
WHITES BRANCH
NEWTON CREEK
NEWTON CREEK
SANTA ROSA BRANCH
WILSON BRANCH
NP
KELLER BRANCH



Southern Dallas County Infrastructure Analysis

FEMA Floodplain City of Lancaster

Figure 5 - 7



Southern Dallas County Infrastructure Analysis

FEMA Floodplain
City of Wilmer

Figure 5 - 8

Table 5-7. Existing Freeboard based on FEMA Storm Frequency Zone AE Streams for the City of Dallas

Current Mapped/ Studied Streams	Road	Storm Frequency			
		10% ACE	2% ACE	1% ACE	0.2% ACE
Alta Mesa Branch	Persimmon Rd. Culvert	Overtopped	Overtopped	Overtopped	Overtopped
	Tracy Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	Simpson Stuart Rd. Culvert	Overtopped	Overtopped	Overtopped	Overtopped
Fivemile Creek	Railroad Bridge	N/A	N/A	Passes	N/A
	SH 310 Bridge	N/A	N/A	Passes	N/A
	IH 45 Bridge	N/A	N/A	Passes	N/A
	IH 45 Bridge	N/A	N/A	Passes	N/A
	Railroad Bridge	N/A	N/A	Overtopped	N/A
	Simpson Stuart Rd. Bridge (Double)	N/A	N/A	Passes	N/A
	Bonnie View Rd. Bridge (Double)	N/A	N/A	Passes	N/A
	Loop 12 Bridge (Double)	Passes	Passes	Passes	Overtopped
Lisbon Branch	Loop 12 Bridge (Double)	Passes	Passes	Passes	Passes
Newton Creek	IH 45 Bridge	Passes	Passes	Passes	Passes
	IH 45 Bridge	Passes	Passes	Passes	Passes
	J J Lemmon Rd. Bridge	Passes	Passes	Passes	Overtopped
	Railroad Bridge	Passes	Passes	Passes	Passes
	Bonnie View Rd. Bridge	Passes	Passes	Passes	Passes
	Cedar Valley College (Downstream) Bridge	Passes	Passes	Passes	Passes
	Cedar Valley College (Upstream) Bridge	Passes	Passes	Passes	Overtopped
	IH 20 Bridge (Double)	Passes	Passes	Passes	Passes
	Langdon Rd. Bridge	Passes	Passes	Passes	Passes
	Telephone Rd. Bridge	Passes	Passes	Passes	Passes
Ricketts Branch	Houston School Rd. Bridge	Passes	Passes	Passes	Passes
	Camp Wisdom Rd. Bridge	Passes	Overtopped	Overtopped	Overtopped
	Camp Wisdom Rd. Bridge	Passes	Overtopped	Overtopped	Overtopped
	Private Rd. Bridge	Passes	Passes	Passes	Passes
	IH 35E Service	Passes	Overtopped	Overtopped	Overtopped

Current Mapped/ Studied Streams	Road	Storm Frequency			
		10% ACE	2% ACE	1% ACE	0.2% ACE
	Bridge				
	IH 35E Bridge	Passes	Passes	Passes	Passes
	IH 35E Bridge	Passes	Passes	Passes	Passes
	IH 35E Service Bridge	Passes	Overtopped	Overtopped	Overtopped
Runyon Springs Branch	Crouch Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
Trinity River	Loop 12 Bridge	Passes	Passes	Passes	Passes
Whites Branch	Cleveland Rd. Bridge	Passes	Passes	Passes	Passes
	IH 20 Bridge (Double)	Passes	Passes	Passes	Passes
	Langdon Rd. Bridge	Passes	Passes	Overtopped	Overtopped
Wilson Branch	Railroad Bridge	Passes	Overtopped	Overtopped	Overtopped
	J J Lemmon Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	Tioga St. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	Bonnie View Rd. Culvert	Overtopped	Overtopped	Overtopped	Overtopped
Woody Branch	Loop 12 (LEDBETTER DR.) Bridge	Passes	Overtopped	Overtopped	Overtopped
	IH 35E Service Bridge	Passes	Passes	Passes	Passes
	IH 35E Bridge	Passes	Passes	Passes	Passes
	IH 35E Service Bridge	Passes	Passes	Passes	Passes

* Freeboard is the level of protection provided before flooding, overtopping, or inundation of a structure occurs.
** 10 year storm event = 10% ACE, 50 year storm event = 2% ACE, 100-year storm event = 1% ACE, and 500 year storm event = 0.2% ACE (ACE = Annual Chance of Exceedance)
*** N/A = Flood Insurance Study (FIS) profile information not available.

Source: 2010 Dallas County Preliminary DFIRM and Dallas County Flood Insurance Study

Table 5-8. Existing Freeboard based on FEMA Storm Frequency Zone AE Streams for the City of Ferris

Current Mapped/ Studied Streams	Road	Storm Frequency			
		10% ACE	2% ACE	1% ACE	0.2% ACE
Long Branch	FM Road 664 Bridge	Passes	Passes	Passes	Passes
	FM Road 983 Bridge	Passes	Passes	Passes	Passes
Tenmile Creek	Railroad Bridge	Passes	Passes	Passes	Passes

* Freeboard is the level of protection provided before flooding, overtopping, or inundation of a structure occurs.
** ACE = Annual Chance of Exceedance (10% = 10 year storm event, 2% = 50 year storm event, 1% = 100-year storm event, and 0.2% = 500 year storm event)

Source: 2010 Dallas County Preliminary DFIRM, Dallas County Flood Insurance Study, 2010 Ellis County Preliminary DFIRM and Ellis County Flood Insurance Study

Table 5-9. Existing Freeboard based on FEMA Storm Frequency
Zone AE Streams for the City of Hutchins

Current Mapped/ Studied Streams	Road	Storm Frequency			
		10% ACE	2% ACE	1% ACE	0.2% ACE
Hutchins Creek	Denton St. Culvert	Overtopped	Overtopped	Overtopped	Overtopped
	IH 20 Culvert	Passes	Passes	Passes	Passes
	IH 45 Culvert	Passes	Passes	Passes	Passes
	J J Lemmon St. Culvert	Overtopped	Overtopped	Overtopped	Overtopped
	Lancaster-Hutchins Culvert	Passes	Passes	Passes	Passes
	Langdon Rd. Culvert	Passes	Passes	Passes	Overtopped
	Main St. Culvert	Overtopped	Overtopped	Overtopped	Overtopped
	Millers Ferry Rd. Culvert*	Overtopped	Overtopped	Overtopped	Overtopped
	Railroad Culvert	Passes	Passes	Passes	Passes
Rawlins Creek	Dowdy Ferry Rd. Culvert	Passes	Overtopped	Overtopped	Overtopped
	IH 45 Culvert	Overtopped	Overtopped	Overtopped	Overtopped
	Main St. Culvert	Overtopped	Overtopped	Overtopped	Overtopped
	Millers Ferry Rd. Culvert	Passes	Overtopped	Overtopped	Overtopped
	Railroad Culvert	Passes	Passes	Passes	Passes
Stream 4A4	Goode Rd. Culvert	Overtopped	Overtopped	Overtopped	Overtopped
	IH 45 Culvert	Overtopped	Overtopped	Overtopped	Overtopped
Stream 4B4	Austin St. Culvert	Overtopped	Overtopped	Overtopped	Overtopped
	Crestridge Dr. Culvert	Overtopped	Overtopped	Overtopped	Overtopped
	Denton St. Culvert	Overtopped	Overtopped	Overtopped	Overtopped
	Dowdy Ferry Rd. Culvert	Passes	Passes	Passes	Passes
	IH 45 Culvert	Passes	Passes	Passes	Passes
	Main St. Culvert	Passes	Passes	Passes	Overtopped
	Millers Ferry Rd. Culvert*	Overtopped	Overtopped	Overtopped	Overtopped
	Private Driveway Culvert	Overtopped	Overtopped	Overtopped	Overtopped
	Railroad Culvert	Passes	Passes	Passes	Passes
	Willowgrove Dr. Culvert	Overtopped	Overtopped	Overtopped	Overtopped
Trinity River	Dowdy Ferry Rd. Bridge	Passes	Passes	Passes	Passes

* Structure is shown in FIS profile and on FEMA floodplain maps, but does not appear on aerials.
** Freeboard is the level of protection provided before flooding, overtopping, or inundation of a structure occurs.
*** 10 year storm event = 10% ACE, 50 year storm event = 2% ACE, 100-year storm event = 1% ACE, and 500 year storm event = 0.2% ACE (ACE = Annual Chance of Exceedance)

Source: 2010 Dallas County Preliminary DFIRM and Dallas County Flood Insurance Study

Table 5-10. Existing Freeboard based on FEMA Storm Frequency
Zone AE Streams for the City of Lancaster

Current Mapped/ Studied Streams	Road	Storm Frequency			
		10% ACE	2% ACE	1% ACE	0.2% ACE
Bear Creek	IH 35E Bridge (Double)	Passes	Passes	Passes	Passes
	IH 35E Ramp Bridge	Passing	Passes	Passes	Passes
Deep Branch	Main St. Bridge	Passes	Passes	Passes	Passes
	Pleasant Run Rd. Bridge	Passes	Passes	Passes	Overtopped
Halls Branch	1ST St. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	4TH St. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	6TH St. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	Cedar St. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	Main St. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	Redbud Ln. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
Keller Branch	2ND St. Bridge	Passes	Passes	Passes	Overtopped
	3RD St. Bridge	Passes	Passes	Passes	Passes
	Beltline Rd. Bridge	Passes	Passes	Passes	Passes
	Jefferson St. Bridge	Passes	Overtopped	Overtopped	Overtopped
	Lancaster-Hutchins Bridge	Passes	Passes	Passes	Passes
	Main St. Bridge	Passes	Passes	Overtopped	Overtopped
	Pleasant Run Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	Railroad Bridge	Passes	Overtopped	Overtopped	Overtopped
Mill Branch	Houston School Rd. Bridge	Passes	Passes	Overtopped	Overtopped
	Main St. Bridge	Passes	Passes	Passes	Passes
	Pleasant Run Rd. Culvert	Passes	Passes	Passes	Passes
	Wintergreen Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
Runyon Springs Branch	Houston School Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
Stream 3A1	Tenmile Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
Stream 3A6	Beltline Rd. Culvert	Overtopped	Overtopped	Overtopped	Overtopped
Tenmile Creek	Bluegrove Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	Houston School Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	IH 35E Bridge (Double)	Passes	Passes	Passes	Passes
	IH 35E Service Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	IH 35E Service (County Highway 1382) Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	Nokomis Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	Old Red Oak Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	Railroad Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	SH 342 Bridge	Overtopped	Overtopped	Overtopped	Overtopped

* Freeboard is the level of protection provided before flooding, overtopping, or inundation of a structure occurs.
** 10 year storm event = 10% ACE, 50 year storm event = 2% ACE, 100-year storm event = 1% ACE, and 500 year storm event = 0.2% ACE (ACE = Annual Chance of Exceedance)

Source: 2010 Dallas County Preliminary DFIRM and Dallas County Flood Insurance Study

Table 5-11. Existing Freeboard based on FEMA Storm Frequency (Zone AE Streams for the City of Wilmer)

Current Mapped/ Studied Streams	Road	Storm Frequency			
		10% ACE	2% ACE	1% ACE	0.2% ACE
Cottonwood Creek of Tenmile Creek	Beltline Rd. Bridge	Passes	Passes	Passes	Overtopped
	Goode Rd. Bridge	Passes	Overtopped	Overtopped	Overtopped
	IH 45 Bridge (Double)	Passes	Overtopped	Overtopped	Overtopped
	IH 45 Service Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	IH 45 Service Rd. Bridge	Passes	Passes	Overtopped	Overtopped
	Kissell (College) Rd. Bridge*	Overtopped	Overtopped	Overtopped	Overtopped
	Millers Ferry Rd. Bridge	Passes	Overtopped	Overtopped	Overtopped
	Pleasant Run Rd. Bridge	Passes	Overtopped	Overtopped	Overtopped
	Railroad Bridge	Passes	Passes	Passes	Passes
Stream 4A1	Goode Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
Stream 4A5	Goode Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
	IH 45 Culvert	Overtopped	Overtopped	Overtopped	Overtopped
Tenmile Creek	Central St. Bridge	Passes	Passes	Passes	Passes
	Ferris Rd. Bridge	Passes	Passes	Overtopped	Overtopped
	IH 45 Bridge (Double)	Passes	Passes	Passes	Passes
	IH 45 RAMP Bridge	Passes	Passes	Passes	Passes
	IH 45 RAMP Bridge	Passes	Passes	Passes	Passes
	Parkinson Rd. (Downstream)	Passes	Passes	Passes	Overtopped
	Parkinson Rd. (Upstream)	Passes	Passes	Passes	Overtopped
	Railroad Bridge	Passes	Passes	Passes	Passes

* Freeboard is the level of protection provided before flooding, overtopping, or inundation of a structure occurs.
** 10 year storm event = 10% ACE, 50 year storm event = 2% ACE, 100-year storm event = 1% ACE, and 500 year storm event = 0.2% ACE (ACE = Annual Chance of Exceedance)
*** Note: Kissell (College) Road was recently replaced with a structure that passes the 100 year storm.

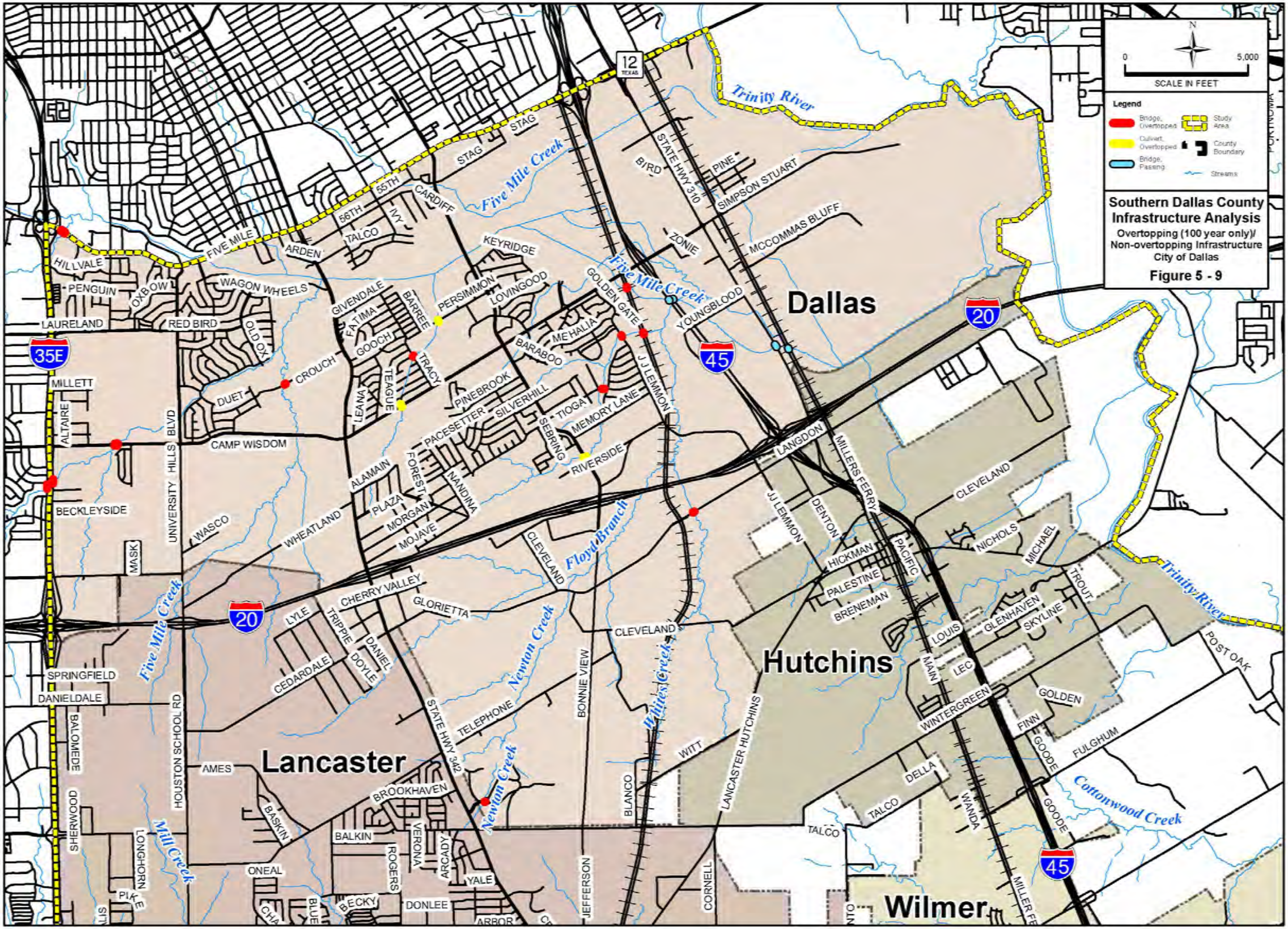
Source: 2010 Dallas County Preliminary DFIRM and Dallas County Flood Insurance Study

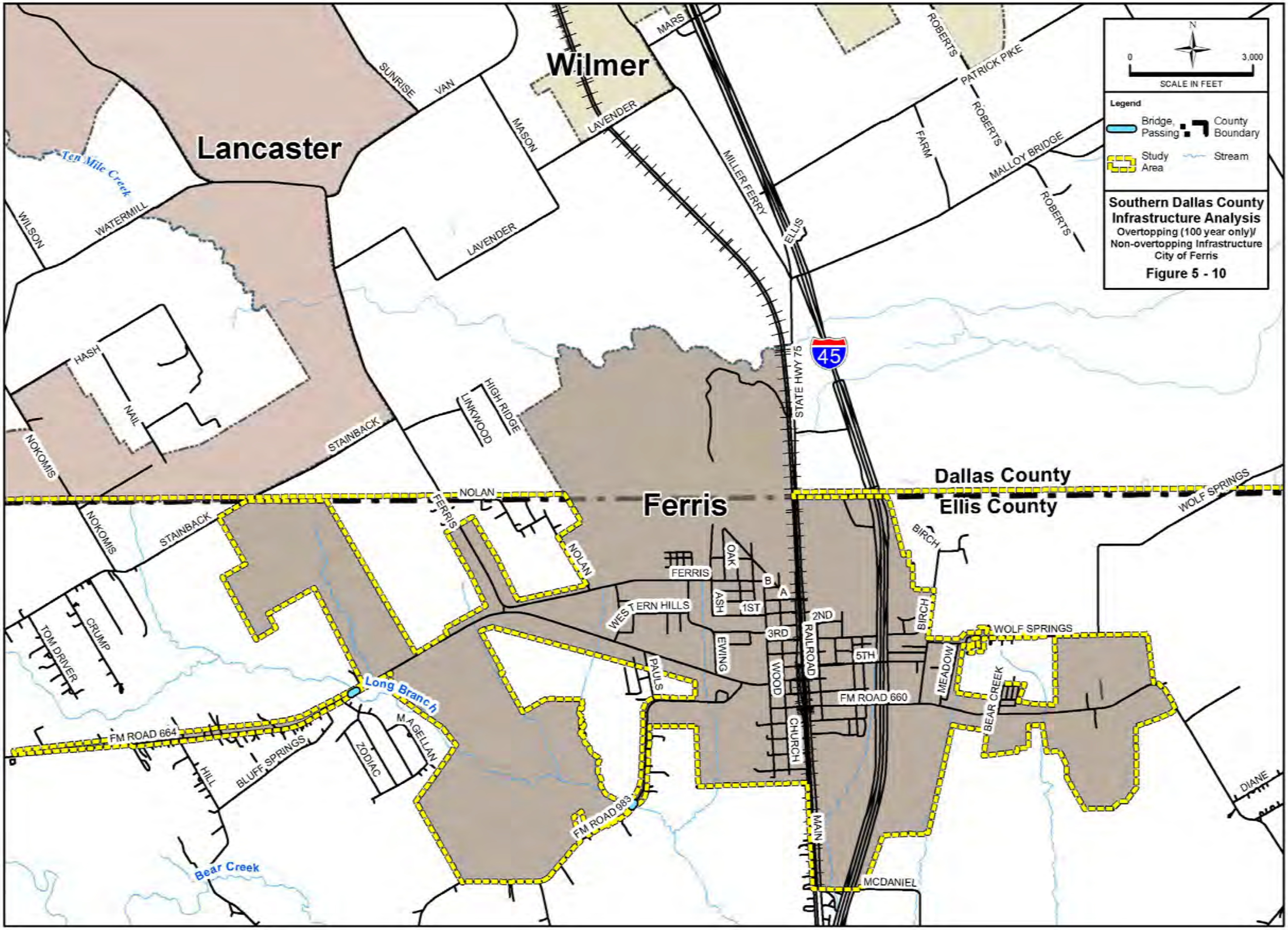
Table 5-12. Existing Freeboard based on FEMA Storm Frequency (Zone AE Streams for Dallas County)

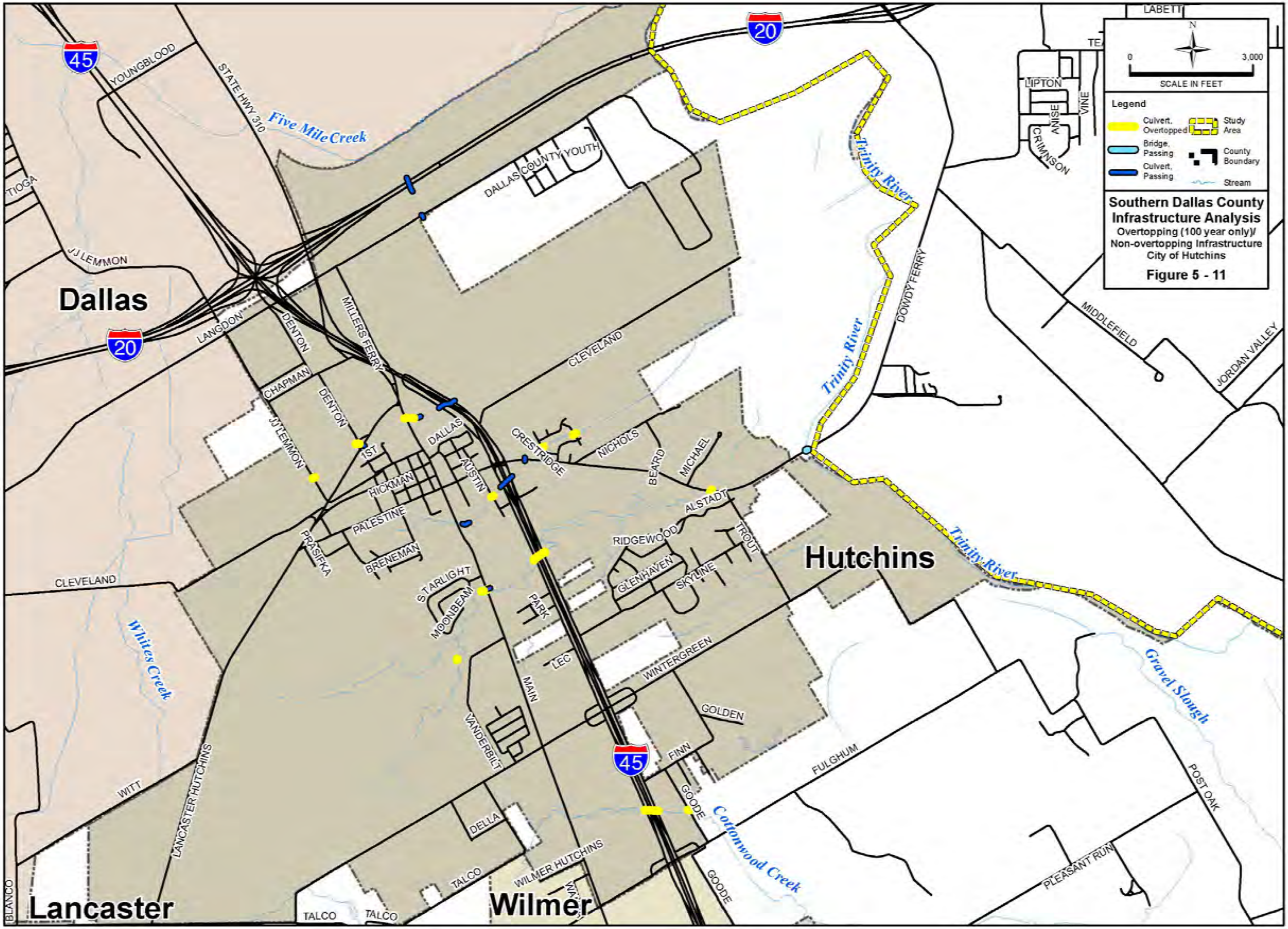
Current Mapped/ Studied Streams	Road	Storm Frequency			
		10% ACE	2% ACE	1% ACE	0.2% ACE
Cottonwood Creek of Tenmile Creek	Malloy Bridge Rd.	Passes	Passes	Passes	Overtopped
Stream 4A1	Geller Rd. Bridge	Overtopped	Overtopped	Overtopped	Overtopped
Stream 4A4	Fulghum Rd. Culvert	Overtopped	Overtopped	Overtopped	Overtopped
	Pleasant Run Rd. Bridge	Passes	Passes	Passes	Passes
Trinity River	Beltline Rd. Bridge	Passes	Passes	Passes	Passes
	Malloy Bridge Rd. Bridge	Passes	Passes	Passes	Passes

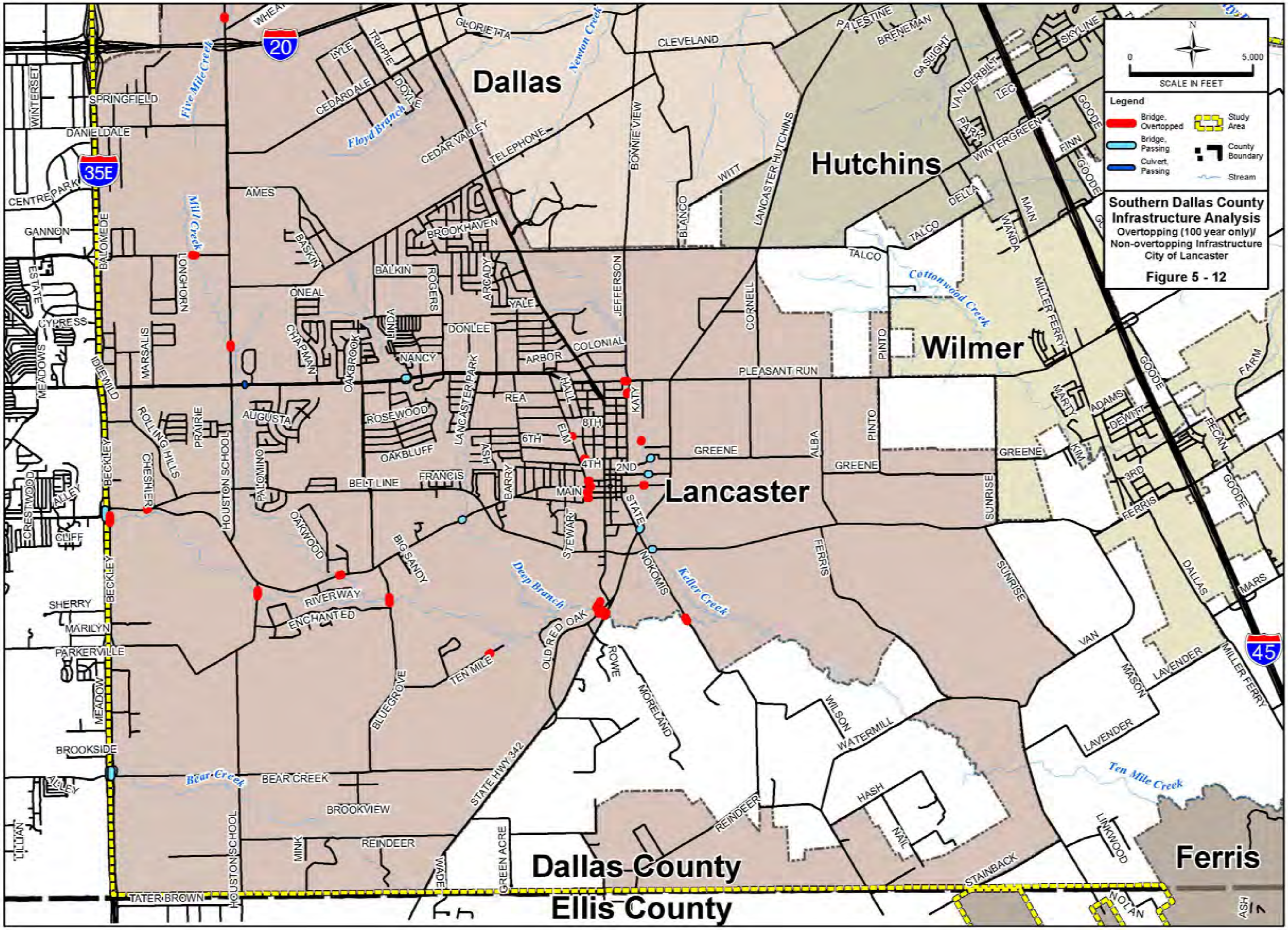
* Freeboard is the level of protection provided before flooding, overtopping, or inundation of a structure occurs.
** 10 year storm event = 10% ACE, 50 year storm event = 2% ACE, 100-year storm event = 1% ACE, and 500 year storm event = 0.2% ACE (ACE = Annual Chance of Exceedance)

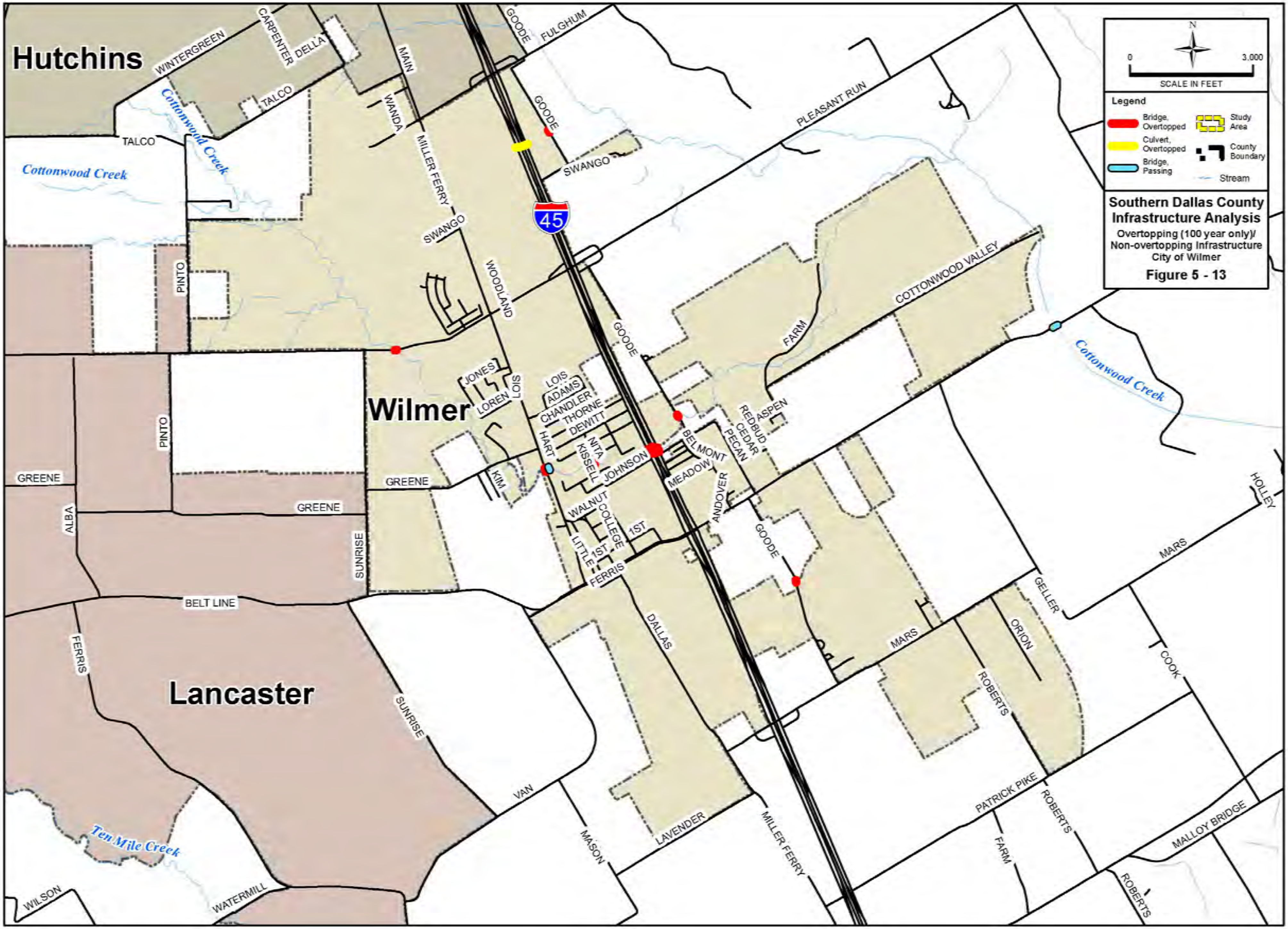
Source: 2010 Dallas County Preliminary DFIRM and Dallas County Flood Insurance Study


Southern Dallas County Infrastructure Analysis
Overtopping (100 year only)/ Non-overtopping Infrastructure
City of Dallas
Figure 5 - 9
Legend
Bridge, Overtopped
Culvert, Overtopped
Bridge, Passing
Study Area
County Boundary
Streams
0
5,000
SCALE IN FEET
N
Dallas
Hutchins
Lancaster
Wilmer
Trinity River
Five Mile Creek
Floyd Branch
Newton Creek
Whites Creek
Mill Creek
Cottonwood Creek
20
45
35E
12


Southern Dallas County
Infrastructure Analysis
Overtopping (100 year only)/
Non-overtopping Infrastructure
City of Ferris
Figure 5 - 10
Legend
Bridge, Passing
County Boundary
Study Area
Stream
0
3,000
SCALE IN FEET
N
Lancaster
Wilmer
Ferris
Dallas County
Ellis County
Ten Mile Creek
Long Branch
Bear Creek
45
STATE HWY 75
ELLIS
MILLER FERRY
MARS
LAVENDER
MASON
VAN
SUNRISE
WATERMILL
WILSON
HASH
NAIL
NOKOMIS
STAINBACK
LINKWOOD
HIGH RIDGE
NOLAN
FERRIS
ROBERTS
PATRICK PIKE
FARM
MALLOY BRIDGE
WOLF SPRINGS
BIRCH
OAK
B
A
1ST
ASH
WESTERN HILLS
EWING
2ND
3RD
RAILROAD
WOOD
5TH
CHURCH
PAULS
FM ROAD 660
MEADOW
BEAR CREEK
DIANE
MAIN
MCDANIEL
FM ROAD 983
FM ROAD 664
TOM DRIVER
CRUMP
ZODIAC
MAGELLAN
HILL
BLUFF SPRINGS


Southern Dallas County
Infrastructure Analysis
Overtopping (100 year only)/
Non-overtopping Infrastructure
City of Hutchins
Figure 5 - 11
Legend
Culvert, Overtopped
Bridge, Passing
Culvert, Passing
Study Area
County Boundary
Stream
SCALE IN FEET
0
3,000
N
Dallas
Hutchins
Wilmer
Lancaster
Trinity River
Five Mile Creek
Whites Creek
Gravel Slough
Cottonwood Creek
20
45
YOUNGBLOOD
STATE HWY 310
TIOGA
JJ LEMMON
LANGDON
DENTON
CHAPMAN
MILLERS FERRY
DALLAS COUNTY YOUTH
CLEVELAND
DOWDY FERRY
LIPTON
ANISE
VINE
CRIMNSON
LABETT
MIDDLEFIELD
JORDAN VALLEY
CRESTRIDGE
NICHOLS
BEARD
MICHAEL
ALSTADT
1ST
DALLAS
AUSTIN
HICKMAN
PALESTINE
PRASIFKA
BRENEMAN
S TARLIGHT
MOONBEAM
RIDGEWOOD
GLENHAVEN
SKYLINE
TROUT
PARK
LEC
MAIN
WINTERGREEN
GOLDEN
VANDERBILT
FINN
GOODE
FULGHUM
POST OAK
PLEASANT RUN
DELLA
TALCO
WILMER HUTCHINS
LANCASTER HUTCHINS
WITT
BLANCO


Southern Dallas County
Infrastructure Analysis
Overtopping (100 year only)/
Non-overtopping Infrastructure
City of Lancaster
Figure 5 - 12
Legend
Bridge, Overtopped
Bridge, Passing
Culvert, Passing
Study Area
County Boundary
Stream
N
0
5,000
SCALE IN FEET
Dallas
Hutchins
Wilmer
Lancaster
Ferris
Dallas County
Ellis County
Five Mile Creek
Newton Creek
Floyd Branch
Mill Creek
Cottonwood Creek
Deep Branch
Keller Creek
Bear Creek
Ten Mile Creek
20
35E
45



Southern Dallas County Infrastructure Analysis

Overtopping (100 year only)/ Non-overtopping Infrastructure City of Wilmer

Figure 5 - 13

RECOMMENDED STORMWATER INFRASTRUCTURE

RECOMMENDED UPGRADES TO EXISTING BRIDGE AND CULVERTS

Safety of the public during a flooding event is paramount. Replacing the overtopped structures shown in **Tables 5-7** through **5-12** with structures that pass the one hundred year (1% Annual Chance of Exceedance) storm event as the area develops is highly recommended. Determination of the recommended replacement structure was based on the depth of flow in the existing stream. A bridge is recommended for depths greater than ten feet, a culvert or culverts are recommended for depths below ten feet.

Preliminary cost estimates for replacing these structures are listed in **Tables 5-13** through **5-17**. A more detailed breakdown of these cost estimates can be found in Appendix E. Cost estimates for bridges were based on a typical unit cost for this region of $50 per square foot of bridge deck. For culverts, cost estimates were based on February 2012 Texas Department of Transportation Average Low Bid prices. While overtopping of railroad bridges and private driveways exist and should be replaced, replacement of these structures was not included in the cost estimates provided below. Cost of replacement was assumed to be the responsibility of the railroad and driveway owner to pay for the replacement of these structures.

Table 5-13. Recommend Structure Replacements and Cost Estimates – City of Dallas

Current Mapped/ Studied Streams	Road	Recommendation	Total Cost
Alta Mesa Branch	Persimmon Rd.	New Bridge	$280,000
	Tracy Rd.	New Bridge	$280,000
	Simpson Stuart Rd.	New Culvert	$42,000
Ricketts Branch	Camp Wisdom Rd.	New Bridge	$644,000
	Camp Wisdom Rd.	New Bridge	$644,000
	IH 35E Service	New Bridge	$518,000
	IH 35E Service	New Bridge	$504,000
Runyon Springs Branch	Crouch Rd.	New Bridge	$602,000
Whites Branch	Langdon Rd.	New Bridge	$252,000
Wilson Branch	J J Lemmon Rd.	New Bridge	$350,000
	Tioga St.	New Bridge	$434,000
	Bonnie View Rd.	New Bridge	$1,232,000
Woody Branch	Loop 12 (LEDBETTER DR.)	New Bridge	$2,618,000
			Grand Total
			$8,400,000

Source: 2010 Dallas County Preliminary DFIRM and Dallas County Flood Insurance Study

Table 5-14. Recommended Structure Replacements and Cost Estimates – City of Hutchins

Current Mapped/ Studied Streams	Road	Recommendation	Total Cost
Hutchins Creek	Denton Street	New Culvert	$238,000
	J J Lemmon St.	New Bridge	$224,000
	Main Street	New Bridge	$294,000
	Millers Ferry Rd.	New Bridge	$434,000
Rawlins Creek	Dowdy Ferry Rd.	New Bridge	$238,000
	IH 45	New Bridge	$3,094,000
	Main Street	New Bridge	$462,000
Stream 4A4	Goode Road	New Bridge	$252,000
	IH 45	New Bridge	$1,414,000
Stream 4B4	Austin Street	New Culvert	$56,000
	Crestridge Drive	New Culvert	$84,000
	Denton Street	New Culvert	$70,000
			Grand Total
			$6,860,000

Source: 2010 Dallas County Preliminary DFIRM and Dallas County Flood Insurance Study

Table 5-15. Recommended Structure Replacements and Cost Estimates – City of Lancaster

Current Mapped/ Studied Streams	Road	Recommendation	Total Cost
Halls Branch	1ST St.	New Bridge	$294,000
	4TH St.	New Bridge	$294,000
	6TH St.	New Bridge	$280,000
	Cedar St.	New Bridge	$294,000
	Main St.	New Bridge	$336,000
	Redbud Ln.	New Bridge	$308,000
Keller Branch	Jefferson St.	New Bridge	$294,000
	Main St.	New Bridge	$350,000
	Pleasant Run Rd.	New Bridge	$280,000
Mill Branch	Houston School Rd.	New Bridge	$336,000
	Wintergreen Rd.	New Bridge	$224,000
Stream 3A1	Tenmile Rd.	New Bridge	$308,000
Stream 3A6	Beltline Rd.	New Bridge	$2,814,000
Tenmile Creek	Bluegrove Rd.	New Bridge	$2,184,000
	Houston School Rd.	New Bridge	$2,086,000
	IH 35E Service	New Bridge	$3,038,000
	IH 35E Service (County Highway 1382)	New Bridge	$3,710,000
	Nokomis Rd.	New Bridge	$2,170,000
	Old Red Oak Rd.	New Bridge	$2,100,000
	SH 342	New Bridge	$2,632,000
			Grand Total
			$24,322,000

Source: 2010 Dallas County Preliminary DFIRM and Dallas County Flood Insurance Study

Table 5-16. Recommended Structure Replacements and Cost Estimates – City of Wilmer

Current Mapped/ Studied Streams	Road	Recommendation	Total Cost
Cottonwood Creek of Tenmile Creek	Goode Rd.	New Bridge	$448,000
	IH 45	New Bridge	$1,610,000
	IH 45 Service Rd.	New Bridge	$434,000
	IH 45 Service Rd.	New Bridge	$448,000
	Millers Ferry Rd.	New Bridge	$560,000
	Pleasant Run Rd.	New Bridge	$420,000
Stream 4A1	Goode Rd.	New Bridge	$336,000
Stream 4A5	Goode Rd.	New Bridge	$210,000
	IH 45	New Bridge	$1,400,000
Tenmile Creek	Ferris Rd.	New Bridge	$2,142,000
			Grand Total
			$8,008,000

Source: 2010 Dallas County Preliminary DFIRM and Dallas County Flood Insurance Study

Table 5-17. Recommended Structure Replacements and Cost Estimates – Dallas County

Current Mapped/ Studied Streams	Road	Recommendation	Total Cost
Stream 4A1	Geller Rd.	New Bridge	$336,000
Stream 4A4	Fulghum Rd.	New Bridge	$238,000
			Grand Total
			$574,000

Source: 2010 Dallas County Preliminary DFIRM and Dallas County Flood Insurance Study

Prioritization of structure replacement was developed based on the level of risk to public safety and the structure's location within each community. The level of risk for each structure was determined from computations made for inundation depth and velocity, as well as **Figures 5-14** and **5-15**, which are from the U.S. Department of the Interior Assistant Commissioner – *Engineering and Research Technical Memorandum No. 11, Downstream Hazard Classification Guidelines*. In each of the figures, danger zones are divided into three separate zones: High, Judgment, and Low for both children and passenger vehicles. A third figure for "Adults" exists within the referenced memorandum; however, it recommends that the figure for children be used for areas where the population is mixed. Each of the structures was located on an aerial map. Factors impacting replacement priority include: proximity to a school or residential area, if the structure is located on a major road, and if the structure is in a rural or urban location. **Table 5-18** shows the computational depths and velocities for both the 10 percent (10-year) and 1 percent (100-year) Annual Chance of Exceedance storm events, resulting danger zone classifications determined from **Figures 5-14** and **5-15**, and resulting priority of replacement for each of the structures. Prioritization ranged from 1 (high importance) to 3 (low importance). The priority shown in **Table 5-18** is a recommendation only and a change in replacement priority could be development driven. Until these structures are replaced, installation of guardrails, warning signs or systems, and flood gages with easy-to-read depth markings are recommended.

Table 5-18. Danger Classification and Replacement Priority Per City

City/County	Current Mapped/Studied Streams	Flooded Structures	Depth of Inundation (feet)		Velocity (feet per second)		Danger Level for Pedestrians		Danger Level for Vehicles		Priority*
			10 yr	100 yr	10 yr	100 yr	10 yr	100 yr	10 yr	100 yr	
Dallas	Alta Mesa Branch	Persimmon Rd.	2.5	3.75	4.11	5.03	High	High	Judge	High	2
Dallas	Alta Mesa Branch	Simpson Stuart Rd.	2	2.2	3.68	3.86	High	High	High	Judge	1
Dallas	Alta Mesa Branch	Tracy Rd.	4	4.5	5.20	5.52	High	High	High	High	2
Dallas	Ricketts Branch	Camp Wisdom Rd.	-	2	-	3.68		High		Judge	3
Dallas	Ricketts Branch	Camp Wisdom Rd.	-	2	-	3.68		High		Judge	3
Dallas	Ricketts Branch	IH 35E Service	-	1.5	-	3.18		High		Low	3
Dallas	Ricketts Branch	IH 35E Service	-	1	-	2.60		High		Low	3
Dallas	Runyon Springs Branch	Crouch Rd.	0.1	1.5	0.82	3.18	Low	High	Low	Low	3
Dallas	Whites Branch	Langdon Rd.	-	0.2	-	1.16		Low		Low	3
Dallas	Wilson Branch	Bonnie View Rd.	1.9	3	3.58	4.50	High	High	Judge	High	1
Dallas	Wilson Branch	J J Lemmon Rd.	0.5	1.5	1.84	3.18	Judge	High	Low	Low	1
Dallas	Wilson Branch	Tioga St.	0.5	1.75	1.84	3.44	Judge	High	Low	Low	1
Dallas	Woody Branch	Loop 12 (LEDBETTER DR.)	-	2.5	-	4.11		High		Judge	3
Hutchins	Hutchins Creek	Denton Street	1.75	2.25	3.44	3.90	High	High	Low	Judge	3
Hutchins	Hutchins Creek	J J Lemmon St.	0.2	1	1.16	2.60	Low	High	Low	Judge	3
Hutchins	Hutchins Creek	Main Street	2	3	3.68	4.50	High	High	Judge	High	1
Hutchins	Rawlins Creek	Dowdy Ferry Rd.	-	1	-	2.60		High		Low	3
Hutchins	Rawlins Creek	IH 45	-	1	-	2.60		High		Low	3
Hutchins	Rawlins Creek	Main Street	2	8	3.68	7.35	High	High	Judge	High	1
Hutchins	Stream 4A4	Goode Road	2	2.75	3.68	4.31	High	High	Judge	High	3
Hutchins	Stream 4A4	IH 45	1	2	2.60	3.68	High	High	Low	Judge	2
Hutchins	Stream 4B4	Austin Street	1.25	1.6	2.91	3.29	High	High	Low	Low	2
Hutchins	Stream 4B4	Crestridge Drive	1	1.5	2.60	3.18	High	High	Low	Low	2
Hutchins	Stream 4B4	Denton Street	0.5	1.5	1.84	3.18	Judge	High	Low	Low	2
Lancaster	Halls Branch	1ST St.	1.5	2	3.18	3.68	High	High	Low	Judge	2
Lancaster	Halls Branch	4TH St.	1	2	2.60	3.68	High	High	Low	Judge	2
Lancaster	Halls Branch	6TH St.	1	1.5	2.60	3.18	High	High	Low	Low	3
Lancaster	Halls Branch	Cedar St.	1	1.5	2.60	3.18	High	High	Low	Low	2
Lancaster	Halls Branch	Main St.	0.2	1.2	1.16	2.85	Low	High	Low	Low	1
Lancaster	Halls Branch	Redbud Ln.	-	2	-	3.68		High		Judge	3
Lancaster	Keller Branch	Jefferson St.	-	1.2	-	2.85		High		Low	3
Lancaster	Keller Branch	Main St.	-	0.2	-	1.16		Low		Low	3
Lancaster	Keller Branch	Pleasant Run Rd.	0.3	1	1.42	2.60	Low	High	Low	Low	2
Lancaster	Mill Branch	Houston School Rd.	-	0.1	-	0.82		Low		Low	3
Lancaster	Mill Branch	Wintergreen Rd.	0.75	1	2.25	2.60	Judge	High	Low	Low	3
Lancaster	Stream 3A1	Tenmile Rd.	4.8	7.2	5.70	6.98	High	High	High	High	2
Lancaster	Stream 3A6	Beltline Rd.	3.2	6	4.65	6.37	High	High	High	High	1
Lancaster	Tenmile Creek	Bluegrove Rd.	0.25	3.25	1.30	4.69	Low	High	Low	High	3
Lancaster	Tenmile Creek	Houston School Rd.	0.75	4.75	2.25	5.67	Judge	High	Low	High	2
Lancaster	Tenmile Creek	IH 35E Service	1.5	5	3.18	5.81	High	High	Low	High	2

City/County	Current Mapped/Studied Streams	Flooded Structures	Depth of Inundation (feet)		Velocity (feet per second)		Danger Level for Pedestrians		Danger Level for Vehicles		Priority*
	Tenmile Creek	IH 35E Service (County Highway 1382)	0.5	4	1.84	5.20	Low	High	Low	High	2
	Tenmile Creek	Nokomis Rd.	0.75	3	2.25	4.50	Judge	High	Low	High	2
	Tenmile Creek	Old Red Oak Rd.	1.5	5.75	3.18	6.23	High	High	Low	High	2
	Tenmile Creek	SH 342	-	3	-	4.50		High		High	3
Wilmer	Cottonwood Creek of Tenmile Creek	Goode Rd.	-	3.1	-	4.58		High		High	3
	Cottonwood Creek of Tenmile Creek	IH 45	-	3.2	-	4.65		High		High	3
	Cottonwood Creek of Tenmile Creek	IH 45 Northbound Service Rd.	-	1	-	2.60		High		Low	3
	Cottonwood Creek of Tenmile Creek	IH 45 Southbound Service Rd.	2.5	7.2	4.11	6.98	High	High	Judge	High	1
	Cottonwood Creek of Tenmile Creek	Kissell (College) Rd.	5	7.5	5.81	7.12	High	High	High	High	1
	Cottonwood Creek of Tenmile Creek	Millers Ferry Rd.	-	3.5	-	4.86		High		High	3
	Cottonwood Creek of Tenmile Creek	Pleasant Run Rd.	-	1.5	-	3.18		High		Low	3
	Stream 4A1	Goode Rd.	0.2	2.2	1.16	3.86	Low	High	Low	Judge	2
	Stream 4A5	Goode Rd.	1.2	1.5	2.85	3.18	High	High	Low	Low	2
	Stream 4A5	IH 45	0.5	1	1.84	2.60	Low	High	Low	Low	2
	Tenmile Creek	Ferris Rd.	-	0.2	-	1.16		Low		Low	3
Dallas County	Stream 4A4	Fulghum Rd.	1	1.5	2.60	3.18	High	High	Low	Low	2
	Stream 4A1	Geller Rd.	1.5	2.5	3.18	4.11	High	High	Low	Judge	2

Priority - 1 = High Importance, 2 = Medium Importance, and 3 = Low Importance

Source: 2010 Dallas County Preliminary DFIRM, Dallas County Flood Insurance Study, and U.S. Department of the Interior Assistant Commissioner – *Engineering and Research Technical Memorandum No. 11, Downstream Hazard Classification Guidelines*

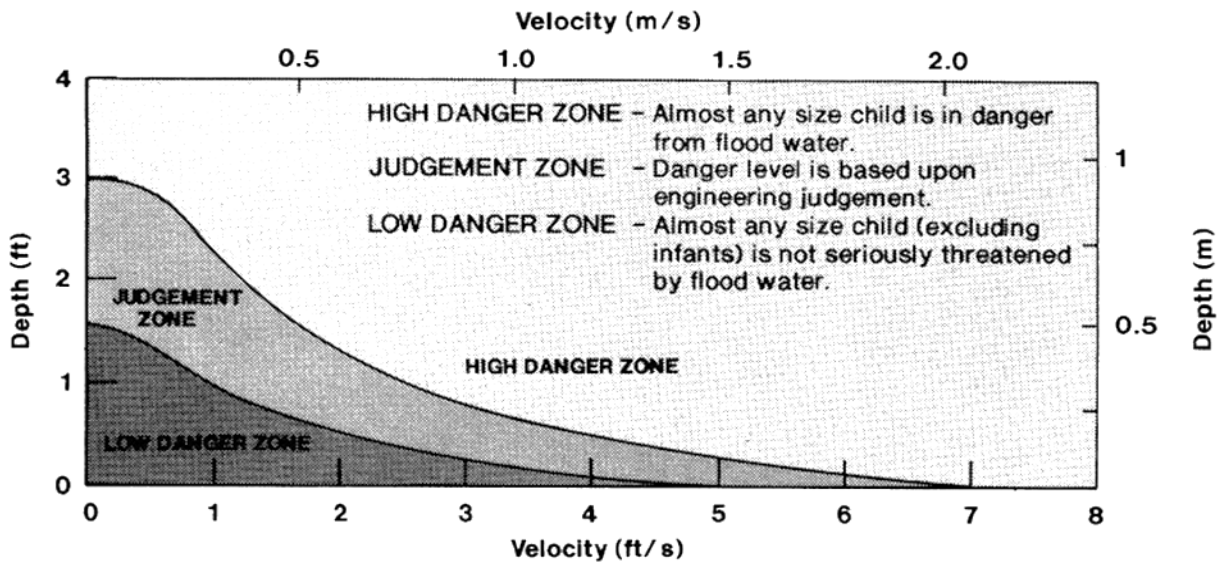


Figure 5-14. Depth –Velocity Flood Danger Level Relationship for Children

Source: U.S. Department of the Interior Assistant Commissioner – Engineering and Research Technical Memorandum N0. 11, Downstream Hazard Classification Guidelines

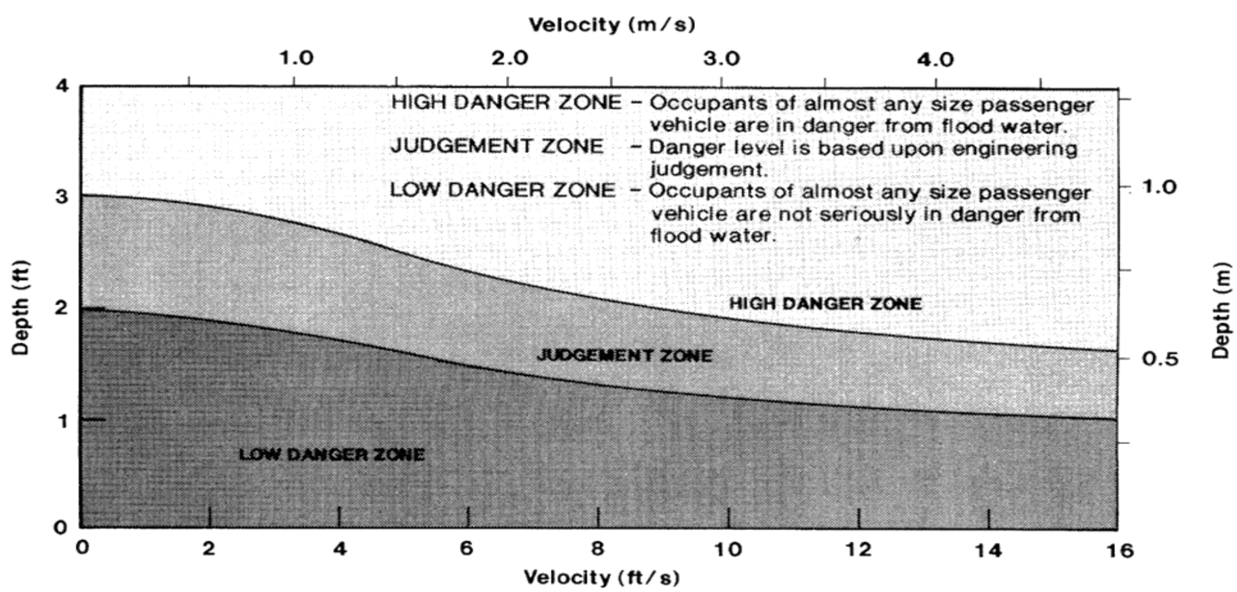


Figure 5-15. Depth-Velocity Flood Danger Relationship for Passenger Vehicles

Source: U.S. Department of the Interior Assistant Commissioner – Engineering and Research Technical Memorandum N0. 11, Downstream Hazard Classification Guidelines

The replacement cost of five structures could be shared since the creek each structure crosses is the boundary between two jurisdictions. These structures are listed in **Table 5-19**.

Table 5-19. Potential Cost Sharing for Recommended Replacement Structures

Stream	Road	Community
Stream 4A4	Goode Road	City of Hutchins/Dallas County
Cottonwood Creek of Tenmile Creek	Goode Road	City of Wilmer/Dallas County
Stream 4A1	Goode Road	City of Wilmer/Dallas County
Stream 4A5	Goode Road	City of Wilmer/Dallas County
Tenmile Creek	Ferris Road	City of Wilmer/Dallas County

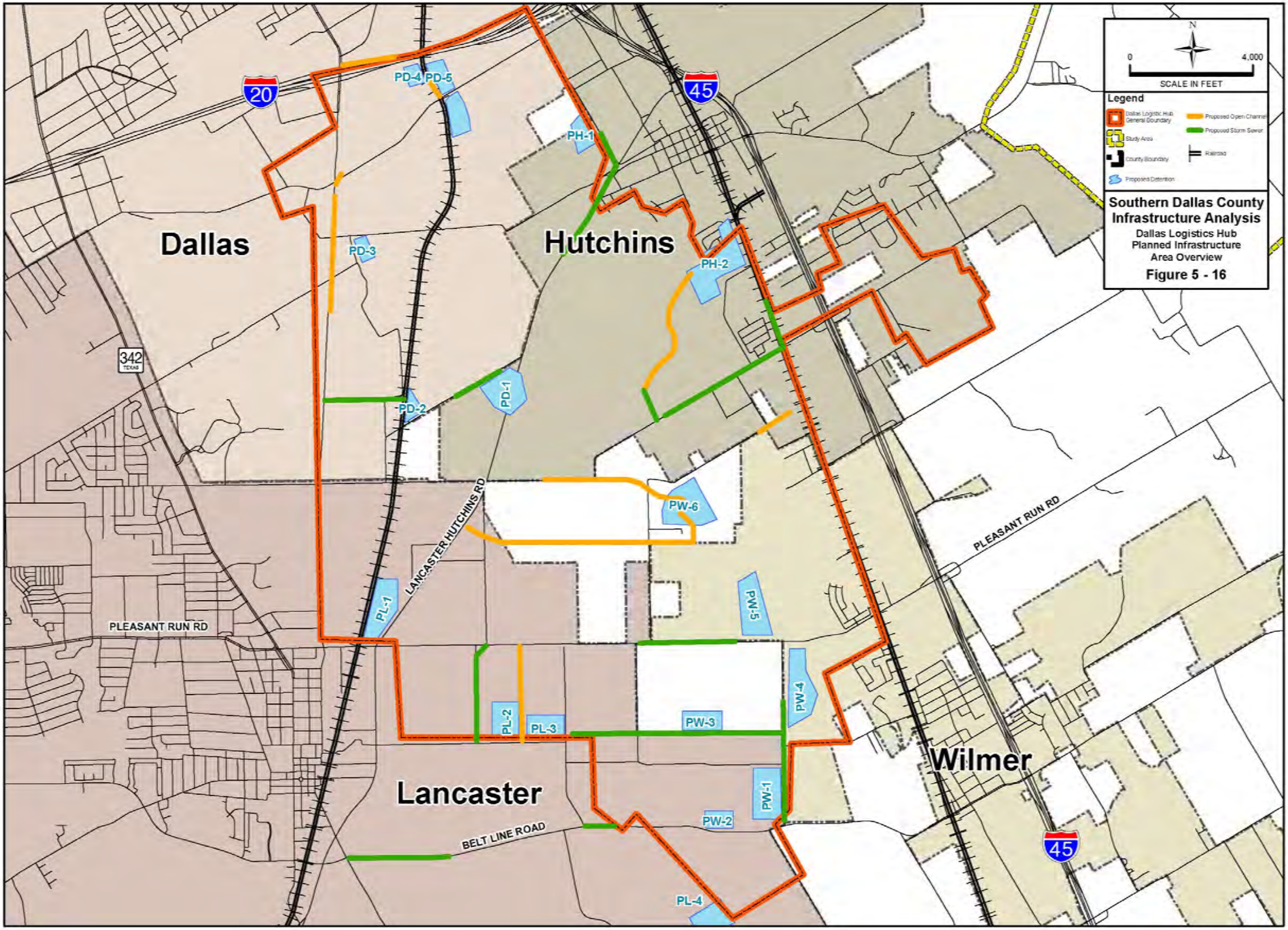
Source: 2010 Dallas County Preliminary DFIRM and Dallas County Flood Insurance Study

Some structures listed in **Tables 5-13** through **5-17** may have already been reconstructed and cost estimates provided may not be valid. Until a Letter of Map Revision (LOMR) to FEMA is prepared for those reconstructed structures, a new detailed study by FEMA is conducted, or a stream study is paid for by the city, the Flood Insurance Study profiles from which the freeboard was based will reflect conditions which may no longer exist or structures which are not correctly shown on the profiles. Submission of required models, reports, and forms to FEMA as development occurs in the area is highly recommended. As the study area develops and impervious cover increases, runoff from the developed areas will increase, as will the potential for higher and more frequent flooding along these streams. Consequently, these structures may become inundated more frequently by storm events. A more stringent floodplain management approach could prevent significant increases in future discharges, thereby preventing the need to reconstruct some bridges and culverts.

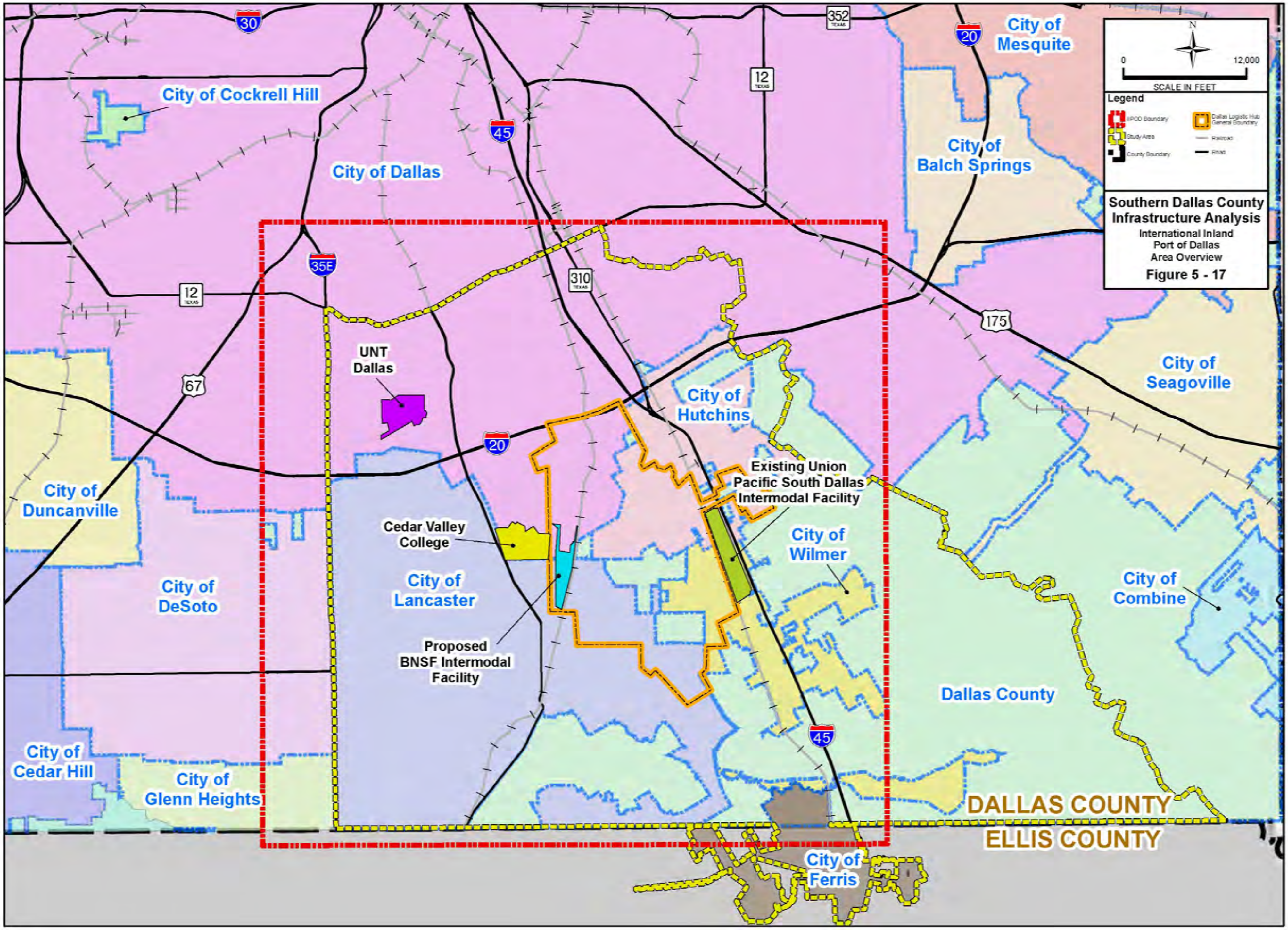
PLANNED INFRASTRUCTURE

In 2006 and 2007, a master drainage plan was developed as part of the proposed Dallas Logistics Hub (DLH) development (see **Figure 5-16)**. In this study, which included portions of Dallas, Hutchins, Lancaster, and Wilmer, a list of proposed infrastructure needs both inside and outside the DLH area was developed in order to maintain existing fully developed discharges at predevelopment levels. The infrastructure features included: open channels, detention/retention ponds, culverts, and storm sewers. While the development never materialized, it was accepted by the member cities as a standard or level of care that should be adopted for stormwater related infrastructure as development occurs.

The former DLH development area is just a small piece of a much larger planned development referred to as the International Inland Port of Dallas (IIPOD). As shown in **Figure 5-17,** the core of this development centers on the area bounded by Loop 12 (North side), Trinity River (East side), the Dallas/Ellis County Line (South side), and Interstate Highway 35 (West Side) or approximately 77,440 acres (121 square miles). No two city ordinances or design standards are the same when it comes to addressing stormwater related issues in the proposed IIPOD area. Therefore, like the DLH development, IIPOD should consider adopting stormwater infrastructure standards which all member cities can agree upon as the development occurs. Based on the estimated construction cost and acreage associated with the DLH stormwater infrastructure features, an estimated cost per acre for stormwater was developed. The estimated construction cost was computed to be approximately $3400 per acre. If the IIPOD development implements a similar standard or level of care for stormwater as that developed for the DLH development the total cost of the storm water infrastructure would be approximately $206,500,000. Please note that this cost does not include that portion of the IIPOD located within the Trinity River 100-year floodplain (approximately 16,710 acres or 26 square miles). It is assumed that the cost of constructing these stormwater features will be the responsibility of the private developer and/or the city in which they are located.



Dallas
Hutchins
Wilmer
Lancaster
PLEASANT RUN RD
LANCASTER HUTCHINS RD
BELT LINE ROAD
PD-1
PD-2
PD-3
PD-4
PD-5
PH-1
PH-2
PW-1
PW-2
PW-3
PW-4
PW-5
PW-6
PL-1
PL-2
PL-3
PL-4
20
45
342
N
0
4,000
SCALE IN FEET
Legend
Dallas Logistic Hub General Boundary
Study Area
County Boundary
Proposed Detention
Proposed Open Channel
Proposed Storm Sewer
Railroad
Southern Dallas County Infrastructure Analysis
Dallas Logistics Hub Planned Infrastructure Area Overview
Figure 5 - 16



Southern Dallas County Infrastructure Analysis
International Inland Port of Dallas
Area Overview
Figure 5 - 17
Legend
SCALE IN FEET
0
12,000
N
City of Mesquite
City of Balch Springs
City of Cockrell Hill
City of Dallas
City of Seagoville
City of Hutchins
UNT Dallas
Existing Union Pacific South Dallas Intermodal Facility
City of Wilmer
City of Combine
Cedar Valley College
City of Lancaster
Proposed BNSF Intermodal Facility
City of Duncanville
City of DeSoto
Dallas County
City of Cedar Hill
City of Glenn Heights
DALLAS COUNTY
ELLIS COUNTY
City of Ferris
30
20
352
12
45
35E
310
175
67

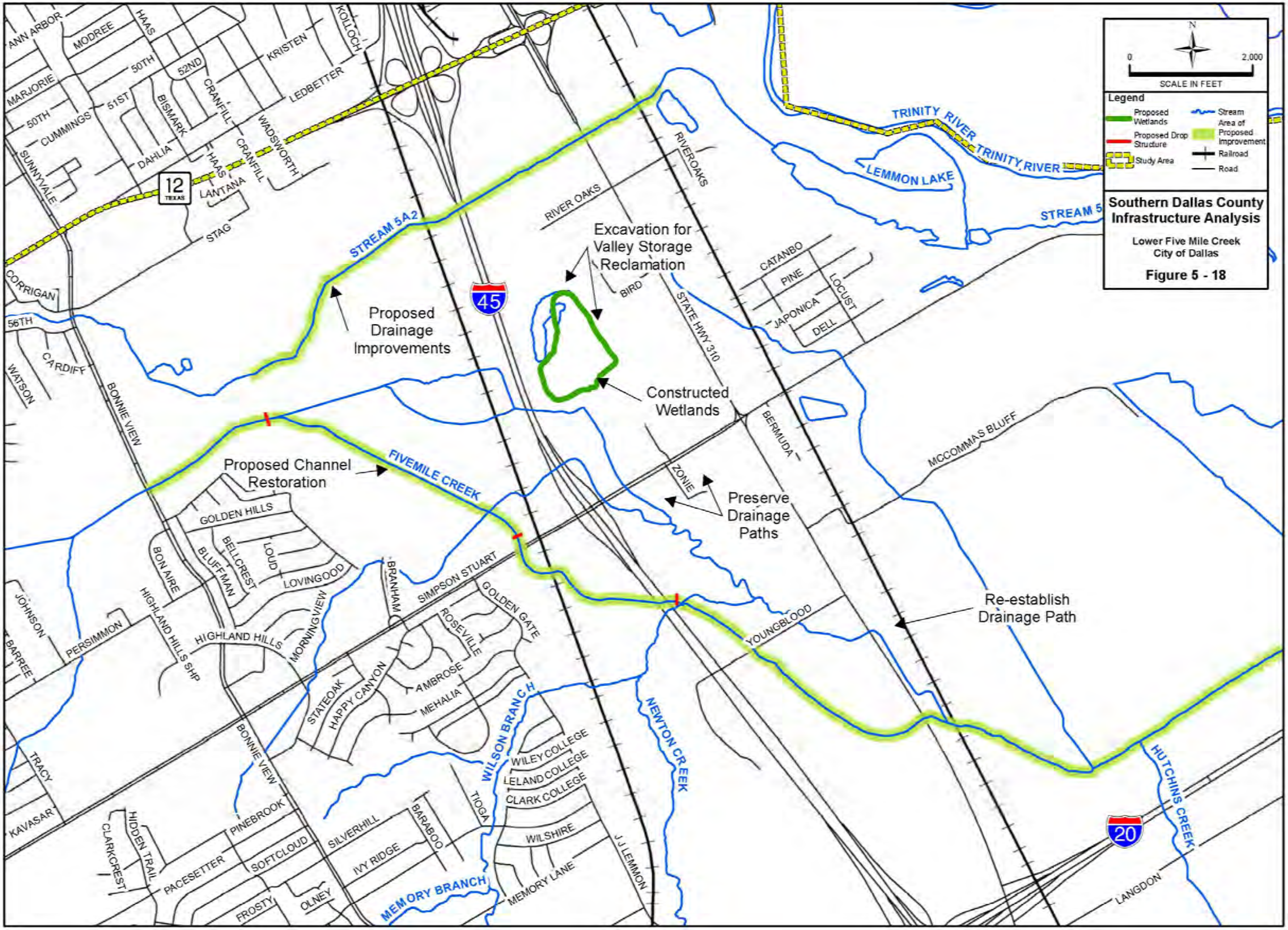
In 2006, a Floodplain Management Plan was prepared for the City of Dallas for Lower Fivemile Creek (Bonnie View to the Trinity River). Recommendations from the plan included: channel restoration and channel improvements, construction of wetlands and restoration of valley storage, preservation of existing drainage paths, erosion control, and the potential of economic development. **Table 5-24** shows the estimated cost of the recommended alternative at the time of the study. **Figure 5-18** shows the location of the proposed drainage features for this planning study.

Table 5-24. 2006 Lower Fivemile Floodplain Management Plan

Item (Responsibility)	Estimated Cost
Channel Restoration (City of Dallas)	$6,500,000
Mitigation, Landscape, and Trails (City of Dallas)	$2,400,000
Floodplain Reclamation (Private)	$12,100,000
Total	**$21,000,000**

Source: August 2006 Lower Fivemile Creek Floodplain Management Study

A 1976 Floodplain Management study exists for the entire Fivemile Creek Basin; however, for the portion of Fivemile below Bonnie View the 2006 study above supersedes the 1976 study recommendations. Between Bonnie View and IH35, the 1976 plan recommends that a series of small dams and lakes be created starting just downstream of Bonnie View and extending up Fivemile Creek to Marsalis Avenue. Based on the 1976 cost estimate, total project cost for this recommendation was $5,800,000. Before implementation of the 1976 plan, it is highly recommended that the reach of Fivemile Creek between Bonnie View and IH35 be reevaluated in order to check the continued validity of the original recommendation. The cost of this reevaluation could be as much as $250,000.



Southern Dallas County Infrastructure Analysis
Lower Five Mile Creek
City of Dallas
Figure 5 - 18
SCALE IN FEET
0
2,000
N
Legend
Proposed Wetlands
Proposed Drop Structure
Study Area
Stream
Area of Proposed Improvement
Railroad
Road
Excavation for Valley Storage Reclamation
Constructed Wetlands
Proposed Drainage Improvements
Proposed Channel Restoration
Preserve Drainage Paths
Re-establish Drainage Path
STREAM 5A2
FIVEMILE CREEK
TRINITY RIVER
LEMMON LAKE
STREAM 5
NEWTON CREEK
WILSON BRANCH
MEMORY BRANCH
HUTCHINS CREEK
45
20
12

SUMMARY

All members of the South Dallas County Infrastructure Analysis (SDCIA) area have adopted the minimum required floodplain regulations in order to be a part of the Nation Flood Insurance Program. Dallas and Lancaster have taken their floodplain ordinance and stormwater ordinances a step further than the minimum and require more stringent conditions for developments in order to limit impacts to adjacent properties and communities. Based on the assessment, adopting similar floodplain regulations by the other members of the SDCIA area is recommended for consistency in all communities.

Existing information on storm sewers, detention/retention ponds, ditches, and curb and gutters is lacking except in the areas where new construction has occurred. Field surveys are highly recommended to document the locations and sizes of existing infrastructure and to assess its condition. This information is critical to the process of determining what new infrastructure is needed as future development occurs. The cost of such an investigation can range from $50,000 per community (for a limited investigation) or to as much as $100,000 per square mile for a detailed investigation.

As for floodplain related information, a significant number of streams in the area have been studied and mapped. However, a review of the FEMA flood profiles and maps reveal that there are several instances where discrepancies exist. An update of the hydrology and hydraulics of the streams in the SDCIA area is recommended. Updating the models would allow for the correction of inaccuracies shown in the current Flood Insurance Study and Federal Emergency Management Agency floodplain maps, and allow the communities to better manage their floodplains as development occurs. The cost of such a study is estimated at $2,000,000 for all streams in the SDCIA area. Additionally, as the area develops, communities need to make sure that Letters of Map Revision (LOMR) are submitted to FEMA so that FEMA profiles and maps are updated.

Even before the area develops, the communities in the SDCIA should consider reconstructing those bridges and culverts that are overtopped by the one percent annual chance of exceedance (100-year) floodplain for the safety of the public. Replacement of these structures should start with those listed as having a priority of “1”, and then followed by those having a priority of “2” and”3”, respectively, unless future development dictates differently. The total estimated cost of reconstructing all the structures inundated is $48,200,000.

The Dallas Logistics Hub development provided an example of cities within the SDCIA area working together to address stormwater related issues before development occurs. Adoption of a similar agreement by the member cities that will be impacted by the IIPOD development is recommended. The cost of implementing such an agreement would require the construction of approximately $206,500,000 worth of stormwater related infrastructure as part of the IIPOD development. The implementation of the features associated with Lower Fivemile Creek is also recommended. This project is located entirely in the City of Dallas and would require either the City of Dallas and/or a developer to fund the construction of the stormwater features. The total cost associated with the 2004 Lower Fivemile Plan was estimated to be approximately $21,000,000.

A master drainage study for the entire SDCIA area similar to what was prepared for the Dallas Logistics Hub should also be considered. This will allow for consistency across the entire SDCIA area. This effort will develop a floodplain management plan that includes a detailed evaluation of alternatives for channelization, structure improvements, detention, diversions, water quality issues, and nonstructural alternatives. The cost associated with such a study is approximately $1,800,000, which would be performed subsequent to the recommended hydrology and hydraulic model updates mentioned previously.

At the time of this report, none of the projects mentioned above have been funded, studied, designed, or constructed.

Section 6: Transportation Infrastructure Assessment

This section presents an overview of the current and planned transportation infrastructure in the Southern Dallas County area, which includes the Cities of Dallas, Ferris, Hutchins, Lancaster, Wilmer and some unincorporated portions of Dallas County. To determine the available capacity that is on the ground today, the current roadway network in Southern Dallas County was reviewed. The future year transportation/thoroughfare plans of NCTCOG and the individual municipalities within the Southern Dallas County area were also reviewed to inventory the planned improvements (both funded and unfunded) that lie within the study area boundaries. Based on forecasted 2035 travel demand in the study area, the future infrastructure that will be needed to ensure a transportation network that will operate smoothly and efficiently was assessed.

Major transportation improvements, more so than most any infrastructure improvement, provide regional benefit and require multi-jurisdictional coordination. A major development within one jurisdiction can require highway, rail, aviation, and/or transit capacity improvements within multiple jurisdictions; improvements to an airport located within one jurisdiction benefits all neighboring communities; and as an example, designating a highway corridor for truck access improvements or an access management program does not realize its full benefit if all benefiting communities do not participate. This assessment identifies potential future transportation improvements of various types. While some are identified by local jurisdiction, estimated costs are not allocated by jurisdiction, as this will be highly dependent on the availability of federal participation under the federal transportation bill for highway, transit and aviation programs in place at the time of implementation. This section provides planned improvements and projected costs based on a review of the transportation plans of several local governments and forecasted traffic in the study area. The process of planning for and allocating local jurisdictional funding or local match responsibility for the recommended transportation projects will be a project-specific initiative which should take place with regional planning agency participation during the preliminary engineering and project planning phases of a project.

EXISTING TRANSPORTATION INVENTORY

Southern Dallas County and the greater Dallas region are served by a diverse transportation network. Ground transportation for passenger and freight travel in Southern Dallas County includes an extensive network of roadways including interstate highways (IH) 35E, IH 20 and IH 45 providing high-speed access through the Southern Dallas County area. These highways connect in a direct fashion to interstate highways serving all commercial and industrial sectors of the country and the Port of Houston. A network of arterial roadways connects to the interstates providing mobility through each of the local municipalities. The study area is also served by two freight railroads (Union Pacific and BNSF), transit options which are more limited in scope in part due to population density, and a regional general aviation airport. Three major airports located outside of the study area provide air cargo. Two of those airports offer domestic passenger service, and one offers direct international air travel connections.

ROADWAY NETWORK

City of Dallas

The Southern Dallas County study area includes the southern portion of the City of Dallas that lies south of Loop 12 and east of IH 35E. The transportation network in this portion of Dallas is shown in **Figure 6-1**. The primary north-south routes in this area are Houston School Road and Bonnie View Road, while Camp Wisdom/Simpson-Stuart, Loop 12 and IH 20 serve as the primary east-west routes.

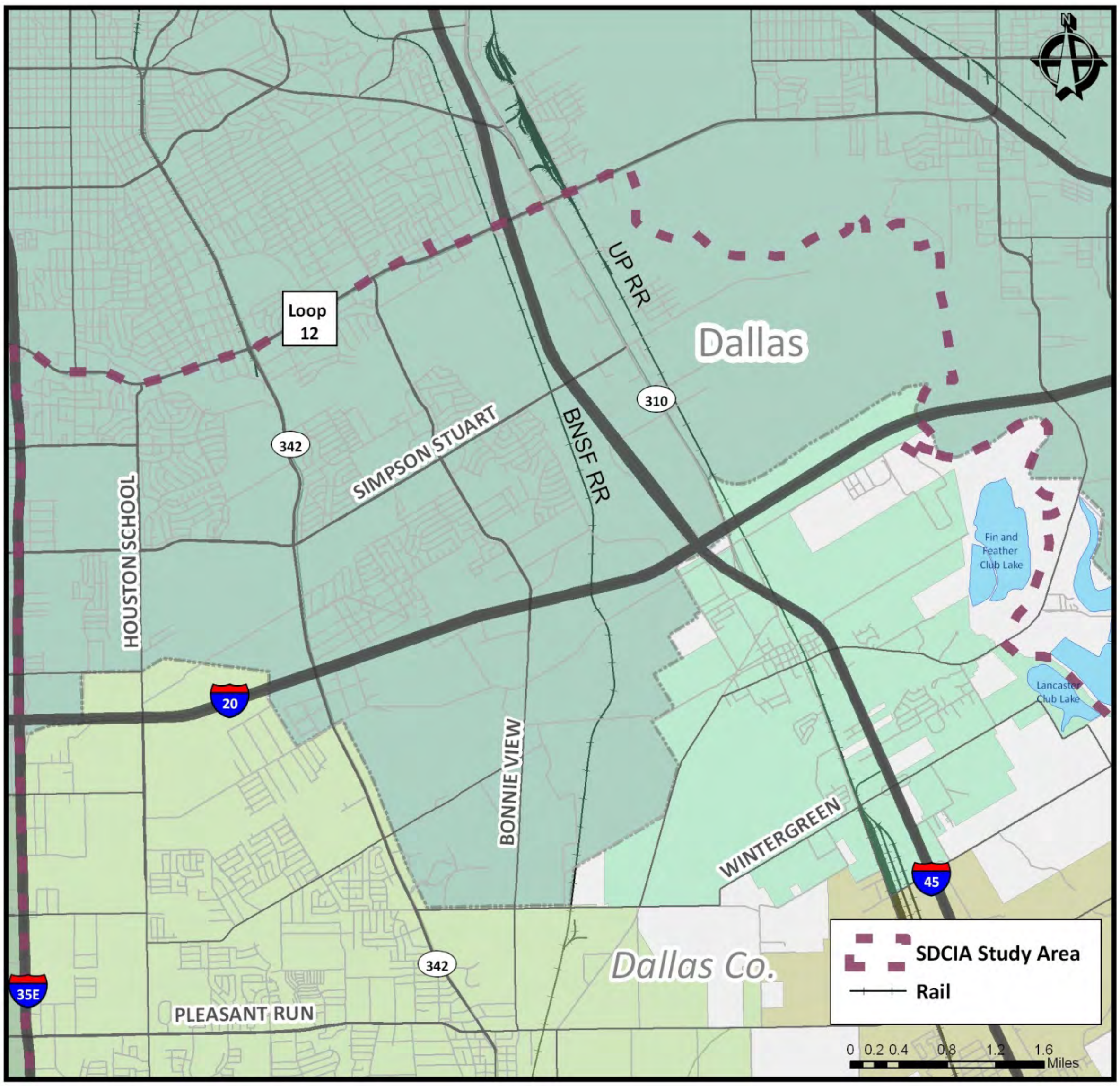


Figure 6-1. City of Dallas Transportation Network

CDM Smith

City of Ferris

The roadway network in the City of Ferris is shown in **Figure 6-2**. The primary north south routes in Ferris are Central and IH 45, while the primary east-west route is FM 664. A majority of the City of Ferris lies in Ellis County; however, the northernmost area of the city lies in Dallas County.

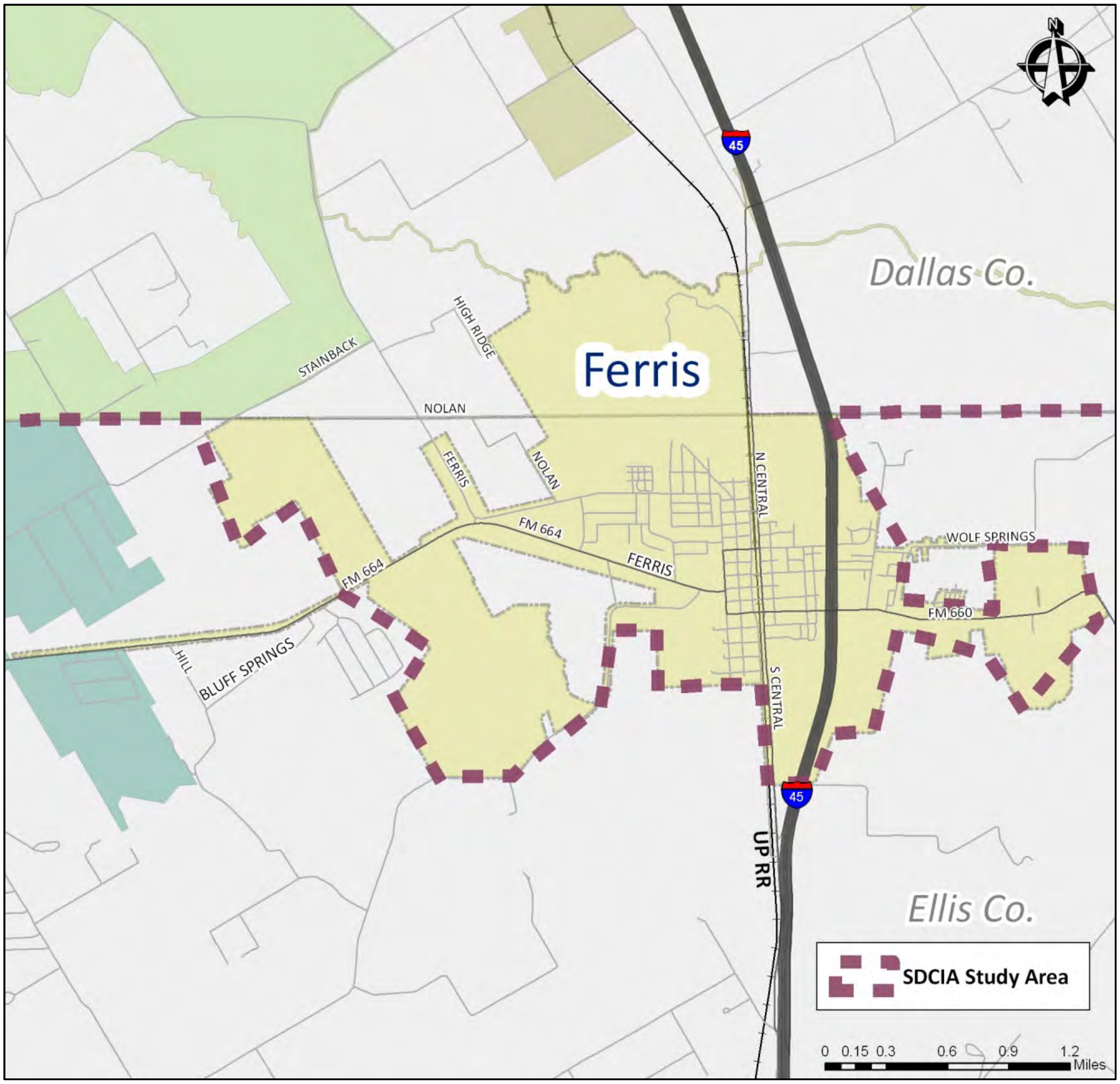


Figure 6-2. City of Ferris Transportation Network

City of Hutchins

The City of Hutchins lies along IH 45 between the Cities of Dallas and Wilmer in southern Dallas County. It is located to the south of the intersection of IH 20 and IH 45, and a portion of UPRR's Dallas Intermodal Terminal is located in the southern part of the city. The major north-south arterials include Millers Ferry Road and Main Street. The primary east-west arterials through the City of Hutchins include Wintergreen Road and Dowdy Ferry Road. The roadway network in the City of Hutchins is shown in **Figure 6-3**.

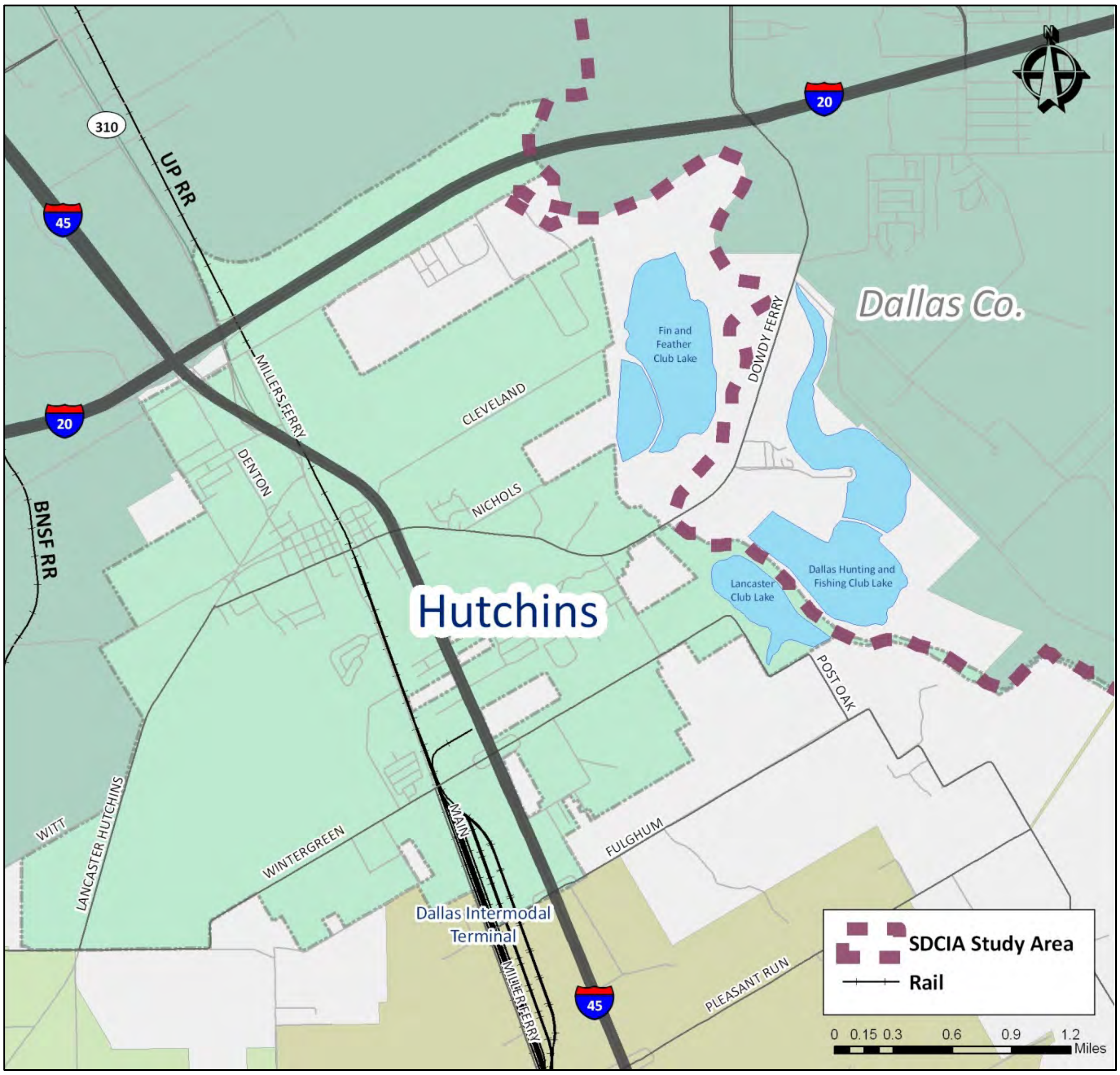


Figure 6-3. City of Hutchins Transportation Network

City of Lancaster

The City of Lancaster is located south of the City of Dallas and east of IH 35E. The major north-south arterials in the City of Lancaster are State Highway 342 (also known as North Dallas Avenue), Houston School Road and Jefferson Street. The major east-west arterials in the City of Lancaster include Pleasant Run Road, Wintergreen Road, Belt Line Road, Danieldale Road and Bear Creek. The roadway network in Lancaster is shown in **Figure 6-4**.

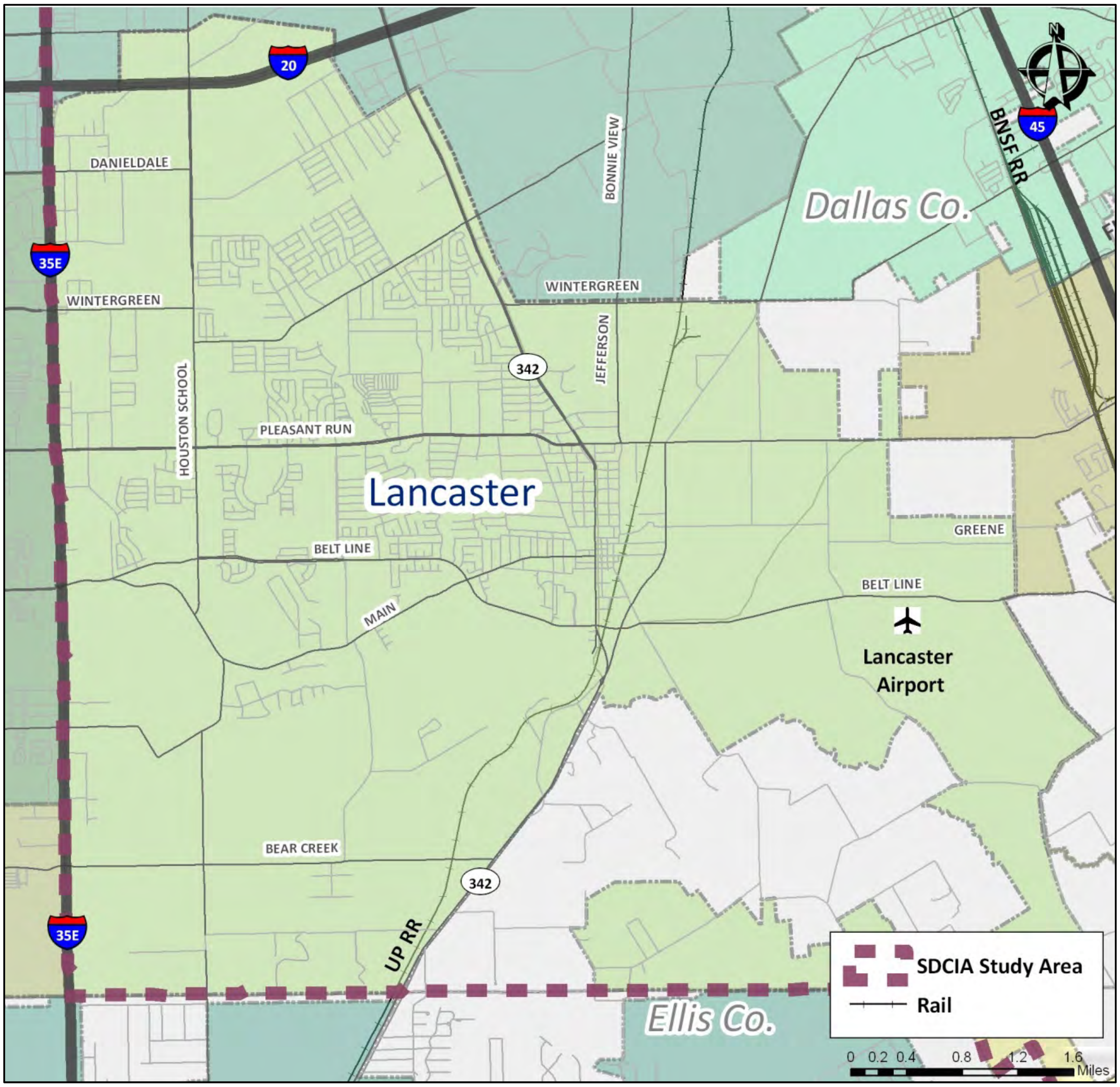


Figure 6-4. City of Lancaster Transportation Network

City of Wilmer

The City of Wilmer is located along IH 45, approximately fourteen miles southeast of the City of Dallas. The existing roadway network in Wilmer is largely dispersed with major north-south routes along IH 45 and Millers Ferry Road while the major east-west routes are Pleasant Run Road and Belt Line Road. The transportation network in the City of Wilmer is shown in **Figure 6-5**.

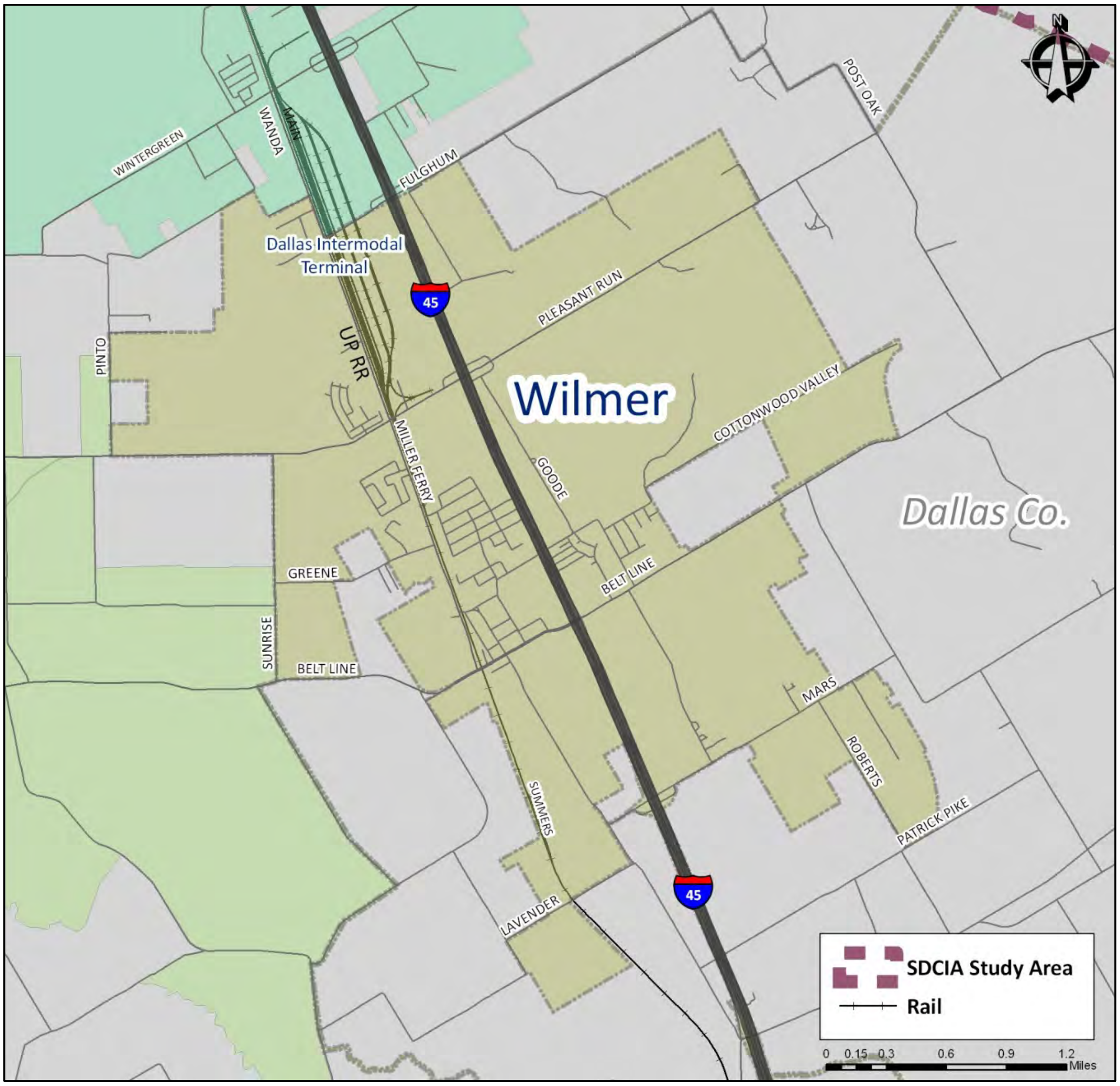


Figure 6-5. City of Wilmer Transportation Network

Current Truck Freight Corridors

Dallas is a central location to much of the United States and neighboring countries. Ninety-eight percent of the U.S. population can be reached from this region within 48 hours by truck.[1] Figure 6-6 shows the major freight corridors in the U.S. As discussed, IH 35E, IH 45 and IH 20 are prominent within the study area, along with some other State and U.S Highways. The benefits of each interstate to this area are:

- IH 45 is a direct connection to the Port of Houston. The intermodal movements from the port are significant and have the potential to increase rapidly after the Panama Canal expansion to allow larger cargo shipments to eastern ports is complete.
- IH 35 is a primary north/south interstate through the heartland of the nation and is also known as the NAFTA Highway. It connects IH 10 and the western port traffic to Dallas along with direct access to the Mexican border at Laredo. North are Oklahoma City and Kansas City and a direct link to Minneapolis and Canada. IH 35 is the connection to other major intermodal centers in Kansas City and Chicago as well. IH 35 has been identified by the Federal Highway Administration (FHWA) as a megaproject with the ongoing objective to separate freight traffic along the corridor in order to improve mobility, safety, and economic vitality.
- IH 20 is the connection to eastern population centers like Atlanta and major system connectors like IH 75, IH 81, and IH 95. It connects IH 10 and the San Pedro Bay Ports of Los Angles and Long Beach to the east coast population centers. IH 20 has played a major role in the growth of the Dallas-Fort Worth region over the years and will continue to do so in the future. IH 20 is the only area route approved for the transport of transuranic radioactive waste cargo and one of the only approved routes for other types of hazardous materials.

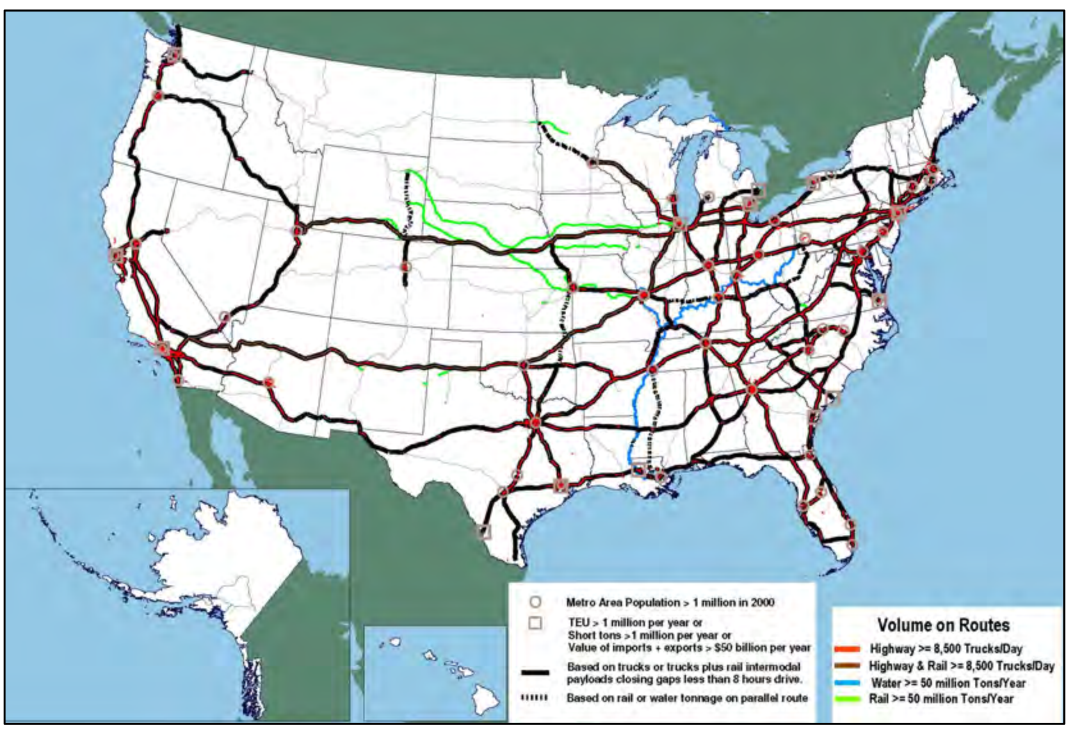


Figure 6-6. Major Freight Corridors in the United States

Source: Federal Highway Administration, Office of Freight Management and Operations, 2008

RAIL NETWORK

The study area is serviced by lines of two Class I railroads, the BNSF Railway (BNSF) and the Union Pacific Railroad (UP). The BNSF line includes the railroad's DFW Subdivision that runs from Teague, Texas north to Dallas (Union Pacific operates on this line as well). The Union Pacific line includes its Ennis Subdivision, Ennis Junction to Hearne, Texas.

DFW Subdivision

A map of BNSF Railway's intermodal rail lines and facilities in the U.S. is shown in **Figure 6-7**. The BNSF line runs 11.6 miles through the study area entering from the north at the Loop 12 (BNSF mile post 773.9) and crossing the southern study area boundary at the Dallas-Ellis County line (BNSF mile post 785.5). The northern portion of the line lies in the City of Dallas and the southern portion in the City of Lancaster. In 2008, BNSF purchased 198 acres from the Allen Group and optioned another 164 acres[2] along the line segment "to add more intermodal capabilities in North Texas."[3] However, the option expired, and the property has yet to be developed. BNSF's current Dallas area intermodal terminal is 61 miles away in the Alliance development, north of Fort Worth.

The single-track mainline is equipped with an automatic block signal system and operations are governed by track warrant control rules. The maximum operating speed for freight trains is 40 mph[4], and the carload weight limit is 286,000 lbs.

The main track is comprised of 115 and 136 lb. continuously welded rail (CWR), in good condition, laid on timber ties in fair to good condition. A double-ended siding, approximately 4,000 feet long, exists in Lancaster, and one side track serves an on-line business just north of town.

Figure 6-7. BNSF Railway Intermodal Routes
Source: BNSF Railway

CDM Smith

A dozen bridges principally spanning waterways and drainage paths exist on the line segment, most are open deck timber pile trestles, and the longest is 154 feet. A 321-foot-long through truss over Ten Mile Creek is the longest structure.

Eighteen public roadways and one private road cross the rail line within the study area. Four of these are grade separated – two associated with the Highway 12 Loop, and one each with IH 20 and Dallas Avenue (SR 342), all principal study area highways.

Ennis Subdivision

A map of Union Pacific's intermodal rail lines and facilities in the U.S. is shown in **Figure 6-8**. The Union Pacific rail line crosses into the study area from the north at the Highway 12 Loop (UP mile post 258.7) and crosses the southern study boundary (the southern city limits of Ferris) at mile post 244.9, a total distance of 13.8 miles. The line passes through southern Dallas and the Cities of Hutchins, Wilmer and Ferris. The line segment has automatic block signals with operations governed by track warrant control rules. The maximum operating speed for freight trains is 40 mph, and the carload weight limit is 315,000 lbs.[5]

The line segment is home to UP's 360-acre Dallas Intermodal Terminal (DIT) which is open 7 days/week 24 hours/day[6]. The facility opened in 2005 and lies adjacent to IH 45 with direct access at interchange 272. In addition, the UP operates another intermodal terminal at Mesquite, 20 miles away. The south end of Miller Yard, a classification yard, is located at the northern end of the study area.

The single-track mainline has a double ended siding in Ferris of 5,500 linear feet. Two other sidings at the northern end of the line segment are lead tracks for Miller Yard and the Dallas Intermodal Terminal, 3,000 and 7,500 feet long, respectively. In addition, there are five spurs serving on-line industries.

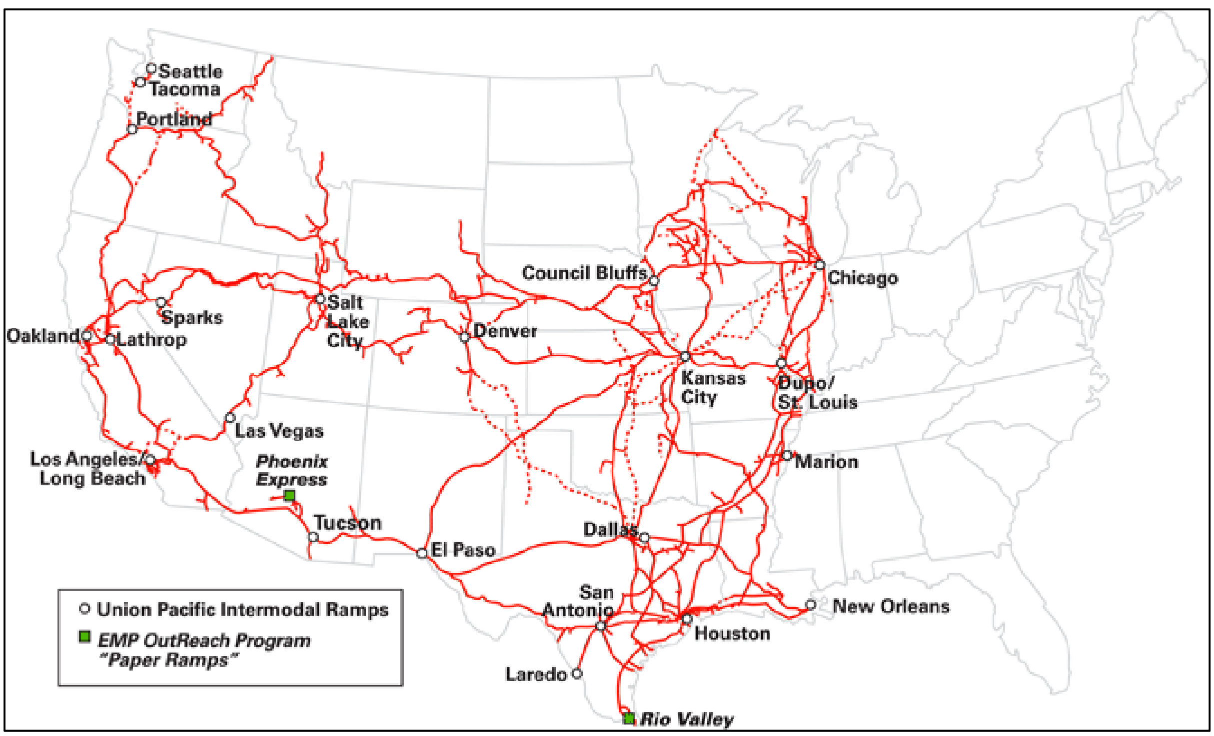


Figure 6-8. Union Pacific Intermodal Routes

Source: Union Pacific Railroad

There are nine railway bridges on the line segment in the study area, and a number of culverts to handle drainage under the track. The longest bridge is a 68-span timber trestle over Five Mile Creek with a total length of 1,020 feet. The next longest structures are approximately 200 feet long.

Twenty-nine roads cross the study line segment, four of which are grade separated – Loop 12, IH 20, IH 45 and Wintergreen Road. All of the public roadway at-grade crossings have active protection devices with the exception of three. There are three private road crossings.

Area Freight Development

Much of the freight growth in the SDCIA area is centered around the "inland port" area near the UP intermodal facility. The term "inland port" has many different connotations ranging from a port facility located on the inland waterway system to a non-waterway site functioning as a destination or as an original for marine traffic. In most cases the marine traffic is comprised of containers, although it could also be comprised of bulk shipments. The magnitude of the inland port can also vary depending on the concept employed and can vary from entire metropolitan areas with multiple major transportation facilities and a high level of industrial, warehousing/distribution activity, to simply a single facility with a marine terminal connection, either rail or highway.

DFW Freight Facilities

The Alliance development located in Fort Worth is a planned mixed-use development of 17,000 acres which includes 9,600 acres of business park. Its transportation infrastructure includes the Fort Worth Alliance Airport, service by both the Union Pacific Railroad and BNSF Railway, the BNSF Dallas-Fort Worth intermodal facility, a BNSF automobile transload facility, and access to I-35W and Texas routes 114 and 170.

The Union Pacific Mesquite intermodal facility, located at the confluence of IH 30, US 80 and IH 635, handles both domestic trailers and containers. It is smaller than the railroad's Dallas Intermodal Terminal and is located adjacent to the carrier's automobile transload facility.

A transload facility is designed to facilitate the transfer of freight from one mode to another. Intermodal facilities are transload facilities, but transload is not limited to containerized goods only as bulk material, such as coal, might be reallocated and transferred to new destinations. The facility may or may not provide for storage/warehousing.

The Southern Dallas County area is home to a multitude of freight oriented amenities and resources in the area. From the 2035 mobility plan (**Figure 6-9**), the following facilities were inventoried:

- Truck stops
- Rail yards and intermodal facilities
- Pipelines
- Delivery Hubs
- Airports
- Industrial Parks
- Foreign Trade Zones (FTZ)
- Freight-oriented development designed locations

Industrial Business Development

There are several existing industrial developments within the study area and interest from additional companies and manufacturers continues to grow. The following businesses are currently operating within the study area:

- IH 45 Corridor
  - Unilever = 860,000 sq ft (opened in 2007)
  - Osborne Hessy (USAA) = 530,000 sq ft (opened in 2007)
  - Whirlpool = 1,000,000 sq ft (opened in 2011)
  - Cooper Tire = 275,000 sq ft (opened in 2007)
  - American Standard = 630,000 sq ft (opened in 2010)
  - FedEx Ground = state-of-the-art 325,000 sq ft distribution hub (opened in 2005)
  - Union Pacific Dallas Intermodal Terminal (opened in 2005)
- IH 20 Corridor
  - Prologis = 300 acre site (opened in 2007)
- IH 35E Corridor
  - KOHL'S = 1,000,000 sq ft west of IH 35E (just west of study area, opened in 2012)

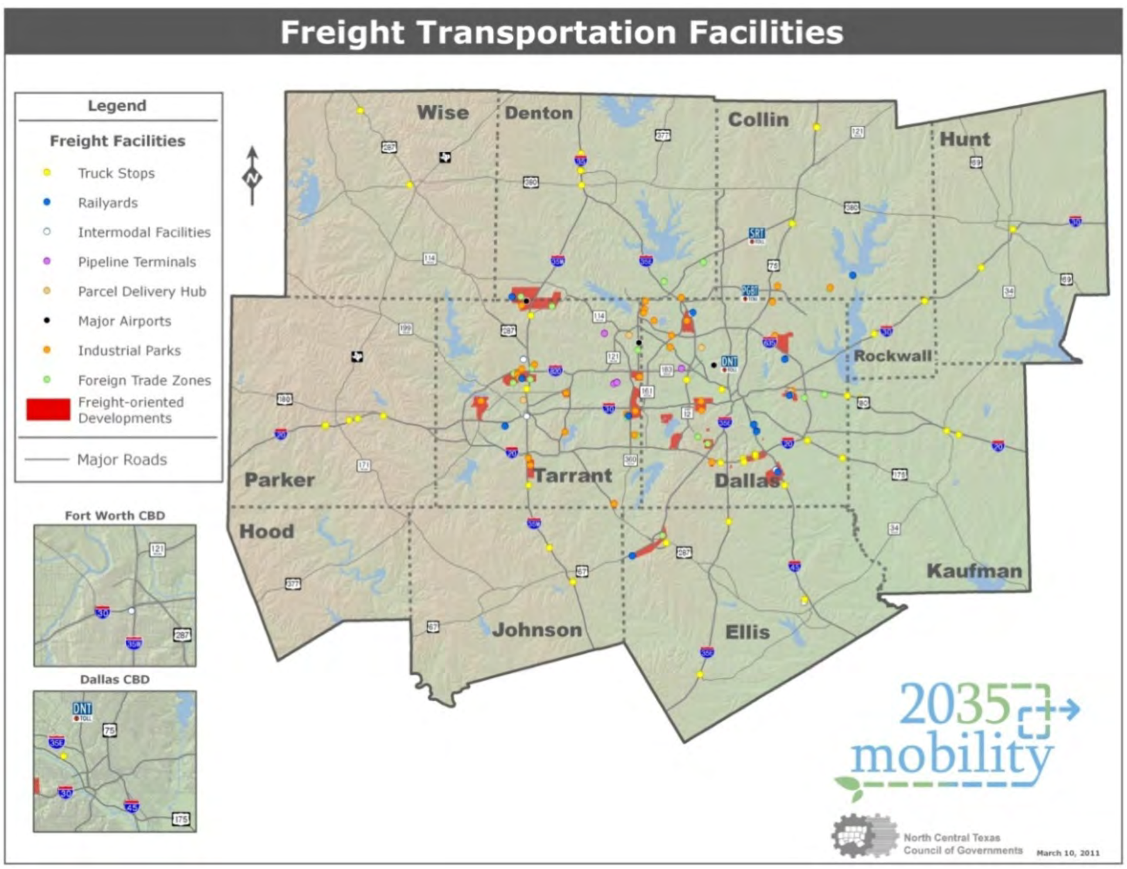


Figure 6-9. Freight Transportation Facilities in DFW

International Inland Port of Dallas

A principal example of freight growth potential in the Southern Dallas County area is the International Inland Port of Dallas (IIPOD)[7], a regional intermodal development focused on logistics and freight distribution. It is a key driver in making Southern Dallas County a logistics hub and national distribution center. Located in the SDCIA study area, the development covers 234,000 acres and encompasses ten municipalities. The project takes advantage of the area's transportation infrastructure, which includes two Class I railroads (Union Pacific and BNSF Railway) and is located at the general convergence of IH 35E, IH 45 and IH 20. As shown in **Figure 6-10**, both Union Pacific and BNSF have existing or proposed intermodal facilities in the SDCIA area.

The IIPOD is a public-private partnership with considerable potential, much like similar developments in Kansas City (Edgerton) and Chicago (Clearpoint). When built out, the project will serve as a significant inland port. The total project is estimated[8] to take 30 plus years to complete. Edgerton will soon be home to a 1,000-acre development that will contain a 440-acre BNSF Intermodal Facility and the 560-acre Logistics Park-KC (warehousing and distribution centers). The BNSF Intermodal Facility will provide a direct connection via the BNSF's transcontinental railroad that begins in Long Beach, California and terminates in Chicago, Illinois. The facility will provide multi-modal transportation for many goods being imported from China and the Pacific Rim. Located south of Kansas City, IH 35 and IH 70 are major transportation facilities easily accessed from the site.

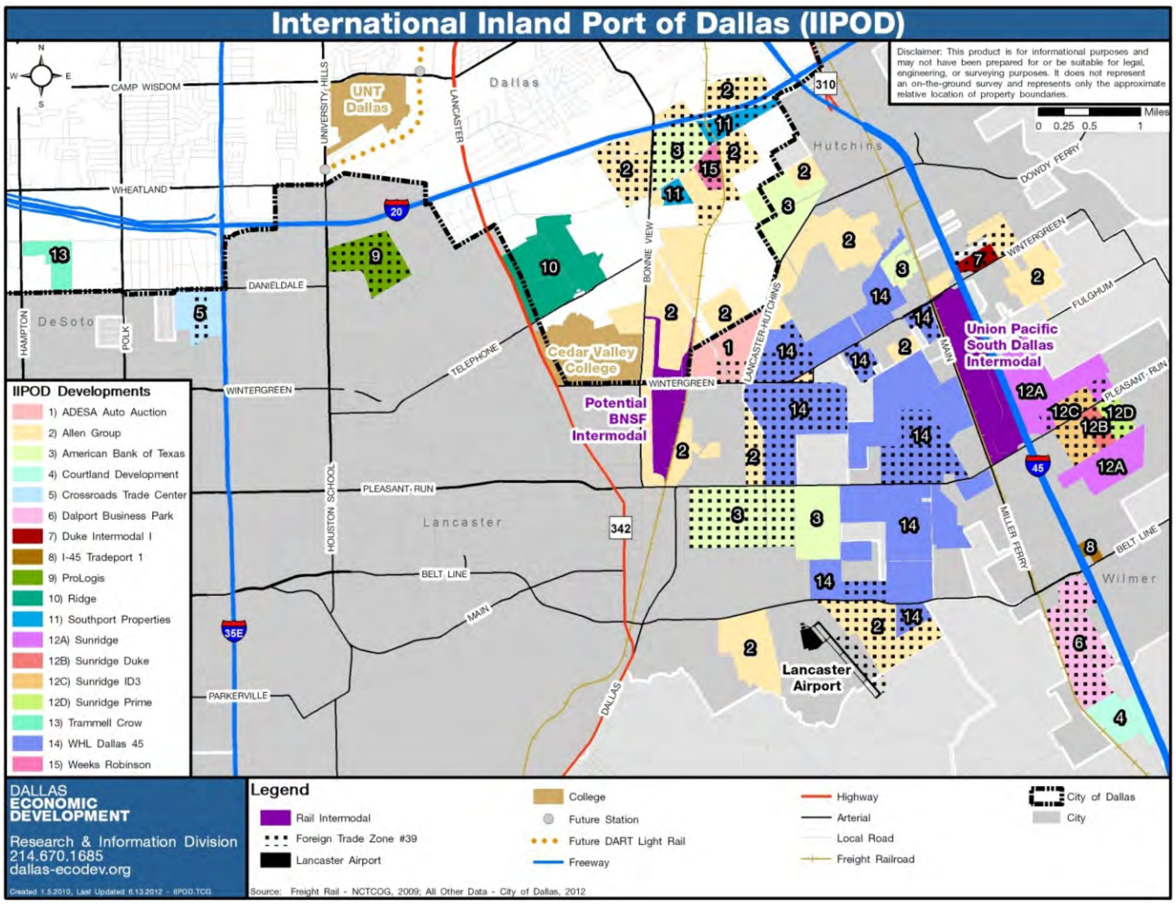


Figure 6-10. International Inland Port of Dallas

Truck Lane Restrictions

In practice, truck lane restrictions on highways have been shown to improve mobility, safety, and air quality. For a corridor to be eligible to be considered for truck lane restrictions there must be three or more traffic lanes (excluding frontage roads) in each direction, it must be controlled access, and it must be on the State System. There also cannot be left exits or entrances. Truck lane restrictions currently exist along sections of IH 20 in Dallas, Kaufman, and Tarrant Counties; IH 30 in Tarrant County; IH 45 in Dallas and Ellis Counties; and IH 820 in Tarrant County. Along these corridor sections, trucks with three or more axles are prohibited from using the inside left lane, except when passing traffic. **Table 6-1** lists the current truck lane restrictions in the DFW area.

Table 6-1. Freeway Truck Lane Restrictions in Dallas-Fort Worth

Highway	Counties	Limits
IH 20	Dallas, Kaufman, and Tarrant	From US 377 in Fort Worth to FM 740 in Mesquite
IH 30	Tarrant	From Dale Lane in Fort Worth to FM 157 in Arlington
IH 45	Dallas and Ellis	From IH 30 in Dallas to FM 3413 in Ennis
IH 820	Tarrant	From Westpoint Boulevard in Fort Worth to IH 20 in Fort Worth

Current Freight Movement

According to the Federal Highway Administration's Freight Analysis Framework (FAF)[9], there were an estimated 1.7 billion tons[10] of freight moved within Texas in 2010; 395 million tons generated from Texas and moved outside the state; and approximately 440 million tons with Texas as its destination. Freight values are shown across all modes, but only for domestic freight.

Rail Operating Volumes

Six to eight trains per day[11] operate over both rail lines serving the study area. Union Pacific's Dallas intermodal terminal opened with an annual capacity of 500,000 units expandable to 700,000[12]. Lifts[13] in 2011 totaled 261,000 (making it the eighth largest Union Pacific facility by volume), down from 280,000 in 2010.[14] The BNSF Alliance intermodal terminal in Fort Worth has been upgraded to handle 1 to 1.5 million lifts, well above 2008's 540,000 lifts.[15]

Truck Volumes

Truck traffic is well established on the interstate highways in the area. All three interstates have over 3,000 trucks per day along the segments in the study area. Interstate 20 is especially heavy as it is the primary east-west route for the region. **Figure 6-11** shows the NCTCOG forecasted 2012 average daily truck traffic in the Southern Dallas County area. As shown in figure, the daily truck volume is intense between IH 35 and IH 45 as trucks and commuters use IH 20 to move between the two north-south corridors. Daily volumes for trucks can reach approximately 6,500 (which is over nine percent of the total traffic on this segment).

Other major corridors in Southern Dallas County for trucks include:

- North/South – Houston School Rd, Lancaster-Hutchins St, Bonnie View Rd, N Dallas Ave (342)
- East/West – Farm to Market (FM) 664, Belt Line Rd, Wintergreen Rd, Pleasant Run Rd

The north-south arterial routes carry approximately 400 trucks per day from IH 20 to the inner study area according to NCTCOG forecasts, but the development is currently close to the interstates themselves, so they are short distance trips. As development progresses, the corridors will become more utilized, as well as the east west connectors. Currently the east-west arterial corridors handle 200-300 trucks per day.

In approximately 80 percent of all U.S. communities, freight movement is achieved solely through trucks[16]. Goods are carried across all modes, but trucks[17] handled the majority within Texas (60 percent of total commodities shown from FAF[18]), and an estimated 41 and 34 percent respectively of state imports and exports. For the Dallas-Fort Worth area specifically, the following are the estimated truck volumes into, out of, and within the urban area. An equivalency factor was used to calculate the resulting number of trucks (including empties).

- From DFW to areas outside: 211,951 ktons ($305.7 M) = 5.8 million trucks annually[19]
- To DFW from areas outside: 229,956 ktons ($310.6 M) = 6.3 million trucks annually
- Staying within DFW: 145,914 ktons ($155.0 M) = 4.0 million trucks annually

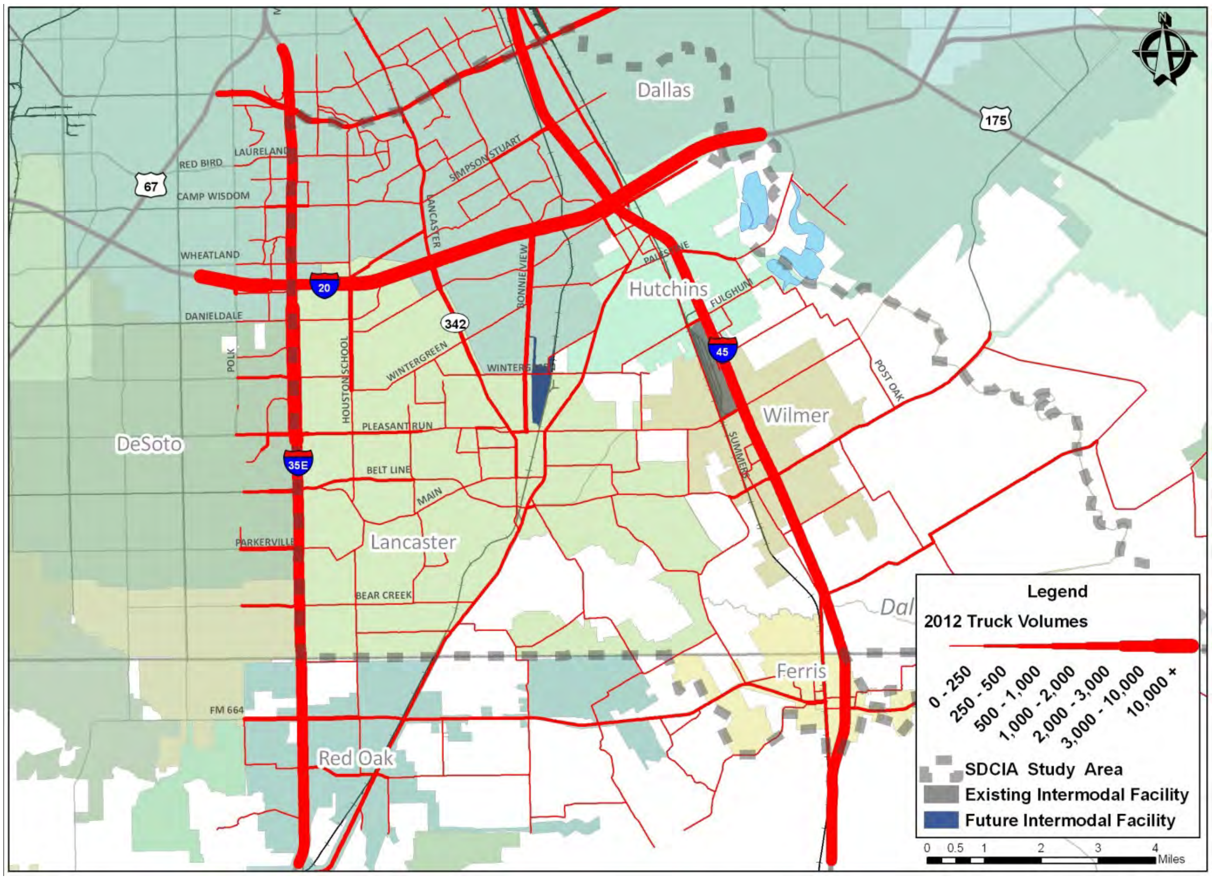


Figure 6-11. 2012 Average Daily Truck Volumes in the SDCIA Area

Source: NCTCOG Mobility 2035 Truck Volume Forecast

This large freight movement is a prime reason why the DFW area has emerged as a freight and logistics hub. This area is equidistance from major cities on the east and west coasts, as well as being a major transfer site for freight moving north and south to/from Canada and Mexico along the NAFTA corridor. The activity level, domestically and internationally, is robust and poised to increase further. It will be a strain on the existing system as freight movements increase if the infrastructure does not adapt to accommodate this growth.

TRANSIT SYSTEM

Dallas Area Rapid Transit (DART) is currently the sole provider of transit in the study area. This area is referred to in DART's 2030 transit system plan as the Southern Sector. Current DART service in the Southern Dallas County study area is illustrated in **Figure 6-12**, and currently the City of Dallas is the only municipality in the study area that is a member of DART. DART light rail service is offered via the Blue Line which currently serves the very northern edge of the study area at Ledbetter Station (15 minute weekday service, 20 minute weekend service). Currently, DART provides nine bus routes as summarized in **Table 6-2**.

Although DART service is currently only available in the City of Dallas, other cities in the Southern Dallas County area offer demand response transportation for seniors and the disabled. These include the City of Wilmer Transportation Program, the Hutchins Senior Center, and the Lancaster Senior Center. Demand response transportation is also available for all residents through private providers such as CVT Transportation Services, Metro Transporters and My Private Driver.

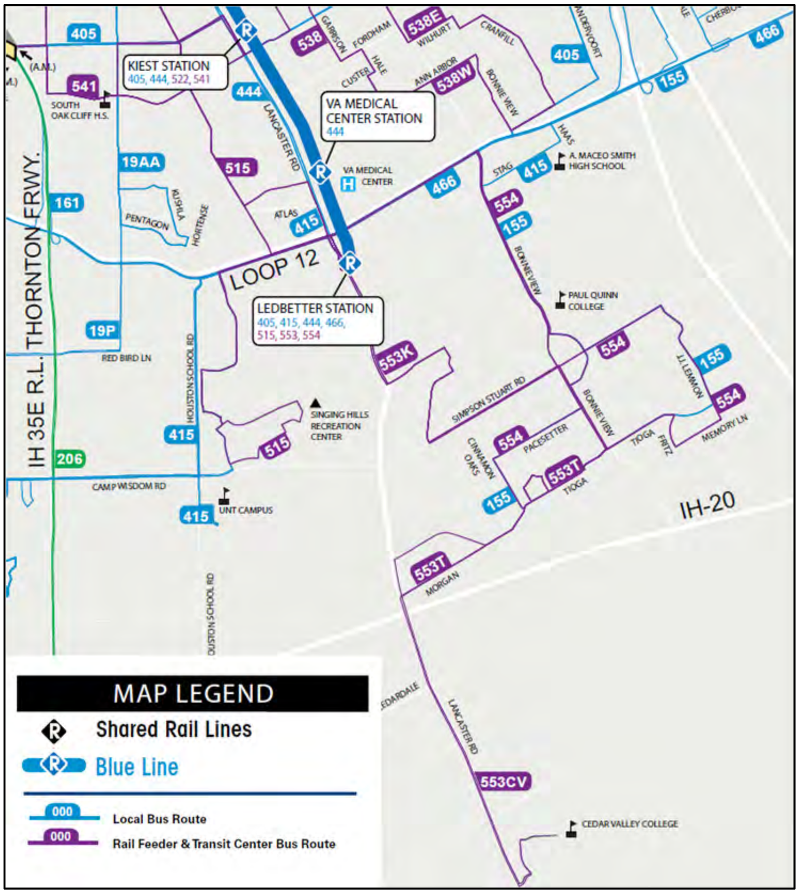


Figure 6-12. Transit Service in the Study Area

Source: Dallas Area Rapid Transit

Table 6-2. Current DART Bus Service in Study Area

Route Number	Description	Service Frequency
155	Paul Quinn College/Downtown Dallas	30 minute peak only
206	Express Glenn Heights to Dallas	8-15 minute peak only
405	Southwestern Medical District to Ledbetter Station	35 to 45 minute peak weekday, 60 minutes weekend
415	Southwest Center Mall, Ledbetter Station, Loop 12	30 min peak, 60 min off peak
466	Charlton Methodist Hospital, Ledbetter Station, Buckner Station	20-30 min peak, 40 min off-peak
515	Singing Hills Recreation Center, Dallas Zoo and Ledbetter Station	20 min peak, 40 min off-peak
553	Cedar Valley College/Plaza	30 min peak, 60 min off-peak

AVIATION

The Dallas-Fort Worth region is served by two commercial service airports – Dallas/Fort Worth International (DFW) and Dallas Love Field. Both DFW and Love Field provide commercial passenger service through multiple scheduled airlines, with American Airlines conducting hub operations at DFW and Southwest Airlines headquartered at Love Field. One of the busier general aviation airports also serves the Dallas-Fort Worth region – Fort Worth Alliance Airport. The majority of Fort Worth Alliance Airport's operations are focused on air cargo, industrial aircraft activities, military flights, and corporate aircraft. Note that all three airports move significant amounts of air cargo. Additionally, Dallas Executive Airport, another general aviation airport, is located near the SDCIA project area.

As shown in **Table 6-3**, DFW and Love Field together accommodated nearly 65 million annual passengers in 2010 with over 820,000 aircraft operations. Fort Worth Alliance contributed over 50,000 aircraft operations over that same period and moved more air cargo tonnage than Dallas Love Field did. It is reasonable to assume that these airports will continue to meet the air travel needs of the Dallas-Fort Worth region for the foreseeable future.

Table 6-3. Overview of Major Airports in the Dallas-Fort Worth Region

Airport	Total 2010 Passengers	Total 2010 Aircraft Operations	Total 2010 Commercial Cargo (metric tonnes)
Dallas/Fort Worth International	56,906,610	652,261	645,426
Dallas Love Field	7,960,809	168,544	126,577
Fort Worth Alliance	0	52,243	154,000

Source: 2010 ACI Annual Worldwide Airport Traffic Report and Lancaster Municipal Airport Master Plan, Draft Final Report, February 2010

SDCIA Study Area Aviation Infrastructure

Lancaster Regional Airport is owned and operated by the City of Lancaster. It is located approximately two miles southeast of Lancaster on Ferris Road, just south of E. Belt Line Road. The airport is in Dallas County and approximately 13 miles south of downtown Dallas.

The airport has a single 6,502-foot runway capable of handling more than 75 percent of large airplanes (weighing 60,000 pounds or less) using up to 90 percent of useful load.[20] The runway weight bearing capacity is 20,000 pounds for single wheel landing gear aircraft and 60,000 pounds for dual wheel landing gear aircraft. The runway is equipped with medium intensity runway lights (MIRLs), and a runway end identifier light system (REIL) at the approach end of Runway 31 for use at night and during other low visibility conditions. Each runway end has a 4-light precision approach path indicator (PAPI) on the left side of the runway. A taxiway on the west side of the runway runs parallel to the full length of the runway.[21]

Lancaster Regional Airport has easy access to three interstate highways. Interstate 45 is just east of the airport and is connected by Belt Line Road, which runs east and west, and provides access to the airport via Ferris Road. Additionally, Belt Line Road continues west past South Dallas Avenue and connects with Interstate 35E/U.S. Highway 77. Interstate 20 is to the north of the airport, and is easily accessed by I-35E or I-45. The vehicle parking area serving the terminal building is located immediately northwest of the terminal building.

Aircraft Operational Volumes (baseline)

Lancaster Regional Airport is designated as a general aviation reliever airport in the FAA's National Plan of Integrated Airport Systems (NPIAS). This means that the airport serves general aviation aircraft and does not have scheduled commercial airline service. A reliever airport is intended to serve as an alternate destination for general aviation aircraft that would otherwise use the region's major commercial airports: Dallas/Ft. Worth International and Dallas Love Field. By serving as a viable alternate destination to these airports for general aviation aircraft, air traffic congestion is reduced at these commercial service airports and the users of Lancaster Regional get to enjoy airspace that is less restrictive than the airspace found around the larger airports. Additionally, there is less ground congestion around Lancaster Regional Airport, which makes access to the community and surrounding areas more convenient for airport users.

Lancaster Regional Airport is a non-towered airport, so there is no official record of the number of aircraft operations (defined as an aircraft take off or a landing) that occur at the airport each year. Instead, a variety of techniques are used to estimate the airport's annual activity levels. It is important to understand that different techniques will typically result in different activity estimates, which explains why the FAA has a different number of operations than what has been reported in the *Lancaster Municipal Airport Master Plan*. Of all the sources available, the *Lancaster Municipal Airport Master Plan* provides the most detailed listing of airport operations, indicating that there were approximately 50,000 operations at the airport in 2008, the most recent year of operations in the master plan, as shown in **Table 6-4**.

Table 6-4. Annual Operations at Lancaster Regional Airport for 2008

Itinerant Operations			Local Operations			Total Operations
General Aviation	Military	Total	General Aviation	Military	Total	
16,500	50	16,550	33,000	0	33,000	49,550

Source: Lancaster Municipal Airport Master Plan, Draft Final Report, February 2010

Aircraft operations are categorized as either itinerant or local. Itinerant operations are those conducted by aircraft coming from outside the airport's local area of operations, including those that are visiting from another airport, or those aircraft based at Lancaster Regional that are returning from a long flight. Local operations are those operations conducted by aircraft that remain in the airport's local area of operations including its traffic pattern. It should be noted that almost all local operations are training-related. Approximately one-third of the operations at Lancaster Regional are itinerant in nature, while the other two-thirds are considered local. A small number of military flights are conducted at the airport every year.

The standard measurement for airport capacity is Annual Service Volume (ASV), a metric established by the FAA representing the annual number of aircraft operations that an airport can reasonably be expected to accommodate with an acceptable level of average delay. The principal benefit of this metric is to help recognize that as airfield demand levels reach (and possibly exceed) the ASV, individual aircraft delays will increase and result in overall airport congestion and operational inefficiencies. It is also important to understand that even when the annual demand is less than the ASV, aircraft delays may still occur and as the operational demand levels approach the ASV, delays become progressively worse. Regardless of the specific circumstances, delay resulting from airport capacity issues is a significant negative factor for any airport in that it reduces airfield processing efficiency, increases operational costs and could ultimately degrade the general level of airport safety.

As such, it is important to have a clear understanding of airport capacity, and how to plan to alleviate delays associated with capacity limitations.

The calculation used to measure the degree to which an airport can handle its traffic volume is called the airport's demand/capacity ratio and is determined by dividing annual operations by airport ASV. FAA demand/capacity guidelines recommend that when an airport's demand/capacity ratio reaches 60 percent, the airport should begin planning for capacity enhancement projects. When that airport's demand/capacity ratio is at 80 percent, the airport should start implementing those projects. By following these guidelines, the airport will ideally never reach a 100 percent demand/capacity ratio since those improvements should be in place by that point. It should be noted that these are general guidelines and conditions at individual airports may warrant different responses or no action based on achievement on these triggers. With its single runway, Lancaster Regional Airport has a theoretical annual operational capacity of 230,000 operations.[22] Its annual operations of fewer than 50,000 give it a demand/capacity ratio of less than 22 percent, well below the capacity enhancement planning threshold of 60 percent.

PLANNED IMPROVEMENTS

The most recent transportation/thoroughfare plans for both the DFW region (Mobility 2035) and local municipalities include several proposed improvements in the Southern Dallas County area. There are also planned improvements in freight development, transit and aviation in the Southern Dallas County area. The Mobility 2035 Plan as well as several local thoroughfare plans examined as a part of this study are included in the appendices of this report.

MOBILITY 2035 METROPOLITAN TRANSPORTATION PLAN

Mobility 2035: the Metropolitan Transportation Plan for North Central Texas includes proposed improvements to multiple major and minor arterials in the Southern Dallas County area as well as the addition of a limited access toll facility in the southern portion of the study area (see **Figure 6-13**). **Table 6-5** lists the improvements as included in the Mobility 2035 Plan. As shown in the table, the majority of the planned improvements are expansions of existing arterials in the study area, including SH 342, Belt Line Road, Danieldale Road, FM 664 and Houston School Road. The Mobility 2035 plan also includes the sections of the proposed Loop 9 corridor, which would provide high speed access across southern Dallas County from IH 35E to east of the Trinity River. The full alignment of this proposed corridor would run from US 287 west of the study area to IH 20 northeast of the study area.

Table 6-5. Mobility 2035 Planned Improvements in the SDCIA Study Area

				Number of Lanes	
Roadway	Type (Planned)	From	To	Current	Planned
Loop 9	Freeway	IH 35E	Trinity River	0	6
SH 342	Major Arterial	Loop 9	8th St	2	4
Belt Line Rd	Minor Arterial	Bluegrove Rd	Main St	2	6
Belt Line Rd	Minor Arterial	Main St	Summers Rd	2	4
Belt Line Rd	Minor Arterial	IH 45	Post Oak Rd	2	4
FM 664	Minor Arterial	SH 342	IH 45	2	4
Houston School Rd	Minor Arterial	Loop 9	FM 664	2	4
Houston School Rd	Minor Arterial	IH 20	Meadowgate Ln	4	6
Houston School Rd	Minor Arterial	Meadowgate Ln	Pleasant Run Rd	2	6

Source: NCTCOG Mobility 2035 Metropolitan Transportation Plan, 2011

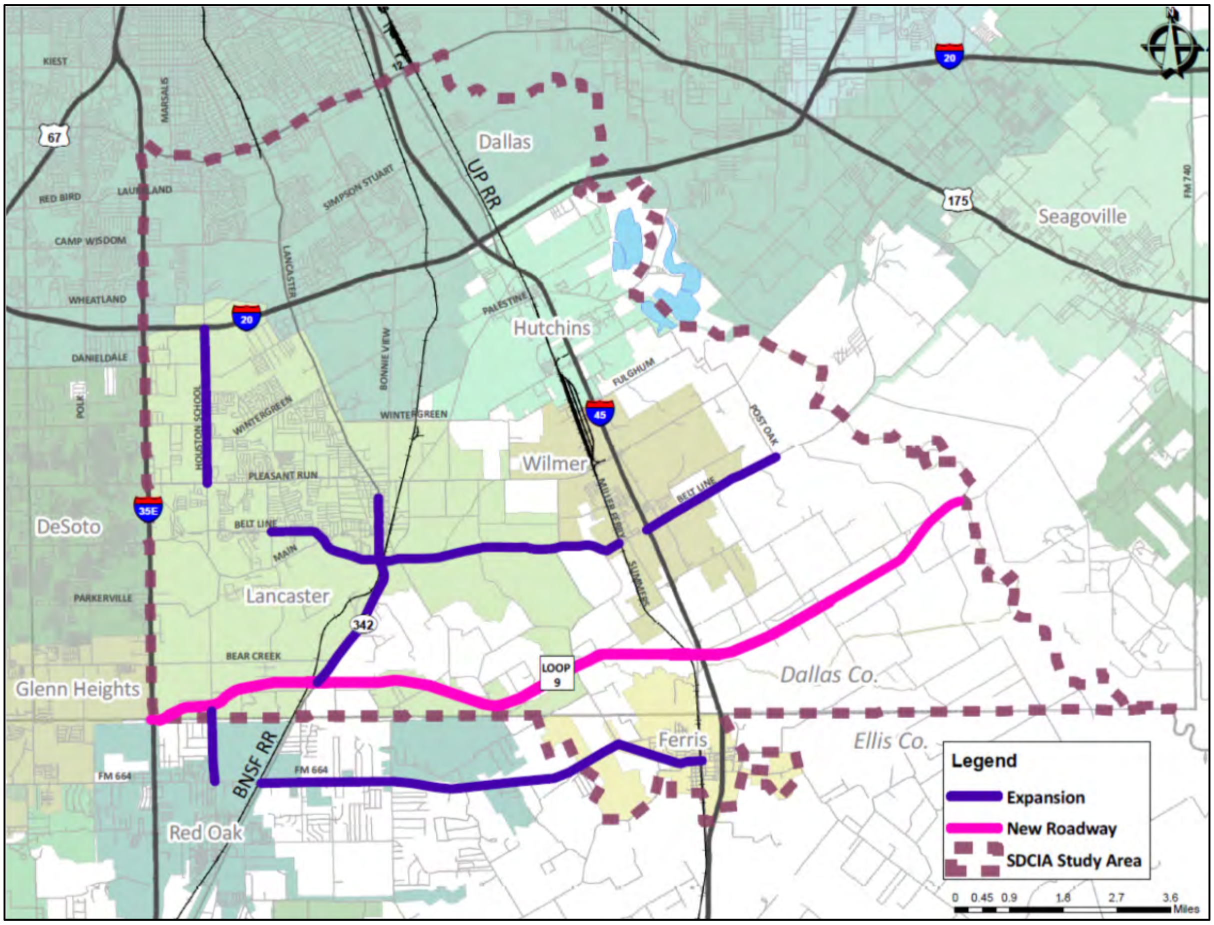


Figure 6-13. Mobility 2035 Planned Improvements in the SDCIA Study Area
Source: NCTCOG Mobility 2035 Metropolitan Transportation Plan, 2011

CITY OF DALLAS THOROUGHFARE PLAN

The City of Dallas Thoroughfare Plan includes several improvements in southern Dallas between Loop 12 and the borders with the Cities of Lancaster and Hutchins (**see Figure 6-14**). The plan includes the expansions of SH 310 and Telephone Road to major arterials, including the extension of Telephone Road to Cleveland. Several collector streets in southern Dallas are also planned for extension or expansion, including Bonnie View Road, Kirnwood Drive, and Tioga Street. A full list of the planned improvements in the City of Dallas Thoroughfare Plan is shown in **Table 6-6**.

CITY OF FERRIS PLANNING STUDY

In a planning study completed in 2007, the City of Ferris laid out its transportation plans through 2027. Along with the goal of adopting a thoroughfare plan to ensure future corridors, the planning study also highlighted a few specific projects that the city considers high priority. These include a two-lane route to divert traffic around the high school, a south business loop, and a north-south crosstown route.

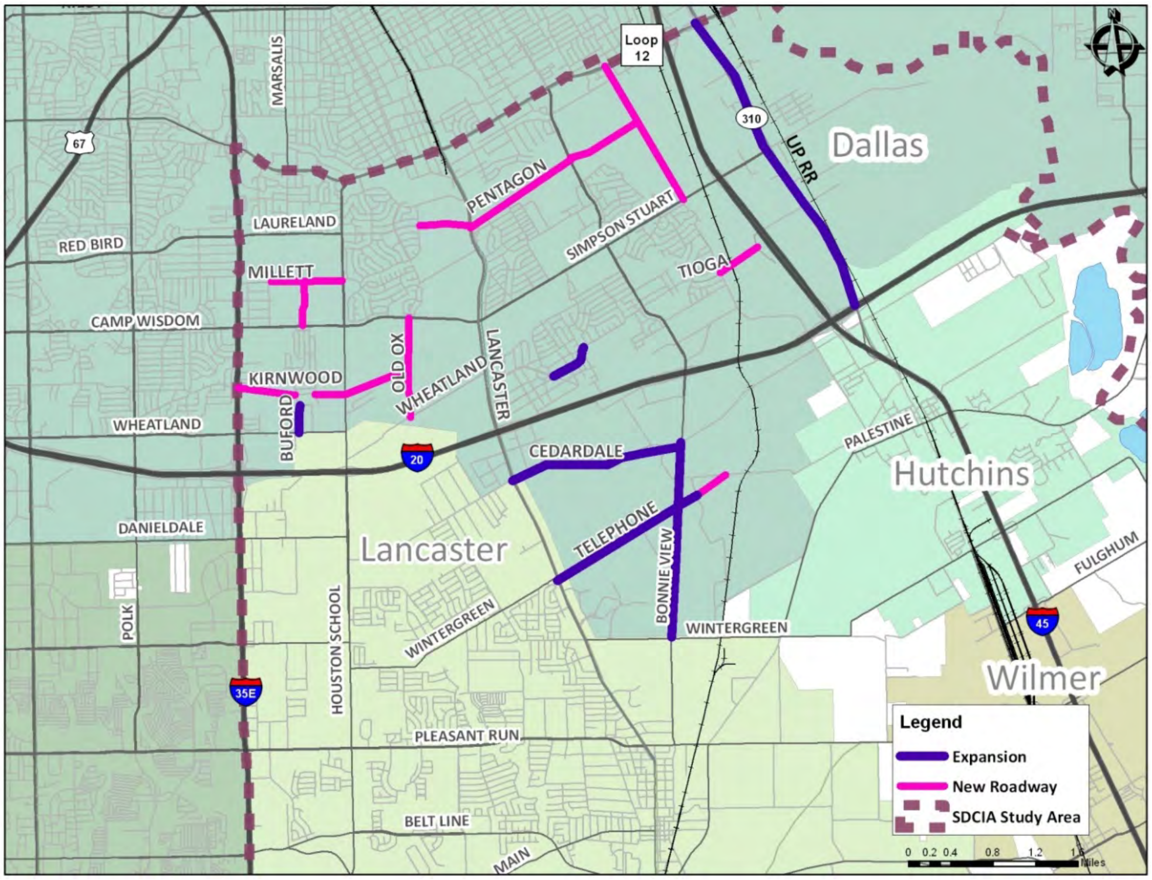


Figure 6-14. City of Dallas Planned Improvements in the SDCIA Study Area

Source: City of Dallas Thoroughfare Plan, 2004

Table 6-6. City of Dallas Planned Improvements in the SDCIA Study Area

Roadway	Type (Planned)	From	To	Number of Lanes Current	Number of Lanes Planned
SH 310	Major Arterial	IH 20	Loop 12	4	6
Telephone Rd	Major Arterial	SH 342	Bonnie View Rd	2	4/6
Telephone Rd	Major Arterial	Bonnie View Rd	Blanco Dr	2	6
Telephone Rd	Major Arterial	Blanco Dr	Cleveland	0	6
Bonnie View Rd	Collector	Cedardale Rd	Wintergreen Rd	2	6
Buford Dr	Collector	Wheatland Rd	Dodson Dr	2	4
Buford Dr	Collector	Camp Wisdom Rd	Millett Dr	0	4
Cedardale Rd	Collector	SH 342	Bonnie View Rd	2	4
Haas Dr	Collector	Simpson Stuart	Loop 12	0	4
Kirnwood Dr	Collector	Arkan Parkway	Buford Dr	0	4
Kirnwood Dr	Collector	Concordia Dr	University Hills Blvd	0	4
Kirnwood Dr	Collector	University Hills Blvd	Old Ox Rd	0	2
Millett Dr	Collector	Manitoba Ave	University Hills Blvd	0	2
Morgan Dr	Collector	Midway Plaza Blvd	Tioga St	2	4
Old Ox Rd	Collector	Wheatland Rd	Camp Wisdom Rd	0	4
Pentagon	Collector	Lancaster	Haas Dr	0	4
Red Bird	Collector	Lazy River Dr	Lancaster	0	4
Tioga St	Collector	Youngblood Rd	JJ Lemmon	0	4

Source: City of Dallas Thoroughfare Plan, 2004

CITY OF HUTCHINS ROADWAY CAPITAL IMPROVEMENT PLAN

The City of Hutchins Roadway Capital Improvement Plan calls for the widening of several minor arterials including Lancaster-Hutchins and Wintergreen Road (**see Figure 6-15**). The plan also includes one new alignment, Pinto Road. A complete list of the planned improvements in the City of Hutchins Roadway Capital Improvement Plan is shown in **Table 6-7**.

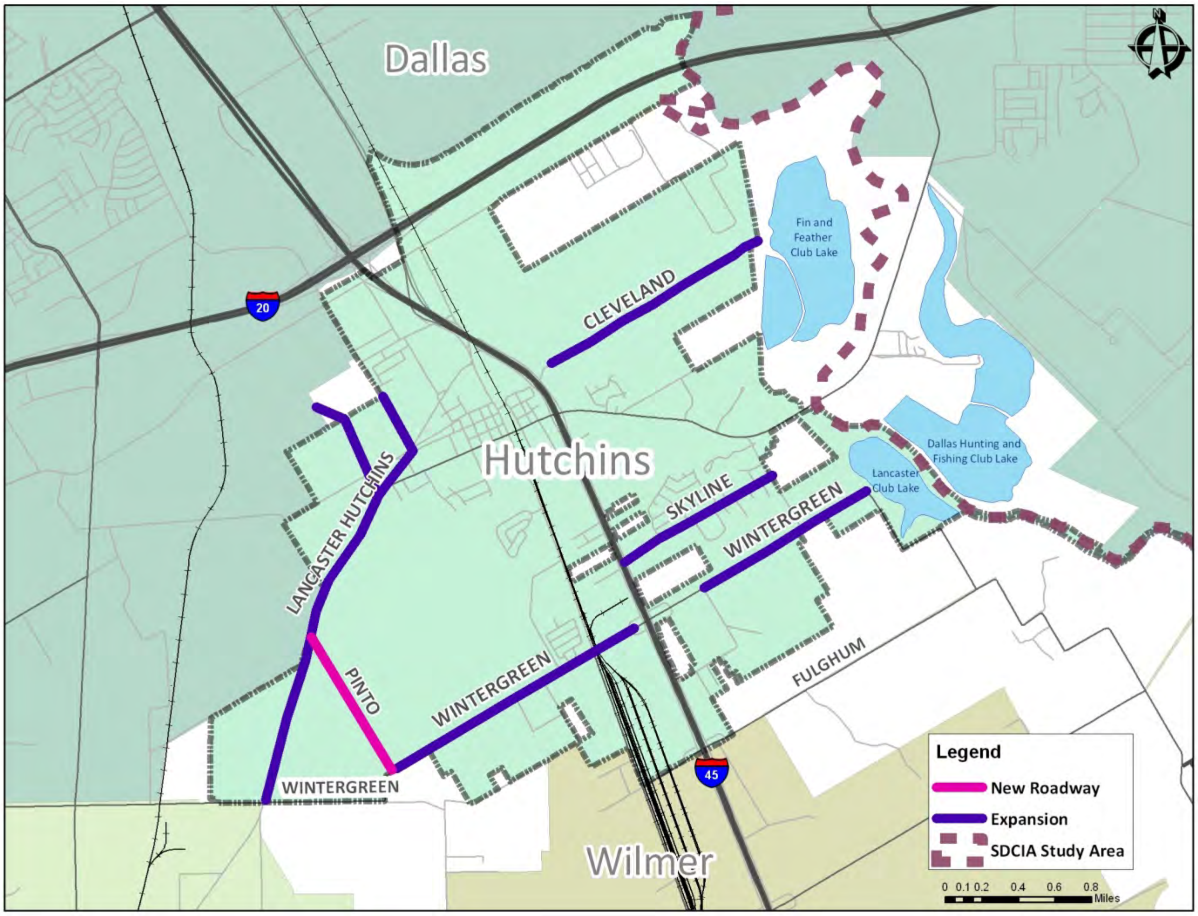


Figure 6-15. City of Hutchins Planned Improvements in the SDCIA Study Area
Source: City of Hutchins Roadway Capital Improvement Plan, 2009

Table 6-7. City of Hutchins Planned Improvements in the SDCIA Study Area

				Number of Lanes	
Roadway	Type (Planned)	From	To	Current	Planned
Cleveland Rd	Minor Arterial	East of IH 45	Cleveland Rd	2	4
Lancaster-Hutchins	Minor Arterial	Cornell	JJ Lemmon St	2	4
Pinto	Minor Arterial	Wintergreen Rd	Lancaster-Hutchins	0	4
Skyline	Minor Arterial	IH 45	Trout Rd	2	4
Wintergreen Rd	Minor Arterial	Goode Rd	Trout Rd	2	4
Wintergreen Rd	Minor Arterial	Pinto	Vanderbilt Rd	2	4
Wintergreen Rd	Minor Arterial	Vanderbilt Rd	IH 45	2	6
Wintergreen Rd	Minor Arterial	Goode Rd	Trout Rd	2	4

Source: City of Hutchins Roadway Capital Improvement Plan, 2009

CITY OF LANCASTER THOROUGHFARE PLAN

The City of Lancaster's Master Thoroughfare Plan consists primarily of expansions of several roadways in the city (see **Figure 6-16**). Only a handful of new alignments are planned, and they are mainly extensions of existing roadways such as Alba Road, Cornell and Wintergreen Road. Many of the planned improvements are the expansions of current two-lane roads into major arterial routes through the city. These include east-west roads such as Belt Line Road, Pleasant Run Road and Wintergreen Road, and north-south routes such as Houston School Road and Lancaster-Hutchins. A full list of the planned improvements in the City of Lancaster Master Thoroughfare Plan is shown in **Table 6-8**.

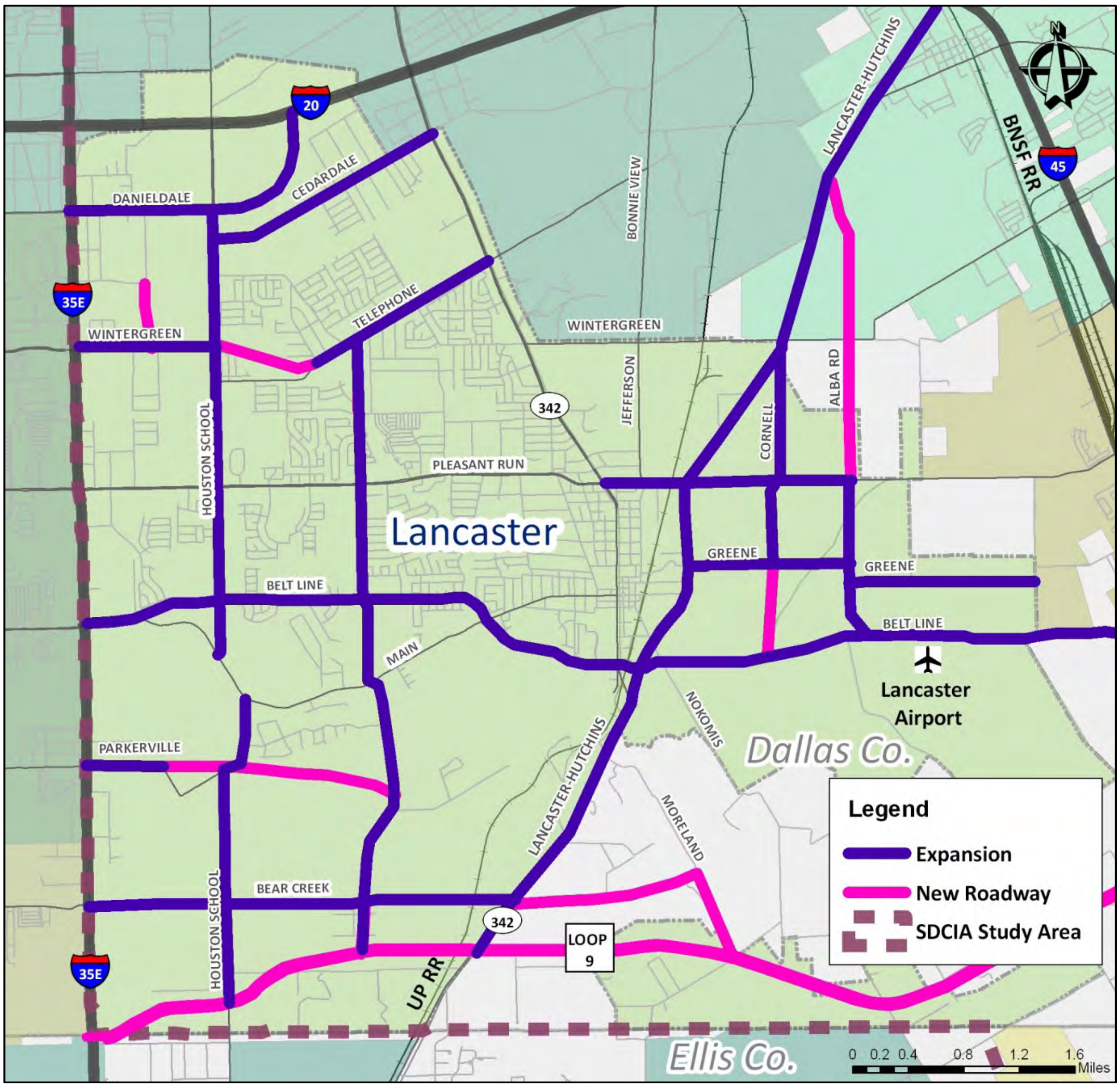


Figure 6-16. City of Lancaster Planned Improvements in the SDCIA Study Area

Source: City of Lancaster Master Thoroughfare Plan, 2006

CDM Smith

Table 6-8. City of Lancaster Planned Improvements in the SDCIA Study Area

Roadway	Type (Planned)	From	To	Number of Lanes	
				Current	Planned
Alba Rd	Major Arterial	Greene Rd	Belt Line Rd	2	4
Alba Rd	Major Arterial	Greene Rd	Lancaster-Hutchins	0	4
Belt Line Rd	Major Arterial	IH 35E	Bluegrove Rd	4	6
Belt Line Rd	Major Arterial	Bluegrove Rd	Main St	2	6
Belt Line Rd	Major Arterial	Main St	Summers Rd	2	4
Bluegrove Rd	Major Arterial	Belt Line Rd	Loop 9	0/2	4
Bluegrove Rd	Major Arterial	Belt Line Rd	Wintergreen Rd	0/2	4
Cornell	Major Arterial	Greene Rd	Belt Line Rd	0	4
Cornell	Major Arterial	Greene Rd	Lancaster-Hutchins	2	4
Houston School Rd	Major Arterial	Meadowgate Ln	Pleasant Run Rd	2	4
Houston School Rd	Major Arterial	Pleasant Run Rd	Main St	2	4
Houston School Rd	Major Arterial	Main St	Loop 9	2	4
Lancaster-Hutchins	Major Arterial	IH 45	Pleasant Run Rd	2	6
Lancaster-Hutchins	Major Arterial	Pleasant Run Rd	Nokomis Rd	2	4
Lancaster-Hutchins	Major Arterial	Nokomis Rd	SH 342	2	6
Lancaster-Hutchins	Major Arterial	SH 342	Loop 9	4	6
Pleasant Run Rd	Major Arterial	Rolling Meadows	Rodgers	4	6
Pleasant Run Rd	Major Arterial	SH 342	Lancaster-Hutchins	2	6
Pleasant Run Rd	Major Arterial	Lancaster-Hutchins	Alba Rd	2	4
Wintergreen Rd	Major Arterial	IH 35E	Houston School Rd	2	4
Wintergreen Rd	Major Arterial	Houston School Rd	Telephone Rd	0/2	4
Bear Creek Rd	Minor Arterial	SH 342	Moreland	0	4
Bear Creek Rd	Minor Arterial	SH 342	IH 35E	2	4
Cedardale Rd	Minor Arterial	Houston School Rd	SH 342	2	4
Danieldale Rd	Minor Arterial	IH 35E	IH 20	2	4
Greene Rd	Minor Arterial	Lancaster-Hutchins	Sunrise Rd	2	4
Moreland	Minor Arterial	Bear Creek Rd	Loop 9	0	4
Parkerville Rd	Minor Arterial	Houston School Rd	IH 35E	0/2	4
Longhorn E. Dr	Collector	West Dr	Wintergreen Rd	0	2

Source: City of Lancaster Master Thoroughfare Plan, 2006

CITY OF WILMER COMMUNITY PLAN

The City of Wilmer Community Plan includes a thoroughfare plan that highlights several planned improvements throughout the city (see **Figure 6-17**). The planned improvements consist primarily of the expansion/extension of major and minor arterials including Sunrise Road, Malloy Bridge Road and Millers Ferry Road. A new major arterial alignment, Cook Road, is a prominent improvement in the thoroughfare plan. A full list of the planned improvements in the City of Wilmer Community Plan is shown in **Table 6-9**.

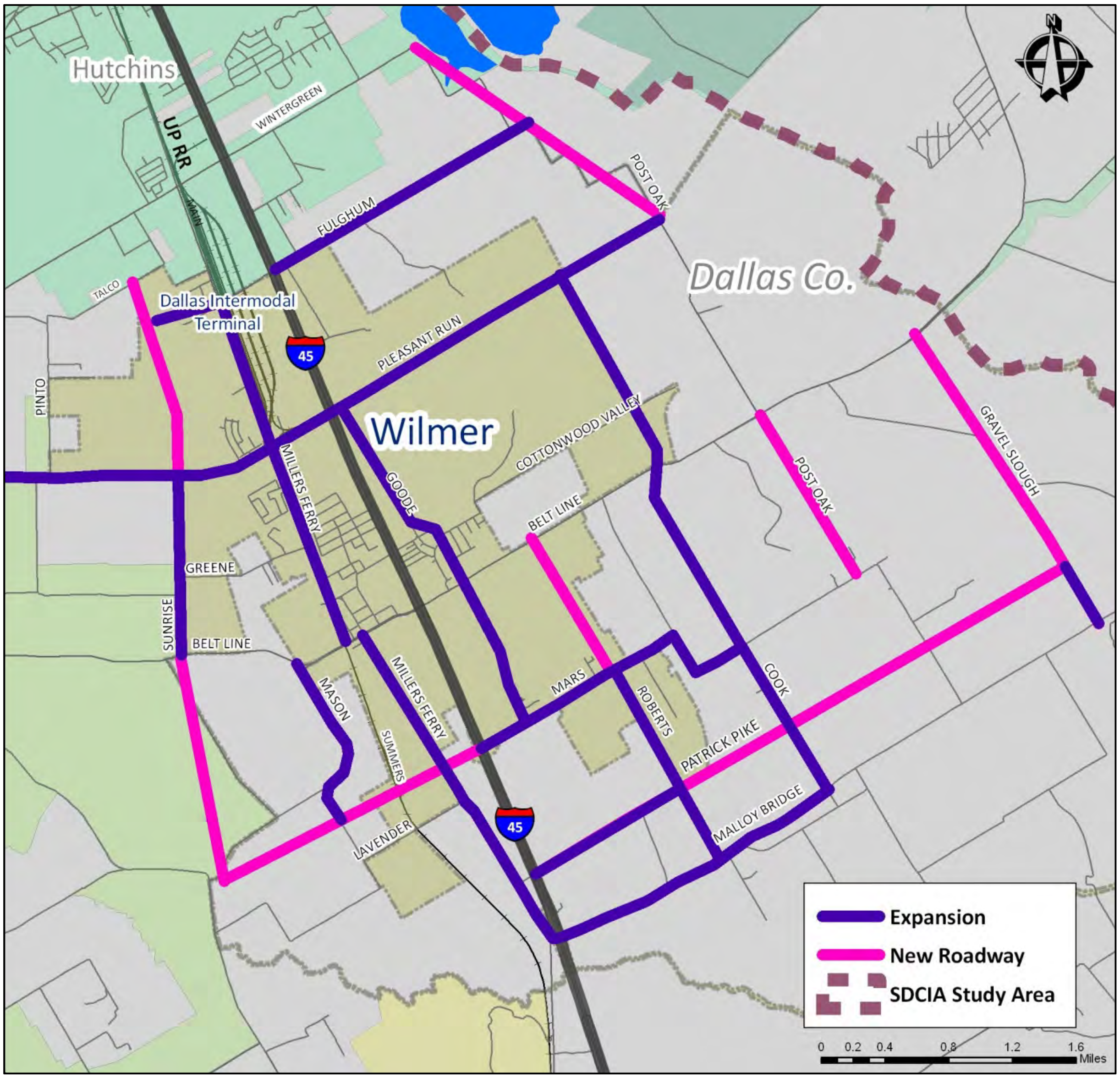


Figure 6-17. City of Wilmer Planned Improvements in the SDCIA Study Area

Source: City of Wilmer Community Plan 2030, 2009

Table 6-9. City of Wilmer Planned Improvements in the SDCIA Study Area

Roadway	Type (Planned)	From	To	Number of Lanes	
				Current	Planned
Cook Rd	Major Arterial	Pleasant Run Rd	Wintergreen Rd	0	6
Pleasant Run Rd	Major Arterial	Lancaster-Hutchins	Post Oak Rd	2	4/6
Sunrise Rd	Major Arterial	Pleasant Run Rd	Belt Line Rd	2	6
Sunrise Rd	Major Arterial	Pleasant Run Rd	Talco	0	6
Sunrise Rd	Major Arterial	Belt Line Rd	Mars Rd	0	6
Cook Rd	Minor Arterial	Malloy Bridge Rd	Mars Rd	2	4
Cook Rd	Minor Arterial	Mars Rd	Pleasant Run Rd	2	4
Fulgham Rd	Minor Arterial	IH 45	Post Oak Rd	2	4
Malloy Bridge Rd	Minor Arterial	IH 45	Cook Rd	2	4
Mars Rd	Minor Arterial	Sunrise Rd	IH 45	0	4
Mars Rd	Minor Arterial	IH 45	Cook Rd	2	4
Mason Rd	Minor Arterial	Mars Rd	Belt Line Rd	2	5
Millers Ferry Rd	Minor Arterial	Mars Rd	Malloy Bridge Rd	2	5
Millers Ferry Rd	Minor Arterial	Belt Line Rd	Sunrise Rd	2	5
Millers Ferry Rd	Minor Arterial	Mars Rd	Belt Line Rd	2	5
Robert Rd	Minor Arterial	Malloy Bridge Rd	Mars Rd	2	4
Robert Rd	Minor Arterial	Mars Rd	Belt Line Rd	0	4
Goode Rd	Collector	Mars Rd	Pleasant Run Rd	2	3
Gravel Sough Rd	Collector	Malloy Bridge Rd	Belt Line Rd	0/2	2
Patrick Pike Rd	Collector	IH 45	Gravel Sough Rd	0/2	3
Post Oak Rd	Collector	Pleasant Run Rd	Wintergreen Rd	0	4
Post Oak Rd	Collector	Belt Line Rd	Mars Rd	0	2

Source: City of Wilmer Community Plan 2030, 2009

PLANNED FREIGHT DEVELOPMENTS

Future freight movements in the SDCIA area will be heavily influenced by the continued development of the IIPOD. However, the future rail freight volumes that might ultimately be developed cannot be defined given changes in the economy and development patterns and diverse development priorities between land owners and local jurisdictions. It is expected that development will continue in a sequenced pattern radiating out from current developments in a "normal" growth pattern in order to achieve desired economies of scale from companies locating in a central area. These clustered industries would utilize similar infrastructure or partner with each other in an effort to limit travel time and delay in the supply chain. Knowledge of development plans would enable the development of a sustainable and growth-oriented business base, while allowing for proper planning of infrastructure. Zoning is controlled by the local municipalities, but coordination must exist across all levels to make sure a safe and beneficial mix of residential, commercial, and industrial zoning exists and in responsible locations.

PLANNED TRANSIT IMPROVEMENTS

There is currently a demonstrated jobs/housing imbalance in the Southern Sector which creates a large number of daily commute trips in and out of the Southern Dallas County area. This makes transit connections to the job centers one important element to enhancing mobility and job opportunities.[23]

DART has participated in several area plans (refer to **Figure 6-18**) in the Southern Sector that directly relate to existing DART services and future expansion opportunities in the study area. These plans include: [24]

- Lancaster Corridor Plan (contains 3 DART stations on the South Oak Cliff Blue Line)
- University of North Texas Campus Area (South Oak Cliff Blue Line proposed to be extended to this new campus – two new DART stations)

Forecasted industrial and commercial growth in the study area is expected to bring significant job growth to Southern Dallas County. Currently, much of the study area is low density and auto oriented and DART does not currently provide fixed route service. DART's 2030 plan does include a light rail extension to this area, discussed in more detail later in the report.

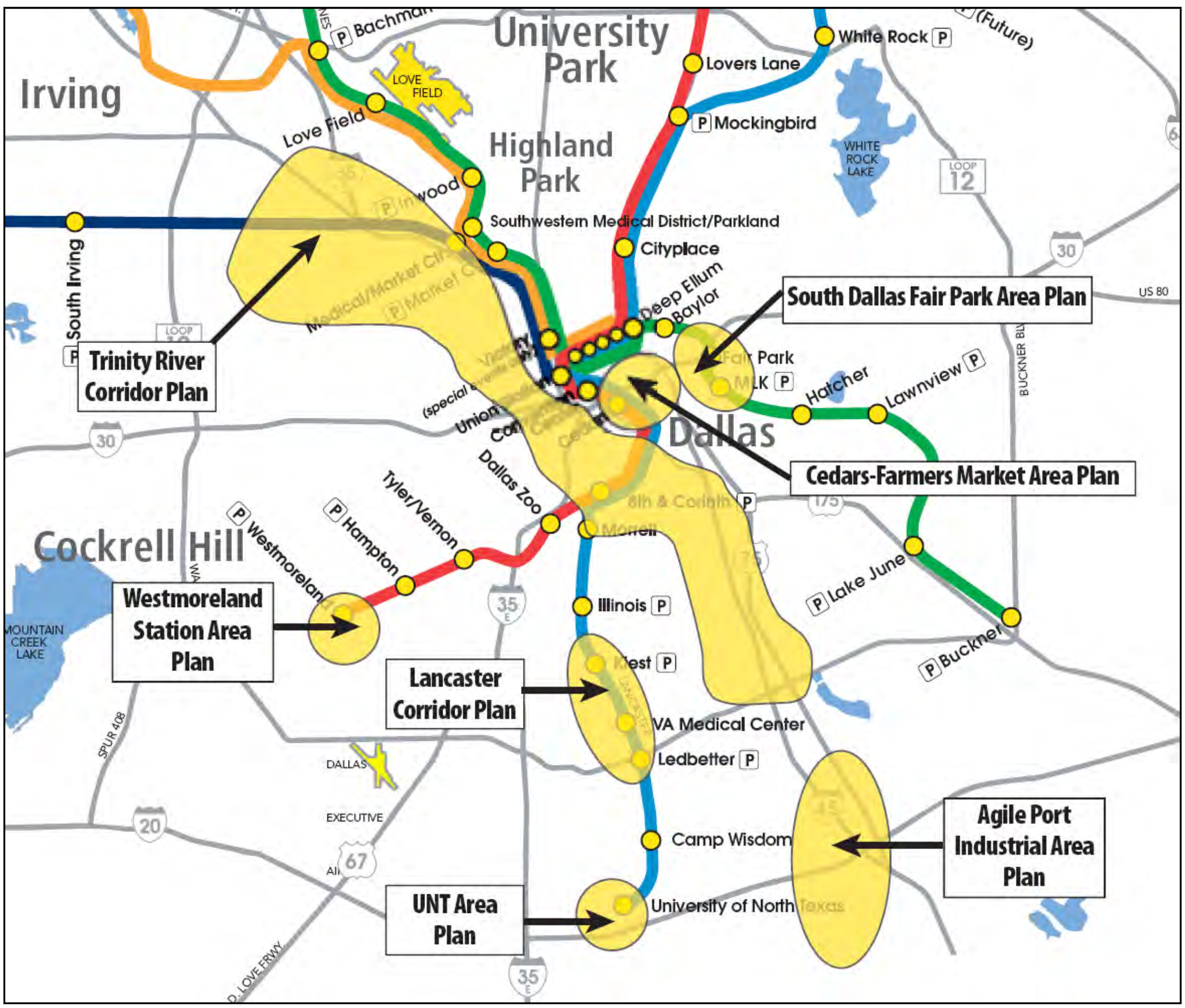


Figure 6-18. DART Southern Sector Area Plans[25]

Ridership Projections

As part of its 2030 Transit System Plan effort, DART worked with NCTCOG and the City of Dallas on the City's Comprehensive Plan vision and NCTCOG's Vision North Texas to determine the plan projections' impact on transportation. When compared to the approved regional demographic trends, the future scenario resulted in:

- A forecast overall increase in rail ridership of nearly 20 percent, and Station ridership increases of approximately 30 percent to 50 percent in the southern sector; and
- Strengthening of ridership and cost-effectiveness for rail corridors evaluated in the southern sector [26]

Planned Service for the Southern Sector (2030)

The southern sector of Dallas is south of the Trinity River and IH 30 and encompasses a large portion of the DART Service Area. This area has significant development opportunities and is the target of much of the area's future planning efforts. DART currently provides significant local, enhanced and express bus coverage and has near and longer term plans to expand light rail into the sector. DART's 2030 Transit System Plan Map is shown in **Figure 6-19**.

DART's 2030 Transit System Plan has identified several transit opportunities for the southern sector. Specific recommendations located in the project study area include:[27]

- Light rail extension of the Blue Line to the UNT-Dallas area (IH20)
- Several enhanced bus service corridors, including Ledbetter Station, and the Blue Line to IH20.

Light Rail Line Extension (Blue Line) and the IIPOD Area

The future Blue Line extension to the new University of North Texas campus will increase the number of light rail stations in the study area from one to three.[28] Preliminary engineering and environmental impact assessments are anticipated to begin in early 2012. Final design and construction is anticipated to commence in early 2014 for the line to be operational by 2018.[29] The northern portion of the IIPOD development is one of the key economic initiatives identified for their Southern Sector. The capital cost estimate for this planned light rail extension is $180,000,000.[30]

The northernmost section of the larger planned IIPOD is an expansive industrial and intermodal center that has the potential to create 30,000 to 40,000 jobs. A proposed transit corridor to serve this area would consist of a 2.9-mile light rail extension from the planned Blue Line to the University of North Texas campus. A second line would branch off near Camp Wisdom/Simpson Stuart, continuing east to Bonnie View and then terminating near Bonnie View/IH 20.[31]

Planned Bus Service Expansion

DART is planning for several enhanced bus corridors that have shorter headways and fewer stops as well as express bus corridors connecting park and ride facilities with employment centers. DART's planned enhanced and express bus corridors in the Southern Sector for 2030 are summarized in **Table 6-10.**

In addition to the light rail extension to UNT-Dallas and IH 20, there may be additional need for an expanded feeder bus service to bring riders to the new destinations and transit linkages in the Southern Sector.

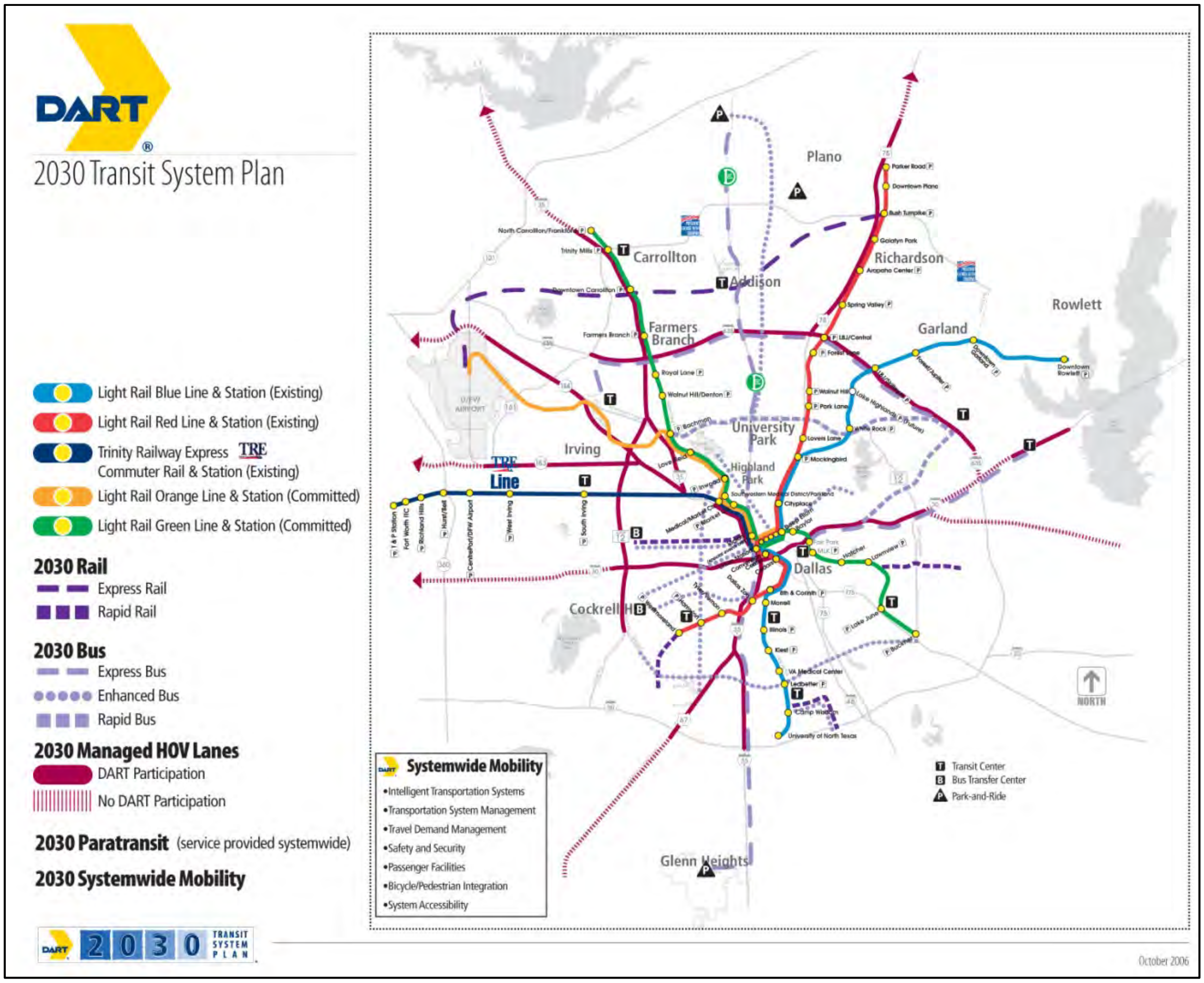


Figure 6-19. DART's 2030 Transit System Plan Map[32]

Table 6-10. Planned 2030 Bus Service[33]

Corridor	From	To	Miles	Estimate
Enhanced Bus				
Simpson Stuart/Bonnie View Corridor	Blue Line	IH 20	2.9	$3,200,000
Ledbetter Corridor	Loop 12/Kiest	Buckner Station (Green Line)	14.4	$16,400,000
Express Bus				
Stemmons Freeway (IH 35E)	Downtown Dallas	Glenn Heights Park and Ride	---	Strengthen Existing Service

PLANNED AVIATION IMPROVEMENTS

Future improvements to Lancaster Regional Airport are largely contingent upon the goals established for the airport through its most recent master planning effort. According to that plan, the goals established for Lancaster Regional Airport include the following:[34]

- Accommodate forecast aircraft operations in a safe and efficient manner by the provision of proper facilities and services.

- Plan and develop the airport to be capable of accommodating the future needs and requirements of Lancaster and the DFW area; thus, the airport is proposed to continue to serve as a regional general aviation facility.
- The Master Plan will provide a program to facilitate the continued operation of the airport as a well managed, efficiently operated facility.
- Recognize the true development potentials for the airport and program for improvements accordingly.

According to its master plan, Lancaster Regional Airport is expected to continue to serve business jets similar to the types that currently utilize the airport. The improvements planned for the airport are aimed at addressing the goals previously listed. It should be noted that the master plan did examine a number of other potential development alternatives, including the possibility of accommodating air cargo service at the airport. However, it was concluded that it would be economically impractical to compete with the existing air cargo facilities offered by DFW and Fort Worth Alliance Airport, even with robust growth and development of the nearby IIPOD.

Future Development Planning Issues

The airport's master plan identified a number of other potential planning issues that the airport could face beyond its 20-year planning horizon. These issues concern the lack of developable land on the west side of the airport (where the aircraft ramp and hangar facilities are located) and the potential need for air traffic control services. The future growth in based aircraft is expected to increase the demand for aircraft storage as well as for aircraft services. Additionally, growth in aircraft operations may require an air traffic control tower (ATCT) at some point in the future. Planning for these contingencies now will prevent unnecessary difficulties in the future.

In order to make the best use of the remaining developable land on the west side of the airport, an appropriate land use development plan is needed that would reserve space required for ramp operations while designating areas for future hangar and business development. Such plans should include development of a taxiway system for that side of the airport, hangar and business areas, space for a future ATCT, and ground access to the airport. According to the airport's master plan, ground access to the airport may be influenced by changes and improvements to nearby roadways. The master plan states:

> *The City of Lancaster's 2006 Master Thoroughfare Plan shows a proposed four-lane major arterial roadway that would run east along the potential aviation development area located east of airport property. This arterial would provide prime access to the surrounding roadway network, which includes Belt Line Road, Proposed Loop 9 Southeast, Interstate 45, Interstate 35E, and Interstate 20.*[35]

It is anticipated that this arterial will drive demand for commercial development on the east side of the airport, since it is more accessible by trucks and presents opportunities for integrating with nearby railroads. The concept of providing rail access on the east side of the airport was examined but discarded as being cost prohibitive. However, a plan was developed to provide limited access to the proposed arterial (in order to reduce congestion on the new road) while also allowing access to the east side of the airport for commercial development. Additional coordination and input from the City of Lancaster is needed to develop the final recommendations. [36]

In March 2012, NCTCOG released its report, "General Aviation System Development Recommendations" which contains aviation recommendations for the DFW area.

FUTURE NEEDS ASSESSMENT

This section presents an assessment of the future transportation infrastructure needs of the Southern Dallas County area based on the projected growth in demand for passenger car travel, freight movement, transit and aviation.

ROADWAY NEEDS FOR PASSENGER TRAVEL

In order to assess the future roadway capacity needs in the Southern Dallas County Study Area, the projected traffic on the local arterial and freeway routes was evaluated. The first step in this process was to determine the total travel demand in the study area, which was calculated based on NCTCOG's projected 2035 demographics. Using travel demand model outputs, the total 2035 travel demand was then evaluated in a high level planning analysis against the current year (2012) capacity to identify potential areas in the southern Dallas County area that could most benefit from transportation infrastructure improvements. All roadway recommendations are based on NCTCOG's 2035 forecasted passenger car and truck traffic in the Southern Dallas County area.

Forecasted 2035 levels of service and volume-to-capacity ratios were evaluated for all freeways and arterials in the study area and used to highlight locations in the study area where anticipated future traffic levels could potentially generate noticeable levels of congestion. **Figures 6-20** and **6-21** show the estimated levels of services on Southern Dallas County roadways in 2012 and 2035 based on NCTCOG traffic forecasts. Based on the forecasted levels of service and total traffic in the area, several key improvements were identified that are needed to ensure a smooth and efficient transportation system is in place for Southern Dallas County. The potential improvements that are projected to be needed by 2035 to provide adequate capacity and ensure efficient traffic flow are shown in **Table 6-11**.

A range of cost estimates for the proposed improvements are also included in **Table 6-11**. The cost estimates are based upon average improvement costs per lane mile as provided by the Federal Highway Administration (FHWA) Highway Economic Requirements System, which provides ranges of costs per lane mile of improvement based on historical data. For each proposed arterial improvement, the length and width of the capacity expansion was multiplied by an average per mile cost rate to determine, at a very high planning level, potential total costs of the improvements. These costs are based upon averages and do not account for what can be large differences in real estate acquisition, geotechnical, impact avoidance and mitigation costs which may arise as a part of a comprehensive environmental and engineering analysis. The cost estimate for the Loop 9 project was obtained from the Mobility 2035: Metropolitan Transportation Plan. Because Mobility 2035 is a financially constrained plan, those projects included in Mobility 2035 could be considered "funded", while those included only in the local municipal plans, which are not financially constrained, would not be.

Based on forecasted future traffic demand in the Southern Dallas County area, the most needed improvement in the study area is Loop 9, which is planned to run from US 287 west of the study area to IH 20 northeast of the study area. The proposed Loop 9 project would provide a high speed alternative for east-west traffic in the area and alleviate demand for parallel routes such as Belt Line Road and IH 20.

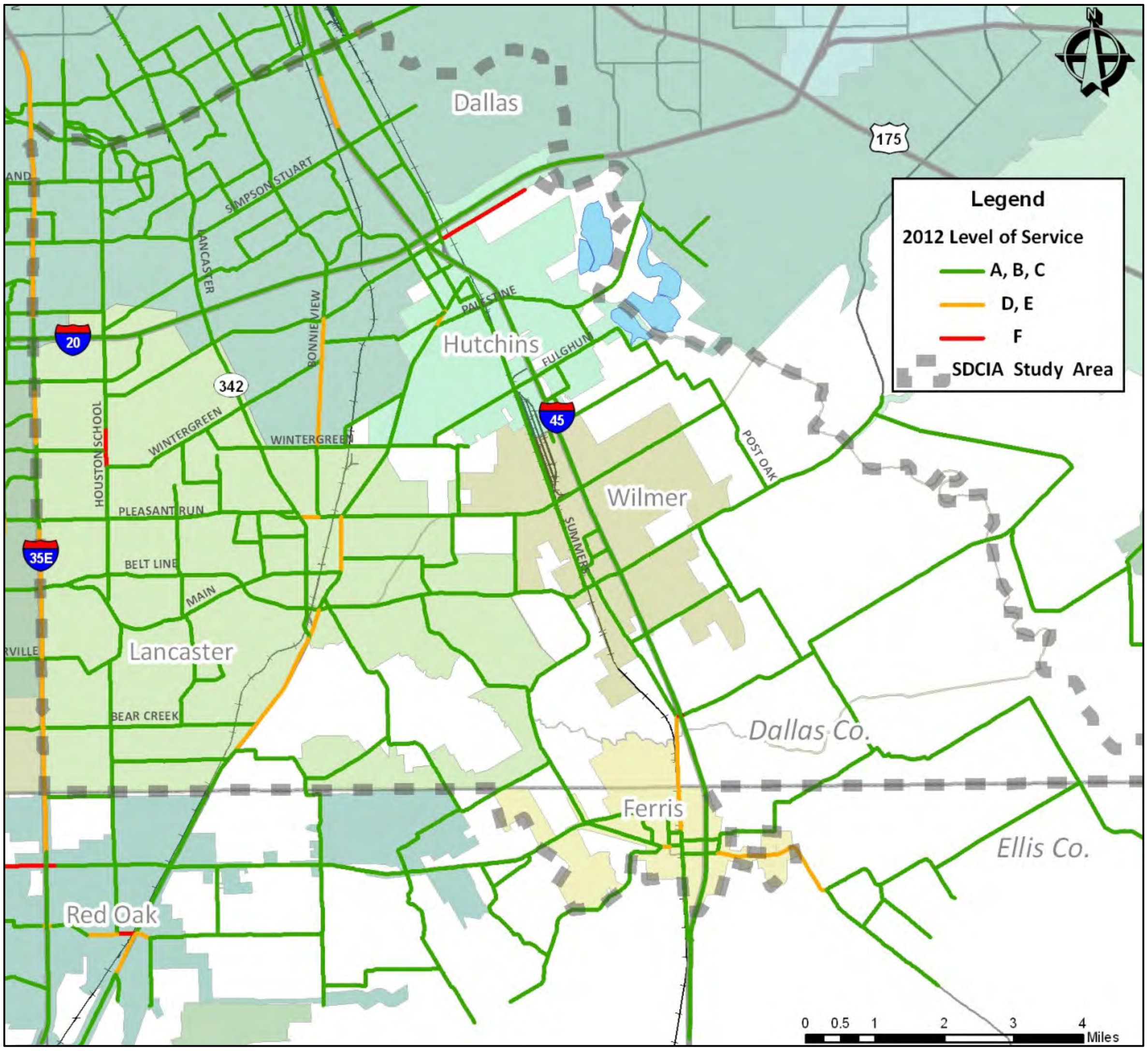


Figure 6-20. 2012 Estimated Levels of Service in SDCIA Study Area

Source: Mobility 2035 Traffic Forecasts

Although the construction of Loop 9 would do much to prevent unnecessary congestion and move traffic, several roadways in the study area are projected to operate at congested conditions in 2035, even with Loop 9 in place. One such roadway is Belt Line Road, which runs east-west across the length of the study area as a two- and four-lane arterial. In order to meet projected travel demand in 2035, Belt Line should be expanded to six lanes between IH 35E and Main Street, and it should be expanded to four lanes between Main Street and the east side of the Trinity River. This improvement is included in the most recent thoroughfare plans for the City of Lancaster and the City of Wilmer.

Several north-south routes are also projected to need future expansion to accommodate forecast traffic demands. Houston School Road in Lancaster between Pleasant Run Road and Main Street should be expanded from its current two lanes to four lanes. Bonnie View Road in Dallas and Lancaster-Hutchins Road is also projected to need widening from two lanes to four lanes. Lancaster-Hutchins Road, a primary north-south arterial through the Cities of Lancaster and Hutchins, would also require widening to meet projected future demand. SH 310, which runs parallel to IH 45 in Dallas, would require an additional two lanes of capacity by 2035. These routes have been previously identified in the thoroughfare plans for the Cities of Lancaster and Dallas.

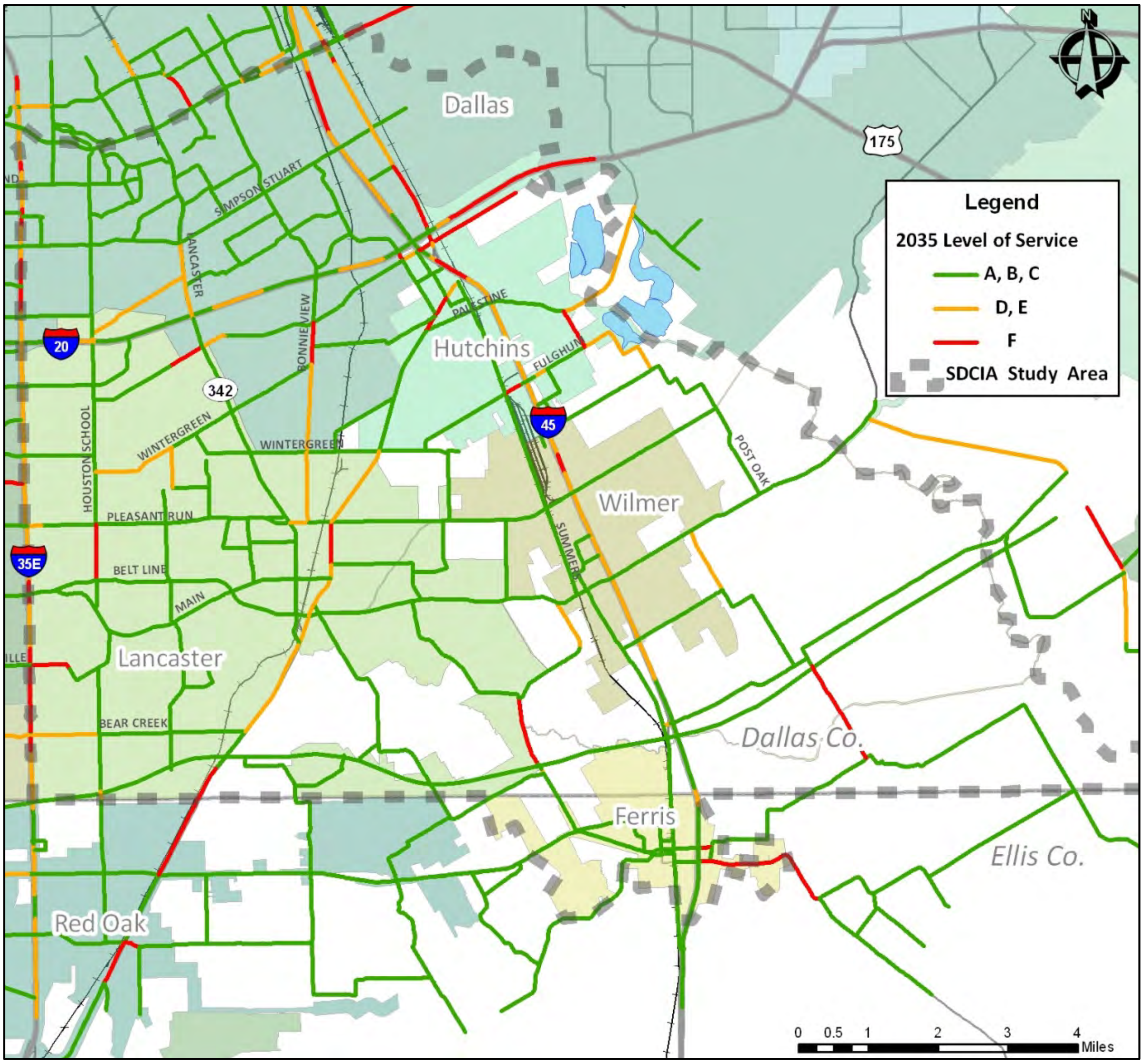


Figure 6-21. 2035 Estimated Levels of Service in SDCIA Study Area

Source: Mobility 2035 Traffic Forecasts

A new alignment through Wilmer and unincorporated portions of Dallas County is also projected to be needed based on the anticipated north-south traffic through that area in 2035. The new alignment, Cook Road/Parkinson Road, which exists currently only as a partial two-lane road south of Wilmer, is projected to require four-lane capacity from Belt Line Road to Malloy Bridge Road south of Wilmer. The most recent City of Wilmer thoroughfare plan includes this alignment.

Due to the expected growth in freight movement in the SDCIA area, expansions of Pleasant Run Road and Wintergreen Road will be needed to provide access from the IIPOD area to IH 45. Additionally, a new north-south alignment will be needed through the IIPOD area to connect the area with the City of Ferris and provide access to Lancaster Regional Airport. A detailed discussion of the freight growth that will drive the need for these improvements is included in the next section.

Detailed analysis is recommended for each of these potential improvements as traffic increases. Proposals utilizing federal transportation funding will require analysis in accordance with the National Environmental Policy Act (NEPA), including analysis of the purpose and need for the proposed improvements and analysis of alternatives to avoid and minimize social, economic and environmental impacts. For projects having potentially significant impacts this can require development of an environmental assessment or environmental impact statement. Depending on many factors including public sentiment, this can take many months or even years; ongoing monitoring of potential need is important.

Table 6-11. Recommended Improvements in the SDCIA Study Area for Traffic Needs

Roadway	From	To	Number of Lanes		Cost Estimate ($millions)		Expansion Needed
			Current	Planned	Low	High	
Regional Routes							
Loop 9	US 287	IH 20	0	6	5,756.2*		2030-2035
City of Dallas							
SH 310	IH 20	Loop 12	4	6	16.6	26.4	2020-2030
Bonnie View Rd*	Cedardale Rd	Wintergreen Rd	2	4	6.9	10.0	2012-2020
City of Hutchins							
Lancaster-Hutchins*	IH 45	Wintergreen Rd	2	6	28.4	45.0	2012-2020
Wintergreen Rd*	Lancaster-Hutchins	IH 45	2	4	9.0	13.2	2020-2030
City of Lancaster							
Belt Line Rd	IH 35E	Bluegrove Rd	4	6	9.8	15.5	2012-2020
Belt Line Rd	Bluegrove Rd	Main St	2	6	8.8	14.0	2012-2020
Belt Line Rd*	Main St	Sunrise Rd	2	4	20.1	31.8	2020-2030
Lancaster-Hutchins*	Wintergreen Rd	Pleasant Run Rd	2	6	11.7	18.6	2012-2020
Lancaster-Hutchins	Pleasant Run Rd	Belt Line Rd	2	4	6.8	10.9	2012-2020
Lancaster-Hutchins	Belt Line Rd	Loop 9	2	6	23.5	37.2	2020-2030
Bonnie View Rd*	Wintergreen Rd	Pleasant Run Rd	2	4	3.6	5.3	2012-2020
Houston School Rd	Pleasant Run Rd	Main St	2	4	4.3	6.3	2020-2030
Pleasant Run Rd*	Bonnie View Rd	Pinto Rd	2	4	7.2	10.6	2020-2030
Wintergreen Rd*	Bonnie View Rd	Lancaster-Hutchins	2	4	3.6	5.3	2020-2030
New N-S Alignment*	Greene Rd	Van Rd	0	4	11.6	16.9	2020-2030
City of Wilmer							
Belt Line Rd*	Sunrise Rd	Wilmer City Limit	2	4	17.6	27.9	2020-2030
Pleasant Run Rd*	Pinto Rd	IH 45	2	4	6.5	9.5	2020-2030
Dallas County							
Belt Line Rd*	Wilmer City Limit	Summers Rd	2	4	8.8	14.0	2020-2030
Cook Rd	Malloy Bridge Rd	Mars Rd	2	4	3.6	5.3	2030-2035
Cook Rd	Mars Rd	Belt Line Rd	0	4	10.1	14.8	2030-2035
Parkinson Rd	Malloy Bridge Rd	Wolf Springs	2	4	6.5	9.5	2030-2035
New N-S Alignment*	Wintergreen Rd	Greene Rd	0	4	16.6	24.3	2020-2030
New N-S Alignment*	Van Rd	FM 664	0	4	16.6	24.3	2020-2030
Totals							
City of Dallas					23.5	36.4	---
City of Hutchins					37.4	58.2	---
City of Lancaster					111.0	172.3	---
City of Wilmer					24.1	37.4	---
Dallas County					62.3	92.1	---
SDCIA Area (not including Loop 9)					**258.3**	**396.4**	---

*Because these projects cross jurisdictional boundaries, logical termini and collaboration with neighboring cities must be considered as part of the development process. Continuous projects are shown in matching colors above.

Cost Calculations Methodology Source: FHWA Improvement Cost Data[37], *Mobility 2035 Cost Estimate, Costs shown in 2012 dollars

FREIGHT NEEDS

Due to the significant number of freight movements in the Southern Dallas County area as well as expected industrial growth, additional considerations are needed to accommodate future freight growth. From a high level planning analysis this section identifies projected future infrastructure needs of the Southern Dallas County area from a freight perspective.

Volume Growth (projected)

Figure 6-22 shows the NCTCOG projected 2035 average daily truck traffic in the study area. The Interstate highways remain the prominent corridors for travel. However, there is significant projected growth in traffic volume within the study area's center as Bonnie View Rd and N Dallas Ave (342). This is driven by the expected development of the BNSF facility. The proposed Loop 9 route along the southern edge of the study area would be well-traveled as close to 1,000 trucks will access the roadway in some sections. Loop 9 will provide the connectivity along an east/west route between IH 35 and IH 45 and acts as a reliever route for IH 20 as traffic will potentially connect to US Highway 175 and IH 20 further east of the Dallas area.

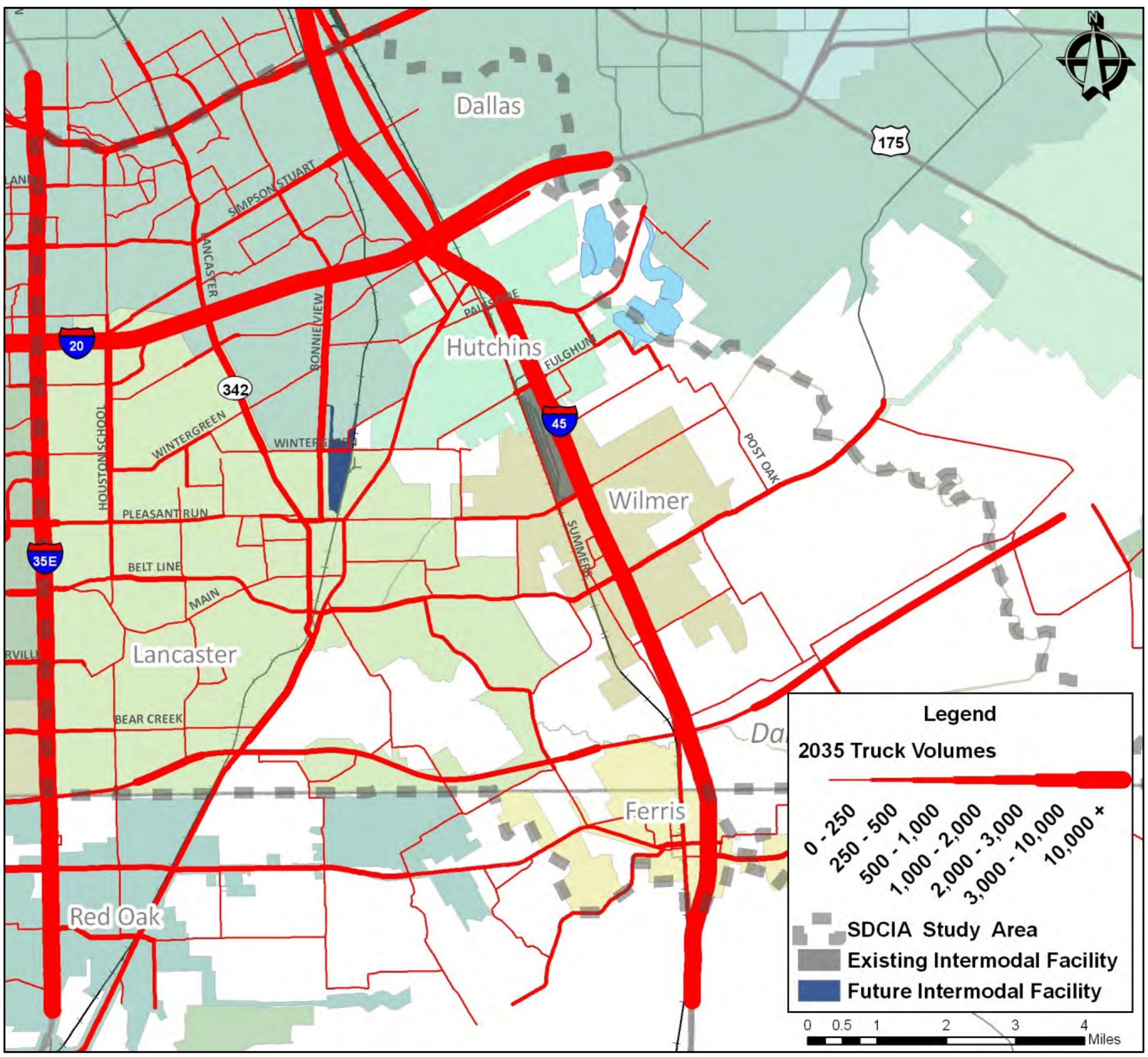


Figure 6-22. 2035 Forecasted Average Daily Truck Volumes in SDCIA Area

Growth within the area is discussed at the beginning of this section. While growth for rail is expected to be centered around the intermodal facilities, area growth for truck traffic will not be so facility or location specific. Due to anticipated industrial development within the study area, it can be expected that 53-foot trailers and 40-foot intermodal containers, along with 20-foot trailers which can be single or double, will increase in frequency.

The Surface Transportation Assistance Act (STAA) of 1982 allows large trucks (up to 59 ft for trailer in Texas) to operate on the Interstate and certain primary routes, also known as the National Highway System. These trucks are referred to as STAA trucks. STAA trucks have a larger turning radius than most local roads can readily accommodate. TxDOT, in compliance with AASHTO design standards, recommends a minimum 45 feet turning radii for trucks. TxDOT design will arterials between 25 and 30 feet turning radii and smaller for local streets. Operating STAA trucks on roads other than the designated routes can lead to a compromise of traffic safety resulting in property damage (wheel off-tracking onto curbs, planters, sidewalks, etc.) or traffic accidents (trapping vehicles in adjacent lanes, crossing into oncoming traffic lanes, etc.). The design standard for new roads and upgrades to existing roads in the study area which will have large number of truck movements should have at least a 45 ft radii design to minimize off-tracking and limit the need for future and continual curb maintenance.

Network Impacts and Deficiencies

Rail

The existing rail lines in the study area will most likely have ample capacity to handle rail freight traffic that would result from rail business generated by IIPOD. Both rail lines serving the IIPOD are single-tracked with some passing sidings and existing volumes of less than 10 trains per day based on the references stated elsewhere. Given the existing operating conditions and infrastructure, both tracks should have a practical capacity of 20 trains per day[38], ample for development of rail traffic created by development of the IIPOD as now envisioned. Available capacity on the two lines over time will be more likely impacted by future passenger service than demand from IIPOD. Both lines are included as options in a high speed rail study being conducted with a federal $15 million High-Speed Intercity Passenger Rail grant awarded on May 9, 2011, and the Union Pacific's Ennis Sub is recommended for high speed rail use in NCTCOG's *Mobility 2035.* This plan also recommended the BNSF FWD sub for regional rail service after initially studying it in the 2005 *Regional Rail Corridor Study* (see footnote 3). Both lines have also been mentioned in possible Amtrak route revisions for its *Sunset Limited* between the DFW area and Houston.[39] There are many factors not involving study area impacts that could also influence line use such as shifts in railroad traffic routing selections, growth of rail traffic beyond the study area, and other railroad business decisions made as specific needs arise. Railroads are private entities that make investments in service improvements as need and economic circumstance warrant.

As for intermodal capacity, as noted earlier, Union Pacific's Dallas Intermodal Terminal (DIT) has excess capacity available and both railroads have other intermodal facilities in the DFW area. There is also potential for development of a BNSF facility within the study area.

Truck

Truck growth is expected to continue in the future. Domestic freight movements by truck around the area are expected to increase by 49 percent by 2035. This is due to area exports from Dallas-Fort Worth to the rest of the nation growing by 66 percent in volume.

Imports, while a small percentage of the total, are expected to increase significantly in volume by 2035- an estimated 240 percent according to analysis on FAF3 data. Canadian imports are projected to grow 135 percent while Mexican imports are expected to increase by more than 12 times current levels. This is mostly because of the current small volume of trucks traveling from Mexico to Dallas, 0.89 ktons.

Area exports are expected to grow 116 percent by 2035[40]. This is led by a large volume increase (118 percent) of freight going to Mexico. Growth is also expected for intermodal shipments to destinations in Africa and Europe. Total overseas markets that are handled by truck through Texas are 7,535.5 ktons in 2035, up 112 percent from 3,559.4 ktons in 2010. These totals are shown in **Table 6-12**.

Table 6-12. Commodity Growth for Dallas-Fort Worth, FAF 2010-2035

	2010		2035		% Change	
	Volume (tons)	Value ($M)	Volume (tons)	Value ($M)	Volume	Value
Domestic	647,380,699.6	771,265.9	965,713,676.4	1,670,354.2	49%	117%
Imports	10,843.7	80.3	37,192.5	239.8	243%	199%
Exports	9,392,412.1	21,130.0	20,254,671.8	45,190.6	116%	114%

Policies or Design Strategies

Freight companies depend on the transportation network, with reliability and accessibility of the system among the highest importance to the freight industry and driving decision making in the private sector because of its impact on the bottom line. An unreliable transportation system increases travel costs beyond what a company may expect or be willing to incur. Unreliability can be from congestion, safety, or maintenance issues. Accessibility deals with the ability to maneuver and connect with other modes or locations. The following begin to cover some needs for the study area which will address the unreliability or inaccessibility concerns. A more detailed discussion of these strategies can be found in Appendix G.

Context Sensitive Solutions

Proposed projects should have positive impacts on travel performance but also incorporate context sensitivity features to mitigate impact on policies and values of the existing communities. Potential policy recommendations may help designated roadways appropriately enhance communities or at minimum reduce the impact of strengthening truck routes. A policy strategy is recommended which provides focus to enhancing community sensitivity and general quality of life through Context Sensitive Design.

Access Management

A coordinated approach and well documented access management strategy can significantly enhance the flow of truck traffic in the SDCIA study area. Both the form of education materials and an interactive implementation strategy can assist in the acceptance and proper utilization of these practices by truck drivers. As a common and recognizable set of ordinances and construction criteria are presented to truck drivers, across the NCTCOG region, the private sector can actively designate route selection to coincide with these practices.

Intersection Design

In designing the area and future development to allow for ease of truck access, intersection design should be a key aspect of review. Forty-two feet of pavement is necessary to accommodate a 180 degree turn by a standard tractor with 53 ft trailer (over 65 ft in total length with tractor) .[41] This is on the upper ends of pavement needs. One single strategy is not necessary to identify. Multiple intersection designs are convenient for truck movement and directly improve or lessen the safety concerns when interacting with other modes, primarily passenger vehicles. Some examples of intersection design or additions are modern roundabouts[42], truck aprons, traversable islands, innovative intersections, and grade-separation crossings. These are all potential intersection solutions.

Signage Practices

The most common issue related to poor signage practices is the failure to provide adequate advance notice for truck drivers to special considerations adjacent to or on the roadway and provide sufficient time for decision making and potential changes of lane or route. Each opportunity to communicate conditions to the truck driver requires increased separation between the vehicle and the event than is standard for the average automobile. Where conditions require alternatives, an additional consideration is that the truck driver must have adequate roadway and traffic interaction to remedy a poor decision. Restricted or posted weight limits on bridges, left turn exits, prohibited routes and minimum vertical clearances are the more common scenarios faced by drivers unfamiliar with local road conditions.

Freight Oriented Development

A Freight Oriented Development (FOD) is defined[43] as an area where manufacturing, warehousing, distribution, and freight forwarding operations are consolidated with access to a multimodal transportation network. Designating an area with an FOD land use will help implement certain design standards in municipalities in a uniform process.

Potential/Recommended Improvements

Rail

Study area freight rail use, based on continued development of IIPOD, would require non-mainline support expansion based on the manner in which rail business is generated. Early development plans presented by the Allen Group portrayed on-site rail service as well as use of the existing Union Pacific facility and the planned BNSF terminal. On-site rail service would be comprised of carload freight, and assuming access to both railroads, both would require storage/switching tracks. If a third carrier were to provide on-site service and interchange with the two Class I carriers, interchange trackage would be necessary also.

Union Pacific has a conventional classification yard, Miller Yard, at the north end of the study area in addition to its intermodal terminal, that would most likely be used for support. The closest BNSF yard is located 21 miles, and several potential bottleneck junctions, away at West Mockingbird Lane just east of Irving. Some sort of support facility near the site would be desirable, depending on the traffic levels. However, this would be a business decision of the railroad when it determined a need existed. Support capacity could be developed in conjunction with an intermodal facility, if the latter is constructed in the future.

Truck

Potential projects for this area, beyond those planned currently, are as follows:

- Pavement widening and adding to shoulders to accommodate truck movements and general needs. This will help turning capabilities by increasing turning radii and avoid pavement deterioration by trucks inadvertently from "off-tracking" while turning. Off-tracking is a condition of a turning movement where the rear tires follow a shorter tracking path than the front tires. This off-tracking, the primary safety concern, may cause the rear wheels to go onto sidewalks, knock down signs, encroach onto shoulders, bike paths, walkways, or cross into the opposing/adjacent lane. Widening major movement areas will help prevent off-tracking.
- Technologically, a development of ITS (intelligent transportation systems), C-TIP related implementations, and AET (all electronic tolling) would be useful improvements to the system

allowing the disbursement of information, coordination of truck movements around the intermodal facilities, and continuous movement through tolling area. Cross-Town Improvement Project (C-TIP) is an FHWA best practices for managing loaded and empty intermodal movements in efficient way, minimizing congestion due to drayage traffic.

- Some companies and truck drivers specifically will begin to look for alternative fueling potentials in the area. California has embraced new truck engine configurations in an effort to control emissions standards. Planning and ensuring local policy allows for alternative fuel stations like CNG stations in the area will be influential in coming years.
- Development of an associated jurisdictional designated truck route plan. This process and framework will help identify future projects, improve maintenance of roadways, properly identify ownership of the improvement/need, and be an overall benefit to both goods and passenger travel. A truck route designation will also help to minimize or prevent truck traffic on local streets.

Some specific projects identified for the area:

- The growth of traffic on Simpson Stuart Road in the northern study area is concerning as the number of trucks increase; it is primarily an established commuter area. A single center turn lane exists in some areas with numerous entry and exit locations throughout the corridor. Access management strategies for this corridor may include but are not limited to frontage roads and restricted access points (drives) at signaled intersections. This will help maintain mobility for the corridor while reducing truck related and other accidents.
- There is presently no direct access from Lancaster-Hutchins Road to IH 20. A new road alignment is proposed to allow this movement and prevent indirect routing of trucks through the arterial network. This would mitigate the current situation which decreases capacity and increases congestion. The new route is proposed to continue from the existing intersection with Main Street and travel over IH 45 as it continues to IH 20 around mile marker 475.
- Improve the intersection at IH 20 and Bonnie View Road. This may be more of a system improvement with coordinated lights with increased passenger traffic and truck traffic at the Travel Centers of America truck stop. The increased truck traffic in this area will test the design limits of the current interchange. A study should be completed to identify conditions and potential improvements specific to this interchange.
- Widening of Pleasant Run Road for 4.2 miles and provide an interchange upgrade at IH 45. Pleasant Run Rd to the west of Bonnie View Rd is currently four lanes and the continuity of this roadway is important as development continues.
- Widening of Wintergreen Road for 2.3 miles to address capacity and continuity between Bonnie View and IH 45. An interchange improvement at IH 45 would also be desired to help promote traffic flow onto and off of the interstate. Safety issues could exist as well with the future BNSF center and related truck traffic and Lancaster High School current location.
- A new road alignment from Ferris to the IIPOD area will help freight and passenger movements. The new alignment would be approximately eight miles and connect IH 45 south of Ferris with Wintergreen Road.

Another key need to address is roadway bridges in the area that may have become structurally deficient. Presently no bridges are at risk. However, within Texas, the total bridge replacement, maintenance and inspection costs are estimated to be $36.1 billion,[44] or $1.6 billion per year. Undoubtedly some bridges could be in the study area and would need to be a priority to avoid freight movement hindrances.

If a bridge is rated "structurally deficient," the bridge requires significant maintenance, rehabilitation or replacement. Heavy vehicle traffic may be restricted (weight restrictions) or the bridge may be closed to all traffic until repairs can be completed. A structurally deficient bridge has a greater potential negative impact to truck mobility than to passenger vehicles.

A summary of the proposed freight improvements are shown in **Table 6-13**. Improvements are shown by location and improvement recommended, with total miles and termini. Also shown is the potential implementation timeline by short (0-5 years), medium (5-15 yrs), long (15-25 yrs). Preparation for the future will require involvement of the IIPOD developers, the railroads, and local, state and potentially federal governmental planning and development entities. Private and public entities will be involved in potential use of the main tracks, development of on-site and support trackage, at-grade or separated highway-rail crossings, utility crossings and access to railroad intermodal facilities.

Table 6-13. Proposed Freight Improvements in the SDCIA Area

Location	Improvement	Miles	Bounds	Timeframe
Various Locations	Pavement improvements on shoulders, travel lane width, etc.	n/a	Various Locations	Short-term
Bonnie View @ IH 20	Interchange	n/a	current exit 472	Short term
Pleasant Run Road	Widen 2 to 4 lanes	4.2	Bonnie View and IH 45	Medium
Wintergreen Road	Widen 2 to 4 lanes	2.3	Bonnie View and IH 45	Medium
Stuart Simpson Road/ Camp Wisdom Road	Access management	5.5	IH 35 E and 310	Medium
System	ITS, CTIP	n/a	n/a	Medium
Lancaster-Hutchins Road	New alignment	1.5	IH 20 and Lancaster-Hutchins at IH 45	Long-term
Wintergreen @ IH 45	Interchange	n/a	current exit 273	Long-term
Pleasant Run @ IH 46	Interchange	n/a	current exit 272	Long-term
Lancaster-Hutchins @ IH 20	Interchange	n/a	new exit 475	Long-term
Ferris to West Hutchins Rdwy	New alignment	8.0	IH 45 and Wintergreen Rd	Long-term

AVIATION NEEDS

Aircraft Operational Volumes (Forecasted)

The purpose of forecasting aviation activity is to identify trends in the growth of based aircraft and aircraft operations. The forecasts are the fundamental starting point for analyzing the future needs of an airport, since knowledge of future use patterns is critical in planning for any facility and service upgrades that might be required.

The Lancaster Regional Airport's master plan projected that aircraft operations at the airport would increase at the same compound annual growth rate (CAGR) as that experienced by its overall based aircraft, or 1.3 percent per year, as shown below in **Table 6-14**. Like the based aircraft forecast, the master plan provided a forecast through the 2030 planning window. This growth was extrapolated to 2035 as part of this current planning effort to match the forecast years of the other transportation modes covered in this study.

While total operations are forecasted to increase more than 43 percent from 2008 to 2035, the airport is expected to have ample capacity for these additional operations. The anticipated demand/capacity ratio in 2035 is approximately 31 percent, still well below the threshold at which capacity enhancement planning needs to occur.

Based upon the Lancaster Regional Airport's most recent master plan, the airport clearly is focused on increasing its utility for business aircraft. To that end, the airport recently completed a project that extended its runway from 5,000 feet to 6,502 feet in length. This longer runway allows larger aircraft to take off with increased payloads, which translates to more fuel for longer range, more passengers, more cargo, or some combination thereof. This is particularly appealing for attracting business aircraft activities.

Table 6-14. Forecast of Aircraft Operations at Lancaster Regional Airport

Year	Itinerant Operations			Local Operations			Total
	General	Military	Total	General	Military	Total	Operations
2008	16,500	50	16,550	33,000	0	33,000	49,550
2009	16,500	50	16,550	33,000	0	33,000	49,550
2010	16,600	50	16,650	33,200	0	33,200	49,850
2011	16,600	50	16,650	33,400	0	33,400	49,850
2012	16,700	50	16,750	33,600	0	33,600	50,150
2013	16,800	50	16,850	34,000	0	34,000	50,450
2014	17,000	50	17,050	34,200	0	34,200	51,050
2015	17,100	50	17,150	34,600	0	34,600	51,350
2016	17,300	50	17,350	34,800	0	34,800	51,950
2017	17,400	50	17,450	35,200	0	35,200	52,250
2018	17,600	50	17,650	35,600	0	35,600	52,850
2019	17,800	50	17,850	35,600	0	35,600	53,450
2020	18,000	50	18,050	36,000	0	36,000	54,050
2021	18,400	50	18,450	36,800	0	36,800	55,250
2022	18,700	50	18,750	37,400	0	37,400	56,150
2023	19,100	50	19,150	38,200	0	38,200	57,350
2024	19,400	50	19,450	38,800	0	38,800	58,250
2025	19,800	50	19,850	39,600	0	39,600	59,450
2026	20,200	50	20,250	40,400	0	40,400	60,650
2027	20,700	50	20,750	41,400	0	41,400	62,150
2028	21,100	50	21,150	42,200	0	42,200	63,350
2029	21,600	50	21,650	43,200	0	43,200	64,850
2030	22,100	50	22,150	44,200	0	44,200	66,350
2035	23,618	50	23,667	47,235	0	47,235	70,902
CAGR	1.3%	0.0%	1.3%	1.3%	0.0%	1.3%	1.3%

Source: Lancaster Municipal Airport Master Plan, Draft Final Report, February 2010 with 2035 estimates extrapolated by CDM Smith.

Having addressed the immediate needs of the airport's current business aircraft users, the master plan examined other areas that could need attention in the future. According to the Lancaster Regional Airport master plan, discussions with airport management resulted in the identification of eight areas of concern, which are described in the following:[45]

- Runway System: potential need for an extension of Runway 31 to meet possible future demand and ultimate design requirements.
- Runway System: construction of an additional runway on the east of the existing runway to meet future aviation needs as may be possibly determined.
- Taxiway System: relocate existing parallel taxiway to the west to allow larger aircraft to operate on the existing runway.
- Terminal Area: expansion of west side facilities to meet future demand and ease of circulation.
- Landside Development: define and create new east side airside and landside complex to meet potential requirements for expanded facilities related to ultimate industrial aviation needs.

- Development of Infrastructure: utilities development for industrial and transportation logistics expansion onto the future east side development area.
- Environmental Issues: a comprehensive approach to defining and mitigating any potential environmental issues, including the Skyline Landfill.
- Development Encroachment: potential incompatible development on surrounding undeveloped land in the vicinity of the Airport.

A number of these areas of concern are addressed in the planned improvements for the airport that resulted from its planning efforts. For example, the airport is considering another runway extension to permit greater aircraft flexibility and increased safety and has started the planning process for such an improvement. Specifically, in order to meet its long-term development goals, Lancaster Regional Airport's master plan identified the following planned improvements:[46]

- Extend Runway 31 1,500 feet to the south, for an ultimate length of 8,000 feet.
- Extend Taxiway "A" 1,500 feet to the south, 50 feet wide, located 400 feet west of the runway (in conjunction with the runway extension).
- Acquire land for future Runway Protection Zones (RPZ) on the south end of the runway, (approximately 95 acres).
- Acquire land or easement for the ultimate Runway 31 RPZ (approximately 57 acres).
- Install a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) to Runway 31.
- Implement a GPS or LPV instrument approach with ½-mile visibility minimums (CAT-I) to Runway 31 (the current GPS approach only has ¾-mile visibility minimums).
- Relocate Taxiway "A" (50 feet wide), located 400 feet west of the runway centerline.
- Acquire land for future landside development on the west side of the Airport, located south of the existing hangar development area (approximately 14 acres).
- Relocate Ferris Road to the south of the Airport.
- Construct a full length parallel taxiway, 50 feet wide, 400 feet east of the runway centerline.
- Acquire land or easements for the future Runway 13 RPZ (approximately 23 acres).
- Implement a non-precision instrument approach with not less than ¾-mile visibility minimums to Runway 13.
- Relocate GA terminal building and restaurant south of the existing hangar development area on the west side of the Airport.

These improvements are proposed to make the airport more efficient and safer for all aircraft, but would particularly benefit business jet aircraft.

In addition to these recommended improvements, the North Central Texas Council of Governments undertook a study that examined ways in which land use planning and compatible development around Lancaster Regional Airport could maximize the long-term functionality and economic development of the airport and its environs. That study[47] was completed in early 2008 and made a number of the same, or similar recommendations found in the master plan, including the airport's acquisition of land in anticipation of future runway expansions. The study also recommended the following land use and zoning actions:

- Implement a proposed LanPort Zoning District that would prevent future incompatible development through height restrictions and limits on residential and other incompatible development near the airport.
- Conduct presentations to city council and planning and zoning commission members about the importance of Lancaster Regional Airport.

- Review all proposed developments to ensure long-term compatibility with the airport.
- Establish development review procedures with neighboring municipalities.

The Southern Dallas County area benefits from the services and facilities of the Lancaster Regional Airport, which attracts air traffic that may otherwise utilize other airports in the Dallas/Fort Worth region. To maintain this economic engine, an estimated $60 million is required over the next 20 years for capital improvement projects at the airport. It is estimated that local funding sources would need to provide a total of $7.3 million in matching funds. These investments would provide for the expansion and growth of the airport, allowing it to serve larger, more sophisticated aircraft, and providing better utility and safety to the current fleet of aircraft users.

SUMMARY OF ROADWAY RECOMMENDATIONS

As the Southern Dallas County area continues to grow, the most pressing transportation infrastructure need will be increases in roadway capacity due to the growing demand from both passenger vehicles as well as truck freight movements across the SDCIA area. A summary map of the proposed roadway capacity improvements is shown in **Figure 6-23**. Among the key improvements that will be needed earlier in the development of Southern Dallas County is the widening of multiple east-west arterials to provide connectivity between the freight centers and IH 45. These include Wintergreen Road, Pleasant Run Road and Belt Line Road. Additionally, expansions of north-south arterials such as Bonnie View Road and Lancaster-Hutchins Road that provide connectivity to IH 20 will be needed. A new alignment connecting the IIPOD area to Lancaster Airport and the City of Ferris will also be needed. As demand for transportation infrastructure continues to grow and expand in the Southern Dallas County area, the implementation of these roadway recommendations can help ensure a smooth, efficient transportation network to service the community.

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[1] NCTCOG.org
[2] *Commercial Property News*, Amanda Marsh, May 14, 2008; http://www.dallashub.com/Secondary.aspx?id=922
[3] *Texas Rail Plan*, Texas Department of Transportation, prepared by the Center for Transportation Research –University of Texas at Austin and Cambridge Systematics for the Texas Department of Transportation Rail Division, November, 2010, p.3-34.
[4] DFW Subdivision operating and physical data derived from *Regional Rail Corridor Study – Corridors Report*, North Central Texas Council of Governments prepared in cooperation with the Texas DOT, the US DOT, Federal Highway Administration, and the Federal Transit Administration, Chapter 8, Waxahachie Line, August 3, 2005, and the *Dallas-Ft. Worth Region Freight Study,* Texas Department of Transportation, prepared by HNTB, July, 2010 unless noted otherwise. The Ennis Subdivision was not included in the *Regional Rail Corridor Study.*
[5] http://www.uprr.com/aboutup/maps/attachments/allow_gross_full.pdf
[6] http://www.uprr.com/customers/intermodal/intmap/dallasdit.shtml
[7] http://www.iipod-texas.org/
[8] estimates according to articles/information from IIPOD http://www.dallas-ecodev.org/SiteContent/66/documents/Incentives/IIPOD/part004.PDF
[9] Freight Analysis Framework, Version 3, FHWA, http://faf.ornl.gov/fafweb/Extraction0.aspx
[10] FAF reports weights in kilotons (ktons). A conversion of 1 kton = 1,102 US short tons = 2,205,000 pounds was used for this report.
[11] Union Pacific volume, 6 trains per day, Network Planning, 2nd quarter 2006. An allowance of 2 trains per day was included in the range for both lines to account for possible growth over the last available data.
[12] *Texas Rail Plan,* pp. 35 and 36.
[13] The act of either loading a container on a rail car or unloading one.
[14] Union Pacific Corporation Form 10-K filed with the US Securities and Exchange Commission February 3, 2012, p. 15.
[15] 261,000 in 2011 just for UP at DIT. BNSF unknown for 2011, but given for 2008 (Alliance is BNSF)
[16] http://www.trucking.org/Newsroom/Trucks%20Are/Trucking%20and%20the%20Economy.pdf
[17] Trucks, within FAF, are assumed to the modes "Truck" and "Multiple modes and mail"
[18] FAF3 with 2010 year values used
[19] Minimum expected. Calculated using 80,000 lbs. payload. Not accounting for empty payload traffic. Data from FAF3, reported in kilotons (ktons) and 2009 dollar values (2009$).
[20] FAA Airport Design for Microcomputers.
[21] FAA 5010 Form dated 9FEB12.

[22] Lancaster Municipal Airport Master Plan, Draft Final Report, February 2010, p. D.11.
[23] DART 2030 Transit System Plan,2006, Chapter 3, p13-14.
[24] Agile Port (located in south Dallas, Hutchins, Wilmer and Lancaster) is also an economic development area, but will be mostly auto-oriented.
[25] DART 2030 Transit System Plan, 2006, Southern Sector Focus Areas, p15.
[26] DART 2030 Transit System Plan,2006. Chapter 4, p19.
[27] DART 2030 Transit System Plan,2006. Chapter 3, p14.
[28] DART 2030 Transit System Plan, 2006. Chapter 3, P13.
[29] UNT – Dallas Area Plan, 2009. P1.
[30] DART 2030 Transit System Plan, 2006. Chapter 6, p42.
[31] DART 2030 Transit System Plan, 2006. Chapter 6, p40.
[32] http://www.dart.org/ShareRoot/images/newsroom/jpgs/DART2030Map26oct06.jpg (downloaded April 10, 2012).
[33] DART 2030 Transit System Plan, 2006. Chapter 6, p37.
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[35] Lancaster Municipal Airport Master Plan, Draft Final Report, February 2010, p. E25.
[36] Lancaster Municipal Airport Master Plan, Draft Final Report, February 2010, p. E25.
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[39] *Texas Rail Plan*, p. 4-X3.
[40] Freight Analysis Framework, Version 3, FHWA, http://faf.ornl.gov/fafweb/Extraction0.aspx
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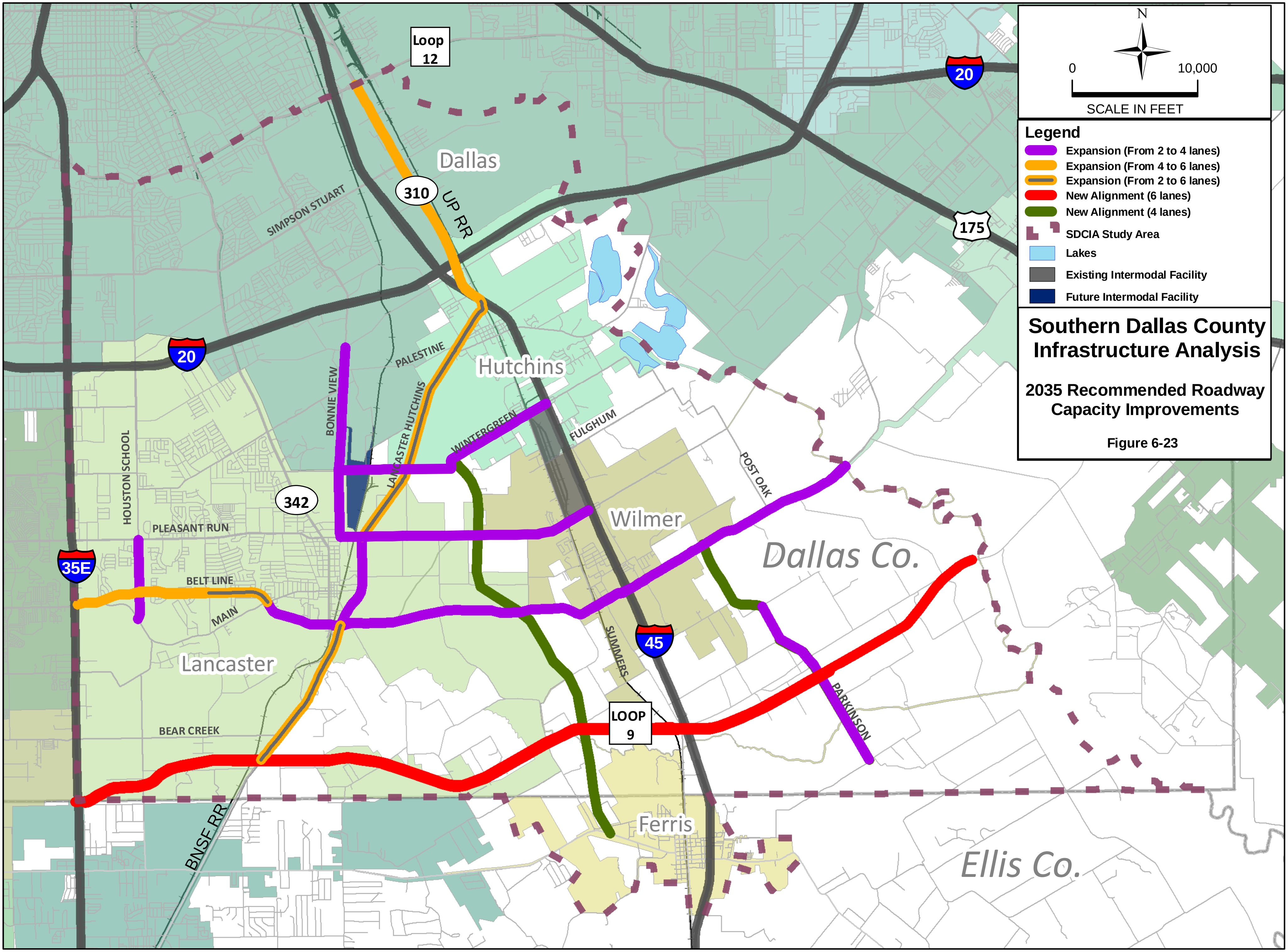
[43] http://www.nctcog.org/trans/goods/freight/fod.asp
[44] 2030 committee, Texas Transportation Needs Summary, February 2009
[45] Lancaster Municipal Airport Master Plan, Draft Final Report, February 2010, p. A33-34.
[46] Lancaster Municipal Airport Master Plan, Draft Final Report, February 2010, p. E22-23.
[47] Demonstration Encroachment Analysis Surrounding Lancaster Municipal Airport, January 2008.



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Expansion (From 2 to 4 lanes)
Expansion (From 4 to 6 lanes)
Expansion (From 2 to 6 lanes)
New Alignment (6 lanes)
New Alignment (4 lanes)
SDCIA Study Area
Lakes
Existing Intermodal Facility
Future Intermodal Facility
Southern Dallas County Infrastructure Analysis
2035 Recommended Roadway Capacity Improvements
Figure 6-23
Loop 12
20
175
Dallas
310
UP RR
SIMPSON STUART
PALESTINE
Hutchins
BONNIE VIEW
LANCASTER HUTCHINS
WINTERGREEN
FULGHUM
POST OAK
342
Wilmer
Dallas Co.
HOUSTON SCHOOL
PLEASANT RUN
35E
BELT LINE
MAIN
Lancaster
45
SUMMERS
PARKINSON
BEAR CREEK
LOOP 9
Ferris
BNSF RR
Ellis Co.

Section 7: Private Sector Utilities Assessment

The focus of this section is private sector utilities which include electricity, natural gas, telecommunication services and municipal solid waste disposal. These utilities have certain similarities and differences that should be discussed prior to evaluating the current infrastructure and future needs. One of the more common similarities is that, with one exception, these utility providers are private business entities that provide service with the intent of generating profits for the company owners. Because private funds are required to finance improvements, there must be an economic justification for the project. Factors that will determine the feasibility of the project or utility enhancement include long-term demand and revenue generating potential, construction costs and operational costs. The development of utility projects is also driven by existing contracts or tariffs in place that require utilities such as natural gas and electricity to provide service to new residents and businesses as long as the customers follow the provisions of the filed tariff.

For electricity, natural gas and telecommunications there are also regulatory approvals that may be required prior to capital investments being made as they affect rate structures and local franchise contracts. There are also regulatory or local government contracts in place with municipalities that establish specific guidelines for new services.

While there are common characteristics, there are differences including the degree to which each utility is regulated by either federal, state or local agencies. For instance, the electric transmission and natural gas transmission services are highly regulated by the Texas Public Utilities Commission (PUC) and the Texas Railroad Commission (TRC) respectively; the solid waste disposal market is open to competition.

There are also competitive differences between the private utility providers which may determine who provides future services and what level of market flexibility exists for current and future customers. The level of competition varies not only by the type of utility provided, but also by location. In the more densely populated urban areas of Dallas and Lancaster, there can be a high degree of competition between service providers, while only a small number of providers are present in the cities of Wilmer, Ferris and the unincorporated areas of the County. Complicating the competitive issue is the fact that in the case of energy service, both electric and natural gas utilities will also compete for the same customer. For example residential heating can be provided by both natural gas and electric utilities.

METHODOLOGY

References

To establish a baseline of existing utility service and planned activities, a number of industry and regulatory sources were evaluated. AZ&B has also interviewed utility providers to gain insight into their current and future plans for possible expansion of capacity in the region. A list of contacts for this analysis is provided at the end of this section.

Projected Needs

An evaluation of the region's population, demographics and economic condition was performed as part of this overall study. A report was recently published, "SDC Infrastructure Planning Analysis Technical Memorandum prepared for Task 3: Population, Households and Employment" for this study which defines the study area and provides projections regarding future demographics and employment. The report does provide projections based on a variety of assumptions and ranges of population growth are presented in the report. These same ranges will be used in forecasting electric, natural gas, telecommunications and solid waste needs.

It should be noted that for determining utility needs, the types of industries brought into the region will have an impact on required infrastructure. For example, a major manufacturing facility will have significantly more electric demand than a service oriented business. Where data is available, comparative analysis is performed on consumption patterns to develop utilization rates for the various utilities. Forecasted demand is generally tied to population increases.

Regulatory Framework

The utilities that are reviewed in this report are to some degree regulated at the federal, state and local levels. The report identifies specific agencies that have regulatory responsibility for overseeing any investments that are proposed by a utility to serve either future homeowners or commercial establishments.

Existing and Planned Infrastructure

Data from regulatory agencies was collected to identify existing infrastructure and to identify current providers of utility service. Interviews were then held with private utility providers to confirm existing data and to identify current plans for expansion. The focus of the analysis is placed on the local system, however, in certain cases an evaluation of resources beyond the SDCIA Study Area is necessary to determine if improvements to the broader infrastructure system are necessary to meet the region's needs.

Investment Costs

The cost of building additional infrastructure will also be discussed in this report. The cost projections are based on information provided by utility providers and other studies. The cost of construction in all of these cases will be borne by the private entity. In certain cases, there are processes for cost recapture for electricity, natural gas and telecommunications as these are regulated to some degree either through PUC regulations or local franchise agreements.

ELECTRICITY

BACKGROUND

Providing electricity to the region's residents and businesses requires an intricate supply chain that moves power from generation facilities located all over the state through a transmission network that includes high voltage power lines and substations and finally to distribution lines and small scale substations. In Texas the generation and distribution of electricity is a mix of both regulated and unregulated entities. This fact has significance with respect to who will ultimately have to make decisions regarding infrastructure investments in the SDCIA Study Area. The primary focus of the infrastructure analysis is the regulated transmission and distribution sector.

ELECTRIC MARKET ORGANIZATIONAL RESPONSIBILITIES

Major entities responsible for electric generation and distribution to the region include the following:

Texas Public Utilities Commission: The Texas PUC's mission is to protect customers, foster competition and promote high quality infrastructure. The PUC regulates the state's electric and telecommunications utilities, implements legislation and offers customer assistance in resolving consumer complaints.

The Electric Reliability Council of Texas (ERCOT) manages the flow of electric power to 23 million Texas customers, representing 85 percent of the state's electric load. As the independent system operator for the region, ERCOT schedules power on an electric grid that connects 40,500 miles of transmission lines and more than 550 generation units. The SDCIA Study Area is within ERCOT's service territory.

Power generators: There are over 550 power facilities in Texas that range from small wind farm applications of only 1 or 2 megawatts to large scale coal or gas fired generating stations or nuclear facilities. ERCOT is responsible for managing the power produced from these utilities to meet demand.

Electric transmission companies: These are regulated entities that are responsible for transmitting the electricity from the generating stations to the distribution system. These companies also maintain substations. Oncor is the transmission utility that serves the SDCIA Study Area.

Electric Retail Companies: With the advent of electric deregulations, consumers and businesses have choices as to which company will provide them retail electricity. These contracts are negotiated between the buyer and the utility.

EXISTING AND PLANNED ELECTRIC INFRASTRUCTURE

Key elements of electric generation, transmission and sales include power generation, high voltage transmission lines and substations. **Figure 7-1** illustrates how power gets from the point of generation to the final customer.

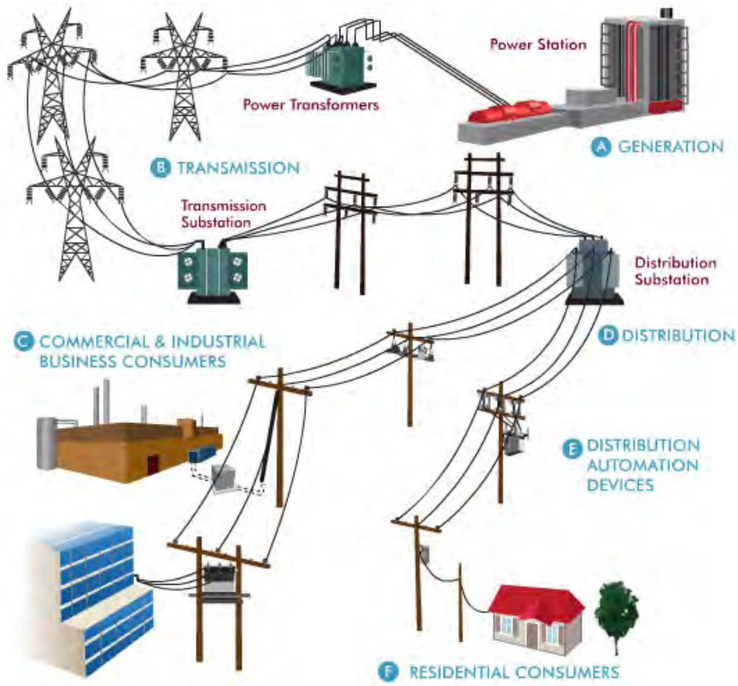


Figure 7-1. Electric Pathway (Source: Oncor)

Electric Generation

Electricity is generated at a number of power plants and renewable energy facilities located throughout the state. Power plants use nuclear, coal, natural gas and oil as fuels to generate electricity. The state is also a leader in the use of renewable resources for electricity generation. In 2010, the total generation within the ERCOT service territory was 84,000 megawatts (MW). ERCOT reported that they currently have a 17% capacity margin – 13% is the goal. The SDCIA's power demand represents 0.4% of the state's total electric generation capacity.

The long-term availability of electricity for the SDCIA Study Area is affected to a large degree by capacity additions and demand state-wide. ERCOT has the responsibility for planning future electric generation for the state and determine if there is action that is needed to address potential electric shortfall conditions. Because the state continues to grow in both population and economic activity, ERCOT has been actively developing new generation and transmission projects to meet this demand. One of the largest projects that have been underway for the past few years has been the CREZ (Competitive Renewable Energy Zones) program that, once completed, will bring additional capacity from western wind farms to urban centers. The CREZ project will not directly affect the SDCIA, except that it will make additional generating capacity available to the ERCOT region as a whole, which at this time is running fairly close to reserve margins.

With the exception of renewable energy projects, most new electric generation facilities are designed in the thousands of MWs of capacity. Based on projected needs for the SDCIA, its demand will be in the hundreds of MWs. It is not anticipated that a new generating facility will be constructed in this area, unless it is built and operated by an industrial facility that uses waste heat for electric generation (co-generation). There are three recently planned or constructed generation facilities and one that is no longer operational (mothballed) in and near the SDCIA Study Area. These are shown in Table 7-1.

Table 7-1. Planned Generation Facilities and Mothballed Facility

Owner	Name	Fuel	Location	Status	Generation Capacity (MW)
ANP	Midlothian I, II, III	Natural Gas	Midlothian	Completed (2010)	1650
Tractebel	Ennis Tractebel Power Project	Natural Gas	Ennis	Completed (2002)	343
Exelon Power	Mountain Creek Expansion	Natural Gas	Dallas	Announced	700
International Power	Midlothian CT5	Natural Gas	Midlothian	Mothballed (in service 2001)	225

Source: Texas Public Utility Commission: New Electric Generation Facilities Since 1995; Updated 12/30/2011

Transmission & Substations

Figure 7-2 illustrates the location of transmission lines and substations located in the SDCIA Study Area. In addition to the SDCIA, these lines serve to transmit power from power plants located south of the region to the DFW Metroplex. Future high voltage transmission lines going into the Dallas / Fort Worth Metroplex will deliver power through the CREZ program from wind power facilities located in the western part of the state. No new major transmission lines in the SDCIA Study Area are planned at this time. Lower voltage power lines are located throughout the SDCIA to meet local needs. It is Oncor's responsibility to work with local governments to locate new power lines to serve new customers. Securing necessary right-of-way for these power lines is a major factor in their ability to provide cost-effective service to new areas. The tariffs that ONCOR has on file with the Texas PUC and the franchise agreements define costs and contract provisions for supplying power to local customers.

Oncor officials have indicated that the preferred sites for new facilities, especially substations, are located along existing 138kv transmission line right-of-way routes. This decreases issues related to right-of-way requirements and reduces interconnection costs from transmission lines to the substations. The photos illustrate substations that are located in the SDCIA Study Area.

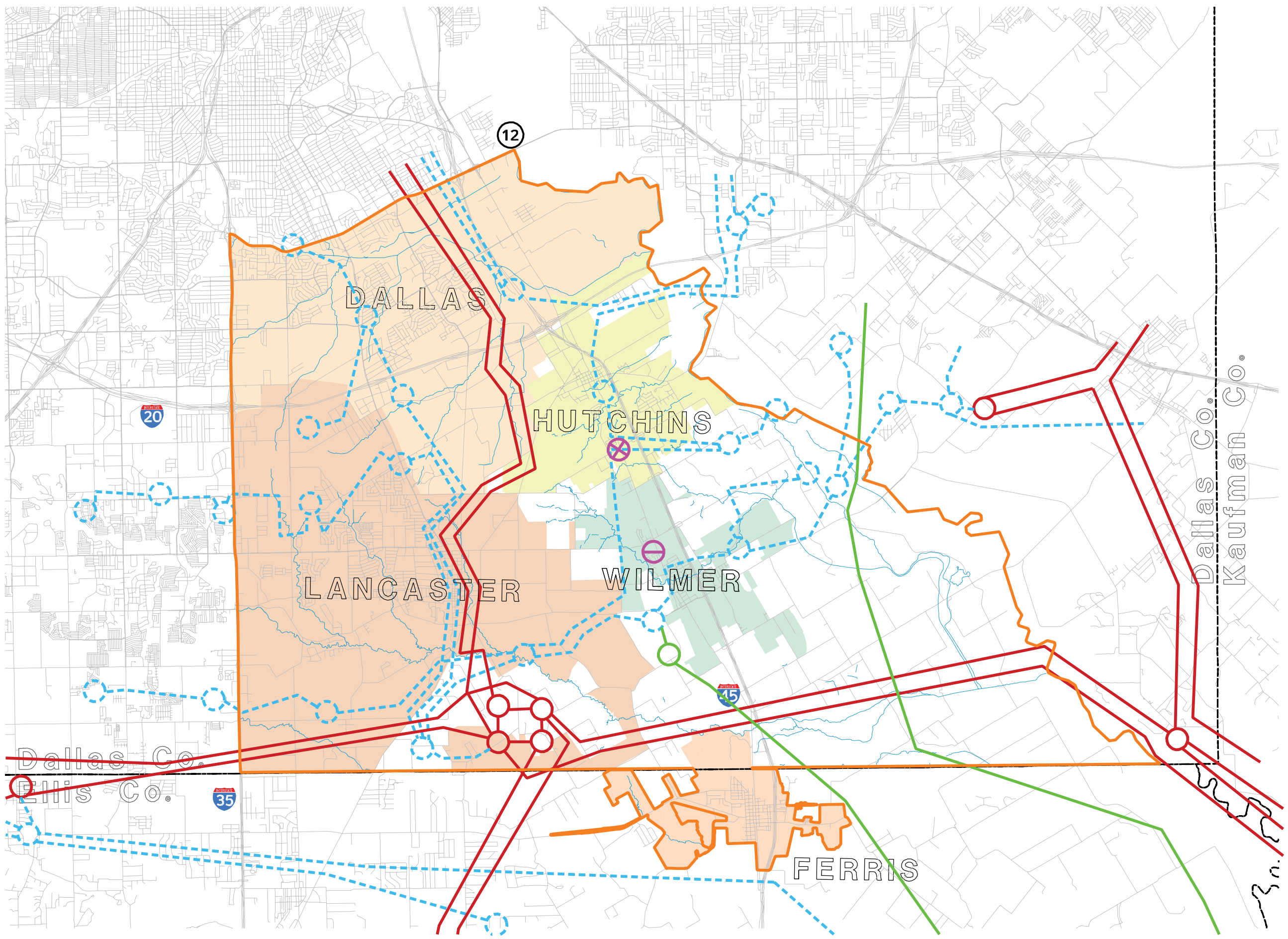
The tariffs that are filed with the PUC define specific inter-connection requirements and cost responsibilities for making connections.

Currently planned transmission and substation improvements are made by ERCOT on an annual basis. In their latest report, no improvements are planned to major transmission lines or substations in the SDCIA Study Area.

ELECTRIC DEMAND AND FORECAST

There are several factors that affect demand for electricity in the region at any given time. These variables include the number of households, number and type of businesses, weather, economic activity, energy conservation measures and changes in technology – including the development of all electric vehicles for transportation. In order to establish a baseline electric demand rate, a variety of sources were evaluated to determine per capita electric demand.

Sources for data include the US Energy Information Agency, the Texas Public Utility Commission, ERCOT, local utilities and data from surrounding municipal utilities.



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EXISTING 345KV TRANS. LINE
EXISTING 138KV TRANS. LINE
EXISTING 345KV SUBSTATION
EXISTING 138KV SUBSTATION
EXISTING 2 - 28KV SUBSTATION
EXISTING 28KV SUBSTATION
STUDY AREA

Southern Dallas County Infrastructure Analysis

Location of Transmission Lines

Figure 7 - 2

Source: ERCOT

A review of US EIA data shows that in 2009, the State of Texas consumed 345,406 million kilowatt hours. **Table 7-2** presents a distribution of this demand. For the year 2009, the State's population was 24.7 million people. The overall annual per capita generation was 13,978 kilowatt hours (kWh). The EIA data breaks down consumption into the following categories: residential, commercial, industrial, transportation and imports (**Figure 7-3**). For Texas, transportation and imports represents less than one percent. This per capita rate was applied to the population of the SDCIA Study Area to estimate the total amount of electricity consumed; the percentages for the state were applied to this total to provide an estimate of the amount of electricity consumed by residential (409 million kilowatt hours), commercial (374 million kilowatt hours) and industrial sectors (306 million kilowatt hours) for the SDCIA Study Area. To determine the electric generation capacity necessary to meet these needs, the total hours are divided by number of hours in the year to arrive at MW (megawatts) requirements.

Table 7-2. State of Texas and SDCIA Study Area Demand

State of Texas Demand			
Sector	**Million kWh**	**Per Capita Consumption kWh**	**Percent of Total**
Residential	129,797	5,237	38%
Commercial	118,497	4,782	34%
Industrial	96,931	3,911	28%
Transportation	71	3	0%
Imports	110	4	0%
Total	345,406	13,938	100%
SDCIA Study Area Demand			
Sector	**Million kWh**	**Per Capita Consumption kWh**	**Percent of Total**
Residential	409	5,237	38%
Commercial	374	4,782	34%
Industrial	306	3,911	28%
Transportation	0	3	0%
Imports	0	4	0%
Total	1,089	13,938	100%

Sources: US Energy Information Agency; State of Texas Department of Health Pop Statistics

The consumption of electricity is very seasonal due to weather conditions; therefore generation capacity has account for these swings in demand. A review of ERCOT data (**Figure 7-3**) illustrates that during summer months, power demand is approximately 40 percent higher than average demand. This seasonal demand fluctuation is taken into account in determining baseload requirements for power generation and for sizing of service equipment discussed in this section.

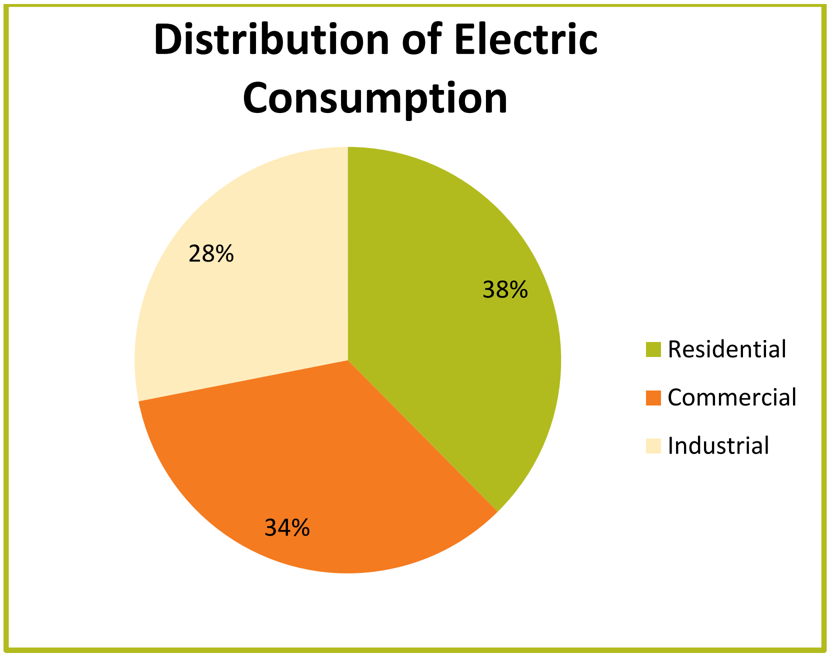


Figure 7-3. Distribution of Electric Consumption

Source: US Energy Information Agency (2010)

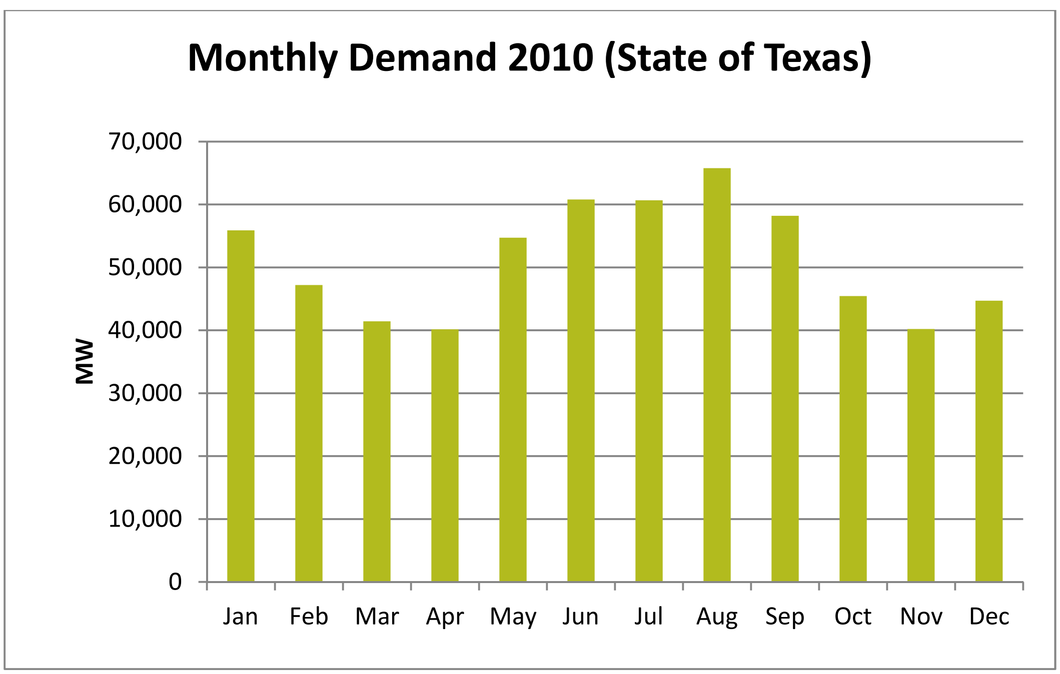


Figure 7-4. Monthly Demand 2010Source: ERCOT

As a means of cross-checking projected electric needs, a review of ERCOT data was conducted. ERCOT reports that it's 23 million customers used 319,000 million kilowatt hours in 2010. The SDCIA Study Area represents approximately 0.3% of ERCOT's customers, which is equal to a total demand of approximately 957 million kilowatt hours of demand. This compares closely to the 1,089 million kilowatt hours calculated in **Table 7-2**.

In June 2011, ERCOT issued its Long-Term Hourly Peak Demand and Energy Forecast. Over the next 10 years, ERCOT estimates that its total demand will increase from 319 Terawatt Hours to 398 Terawatt-Hours; a 25 percent increase over that time frame. Applying this same rate of growth to the SDCIA, the anticipated increase in demand is expected to increase to 1.6 million to 2.3 million kilowatt hours of demand by the year 2035, assuming the growth rate matches the state of Texas. If there is a significant increase in population and economic activity, the demand for electricity could increase significantly.

Residential Electricity Demand

Table 7-3 presents forecasted residential electricity consumption for the SDCIA Study Area. These projections were developed assuming a constant per capita electricity demand value and increasing demand based on population increases. Factors that could affect these projections include continued push for energy conservation in households, the potential of a new market for electricity in the form of transportation and whether future residential construction relies on electricity or natural gas for heating and water heating.

Table 7-3. Residential Electric Demand

Year	Low-Range	Mid-Range	High-Range	Low-Range	Mid-Range	High-Range
	Million KWh			Megawatts		
2012	420	420	420	48.0	48.0	48.0
2015	444	465	479	50.7	53.2	54.7
2020	487	541	577	55.6	61.8	65.9
2025	542	617	676	61.9	70.4	77.2
2030	597	692	774	68.2	79.1	88.4
2035	652	768	873	74.5	87.7	99.7

Commercial/Industrial/Transportation Demand

There is a wide range in electric consumption demand by commercial/industrial sectors. The relative demand from these sectors is driven by the type of business activity employed and the specific power demands of that business. For example, power demands for a large manufacturing facility which may have several large pieces of equipment that rely on large motors and conveyor systems are considerably different than an industrial warehouse operation which may have to maintain temperature and lighting as its principle energy demand. A review of ERCOT and US Energy Information Agency information indicates that the commercial and industrial sectors accounted for approximately 65 percent of overall electric consumption in Texas for the year 2009. Table 7-4 presents forecast for future commercial/industrial demand for electricity. The assumptions for these forecasts include a constant per employee rate of demand applied to the ranges of employment increases forecast in the SDC Demographic Report.

Table 7-4. Commercial/Industrial/Transportation Demand
Study Area

Year	Low-Range	Mid-Range	High-Range	Low-Range	Mid-Range	High-Range
	Million KWh			Megawatts		
2012	679	679	679	77.5	77.5	77.5
2015	709	741	745	81.0	84.7	85.1
2020	763	858	871	87.2	98.0	99.4
2025	822	994	1017	93.9	113.5	116.2
2030	885	1151	1189	101.0	131.5	135.8
2035	952	1334	1389	108.8	152.3	158.6

Total Demand

Combining the residential and commercial sectors provides a total demand for the SDCIA. **Table 7-5** presents the projected electric demand for the years 2012 through 2035.

Table 7-5. Total Demand
Study Area

Year	Low-Range	Mid-Range	High-Range	Low-Range	Mid-Range	High-Range
	Million Kwh			Megawatts		
2012	1,099	1,099	1,099	125	125	125
2015	1,154	1,207	1,225	132	138	140
2020	1,251	1,400	1,449	143	160	165
2025	1,365	1,612	1,694	156	184	193
2030	1,483	1,845	1,964	169	211	224
2035	1,606	2,103	2,263	183	240	258

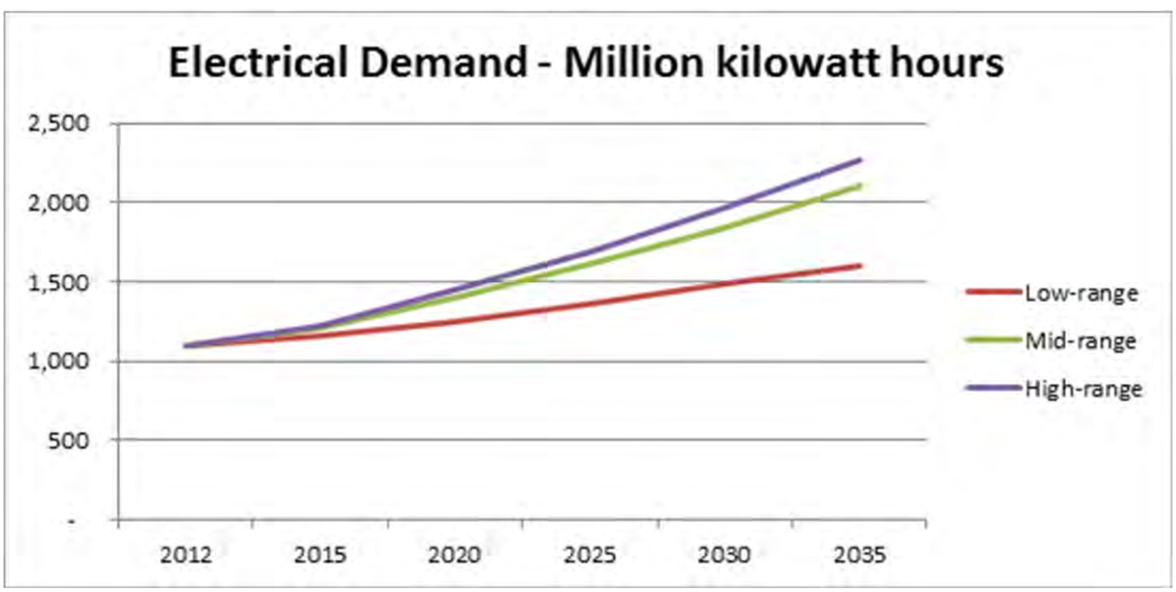


Figure 7-5. Electrical Demand 2012 through 2035

INFRASTRUCTURE NEEDS

Generation

ERCOT currently maintains a 17% generation margin and the goal is 13%. With power demands during the summer months continuing to increase, the margins are growing smaller. Additional capacity will be available to the overall DFW region as the CREZ is completed and will bring additional wind capacity to the area. It should be noted that the additional power needs required to meet the SDCIA's Study Area needs fall well below the requirements for a modern day power plant.

Transmission & Substations

ERCOT prepares an annual report on Electric System Constraints and Needs for the ERCOT region. The report evaluates operational results, load forecasting, generation interconnections and transmission system studies to identify near-term needs to maintain electric service availability. In its 2011 report, no improvements are planned or recommended for the SDCIA Study Area.

Large scale, 345kv power lines that intersect the SDCIA Study Area are designed for long-distance transportation of power throughout the Dallas / Worth Area. Smaller, 138kv power lines are located in the SDCIA also. It is Oncor's recommendation that future substations to serve the area be located along the corridors for these 138kv transmission lines that are shown in **Figure 7-2**.

ONCOR staff indicate that one 28kv substation near Wilmer and one station with 2-28kv transformers located in Hutchins are located in the SDCIA Study Area serving this region. Other substations located outside the SDCIA region also serve parts of the SDCIA Study Area with electric service. These locations are shown in **Figure 7-2**.

ELECTRIC COSTS

Oncor has the regulated responsibility to provide service to customers within the SDCIA. It should be noted that the delivery of power to a facility is very site specific in terms of demand requirements and service needs. The type of business or energy user will have a significant impact on potential improvements that Oncor would have to build to meet their requirements under their tariff with the PUC. The tariff on file with the Texas Public Utility Commission defines the requirements for Oncor services that must be provided and establishes rates that are to be charged for these services. The tariff has a number of rate schedules which apply to services provided to residential and commercial customers. The rate schedules for Residential Service, Secondary Service Less than or equal to 10kW, Secondary Service Grater than 10kW, Primary Service, and Transmission Service are designed to allow Oncor to recover the cost of services provided to customers covered under the tariff. If a customer asks for services that are considered by the tariff to be beyond normal services, such as the demand for underground power lines, the tariff contains rate schedules for these additional requirements. Oncor officials have indicated that should power demands increase to the point where an additional 28kv substation would be required, it would cost approximately $1,500,000. It is Oncor's responsibility to pay for these initial investments and recapture of costs occurs in rate structures that are reviewed by the PUC.

NATURAL GAS

NATURAL GAS EXISTING CONDITIONS

Natural gas is used for heating, water heating, industrial processes and electric generation. In the SDCIA, natural gas is primarily used for residential uses and commercial and light industrial processes. The infrastructure required to support the delivery of natural gas from the point of generation to the final consumer includes large diameter pipelines, compressor stations, city gate stations and distribution pipes to the final users. **Figure 7-6** illustrates the flow of gas from points of generation to final user.

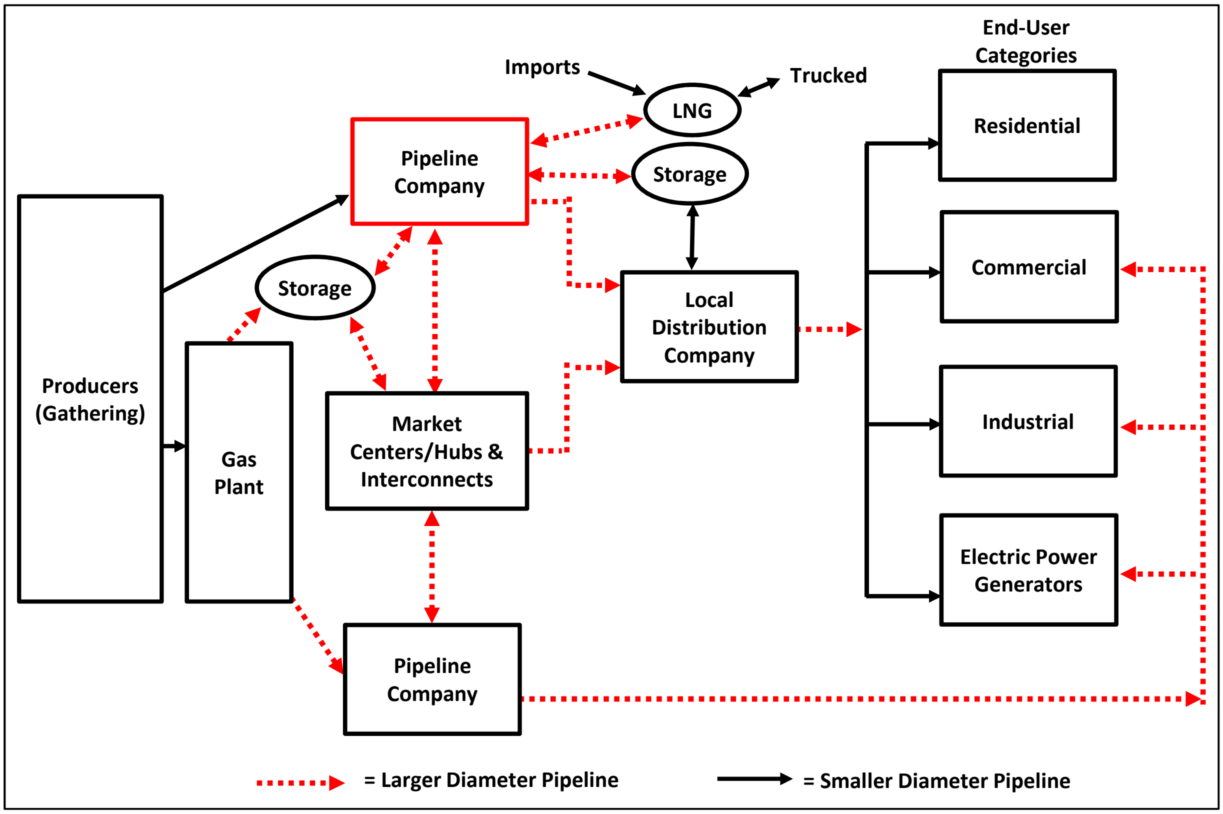


Figure 7-6. Flow of Gas from Points of Generation to Final User

Source: Energy Information Administration, Office of Oil and Gas

There have been major changes in the natural gas market in recent years due to increased production, especially from shale deposits and through advances in drilling techniques. The Barnett Shale, located in the western portion of the north Texas region is one of the areas that have seen significant increases in drilling and production activities. Infrastructure developments in the region may bring this gas to market in the SDCIA region. Increased gas production from these and other fields in other parts of the country have caused the price of natural gas to fall significantly. This decreased price, along with more secure supplies may result in market shifts from fuels such as coal or petroleum to natural gas. The increased availability of this gas and the lower price may also encourage greater use of natural gas for transportation/motor vehicle uses as well.

NATURAL GAS INDUSTRY ORGANIZATION AND RESPONSIBILITIES

Natural gas is regulated by a number of local, state and federal agencies. The following presents a summary of the roles of these agencies. It should be noted that for large customers, the purchase of natural gas from suppliers can be a non-regulated transaction, but this is rare given the interstate nature of the natural gas market.

Federal Regulatory Commission (FERC): FERC has the responsibility to regulate the interstate transmission of natural gas. Pipelines that transport natural gas that crosses state lines is subject to FERC regulations related to the price of transportation.

Texas Railroad Commission (TRC): The Texas Railroad Commission has the responsibility to regulate intrastate transmission of natural gas. Pipeline companies that transport gas from the point of generation to the "city gate" are regulated by the TRC. The TRC also may assist a local government in a rate dispute case with a natural gas service provider.

Local governments: Each of the cities in the SDCIA area has a franchise agreement with Atmos gas to provide natural gas service to residential and commercial users in their boundaries. These franchise agreements establish the responsibilities of the gas supplier and the terms and conditions for any customers of natural gas in the service area. The rates are also negotiated under these franchise agreements. Atmos is able to request a rate increase under the terms of these agreements, and it is up to the individual cities to determine if these rate increases are justifiable or not. If the dispute between the city and Atmos cannot be resolved by the parties, the Texas Railroad Commission and the courts may become involved.

Atmos Energy (Atmos): Atmos delivers natural gas to local customers in this region and is responsible for maintaining the infrastructure for gas delivery.

NATURAL GAS EXISTING INFRASTRUCTURE

Once natural gas is collected at a wellhead, it is cleaned and transported via a network of large pipelines to local markets. Major components of the natural gas infrastructure system include:

Transmission pipelines: These large 24" to 36" diameter pipelines deliver gas from the points of collection to various points for consumers.

Compressor Stations: Compressor stations are located at various points along the transmission pipeline to maintain the pressure of the gas and to remove moisture in the gas that may accumulate as it moves through the pipeline.

City Gate: Gas is piped to the city gate where the pressure of the gas is decreased significantly so it can be used by residents and businesses. The gas is also treated at the city gate to add mercaptan, which gives it an odor for safety purposes.

Distribution Pipes: From the city gate, the gas is distributed to end users. The size of the pipe and pressure are determined by who is using the gas and the amount of gas required. There is a move to replace steel distribution pipes with plastic piping as a means of reducing costs, while maintaining safety.

Transmission and Distribution Pipelines

Natural gas pipelines are distributed throughout the region through a combination of interstate and intrastate pipelines. **Figure 7-7** illustrates the location of major natural gas transmission lines located in the region. These pipelines vary in size and the amounts of gas that they transport. The two major pipelines that serve the SDCIA Study Area are owned and operated by Atmos. Other major pipelines in Dallas and Ellis County, which will either feed into the broader natural gas market through sales to retailers such as Atmos, or sell natural gas directly to industrial users, include the following:

Dallas County

- Atmos Energy Corp – Mid-Tex
- Atmos Pipeline
- Chesapeake Midstream Partners LP
- Dal-Tile Corp
- Energy Transfer Co.

Ellis County Pipelines

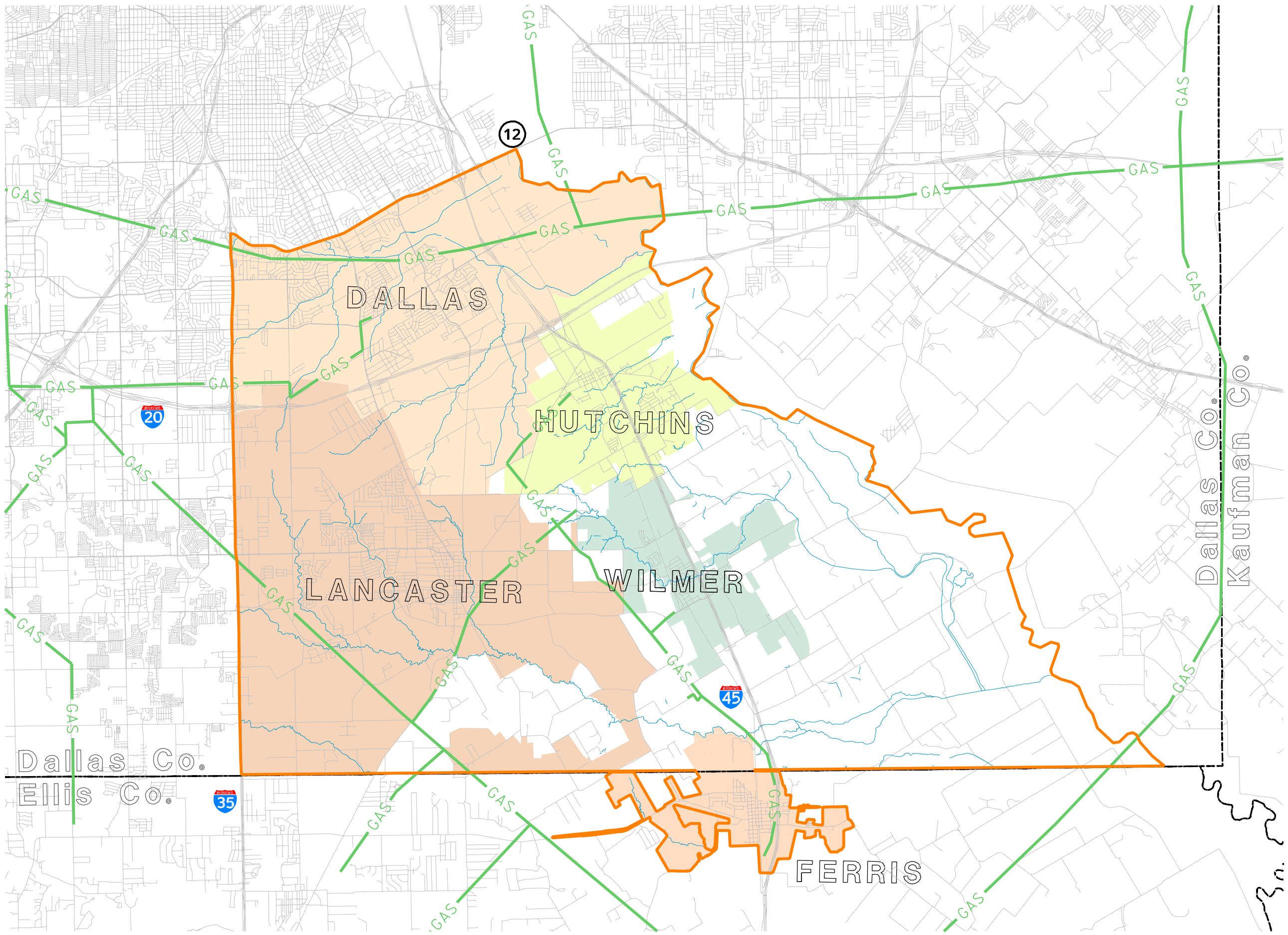
- Atmos Energy Corp – Mid-Tex
- Barnett Gathering LP
- BIS Tepsco
- Energy Maintenance Services Group
- Energy Transfer Col.
- Enterprise Product Operation
- Gateway Pipeline Company

Compressor Stations

There are no identified compressor stations operating in the SDCIA Study Area. The need for such facilities is more a function of transmission line requirements, versus requirements for locally delivered gas.

City Gate & Distribution Lines

Atmos is required by their current tariffs and local contracts to provide gas to customers within each community's boundaries and make the necessary investments for the gas. Atmos maintains and operates city gate facilities in each of the SDCIA cities.



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GAS Gas Transmission Lines

Study Area

Southern Dallas County Infrastructure Analysis

Natural Gas Pipelines

Figure 7 - 7

Source: Texas Railroad Commission

NATURAL GAS DEMAND AND FORECAST

Natural gas consumption patterns for the state of Texas show that a total of 1,997 billion cubic feet of natural gas were consumed according to the Energy Information Agency. **Table 7-6** shows the distribution of gas consumption by consumer for 2009. It should be noted that the industrial sector also includes gas used for electric generation. Forty percent of the state's electricity is produced from natural gas (ERCOT).

Table 7-6. Texas Natural Gas Consumption by Sector

State of Texas Natural Gas Demand		
Sector	**Billion Cubic Feet**	**Percent of Total**
Residential	192	10%
Commercial	167	8%
Industrial	1542	77%
Transportation	96	5%
Total	**1,997**	**100%**

Sources: US Energy Information Agency; State of Texas Department of Health Population Statistics

The TRC maintains annual data on natural gas consumption by municipality and who is provided the gas. **Table 7-7** presents the data for the cities in the SDCIA Study Area. To help forecast future gas consumption, the data is evaluated to determine per capita gas consumption. As can be seen in the table, there are variations in the amounts of gas consumed per household and per commercial customer. The variations in per household consumption are not significant with the exception of the City of Wilmer. There are significant variations in the amount of gas consumed per commercial sector by city. The range of 322 million cubic feet per commercial customer to 628 million cubic feet suggests considerable differences in composition of the commercial sector between communities. A review of prior years indicates that these are consistent gas consumption patterns.

A review of EIA information shows that for the state of Texas, a total of 1997 billion cubic feet of natural gas were used in the year 2009. This is equivalent to 80,000 Mcf per capita.

To determine future gas demand in the SDCIA, a review was conducted of TRC data for each of the cities in the SDCIA Study Area to establish consumption patterns on a per customer basis **(Figures 7-8 and 7-9).** It should be noted that the data is only available for the entire City of Dallas, not the specific households or businesses located in the SDCIA. These data are useful in calculating per household and per commercial customer consumption rates. To forecast SDCIA Study Area demand only, Dallas per household and per commercial consumption rates are applied to the percentage of Dallas' population that is located in the SDCIA Study Area. **Table 7-7** shows natural gas consumption for the year 2010. It should be noted that for all of the customers presented in these tables, Atmos is the natural gas provider. The table does not reflect sales between other carriers and major industries that can negotiate outside the city contracts and Atmos. Some of the observations from the table indicate:

- There is a considerable range in gas consumption per residential customer; 44 Mcf to 73 Mcf.
- A review of population data for the cities shows that natural gas use is more common in the cities with greater population. As population increases in less densely populated areas of the SDCIA, it can be expected that gas demand will likely increase.
- Commercial demand, per customer also has significant variations between the cities in the SDCIA Study Area; between 349 Mcf to 628 Mcf per customer. Again, the more populated

cities have the higher per customer consumption. This can be explained due to the variations in the type of business that is a customer. The quantities of gas consumed are not necessarily a function of gas availability. Each of the cities has an agreement with Atmos in that they must provide service to customers, as long as the customer meets standards established in the agreement and pays for the infrastructure requirements.

Table 7-7. – Natural Gas Annual Consumption/Customers/by Sector

Natural Gas Consumption (Mcf/Year)			
	Residential	Commercial & Small Industrial	Total
Dallas (city-wide)	14,893,814	12,800,302	27,694,116
Ferris	28,495	24,787	53,282
Hutchins	21,300	47,720	69,020
Lancaster	289,348	154,670	444,018
Wilmer	20,732	12,201	32,933
Total	**15,253,689**	**13,039,680**	**28,293,369**
Natural Gas Customers			
	Residential	Commercial & Small Industrial	Total
Dallas (city-wide)	204,227	20,387	224,614
Ferris	465	77	542
Hutchins	402	78	480
Lancaster	4,754	324	5,07
Wilmer	476	35	511
Total	**6,097**	**20,901**	**26,998**
Average Natural Gas Consumption by Sector			
	Residential	Commercial & Small Industrial	Total
Dallas (city-wide)	73	628	
Ferris	61	322	
Hutchins	53	612	
Lancaster	61	477	
Wilmer	44	349	
Average	**58**	**478**	

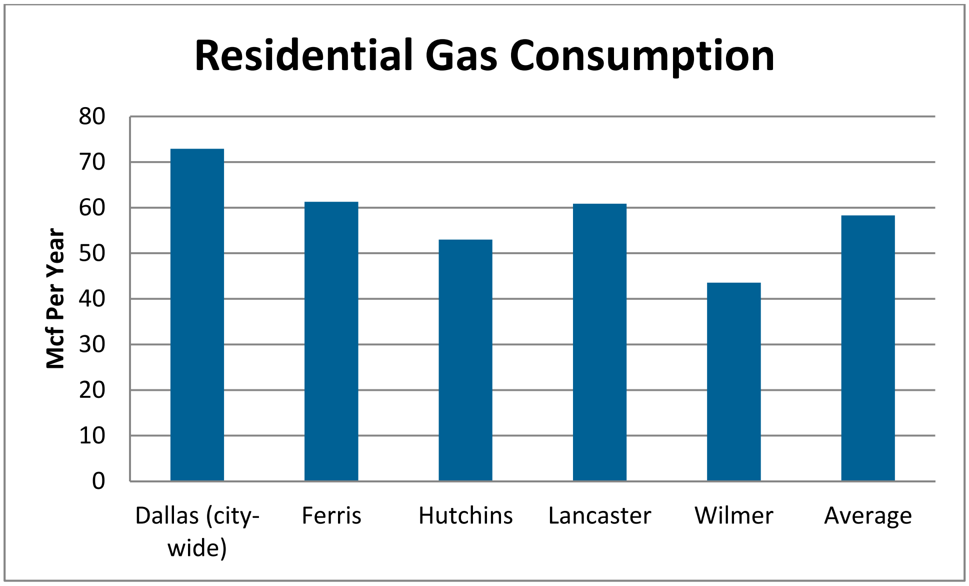


Figure 7-8. - Residential Sector Natural Gas Consumption per Household (Mcf) (2010)

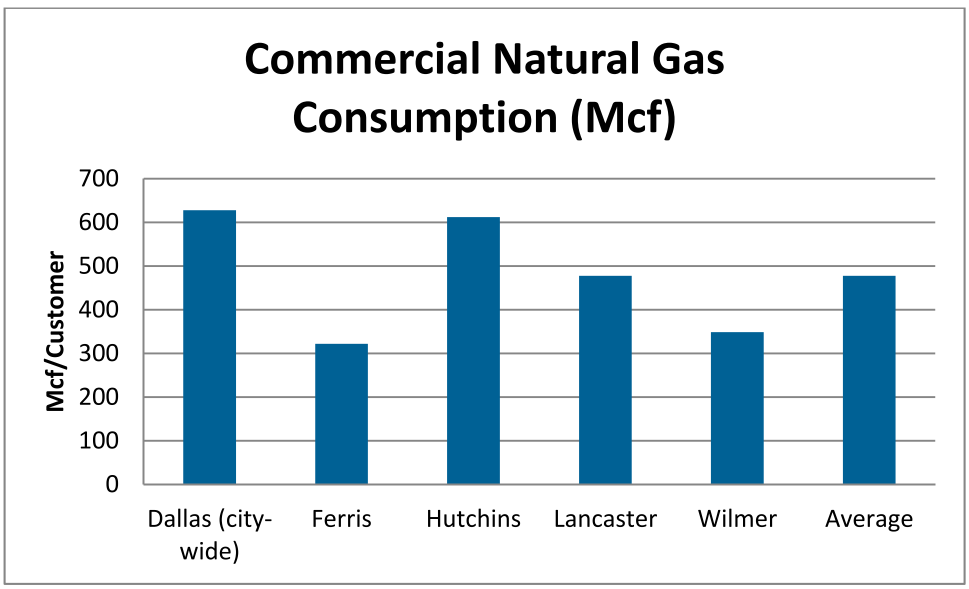


Figure 7-9. Commercial Sector Natural Gas Consumption per Customer (Mcf)- 2010

Forecasting Natural Gas Demand

It is estimated based on census data that the cities of Hutchins, Ferris, Lancaster and Wilmer represent approximately 25 percent of the SDCIA Study Area's population. Using gas demand for these cities and their percentage of the overall region, a total gas demand for the SDCIA of 817,000 Mcf has been calculated. The rate of growth in households was used for the region to determine natural gas demand. The rates of employment increase were used to forecast commercial gas consumption.

Table 7-8. – Gas Consumption – Residential/Commercial/Total

Residential Gas Consumption Mcf			
Year	Low-Range	Mid-Range	High-Range
2012	498,000	498,000	498,000
2015	526,000	552,000	568,000
2020	577,000	641,000	684,000
2025	643,000	731,000	801,000
2030	708,000	821,000	918,000
2035	774,000	911,000	1,034,000
Commercial Gas Consumption Mcf			
Year	Low-Range	Mid-Range	High-Range
2012	319,000	319,000	319,000
2015	334,000	349,000	350,000
2020	359,000	404,000	409,000
2025	387,000	468,000	478,000
2030	416,000	541,000	559,000
2035	448,000	627,000	653,000
Total Gas Consumption Mcf			
Year	Low-Range	Mid-Range	High-Range
2012	817,000	817,000	817,000
2015	860,000	901,000	918,000
2020	936,000	1,045,000	1,093,000
2025	1,030,000	1,199,000	1,279,000
2030	1,124,000	1,362,000	1,477,000
2035	1,222,000	1,538,000	1,687,000

INFRASTRUCTURE NEEDS

Pipeline Needs

The existing pipeline system that is located in the SDCIA is sufficient to meet current and near-term demand. Atmos officials do not anticipate any major pipeline improvements to meet future demand at anticipated growth rates. Should a large natural gas commercial customer come into the marketplace, Atmos can develop a pipeline program that can provide gas to their facility. Guidelines for how this is accomplished are defined in Atmos' tariff with the Texas Railroad Commission.

Compressor Station Needs

If there is a major industrial facility that would have significant power demands, it may be necessary for Atmos to construct and operate a compressor station. No compressor stations are currently anticipated for this region over the planning period.

City Gate and Distribution Pipeline Improvements

Atmos has the responsibility to manage city gate facilities and make improvements to these facilities. Depending on where major population occurs within the SDCIA and the immergence of a major industrial user, some city gate facilities may have to be modified to manage additional demand. City gates are located within each of the cities in the study area.

For future natural gas facilities, existing service lines can be upgraded along the existing right-of-way. Atmos would increase the capacity of these facilities in future years, versus build new facilities to meet demand, unless a large scale user were to be located in the region which required additional major distribution lines and metering facilities.

It should be noted that Atmos is undertaking a broad pipeline replacement program to replace older steel pipes with updated plastic pipes. This replacement program does provide a vehicle for Atmos to increase the size of these pipes as necessary.

COST OF SERVICES

Similar to electric sales, Atmos has the responsibility to provide natural gas services to the communities it serves as a regulated entity. Natural gas system costs are extremely site specific in terms of where a major industrial user would be located to determine the capital costs associated with bringing service to a customer. The tariff does include the ability of Atmos to recover these costs.

The tariff that Atmos Mid-Tex Division operates under defines service requirements, rate schedules and other fees for Residential Sales, Commercial Sales, Industrial Sales and Transportation. Cities are grouped within the tariff whereby there are varying rates depending on which Group a city is defined within.

TELECOMMUNICATIONS

TELECOMMUNICATIONS INDUSTRY BACKGROUND

Telecommunication service to the SDCIA Study Area covers a wide range of technologies including telephone, digital subscriber line (DSL), cable services and broadband access. This is one of the more complex utilities serving the region due to the variety of services provided and the level of competition that exists and does not exist in different parts of the SDCIA Study Area. Also contributing to the complexity of the telecommunications industry is the fact that the technology for communicating information is evolving at a very rapid pace and the means and methods of acquiring data are continuously changing.

The availability of quality communication services is critical not only to economic development, but to education, health care and public safety. Another complicating factor in the telecommunications field is the ever changing technical landscape associated with telecommunications. Major services that are discussed in this section of the report include: telephone service; fiber optics; and broadband. Broadband service is principally being offered by local exchange carriers, cable companies and wireless companies. Broadband is being used to provide internet and television programming, but it is also providing telephone service. The development of Voice over Internet Protocol (VoIP) has enabled cable companies to begin offering telephone service over their own facilities, and cable is becoming an increasingly important competitor for telephone services. In addition, VoIP technology is being used by “non-facilities based” companies such as Vonage and Skype to provide telephone service over broadband facilities furnished to the end-user customer by another company, whether a cable company or a land-line telephone company using DSL technology.

TELECOMMUNICATIONS INDUSTRY ORGANIZATION AND RESPONSIBILITIES

The key agencies and private entities involved in area telecommunications include:

Federal Communications Commission: The Federal Communications Commission regulates interstate and international communications by radio, television, wire, satellite and cable in all 50 states, the District of Columbia and U.S. territories.

Texas Public Utilities Commission: Prior to competition entering the communications industry, the PUC had responsibility for regulating the communications industry in Texas; now it plays an important role in overseeing the transition to competition and ensuring that customers receive the intended benefits of competition.

Technical Advances in Telecommunications

As stated, there are a number of technical advances taking place in the telecommunications industry. These advances are likely to expand the availability of service to existing customers, improve competition in areas and expand service to customers that have been without service. The following provides a brief summary of telecommunication technologies. These definitions are taken from the Texas Public Utilities Commission Report to the Texas State Legislature – State of Competitiveness in the Telecommunications Industry – December 2010.

VoIP – Voice over Internet Protocol, or VoIP, permits the Internet to be used for voice transmission. This permits efficient use of the network, as voice and data can share the same connection simultaneously. It can provide for enhanced features not available with standard telephone service. Cable companies and telephone companies offer VoIP service by using their broadband data services, while third-party service providers such as Vonage rely on their customers' existing broadband connections to provide VoIP service. Some companies such as Skype permit customers to call any other Skype customer on a computer-to-computer basis

Satellite Access – Increased demand for voice and data satellite services has lowered costs for service providers and prices for consumers, making satellite access more attractive, particularly in rural markets where the cost of providing wireline service is often very high.

Broadband over Power Line (BPL) – This technology delivers broadband telecommunications signals over existing power lines. Previously, electric companies were considering BPL both for commercial voice and data services and for internal uses, such as remote meter reading, but at this time interest appears to be shifting to the use of BPL for utility applications only. Concerns continue to be raised about the potential for BPL to interfere with users of the radio spectrum because, unlike the coaxial cable used by cable companies, electric wires are not shielded and the BPL signals may generate radio waves.

WiMAX (Worldwide Interoperability for Microwave Access)–WiMAX is a wireless protocol that provides DSL-like speeds in limited areas. In addition to forming the basis for some wireless companies' next-generation broadband wireless service, it has the potential to extend broadband access in rural areas that currently are not served by DSL or cable modem.

Ethernet – Ethernet, previously used only for local connections with in a building, is being extended by telephone companies over their fiber and copper network to form Metropolitan Area Networks, where multiple buildings or corporate campuses can be connected in the same way that users in a single building have been connected.

Fiber-to-the-Home (FTTH)–Some telephone companies, notably Verizon with its fiber optic service product FiOS, have begun to extend fiber optic cable all the way to subscribers' homes. This provides practically unlimited capacity, enabling high-definition video service, voice service, and very high-speed data transmission. The technology is costly to install and was initially undertaken only in new neighborhoods but has since expanded into existing neighborhoods.

Very High-speed Digital Subscriber Line (VDSL)–Another new technology involves extending fiber further into the network, but uses a portion of the existing copper lines to provide high-speed data and video to customers. This approach provides much higher capacity than the DSL service at a lower cost than FTTH.

TELECOMMUNICATIONS NEEDS AND FORECAST

Continued growth in the demand for advanced technologies related to telecommunications is anticipated, especially in those areas currently under-served. According to data collected by the FCC, the Texas Public Utilities Commission and other sources, there is telephone and broadband service available throughout the SDCIA Study Area, however, the speed of the service varies considerably. Efforts by both the FCC and the PUC have been directed to make broadband services widely available throughout the region.

TELECOMMUNICATIONS EXISTING INFRASTRUCTURE

Existing Telephone Service

Telephone service is currently available throughout the entire SDCIA Study Area. The number of service providers in each of the communities varies depending on location.

Table 7-9 presents the number of certified telecommunication providers servicing communities in the SDCIA Study Area.

Table 7-9. – Certified Telecommunication Providers in the South Dallas Counties

City	Residential Providers	Residential & Business Providers	Business Providers
Dallas	30	39	61
Ferris	1	1	3
Hutchins	8	6	14
Lancaster	14	8	17
Wilmer	1	1	3

Existing Broadband Service

The FCC identified the goals of the NBP as providing: 1) broadband in areas not served; 2) broadband-enabled health information technology; 3) broadband in schools; 4) a broadband-enabled smart electricity grid; and 5) a nationwide public safety mobile broadband communications network. Data collected from Connected Texas, an independent public / private partnership whose focus it is to secure broadband services statewide has evaluated availability across the state and the types of services provided. **Figures 7-10** and **7-11** illustrate the types of services available in the SDCIA.

TELECOMMUNICATIONS INFRASTRUCTURE NEEDS

Telecommunications infrastructure has become increasingly complex. As previously noted, there are a wide range of services now available to residents and businesses to communicate and collect information via telephones, cell phones, computers and other media. The infrastructure required to provide these services includes traditional telephone lines, cell phone towers, and fiber optic cables.

Telephone service is available throughout the region. It is anticipated that with increases in both population and changes in technology, there will also be increased competition for services in the SDCIA Study Area. Broadband is also available throughout the region, however, in Ferris and Wilmer the speed is considerably less than that of areas north of the region. Reasons for this include the fact that the area does not have significant competition and low customer volumes makes it difficult to justify investments in equipment upgrades. As future infrastructure is built in these areas, including water and transportation, it is advised that access for telecommunications systems be included in the design for future services. In locating new infrastructure to serve the region, the FCC strongly recommends that any new linear construction, whether it be for roads or pipelines, take into consideration providing additional right-of-way space for new telecommunications systems. This reduces costs significantly, as shown in **Table 7-10** which was presented in the FCC National Broadband Plan.

Table 7-10. Joint Deployment Cost Savings (Thousands of Dollars per Mile)

	Cost for Joint Deployment	Non-joint deployment additional Costs	Total Costs
Placement	$69	$41	$110
Splicing	$6	$0	$6
Materials	$26	$2	$28
Total	$101	$43	$144

Broadband Service Inventory

Advertised Speeds of at Least 768 kbps Downstream and 200 kbps Upstream

Dallas County
Texas

Updated October 1, 2011
Draft Version
Submit questions or recommended changes to: maps@connectedtx.org

CONNECTED TEXAS

*This map is not a guarantee of coverage, contains areas with no service, and generally predicts where outdoor coverage is available. Equipment, topography and environment affect service.

As required by the US Department of Commerce's State Broadband Initiative, if broadband service is available to at least one household in a census block, then for mapping purposes, that census block is reported to have some level of broadband availability. As such, broadband availability at an exact address location cannot be guaranteed. Providers supplying more specific data than census block are displayed as such.

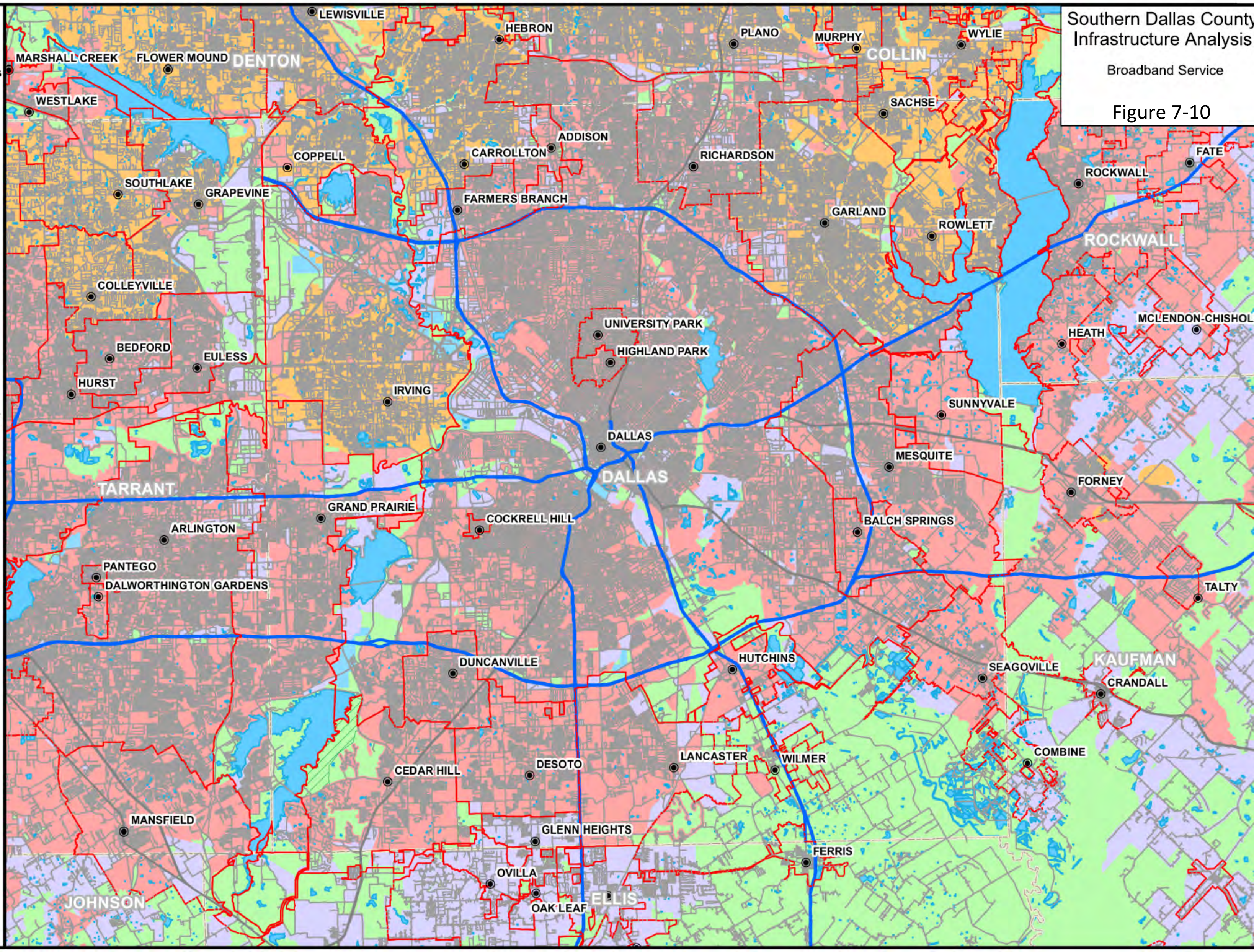
This map represents areas of broadband service availability determined by ongoing, in-depth technical analysis of provider networks and accommodations for the impact of external factors on service quality. Satellite broadband services may also be available.

Map users are encouraged to participate in improving broadband data granularity through data validation and field testing efforts. Learn more about this and other broadband mapping facts at www.connectedtx.org.

N
0 0.35 0.7 1.4 2.1 2.8
Miles

Symbology

- City
- Interstate
- US Road
- Local Road
- Municipal Boundary
- County Boundary
- Water
- National and State Lands
- Fiber Broadband Available
- Cable Broadband Available
- DSL Broadband Available
- Fixed Wireless Broadband Available
- Mobile Wireless Broadband Available*
- Unserved Areas



Southern Dallas County Infrastructure Analysis

Broadband Service

Figure 7-10

Maximum Residential Broadband Download Speed

Dallas County
Texas

Updated October 1, 2011
Draft Version

Submit questions or recommended changes to: maps@connectedtx.org

CONNECTED TEXAS

As required by the US Department of Commerce's State Broadband Initiative, if broadband service is available to at least one household in a census block, then for mapping purposes, that census block is reported to have some level of broadband availability. As such, broadband availability at an exact address location cannot be guaranteed. Providers supplying more specific data than census block are displayed as such.

This map represents areas of broadband service availability determined by ongoing, in-depth technical analysis of provider networks and accommodations for the impact of external factors on service quality. Satellite broadband services may also be available.

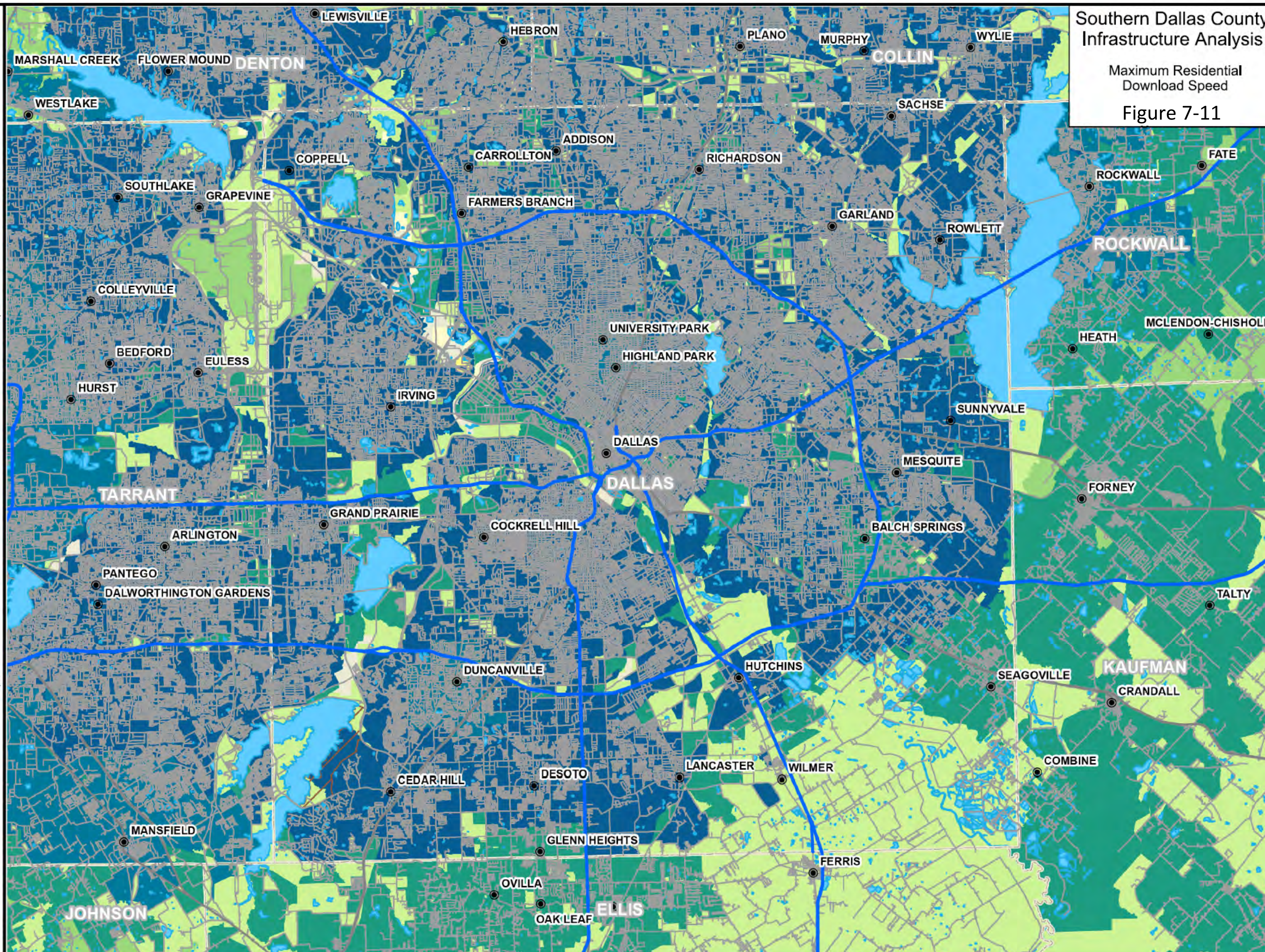
Map users are encouraged to participate in improving broadband data granularity through data validation and field testing efforts. Learn more about this and other broadband mapping facts at www.connectedtx.org.

Mobile broadband providers are not included in this analysis. Data displayed is according to census block availability and fixed wireless provider footprints.

Symbology

- City
- Interstate
- US Road
- Local Road
- County Boundary
- Water
- National and State Lands
- Tier 11 (Greater than 1 Gbps)*
- Tier 10 (100 Mbps to < 1 Gbps)
- Tier 9 (50 Mbps to < 100 Mbps)
- Tier 8 (25 Mbps to < 50 Mbps)
- Tier 7 (10 Mbps to < 25 Mbps)
- Tier 6 (6 Mbps to < 10 Mbps)
- Tier 5 (3 Mbps to < 6 Mbps)
- Tier 4 (1.5 Mbps to < 3 Mbps)
- Tier 3 (768 kbps to < 1.5 Mbps)
- Unserved Areas

*Speed tier not represented on this map.



Southern Dallas County Infrastructure Analysis

Maximum Residential Download Speed

Figure 7-11

MUNICIPAL SOLID WASTE MANAGEMENT

EXISTING CONDITIONS

Municipal solid waste generated by the region's residents and businesses is collected by private firms or local governments and taken to one of the area's permitted landfills. Some of the cities in the SDCIA Study Area have active recycling programs. Materials collected from these programs, either at the curbside or at citizen recycling facilities, are taken to processing facilities that are located throughout the Metroplex region.

At present, there is one landfill located in the SDCIA Study Area and two others located near the SDCIA area (see **Figure 7-12**). The Skyline Landfill is owned and operated by Waste Management and is located south of Ferris. The Ellis County Disposal site is located south of the region on IH 45. The City of Dallas McCommas Bluff Landfill is located just north of the SDCIA Study Area and is owned and operated by the City of Dallas. Currently all of the residential waste generated in Dallas is sent to the McCommas Bluff Landfill. There are also a number of privately owned and operated material processing facilities in the region. In addition to landfills, citizen convenience stations are located in the SDCIA to provide service to residents in unincorporated areas. Citizen convenience stations are controlled areas with waste dumpsters where residents can dispose of their waste.

MSW INDUSTRY ORGANIZATION AND RESPONSIBILITIES

Texas Commission on Environmental Quality (TCEQ): The TCEQ has the responsibility to permit the construction and operation of MSW landfills in the state of Texas.

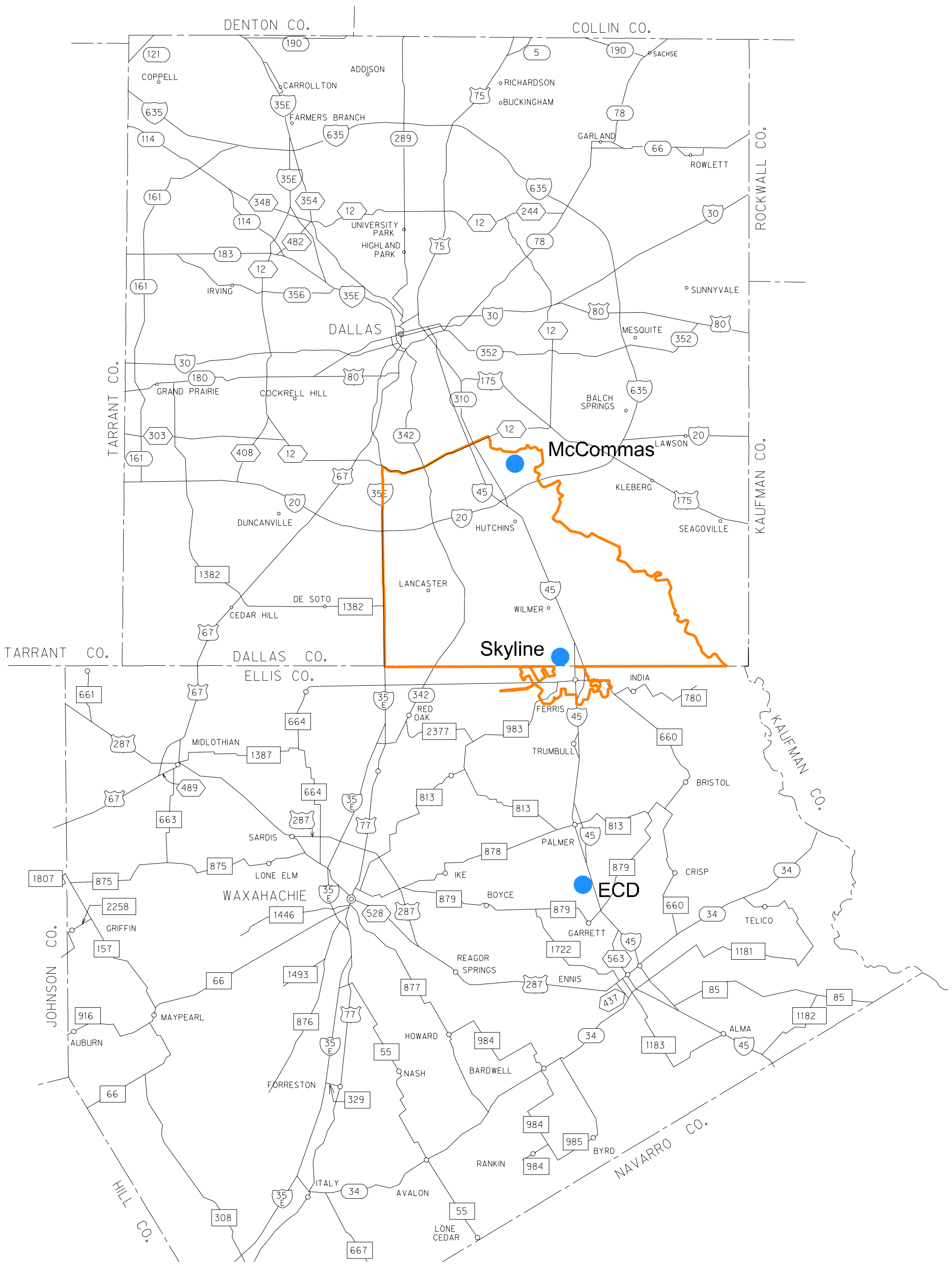
Local governments: Municipalities have the responsibility in Texas to provide for the proper collection and disposal of municipal solid waste. Local governments can meet this responsibility by either providing service directly or contracting with a private firm to provide these services. Businesses have the responsibility to arrange for the proper disposal of waste. In the SDCIA Study Area, no local governments provide collection service to the private sector. The City of Dallas also owns and operates a landfill.

Private Sector: With the exception of the City of Dallas, the cities in the study area rely on private firms for the collection of residential waste; in Dallas, commercial haulers collect and dispose of MSW from private sector businesses. Private firms operating facilities in and near the SDCIA include: Waste Management; Republic Waste; and IESI.

EXISTING MSW INFRASTRUCTURE

The amount of municipal solid waste capacity in the region is approximately 140 million tons. **Table 7-11** presents a summary of data for the facilities that are located in Dallas County that are located within 25 miles of the SDCIA Study Area. These four landfills have a combined capacity of 148 million tons. The estimated waste generation for the region is 3.1 million tons, or approximately 2 percent of the region's capacity.

In addition to the capacity identified in this section, it should be noted that landfills do have the ability to amend their permit applications to add capacity. This process does require a thorough review of the application and there is the potential for a public hearing, but additional capacity can be gained.



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0 32,000

SCALE IN FEET

Legend

Existing Landfills

Study Area

Southern Dallas County Infrastructure Analysis

Existing Landfill Locations

Figure 7 - 12

Amendments to permits allow for lower cost capacity as there is typically not a need for a large purchase of land.

There are some significant policy changes that are taking place within the region related to the flow of waste that will have an impact on the amounts of waste accepted at these facilities and their corresponding long-term capacity. The major policy change is that the City of Dallas has recently adopted a policy that will require all solid waste collection firms collecting waste within the city boundaries be taken to the McCommas Landfill. Currently, waste haulers have the ability to collect waste and take the material to either the McCommas Landfill or a privately operated landfill. It is uncertain how this policy change will affect the waste flows in the region and the amount of capacity at private facilities. Private haulers have sued the City of Dallas over this policy and the courts are now considering the case. Irrespective of how the final court case is decided, the landfill capacity for the region is sufficient to meet the region's long-term needs.

Landfill permits can be modified or permitted to increase or decrease the capacity of the facility.

Table 7-11. Facilities located in Dallas County within 25 miles of the SDCIA Study Area

Landfill	County	2010 Tons Accepted	Remaining tons of Capacity	Remaining Years
City of Dallas	Dallas	1,362,266	69,018,740	51
Skyline Landfill (Waste Management)	Dallas/Ellis	1,009,405	25,745,000	26
ECD Landfill	Ellis	56,914	29,448,588	517
Total		**2,428,585**	**124,212,328**	51

MUNICIPAL SOLID WASTE DEMAND AND FORECAST

On average, the waste generation rate for the state is equal to approximately 6.2 pounds per capita per day (Source: Municipal Solid Waste in Texas: A Year in Review – October 2011). This rate of generation has decreased over the past three years. In 2007, the generation rate was 7.5 pounds per capita per day. Factors that are responsible for the decrease in waste generation include an increase in recycling and source reduction programs and the economic downturn experienced in recent years. This figure includes waste generation from the residential, commercial and industrial sectors. As with other utilities, there is considerable variance due to the types of specific businesses and the amount of waste generated.

Historically, the waste generation rate in Texas has remained relatively constant over the past 10 years. The TCEQ publishes an annual update on solid waste generation and needs for the state. This report is based on data provided by landfill operators.

Table 7-12 presents the estimated amount of waste projected to be generated in the next 35 years. This table also includes cumulative generation. The generation rates were determined by applying the 6.2 pounds per capita to the population increases for the SDCIA Study Area. It is possible that through recycling and source reduction efforts, this 6.2 pounds per capita rate could be decreased over time, however, with increased economic activity, it is also possible that the generation rate could increase in the mid to long-term. Cumulative waste generation estimates are presented in **Table 7-13**. Landfill capacities are measured in total cubic yards of available space. Industry standards assume one ton of waste will consume between 2 and 1.5 cubic yards of landfill space. Variances are due to landfill operation types.

Table 7-12. Estimated Waste Generation Next 35 Years

Annual Waste Generation (tons)			
2012	88,431	88,431	88,431
2015	93,477	97,994	100,862
2020	102,497	113,931	121,580
2025	114,133	129,869	142,297
2030	125,770	145,806	163,015
2035	137,406	161,764	183,733

Table 7-13. Cumulative Waste Generation Estimates

Cumulative Waste Generation (tons)			
2012	88,431	88,431	88,431
2015	363,754	372,631	378,223
2020	857,865	909,451	943,139
2025	1,404,758	1,526,085	1,611,887
2030	2,009,882	2,222,504	2,384,401
2035	2,628,688	2,938,128	3,182,552

MUNICIPAL SOLID WASTE FACILITY NEEDS

Landfill Needs

There is sufficient capacity in the region for municipal solid waste disposal. There is the potential a landfill in the region could close operations during the next 30 years, but even under this scenario, there is sufficient capacity to meet future needs. It should be noted that there are a number of other landfills located throughout the NCTCOG region that could also serve the SDCIA Study Area if these landfills closed.

COSTS

The costs associated with constructing additional infrastructure for landfill disposal is included in the tipping fees that are charged by landfill operators. Future landfill cell development costs include liner construction, the cost of managing gas and leachate produced at landfills and final cover / closure costs, as well as long-term post-closure care.

Because the study area is located in an area where there is a significant amount of capacity, tipping fees are relatively low in comparison to other parts of the state and the country. Rates for this market for disposal of municipal solid waste are in the range of $20 to $25 per ton.

SUMMARY

Private sector utilities provide important services for that are critical to future developments in the region. Electricity, natural gas, telecommunications and municipal solid waste services all vital to serving an increased population and business development. These utility providers are supportive of expanded business development in the region as growth contributes to greater sales of their services. Each of the utility providers have staff that can assist local planners in demonstrating that utility services can be provided. However, it is important to note that early planning for specific projects should include utility representatives so that specific new system improvements that may be required are adequately planned and financed so they are ready when needed. There must also be a strong commitment on the part of a project developer to move forward as it is often necessary to demonstrate to utility regulators that the investment is economically justifiable.

Some of the key findings of this section include the following:

- Electricity, natural gas, telecommunication and municipal solid waste services are available throughout the region. However in areas with smaller populations, the level of telecommunication services are not at the level of quality that they are in more densely populated areas.
- The availability of electricity and natural gas are shaped by franchise agreements and state regulations. Oncor is the provider of electricity to the region and Atmos provides natural gas. There are instances such as home heating and certain industrial processes where these two services are in competition with each other and this competition can have an impact on pricing.
- Demand for electricity state-wide in Texas continues to grow and the need for future generation is continuously being examined by ERCOT. State-wide demand for electricity will have a greater influence on the decision to build large-scale generation facilities than increases locally. Local demand will influence Oncor's decisions regarding the construction and operation of new substations; to the extent practical, these substations should be constructed along the existing high voltage transmission line corridors that are located in the region. It is also important to initiate early planning for major facilities with Oncor so that infrastructure can be put in place when it is needed. New facilities such as substations are going to be determined by the location of new demand and whether other existing facilities located outside the region can possibly serve this demand.
- Current and projected natural gas service can be met with the current infrastructure. Should there be an industry locate in the region that will have significant natural gas demand, there are major natural gas transmission lines that intersect the region that can be tapped to meet this demand. Again, if a major development has significant natural gas demand, it is important to initiate discussions with natural gas suppliers to make sure that required infrastructure can be built when it is needed.
- Telecommunication services including wireless phone, internet services, wifi are available in the region, but according to a state-wide survey, areas with low-density populations have much less access to quality service than areas with high-density populations. This is a supply and demand situation that can be resolved as the number of households and businesses in the area increases.

- Municipal solid waste is the one service that has a significant public sector involvement. The City of Dallas owns and operates the McCommas Bluff Landfill located in southern Dallas. A newly enacted ordinance by the City requires waste generated in the City boundaries must be delivered to a City solid waste facility such as the McCommas Bluff Landfill. There are private sector landfill owners in the region that provide service to cities outside the City of Dallas. With the combined capacities of both public and private facilities, there is long-term available disposal capacity in the region well into the future.

Private Utility Resources:

Electricity

- Texas Public Utility Commission (PUC)
- Energy Reliability Council of Texas (ERCOT)
- US Energy Information Agency
- Oncor
- Edison Electric Institute
- Electric Power Research Institute (EPRI

Natural Gas

- Texas Railroad Commission (TRC)
- Federal Regulatory Commission (FERC)
- American Gas Institute
- US Energy Information Agency
- Atmos Energy
- Other gas industry sources

Telecommunications

- Texas Public Utilities Commission (PUC)
- Federal Regulatory Commission (FERC)
- Other telecommunication industry sources

Municipal Solid Waste

- Texas Commission on Environmental Quality (TCEQ)
- Waste Management Inc.
- City of Dallas
- Solid Waste Association of North America (SWANA)

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Southern Dallas County Infrastructure Analysis

Section 8: Conclusions and Recommendations

This section provides a summary of the conclusions reached in the SDCIA study and highlights the infrastructure recommendations for the Southern Dallas County area.

HISTORICAL DOCUMENT REVIEW

The initial phase of the project was a comprehensive review of the existing infrastructure plans and studies in the SDCIA project area. Existing plans and studies were provided by project partners and stakeholders. A majority of the existing plans and studies have direct applicability to the current and future infrastructure needs of the study area.

The purpose of the historical document review was to examine all available plans and studies for the study area to determine if current plans and studies provide a comprehensive vision for the study area as a whole and were sufficient to guide future development. After completion of the review, it was determined that the existing plans and studies were focused on specific areas and inadequate to guide future development for the study area as a whole through the planning period of 2010 through 2035 and beyond. The conclusion of the historical document review was to proceed with the detailed analysis of the SDCIA area, including a demographic and economic review as well as a needs assessments for potable water, wastewater, stormwater, transportation and private utilities.

INFRASTRUCTURE NEEDS ASSESSMENT

The second phase of the project was to perform a detailed infrastructure needs assessment for the SDCIA area. This effort included a review of the current SDCIA infrastructure as well as a determination of future needs in the area. Based on anticipated demographic growth and the resulting demand for public services, the future infrastructure improvements that will be needed in the SDCIA area were evaluated. The first step of the infrastructure assessment was a demographic and economic review of the SDCIA project study area. The focus of the review was to develop demographic, labor force, and housing forecasts that would be used to analyze the need for various transportation, potable water, sewer, stormwater, drainage, and private/franchise utility infrastructure through the planning horizon year 2035 used by NCTCOG for their demographic forecasts. The resulting forecasts were then used to assess the future infrastructure needs of the Southern Dallas County area.

WATER INFRASTRUCTURE ASSESSMENT

A capacity and needs assessment for potable water infrastructure in the SDCIA study area was completed based on updated demographic forecasts, previous infrastructure studies performed for the municipalities in the study area, and additional data collected during the course of this project.

Each municipality in the SDCIA study area will require additional water supply infrastructure to meet future demands. This study analyzed supplying Dallas Water Utilities (DWU) water to each municipality in the study area to meet long term water supply needs understanding that the appropriate agreements would need to be reached with the City of Ferris, which is not currently a DWU customer. Ferris, Hutchins and Wilmer will need additional water supply capacity to meet new demands within five years based on the assessment results. Therefore, increasing water supply capacity should be considered a priority for the wholesale water customer cities in the SDCIA Study Area.

Priorities for water distribution infrastructure should be considered on a city-by-city basis according to the particular needs of each system. This study included time-of-need estimates for recommended infrastructure based on straight-line demand projections between 2010 and 2035. It is recommended that water storage and pumping projects be given funding priority by each city since these components make up the foundation of a water distribution system. The need to install distribution pipe will follow as development occurs; the cost to install distribution pipes is often shared between municipalities and property owners/developers.

Two water transmission main alternatives have been developed to meet the projected 2060 maximum day demands of Hutchins, Wilmer, Lancaster and Ferris. Each alternative provides the cities with at least two separate points of connection for redundancy; the transmission main assumes Lancaster receives an additional point of connection in the southeast part of its City to augment its two existing connections. Alignment Alternative #2, along the city limit lines, is recommended over Alignment #1, adjacent to the railroad right-of-way. Alignment #2 has more potential to be phased, meaning the initial capital cost to provide the water supply line will be lower. The total project cost is higher relative to Alignment #1, but a significant portion of the total project cost can be deferred to Phase 2. Further, the future booster pump station required with Alignment #2 could be incorporated into an existing or currently proposed DWU pump station, potentially reducing the alternative's Phase 2 cost.

Each city in the SDCIA study area has independently assessed their water distribution systems, and many of the cities have capital improvements plans that identify new infrastructure needed to meet future water demands. These plans were evaluated against state of Texas minimum water system requirements, an assumed emergency demand, and the number of days of average demand stored. Recommendations for new infrastructure were developed for the cities that did not have plans, or where deficient infrastructure capacity was identified. **Table 8-1** summarizes the total estimated cost for water infrastructure needed to meet the anticipated future demand. Detailed engineering studies are recommended for all proposed water infrastructure improvements in each city to verify capacity and locations prior to design and construction.

Table 8-1. Summary of SDCIA Recommended Water Infrastructure

Municipality	Improvement	Total Cost
Dallas	New transmission main, pump station and storage	$129,400,000*
Ferris	Additional pumping and storage facilities	$36,500,000
Hutchins	Additional pumping and storage facilities	$28,600,000
Lancaster	Additional pumping and storage facilities	$62,100,000
Wilmer	Additional pumping and storage facilities	$21,100,000

*Funds for all Dallas water infrastructure improvements have been planned and programmed, excluding the Wintergreen pump station which is planned with a cost estimate of approximately $44M, but will not be programmed until closer to the project date

WASTEWATER INFRASTRUCTURE ASSESSMENT

Wastewater infrastructure capacity and needs were assessed for the SDCIA study area based on the updated demographic forecasts, previous infrastructure studies performed for the municipalities in the study area, and additional data collected during the course of this project.

Each utility in the SDCIA study area has assessed its wastewater collection system, and many of the utilities have capital improvement plans that identify new infrastructure needed to meet anticipated future wastewater flows. These plans were evaluated against existing and projected flows. Where the planned capacity was found to exceed the calculated 2035 peak flows, the recommendations in this report reflect the planned capacity. This report provides additional recommendations for infrastructure upgrades where the infrastructure was estimated to be insufficient for the projected 2035 flows. Each utility in the SDCIA study area will require additional wastewater infrastructure to meet future flow rates. **Table 8-2** summarizes the recommended and/or planned infrastructure needed to meet future flows. Trinity River Authority infrastructure is included in the analysis because Lancaster and Ferris are wholesale customers to TRA for wastewater collection, treatment and disposal.

Table 8-2. Summary of SDCIA Recommended Wastewater Infrastructure

Municipality	Improvement	Total Cost
Dallas	Interceptor	$3,400,000*
Ferris	Interceptor	$2,920,000
Hutchins	Lift Station Upgrade, Force Main	$3,520,000
Lancaster	5 Interceptors	$25,400,000
TRA	9 Interceptors, Lift Station Upgrade, Force Main	$88,400,000
Wilmer	Lift Station Upgrades	$940,000

*Funds for all Dallas wastewater infrastructure improvements have been planned and programmed

STORMWATER INFRASTRUCTURE ASSESSMENT

Stormwater and drainage infrastructure capacity and needs were assessed for the SDCIA area based on the following:

- Current floodplain/stormwater/drainage ordinances and drainage manuals
- Current Federal Emergency Management Agency (FEMA) maps and Flood Insurance Study stream profiles
- Previous planning studies developed for the cities in the project area
- Information obtained previously for the demographic alternative analysis

All members of the SDCIA area have adopted the minimum required floodplain regulations in order to be a part of the Nation Flood Insurance Program. Dallas and Lancaster have taken their floodplain ordinance and stormwater ordinances a step further than the minimum and require more stringent conditions for developments in order to limit impacts to adjacent properties and communities. Based on the assessment, adopting similar floodplain regulations by the other members of the SDCIA area is recommended for consistency in all communities.

Existing information on storm sewers, detention/retention ponds, ditches, and curb and gutters is lacking except in the areas where new construction has occurred. Field surveys are highly recommended to document the locations and sizes of existing infrastructure and to assess its condition. This information is critical to the process of determining what new infrastructure is needed as future development occurs. The cost of such an investigation can range from $50,000 per community (for a limited investigation) to as much as $100,000 per square mile for a detailed investigation.

As for floodplain related information, a significant number of streams in the area have been studied and mapped. However, a review of the FEMA flood profiles and maps reveal that there are several instances where discrepancies exist. An update of the hydrology and hydraulics of the streams in the SDCIA area is recommended. Updating the models would allow for the correction of inaccuracies shown in the current Flood Insurance Study and FEMA floodplain maps, and allow the communities to better manage their floodplains as development occurs. The cost of such a study is estimated at $2,000,000 for all streams in the SDCIA area. Additionally, as the area develops, communities need to make sure that Letters of Map Revision (LOMR) are submitted to FEMA so that FEMA profiles and maps are updated.

Even before the area develops further, the communities in the SDCIA should consider reconstructing those bridges and culverts that are overtopped by the one percent annual chance of exceedance (100-year) floodplain for the safety of the public. Replacement of these structures should start with those listed as having a priority of “1”, and then followed by those having a priority of “2” and”3”, respectively, unless future development dictates differently. The total estimated cost of reconstructing all the structures inundated is $48,200,000. A summary of the preliminary cost estimates for replace those structures is shown by municipality in **Table 8-3**.

Table 8-3. Summary of SDCIA Recommended Stormwater Improvements

Municipality	Improvement	Total Cost
Dallas	Bridge and Culvert Replacements	$8,400,000
Hutchins	Bridge and Culvert Replacements	$6,860,000
Lancaster	Bridge Replacements	$24,322,000
Wilmer	Bridge Replacements	$8,008,000
Dallas County	Bridge Replacements	$574,000

A master drainage study for the entire SDCIA area should also be considered. This will allow for consistency across the entire SDCIA area. This effort will develop a floodplain management plan that includes a detailed evaluation of alternatives for channelization, structure improvements, detention, diversions, water quality issues, and nonstructural alternatives. The cost associated with such a study is approximately $1,800,000, which would be performed subsequent to the recommended hydrology and hydraulic model updates mentioned previously.

TRANSPORTATION INFRASTRUCTURE ASSESSMENT

This effort included an evaluation of the current and planned transportation infrastructure in the SDCIA area. To determine the available capacity on the ground today, the current roadway network in Southern Dallas County was reviewed. The future year transportation/thoroughfare plans of NCTCOG and the individual municipalities within the Southern Dallas County area were also reviewed to inventory the planned improvements (both funded and unfunded) that lie within the study area boundaries. Based on forecasted 2035 travel demand in the study area, the future infrastructure needed to ensure a smoothly-operating and efficient transportation network was assessed.

As the Southern Dallas County area continues to grow, the most pressing transportation infrastructure need will be additional roadway capacity to meet the growing demand from both passenger vehicles as well as truck freight movements across the SDCIA area. A summary of the proposed roadway capacity improvements is shown in **Table 8-4**. Among the key improvements that will be needed earlier in the development of Southern Dallas County is the widening of multiple east-west arterials to provide connectivity between the freight centers and IH 45. These include Wintergreen Road, Pleasant Run Road and Belt Line Road. Additionally, expansions of north-south arterials such as Bonnie View Road and Lancaster-Hutchins Road that provide connectivity to IH 20 will be needed. A new alignment connecting the IIPOD area to Lancaster Airport and the City of Ferris is also recommended to accommodate north-south traffic in the area. As demand for transportation infrastructure continues to grow and expand in the Southern Dallas County area, the implementation of these roadway recommendations can help ensure a smooth, efficient transportation network to service the community.

Table 8-4. Recommended Roadway Capacity Improvements

Municipality	Improvement	Cost (Low)	Cost (High)
Regional	Loop 9	$5,756,200,000	
Dallas	Arterial expansions	$23,500,00	$36,400,00
Hutchins	Arterial expansions	$37,400,000	$58,200,000
Lancaster	Arterial expansions, new alignment	$111,000,000	$172,300,000
Wilmer	Arterial expansions	$24,100,000	$37,400,000
Dallas County	Arterial expansions, new alignment	$62,300,000	$92,100,000

PRIVATE UTILITIES INFRASTRUCTURE ASSESSMENT

A capacity and needs assessment was completed for private sector utilities in the SDCIA area, including electricity, natural gas, telecommunication services and municipal solid waste disposal. Unlike the infrastructure components discussed in previous sections, these utility providers are primarily private business entities that provide service with the intent of generating profits for the company owners. Because private funds are required to finance improvements, there must be an economic justification for the project. Factors that will determine the feasibility of the project or utility enhancement include long-term demand and revenue generating potential, construction costs and operational costs. The development of utility projects is also driven by existing contracts or tariffs in place that require utilities such as natural gas and electricity to provide service to new residents and businesses as long as the customers follow the provisions of the filed tariff.

Private sector utilities provide important services for that are critical to future developments in the region. Electricity, natural gas, telecommunications and municipal solid waste services are all vital to serve an increasing population and additional business development. These utility providers are supportive of expanded business development in the region as growth contributes to greater sales of their services. Each of the utility providers has staff that can assist local planners in demonstrating that utility services can be provided. However, it is important to note that early planning for specific projects should include utility representatives so that specific new system improvements that may be required are adequately planned and financed so they are ready when needed. There must also be a strong commitment on the part of a project developer to move forward as it is often necessary to demonstrate to utility regulators that the investment is economically justifiable.

Some of the key findings of private utilities analysis are the following:

- Electricity, natural gas, telecommunication and municipal solid waste services are available throughout the region. However in areas with low population density, the level of telecommunication services is not at the same level of quality found in more densely populated areas.
- The availability of electricity and natural gas is shaped by franchise agreements and state regulations. Oncor is the provider of electricity to the region, and Atmos provides natural gas. There are instances such as home heating and certain industrial processes where these two services are in competition with each other and this competition can have an impact on pricing.
- Demand for electricity state-wide in Texas continues to grow and the need for future generation is continuously being examined by the Electric Reliability Council of Texas (ERCOT). It is important to initiate early planning for major facilities with Oncor so that infrastructure can be put in place when it is needed. New facilities such as substations are going to be determined by the location of new demand and whether other existing facilities located outside the region can possibly serve this demand.
- Current and projected natural gas service can be met with the current infrastructure.
- Telecommunication services including wireless phone, internet services, Wi-Fi are available in the region, but according to a state-wide survey, areas with low population-density have much less access to quality service than areas with high population-density. Expansion of telecommunication services will be driven by demand.

- Municipal solid waste is the one service that has significant public sector involvement. With the combined capacities of both public and private facilities, there is long-term available disposal capacity in the region well into the future.

KEY CONCLUSIONS AND RECOMMENDATIONS

Completion of the Southern Dallas County Infrastructure Analysis resulted in the following key conclusions and recommendations:

- **Water Infrastructure**
  - Increasing water supply capacity should be considered a key area priority
  - Priorities for water distribution infrastructure should be considered on a city-by-city basis
  - The Cities of Ferris, Hutchins, Lancaster and Wilmer will need additional pumping and storage infrastructure in order to meet future demands
- **Wastewater Infrastructure**
  - Each utility in the SDCIA study area will require additional wastewater infrastructure to meet future flow rates.
- **Stormwater Infrastructure**
  - An update of the hydrology and hydraulics of the streams in the SDCIA area is recommended
  - As the area develops, communities need to make sure that Letters of Map Revision (LOMR) are submitted to FEMA so that FEMA profiles and maps are updated
  - Communities in the SDCIA should consider reconstructing those bridges and culverts that are overtopped by the one percent annual chance of exceedance (100-year) floodplain for the safety of the public
  - A master drainage study for the entire SDCIA area should be considered
- **Transportation Infrastructure**
  - The most pressing transportation infrastructure need will be additional roadway capacity to meet the growing demand from both passenger vehicles as well as truck freight movements across the SDCIA area
  - Widenings of several arterials needed to provide improved access to IH 20 and IH 45
  - A new alignment connecting the IIPOD area to Lancaster Airport and the City of Ferris will also be needed
- **Private Utilities Infrastructure**
  - Utility providers are primarily private business entities that provide service with the intent of generating profits for the company owners
  - Factors that will determine the feasibility of the project or utility enhancement include long-term demand and revenue generating potential, construction costs and operational costs
  - Early planning for specific projects should include utility representatives so that specific new system improvements that may be required are adequately planned and financed so they are ready when needed

Table 8-5 summarizes the overall recommended improvements by municipality.

Table 8-5. Summary of SDCIA Recommended Infrastructure Improvements

Infrastructure Type	Improvement	Estimated Cost*			
		2012-2020	2020-2030	2030-2035	Total
City of Dallas					
Water**	New transmission main, pump station and storage	$85,400,000	$44,000,000	--	$129,400,000
Wastewater***	Interceptor	$3,400,000	--	--	$3,400,000
Stormwater	Bridge and Culvert Replacements	$8,400,000	--	--	$8,400,000
Transportation	Arterial expansions	$8,400,000	$21,500,000	--	$29,900,000
City of Ferris					
Water	Additional pumping and storage facilities	$26,100,000	$4,700,000	$5,700,000	$36,500,000
Wastewater	Interceptor	$2,900,000	--	--	$2,900,000
City of Hutchins					
Water	Additional pumping and storage facilities	$18,600,000	$10,000,000	--	$28,600,000
Wastewater	Lift Station Upgrade, Force Main	$3,500,000	--	--	$3,500,000
Stormwater	Bridge and Culvert Replacements	$6,900,000	--	--	$6,900,000
Transportation	Arterial expansions	$36,700,000	$11,100,000	--	$47,800,000
City of Lancaster					
Water	Additional pumping and storage facilities	$31,800,000	$21,800,000	$8,500,000	$62,100,000
Wastewater	5 Interceptors	$18,300,000	$7,100,000	--	$25,400,000
Stormwater	Bridge Replacements	$24,300,000	--	--	$24,300,000
Transportation	Arterial expansions, new alignment	$52,500,000	$89,200,000	--	$141,700,000
City of Wilmer					
Water	Additional pumping and storage facilities	$16,000,000	$5,100,000	--	$21,100,000
Wastewater	Lift Station Upgrades	$600,000	$300,000	--	$900,000
Stormwater	Bridge Replacements	$8,000,000	--	--	$8,000,000
Transportation	Arterial expansions	--	$30,800,000	--	$30,800,000
Dallas County					
Stormwater	Bridge Replacements	$600,000	--	--	$600,000
Transportation	Arterial expansions, new alignment	--	$52,300,000	$24,900,000	$77,200,000

*Cost estimates for transportation represent an average of the high and low estimates. All stormwater improvements were assumed to take place in the 2012-2020 timeframe.
**Funds for all Dallas water infrastructure improvements have been planned and programmed, excluding the Wintergreen pump station which is planned with a cost estimate of approximately $44M, but will not be programmed until closer to the project date
*** Funds for all Dallas wastewater infrastructure improvements have been planned and programmed

APPENDICES

Southern Dallas County Infrastructure Analysis

Appendix A: Historical Document Review

PROJECT PURPOSE

There has been significant development activity in the Southern Dallas County area during the past ten years. This includes the Union Pacific Intermodal Terminal, the Dallas Logistics Hub, and other industrial and light-industrial facilities. Several jurisdictions are affected by each of these developments. A critical planning element for high-quality growth is the provision of adequate and well-planned infrastructure. The purpose of this project is to confirm if there exists a cohesive and integrated plan for infrastructure development in Southern Dallas County, or if individual plan elements exist that when viewed collectively produce a comprehensive, unified assessment of needed infrastructure to support the anticipated future growth of this area through 2030.

The cities of Dallas, Ferris, Hutchins, Lancaster, and Wilmer, along with Dallas County and the North Central Texas Council of Governments (NCTCOG), have partnered to conduct this infrastructure analysis of Southern Dallas County. The goal of this analysis is to create a development framework and implementation recommendations which will produce a high-quality well-integrated Inland Port in Southern Dallas County that spurs additional high-quality and orderly commercial, industrial, and residential development. This infrastructure needs assessment of the study area (see **Figure A-1**) will facilitate regionally-coordinated infrastructure planning and sound development. The analysis will focus on infrastructure related to transportation, water supply, sanitary sewer, stormwater/drainage, and private/franchise utilities.

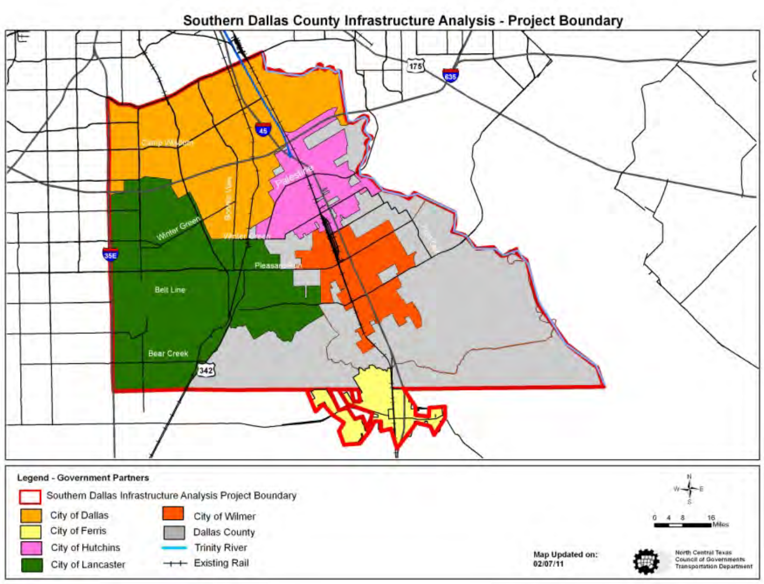


Figure A-1. SDCIA Project Area

This infrastructure analysis is intended to support all current and on-going efforts to promote development in the study area. The analysis includes a review of prior studies, but is not a rework of these prior studies. The Study's purpose is to be a step forward in the planning process to ensure that the infrastructure that is required to support development through 2030 has been identified and planned.

The project consists of two phases. Phase 1 is to review existing plans and studies for the study area to determine if these documents are sufficient to guide future development through 2030. This review includes:

1. The contents of pertinent existing plans and studies regarding their relationship and applicability to this study.
2. The assessment of whether or not existing plans and studies satisfactorily identify the infrastructure needs of the study area to support its future growth through 2030.

If Phase 1 determines that current plans and studies are not sufficient, Phase 2 (which will identify critical infrastructure needs to support development through 2030), will be initiated.

PROJECT BACKGROUND

The study area is located in southeastern Dallas County which includes portions of the City of Dallas, all of the cities of Ferris, Hutchins, Lancaster, and Wilmer, and portions of unincorporated Dallas County. This study area is located within the major impact area of the International Inland Port of Dallas (IIPOD). The IIPOD concept envisions international freight and intermodal logistics facilities which provide processing of containerized cargo from domestic and international suppliers; customs preclearance for goods bound for Mexico or Canada; a Foreign Trade Zone (which may receive special state and local tax treatment), and an airport which can handle smaller cargo (primarily consumer goods). An intermodal freight terminal is a facility specifically designed to efficiently transfer freight between modes (i.e., rail, truck, and air).

The IIPOD is a public-private partnership which is a key driver in making Dallas the nation's premier logistics and distribution center (see **Figure A-2**). It is the third phase of regional intermodal development. The DFW Airport and Alliance Texas are the previous two phases. Each of the phases are being developed independently and are at differing stages of maturity. Collectively, they will continue to grow and strengthen the DFW area as a significant force in the intermodal movement and distribution of freight.

Development and planned development within the study area during the past decade includes the 420-acre intermodal terminal for Union Pacific Railroad; the 6,000-acre Dallas Logistics Hub; the 900-acre Sunridge Business Park; the 350-acre Dalport Park; warehouse and distribution facilities for FedEx Ground, American Standard, Unilever, and Whirlpool (currently under construction); expansion of the Cedar Valley Community College; and a new 300-acre University of North Texas at Dallas campus.

Southern Dallas County includes tremendous transportation facilities to support national and international trade. The area is served by major interstate highways (IH 35E, IH 20, and IH 45), two Class 1 Railroads (Union Pacific and Burlington Northern Santa Fe) including UP's Dallas Intermodal Terminal, and the Lancaster Airport.

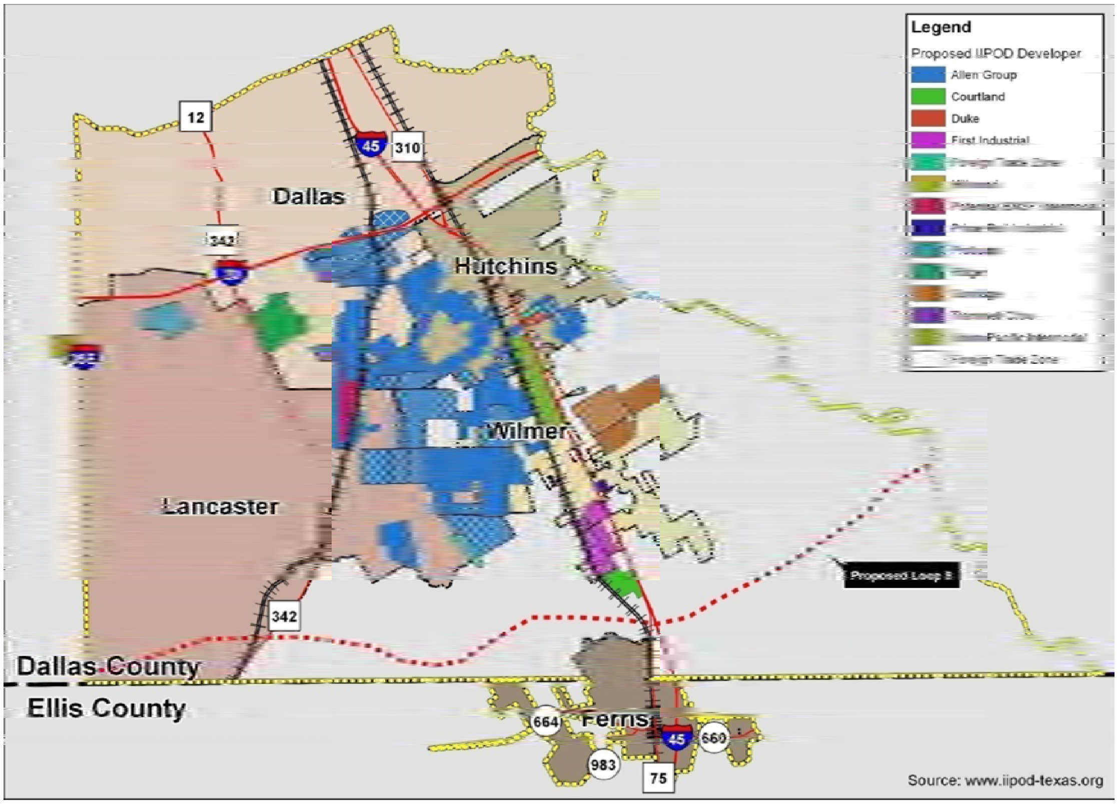


Figure A-2. IIPOD Development

The Urban Land Institute (ULI) conducted an Advisory Services Panel Study of Southern Dallas County in 2006. ULI's Advisory Services Program aims to bring national expertise in the real estate field to bear on complex land use planning and development projects, programs, and policies. The purpose of the Advisory Services Panel Study was to "clarify and explore the City of Dallas' options as it moves forward with participating municipalities in developing an 'inland port' to exploit the influx of trade" in the trade corridors that pass through the Dallas/Fort Worth Metroplex. Among the findings of that study was the following:

> "Although industrial development already is occurring in southern Dallas County, extensive future development will be constrained by the lack of adequate public infrastructure, including water, roads, sewers, and fire and police services. Realizing the area's ultimate development potential, therefore, will require a comprehensive and collaborative approach to prepare for development."

While development of the inland port and related facilities is anticipated to assist in bringing economic stability to the study area, regional cooperation amongst the various jurisdictions in the provision of infrastructure and preservation of existing resources is essential to assure high-quality and sustainable development and a high quality of life within the study area.

HISTORICAL DOCUMENT REVIEW

Existing plans and studies were provided by project partners and by stakeholders. Each document reviewed is listed in Appendix A along with the entity for which it was prepared, when it was prepared, the geographic limits of the study, a brief description of its contents, and the study's "planning period". A majority of the existing plans and studies have direct applicability to the current and future infrastructure needs of the study area.

Since each existing plan and study is an independent document, they have varied geographic limits and planning periods. A listing of each document reviewed, by source, its effective date, and its horizon planning year is listed in **Table A-1** below. Each Document Title that is followed by an asterisk (*) indicates that the study was identified and provided for review as a part of the stakeholder interview process during Phase 1 of this project. Each Document Title that is followed by an arrow (^) indicates that the study is directly applicable to infrastructure planning for the study area. Please refer to Appendix A for additional information.

Table A-1. Documents Reviewed

Agency	Document Title	Date Completed or Adopted	Planning Horizon Year
City of Dallas	Chapter 51A: Article XIII: Form Districts ^	Feb-09	Not Defined
City of Dallas	Trinity River Corridor Comprehensive Land Use Plan ^	Dec-09	2050
City of Dallas	Southern Dallas County Texas: A Strategy for Developing the Southern Dallas Logistics Hub ^	Jun-06	Not Defined
City of Dallas	Draft Dallas Intermodal Terminal Emissions Inventory ^	Dec-07	Not Defined
City of Dallas	Environmental Working Group Presentation ^	Jan-08	Not Defined
City of Dallas	Environmental Working Group Draft of Final Document ^	Jun-06	Not Defined
City of Dallas	The UNT - Dallas Area Plan Implementation Program ^	Dec-09	Not Defined
City of Ferris	City of Ferris Planning Study: Volume 1 ^	Dec-07	2027
City of Ferris	City of Ferris Planning Study: Volume 2 (Zoning Ordinance) ^	Dec-07	2027
City of Hutchins	Water, Wastewater, & Road Impact Fee Update ^	Apr-10	Build-out
City of Hutchins	TWPD CWSRF-09 Application: City of Hutchins Wastewater System Improvements: Preliminary Engineering Report * ^	Oct-08	Not Defined
City of Lancaster	Design Standards for the Lancaster Campus District ^	May-06	Not Defined
City of Lancaster	Phase One - Due Diligence (for Downtown Development Plan) ^	2006	2022
City of Lancaster	The Lancaster Medical District Master Plan ^	2006	2056
City of Lancaster	Master Thoroughfare Plan* ^	Apr-06	2025
City of Lancaster	Water Master Plan* ^	Nov-07	Build-out
City of Lancaster	Wastewater Master Plan* ^	Jul-06	Build-out
City of Lancaster	Lancaster Regional Airport Master Plan* ^	Feb-10	2030
City of Lancaster	Lancaster Airport Sector Plan ^	Mar-07	Not Defined
City of Wilmer	City of Wilmer, Texas Community Plan 2030^	Jun-09	2030

City of Wilmer	City of Wilmer Water and Wastewater Capital Improvement Plan* ^	2010	2030
Dallas Water Utilities	2005 Update to the City of Dallas Long Range Water Supply Plan ^	Dec-05	2030
Dallas Water Utilities	Dallas Water Capital Infrastructure Assessment and Hydraulic Modeling Report ^	Jul-07	Not Defined
Dallas Water Utilities	Comprehensive Wastewater Collection System Assessment ^	Oct-07	2050
Dallas County	Dallas County I-45 Waterline Project (Preliminary Draft)* ^	2008	Not Defined
DART	2030 Transit System Plan ^	Oct-06	2030
Greater Dallas Chamber of Commerce	A Re-evaluation of Greater Dallas Chamber's Industrial Recruitment Targets*	Oct-06	Not Defined
Greater Dallas Chamber of Commerce	Labor Market Assessment for Southern Dallas with Emphasis on Key Target Industries*	Sep-04	Not Defined
NCTCOG	Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area, 2009 Amendment ^	2009	2030
NCTCOG	Cotton Belt Conceptual Engineering and Funding Study*	Apr-10	2030
NCTCOG	Frisco Corridor Conceptual Engineering and Funding Study*	May-10	2030
NCTCOG	McKinney Corridor Conceptual Engineering and Funding Study*	Jul-10	2030
NCTCOG	2011-2014 Transportation Improvement Program* ^	2010	2030
NCTCOG	Rail Station Access Studies* ^	2002	Not Defined
North Texas Commission	Dallas-Fort Worth Metroplex: America's Global Logistics Center	Jan-07	Not Defined
North Texas Future Fund	Demographic Trends and Educational Attainment in DFW Metro Area*	Apr-04	Not Defined
Office of Economic Development, City of Dallas	IIPOD Competitive Assessment and Opportunities Study	Mar-09	Not Defined
Texas Water Development Board (Region C)	Final Report (Study Commission on Region C Water Supply) ^	2009	Not Defined
The Allen Group	Dallas Logistics Hub Development Submittal and Zoning Amend. for City of Dallas* ^	Jul-07	Not Defined
The Allen Group	Dallas Logistics Hub City of Hutchins Comp Plan, Rezoning, and Zoning Text Amend.* ^	Jul-07	Not Defined
The Allen Group	Dallas Logistics Hub Development Submittal Comp Plan and Planned Development Amenr54d. For City of Lancaster* ^	Jul-07 to Mar-08	Not Defined
The Allen Group	Dallas Logistics Hub Master Drainage Plan City of Wilmer* ^	Jul-07	Not Defined

The Allen Group	Draft Dallas Logistics Hub Southeast Dallas County Thirty Year Impact Analysis*	Dec-06	2035
UNT Board of Regents	The University of North Texas Dallas Campus Master Plan – 2005 ^	Apr-06	2030
UNT Center for Economic Development and Research	Targeting Business Opportunities in Southern Dallas*	Apr-06	Not Defined
Vision North Texas	North Texas 2050*	2010	2050

STAKEHOLDER INTERVIEW SUMMARY

Each of the Project Partner Agencies has assigned one representative to a Project Advisory Committee (PAC). One representative for the Major Landowners and one representative for the Developers in the study have been elected to serve on the PAC. These two representatives were elected by their peers in a process administered by NCTCOG prior to commencement of this project.

The PAC is assisting the Consultant Team in identifying stakeholders that could be potential sources of information regarding additional studies and documents (including those currently in process), and future infrastructure and/or development plans within the study area. An individual meeting was conducted with the following stakeholders:

A. **Project Partners**

- City of Dallas
- City of Ferris
- City of Hutchins
- City of Lancaster
- City of Wilmer
- Dallas County
- NCTCOG

The following stakeholders were sent e-mail correspondence requesting their response with information regarding the study area infrastructure needs. Several were also contacted by telephone or in person. A copy of the information provided as attachment to each e-mail is provided in Appendix A. These attachments include a copy of the project handout from the Open House/Listening Session, a stakeholder questionnaire, and a list of identified existing plans/studies.

B. **Additional Phase 1 Stakeholders (Major Landowners, Developers, Railroads, Transportation Agencies, Energy Utilities, Citizens and Neighborhood Group Representatives)**

- Hargrove Real Estate
- Trinity Industries
- B&M Sand & Gravel – Myre Construction Company
- Schlacter Realty
- Joe and Laura Nash
- Prime Rail

- The Allen Group
- Duke Realty
- First Industrial
- Hillwood Partners
- Prologis
- Ridge Properties Trust
- IDI
- Courtland Development
- Cushman & Wakefield of Texas
- Industrial Works Management
- Garner Commercial
- DC Logistics
- Shippers Warehouse
- Burlington Northern Santa Fe Railway (BNSF)
- Union Pacific Railroad (UP)
- Texas Department of Transportation (TxDOT)
- Dallas Area Rapid Transit (DART)
- North Texas Turnpike Authority (NTTA)
- Texas Utilities – Electricity Provider
- Oncor – Natural Gas Provider
- Citizens and study area residents
- Neighborhood Group Representatives

Additional plans and studies along with other information received from stakeholders (as indicated on pages 7 and 8 above) were reviewed and have been incorporated into Phase 1 efforts. This data will also be maintained for possible use during Phase 2, if it is conducted.

The following stakeholders have been identified as entities that could provide valuable information during Phase 2 of the analysis (if it is initiated). These stakeholders are each making their own growth decisions based upon anticipated development within the study area. Sharing and comparing growth assumptions being used by each of these entities will be beneficial in the creation and analysis of various planning scenarios to be developed during Phase 2 for the study area through 2030.

C. Additional Phase 2 Stakeholders (Education and Utilities)

- Cedar Valley Community College
- University of North Texas at Dallas
- Dallas Independent School District
- Lancaster Independent School District
- Time Warner – Telecommunications Provider
- Verizon – Telecommunications Provider
- Rockett Special Utility District – Water Provider
- Trinity River Authority – Wastewater Services Provider
- Waste Management – Landfill Provider

The stakeholder interview process provided multiple benefits during Phase 1. This includes identification and receipt of additional studies, additional knowledge of community issues regarding regional infrastructure needs, and direct outreach to individuals and groups within the study area to discuss the infrastructure study needs and purpose. This process will be continued during Phase 2 through the demographics alternatives and economics task and the infrastructure capacity and needs assessment task to obtain similar desirable outcomes.

PUBLIC OUTREACH ACTIVITIES

PROJECT WEBSITE

Project information was made available to the public at the project website (www.nctcog.org/sdcia) on September 23, 2010. Current content includes a project description, a list of Project Advisory Committee members, project location map, project scope, tasks, schedule, a listing of public outreach events, and a list of documents being reviewed. The website also provides contact information and a link to allow individuals to request being added to the project mailing list.

OPEN HOUSE/LISTENING SESSION

An Open House/Listening Session was held on Thursday, October 21, 2010 at the University of North Texas at Dallas to introduce the project purpose, identify who is performing the study, and request relevant information from attendees. The format was Open House style, with exhibits illustrating the existing infrastructure in the following areas: City Limits and Transportation, Floodplains and Watersheds, Electric Distribution, Water Service, and IIPOD (International Inland Port of Dallas).

Fifty (50) individuals attended the Open House. Each attendee was provided a meeting handout and a comment form. PAC and project team members were stationed at the exhibits to answer questions and listen to citizen comments. A presentation was delivered that included a project overview, identified who is involved in conducting the project, and explained how the public can participate.

A copy of the presentation from the meeting, copies of the exhibits, a summary of the discussion questions and answers, and the written comments received are available on the project website at www.nctcog.org/sdcia.

PHASE 1 PUBLIC MEETING

A Public Meeting will be held on February 8, 2011 at the University of North Texas at Dallas to present the information presented in this Draft Historical Review Summary Report to the public. The format was Open House style, with exhibits illustrating the list of historical documents reviewed as well as Figures 6 (transportation), 8 (water), 9 (sanitary sewer), and 10 (storm water) below were displayed.

Fourteen (14) individuals attended the Phase 1 Public Meeting. Each attendee was provided a comment form. PAC and project team members were stationed at the exhibits to answer questions and listen to citizen comments. A presentation was delivered that included the project purpose, where we are, Phase 1 Summary Report overview, what Phase 2 will include and what it won't include, what's next, and how to be involved. No written comments were received from the public at the Phase 1 Public Meeting. A copy of the presentation from the meeting, copies of the exhibits, and a copy of the presentation are available on the project website.

The public outreach activities provided multiple benefits during Phase 1 similar to those derived from the stakeholder interview activities. The benefits included additional knowledge of community issues regarding regional infrastructure needs and the opportunity for interaction with individuals and groups within the study area to discuss the infrastructure study needs and purpose. This process will also be continued during Phase 2 through the demographics alternatives and economics task and the infrastructure capacity and needs assessment task to obtain similar desirable outcomes.

APPLICABILITY OF EXISTING DOCUMENTS

Upon review, the following documents in each infrastructure category were found to be applicable to the Phase 1 study needs:

TRANSPORTATION

Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area, 2009 Amendment provides an overview of future passenger rail system expansions which include the study area. Extensions of the DART Blue Light Rail Line (serving South Oak Cliff) would serve UNT-Dallas and IIPOD area (also referred to as Southport). See **Figure A-3**.

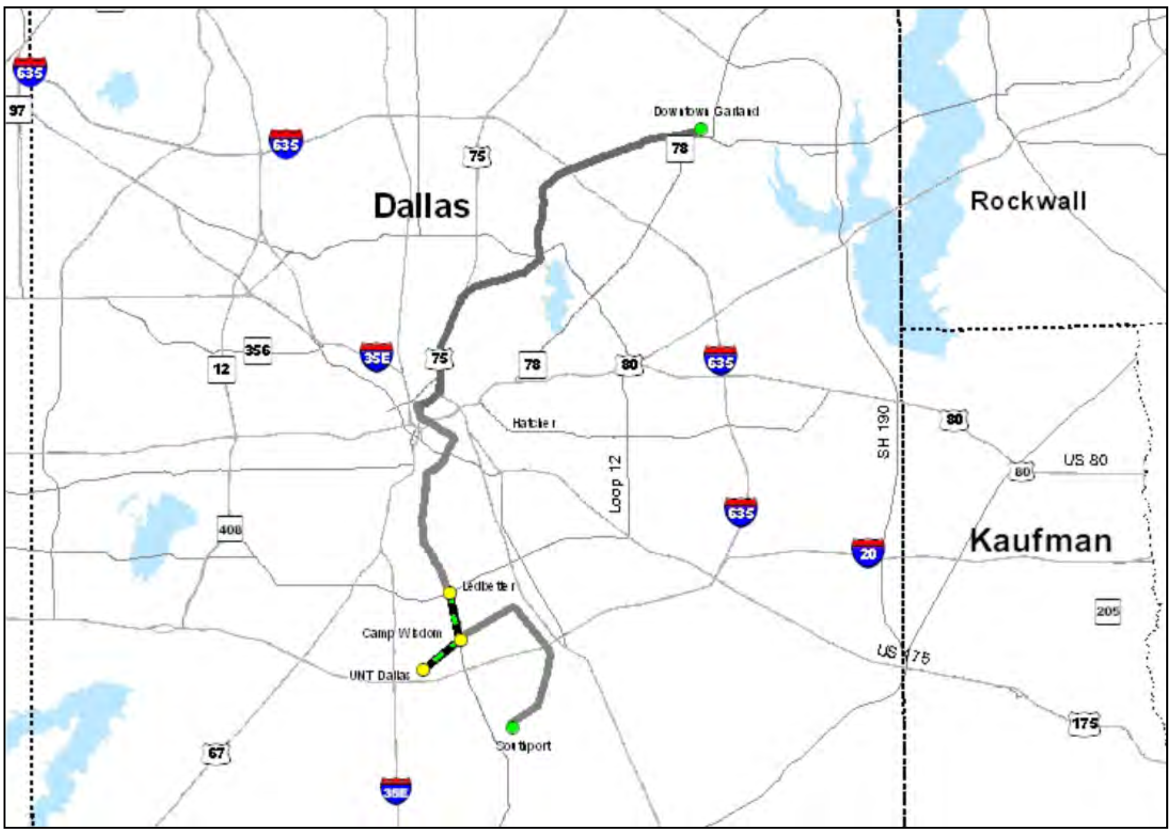


Figure A-3. Future Rail Expansions

A new regional passenger rail line is proposed within the planning horizon to provide service from Union Station in downtown Dallas to Waxahachie. This proposed line could provide stations at Loop 12/ Walton Walker and in downtown Lancaster within the study area. The agency which would construct and operate this potential future regional rail line is not defined at this time. See **Figure A-4**.

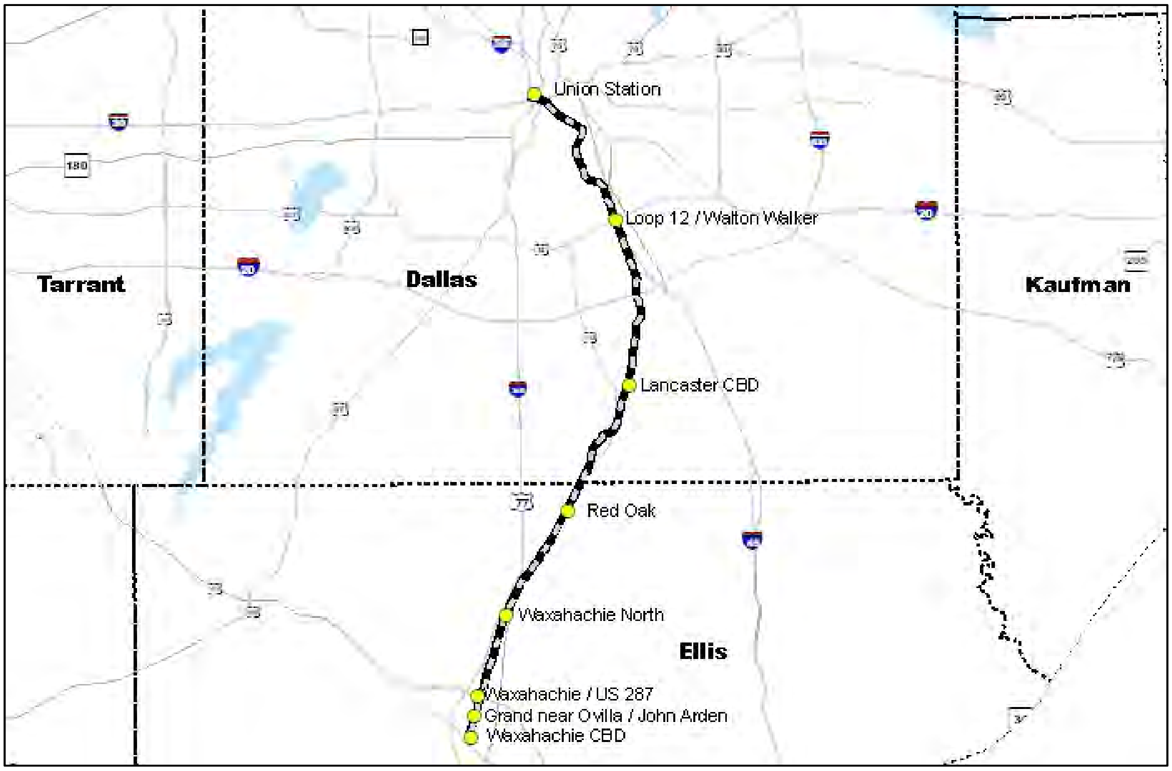


Figure A-4. Future Rail Service

Mobility 2030 also provides an overview of future roadway improvement needs within the study area. These include improvements to IH 35E, construction of the proposed regional outer loop (Loop 9 Southeast), a need for additional improvements to IH 20, and a need for additional improvements to IH 45 between IH 20 and Loop 12. A figure from Mobility 2030 is included as **Figure A-5**.

Mobility 2030 shows the need for only minor improvements to bicycle and pedestrian facilities. This includes proposed regional Veloweb routes in the vicinity of Loop 12 and from the southwest corner of the study area near the proposed Loop 9 up to Loop 12 roughly paralleling Dallas Avenue/Lancaster Avenue. Additionally, the plan recommends connections to the regional Veloweb to increase bicycle and pedestrian mobility as well as spot improvements to increase accessibility to major destinations.

Mobility 2030 provides information on interstate highways and state highways and for major and minor arterial surface streets that will be constructed and maintained by cities and/or counties if funding for these improvements has been identified. These facilities are absolutely critical to provide adequate mobility and access to serve the proposed logistics businesses, commercial entities, and residences within the study area. However, only regionally significant roadways are included in Mobility 2030 (2009 Amendment). Typically these types of arterial streets are included in thoroughfare or transportation plans for local governments and funded with local tax dollars by the city of county within which they are located.

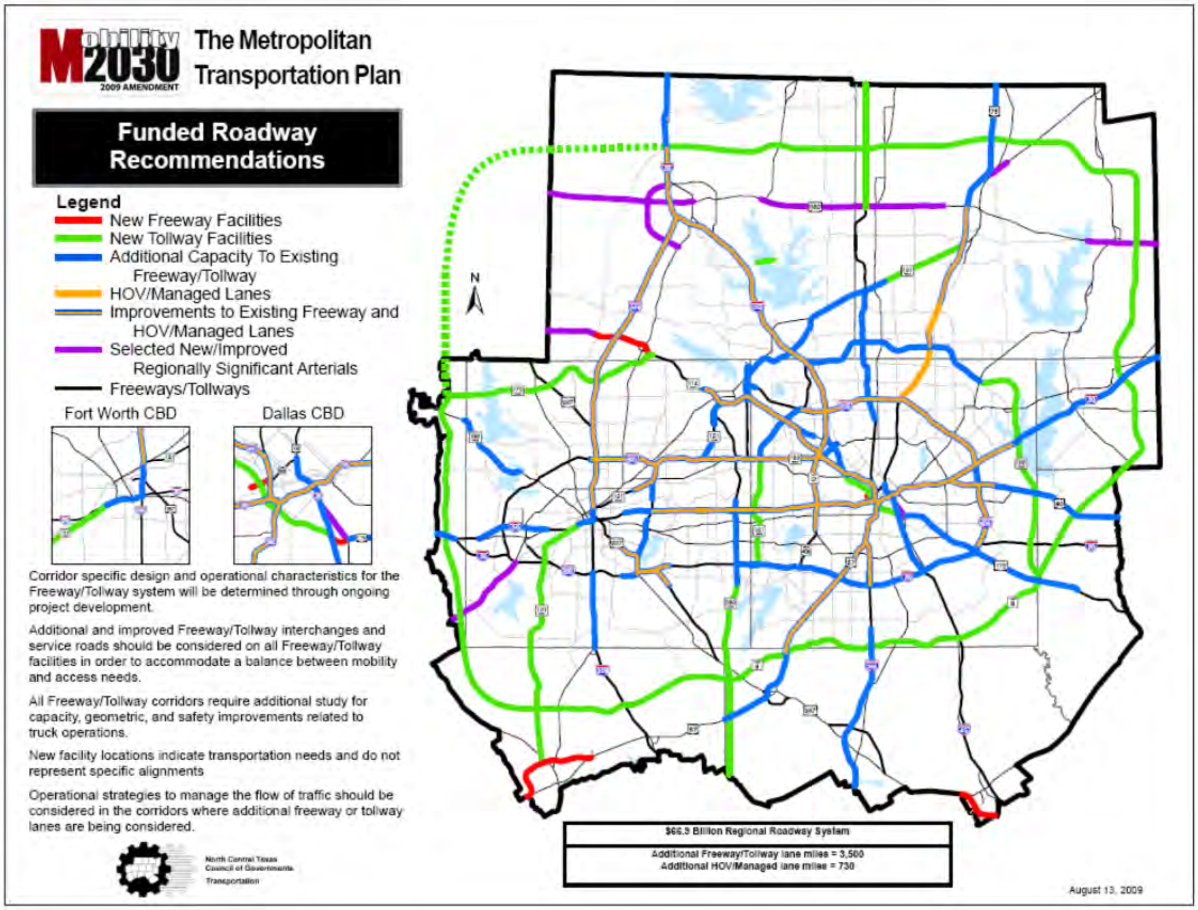


Figure A-5. Mobility 2030 Future Roadway Recommendations

The 2011 – 2014 Transportation Improvement Plan (TIP) identifies proposed surface transportation improvements for the Dallas-Fort Worth Metroplex that have funding identified during the stated time period (2011 – 2014). This includes projects like the grade separation of Pleasant Run Road over the Union Pacific rail line in Wilmer, intersection improvements at Houston School Road and Danieldale Road in Lancaster, and intersection improvements at IH 20 at Bonnie View. This document does not include projects that are needed in future years to meet future needs to accommodate growth for the study area through 2030.

Dallas-Fort Worth Metroplex: America's Global Logistics Center (The NTC Logistics Study) prepared for the North Texas Commission (NTC) shows approximate alignments of highways, planned highways, rail lines, light/commuter rail, planned light/commuter rail, truck/rail and truck aviation terminals, and airports. Pages 12 and 13 of the study diagrammatically depict existing and planned highways, existing rail lines, existing and planned light rail and commuter rail lines, intermodal terminals, and airports. However, they are not indicated with enough specificity to quantify infrastructure needs and costs to support the study area's future growth through 2030.

The DART 2030 Transit System Plan serves the area from approximately IH 20 to the north within the study area (within the city limits of Dallas), but does not serve the area between IH 20 and the Dallas/Ellis County line. Future bus service needs are not defined outside the DART service area and within the study area boundaries. The potential extensions of the Blue Light Rail Line to the UNT-Dallas campus and to Southport and the potential future passenger rail service from Waxahachie to downtown Dallas are also discussed in the DART 2030 Transit System Plan.

The planning documents for each municipality provide more detailed transportation improvements including major and minor arterial surface streets. These include:

- City of Dallas Office of Economic Development IIPOD Competitive Assessment and Opportunities Study,
- City of Dallas Study - Southern Dallas County Texas: A Strategy for Developing the Southern Dallas Logistics Hub,
- City of Ferris Planning Study,
- 2009 Hutchins Impact Fee Update,
- Lancaster Master Thoroughfare Plan,
- Wilmer Community Plan 2030

As an example, the City of Lancaster Master Thoroughfare Plan identifies needed roadway improvements for major arterials, minor arterials, rural arterials, and collector streets. However, it does not provide cost estimates for the recommended improvements. It also does not address bicycle, pedestrian or public transportation needs for the community. Some of the plans do incorporate proposed bicycle and pedestrian transportation improvements. These plans may provide adequate planning for improvements through 2030 for their community. However, they are not coordinated with adjacent communities; some do not include estimated costs or funding mechanisms; and collectively they do not cover the entire study area (See **Figure A-6**). An example of overlapping study areas is evidenced in **Figure A-6** which shows the planning area for the City of Ferris overlapping the planning areas for the City of Wilmer and the City of Lancaster. The proposed thoroughfare improvements through 2027 for the City of Ferris within their planning area differ from the proposed thoroughfare improvements for the City of Wilmer through 2030 in the overlapping area.

The plans prepared by The Allen Group for the Dallas Logistics Hub provide specific alignments in adequate detail to provide an integrated roadway network to accommodate anticipated traffic (reports include estimated vehicle per day on the roadway network) through build-out of their 6,000-acre facility. These plans include:

- Dallas Logistics Hub Development Submittal and Zoning Amendments for the City of Dallas,
- Dallas Logistics Hub Hutchins Comprehensive Plan, Rezoning, and Zoning Text Amendments,
- Dallas Logistics Hub Development Submittal, Comprehensive Plan, and Planned Development Amendments for the City of Lancaster.

However, these plans do not document whether any regional travel demand modeling was performed to meet regional transportation needs (beyond the Dallas Logistics Hub). They also do not provide an estimate of costs, do not prioritize the proposed improvements, and do not specify a planning horizon year. Future transportation improvements for portions of unincorporated Dallas County outside of the Dallas Logistics Hub and within the study area are not included within the plans prepared by The Allen Group (see **Figure A-6**).

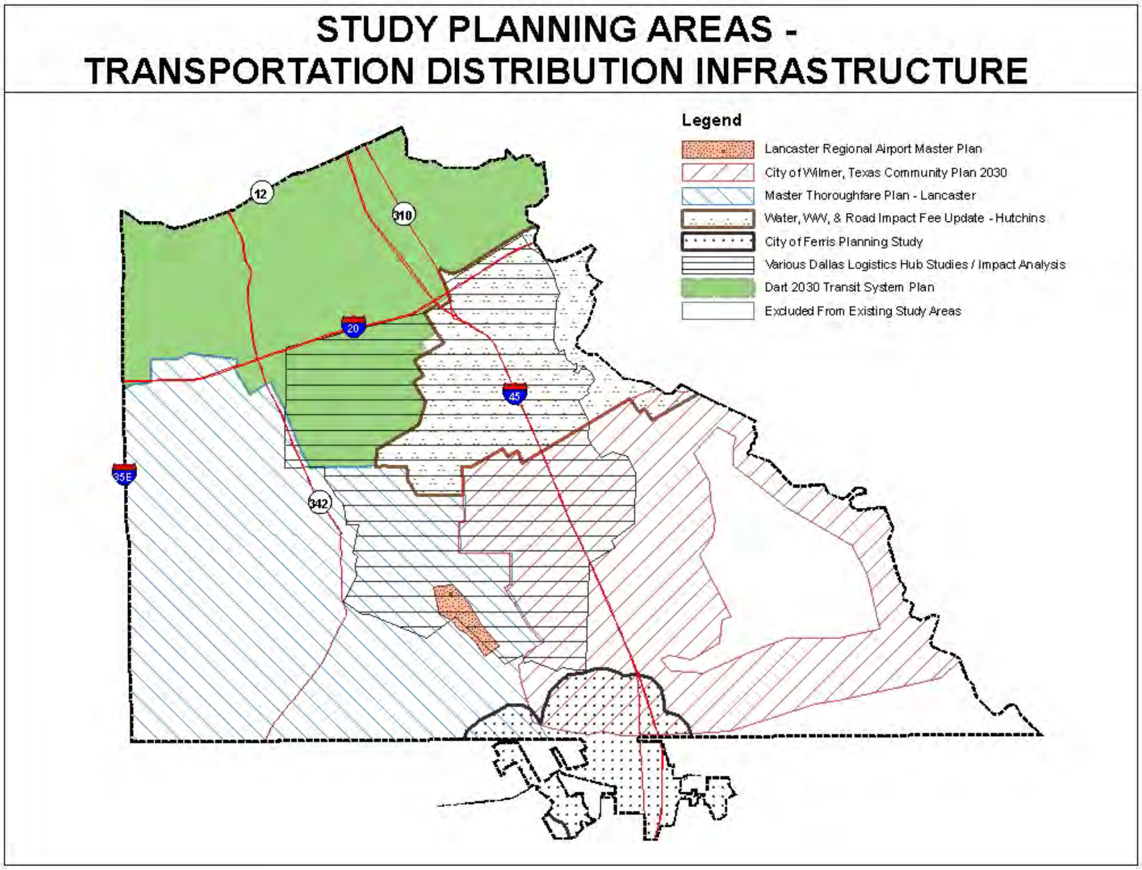


Figure A-6. Transportation Distribution Infrastructure

The Lancaster Regional Airport Master Plan is an update to the Lancaster Airport Sector Plan. The master plan provides adequate planning for growth to accommodate regional air service through 2030. It does not anticipate the development of a major air freight hub at this location due to those needs being met at other airports within the Dallas-Fort Worth Metroplex. It only addresses airport facility needs and does not look at surface transportation, water supply, sanitary sewer, or drainage needs for areas outside of the airport planning area.

Burlington Northern Santa Fe Railway and Union Pacific Railroad plans for system improvements through 2030 have not been provided. Continuing efforts to obtain any relevant information for the purposes of this study will be made during Phase 2 (if it proceeds). Main rail lines are indicated on **Figure A-7** (BNSF is the westerly line and UP is the easterly line).

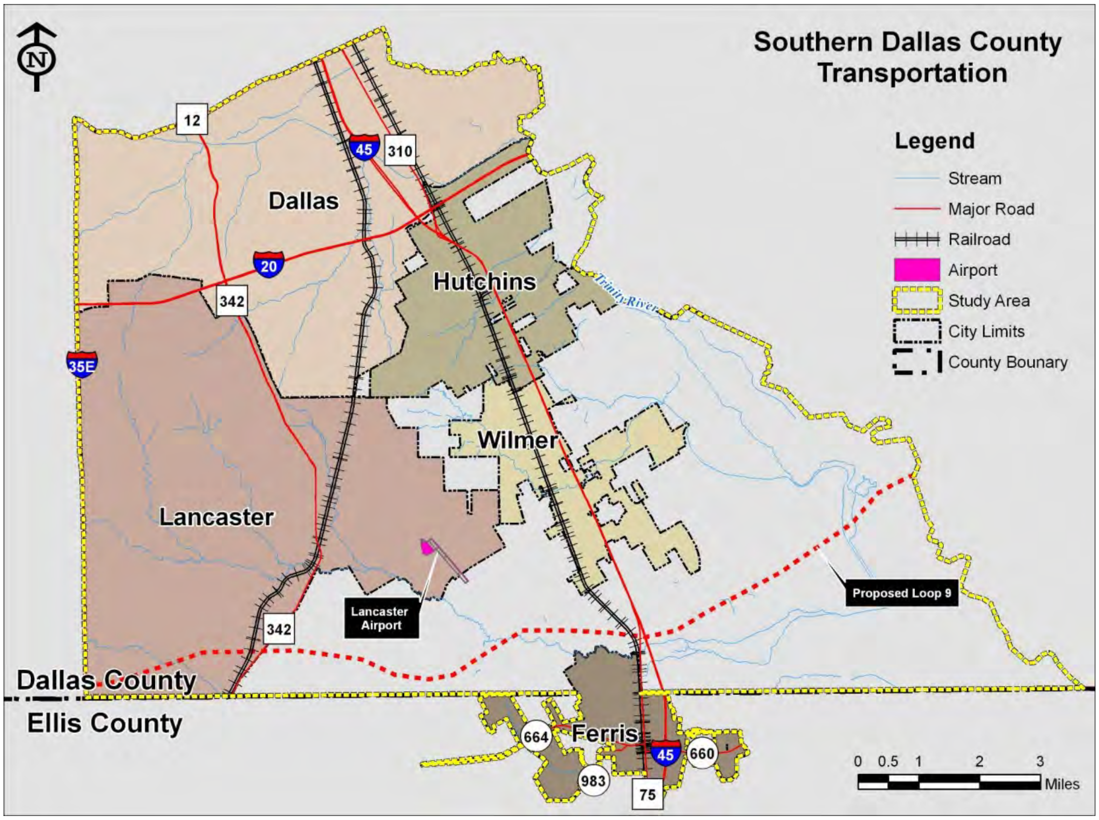


Figure A-7. Major Rail Lines in the SDCIA Area

WATER SUPPLY

The 2005 Update to the City of Dallas Long Range Water Supply Plan projects future water demand and evaluates the supply needs for the Dallas Water Utilities (DWU) service area. This service area consists of the City of Dallas and existing customer cities, including Hutchins, Lancaster, and Rockett Special Utility District (Rockett is an unincorporated area in Ellis County approximately five miles northeast of Waxahachie. The Rockett Special Utility District provides water service for the community of Rockett and surrounding areas in north-central Ellis County. It also provides water to a small portion of southern Dallas County within the study area). Wilmer, Ferris and all unincorporated land in the Southern Dallas County Infrastructure Analysis Project area are included in the study's projected future service area. The report primarily addresses future water supply sources. Water treatment facility needs are described in general terms, but the study does not address transmission and distribution needs to deliver water to the future homes and business throughout the area.

The 2007 Dallas Water Capital Infrastructure Assessment and Hydraulic Modeling Report also addresses future water needs for Dallas and its existing customer cities (including Lancaster and Hutchins). This report recommends water transmission and distribution pipelines within its study area, but does not include pipeline recommendations to supply water outside of its current service area.

The Final Report (Study Commission on Region C Water Supply) addresses long term water supply source issues and does not address transmission, storage, or distribution of water throughout Region

C (including the Southern Dallas County Infrastructure Analysis Project study area). Region C is one of the defined water planning areas created by the 80th Texas Legislative Session (2007) in Senate Bill 3. The Study Commission is responsible to investigate water supply sources and needs for Region C and reports to the Texas Water Development Board.

The planning documents for each municipality (including the developer prepared plans for the Dallas Logistics Hub) provide more detailed water supply improvement recommendations including storage and distribution. These include the following:

- City of Ferris Planning Study: Volume 1
- City of Hutchins Water, Wastewater, & Road Impact Fee Update
- City of Lancaster Water Master Plan
- City of Wilmer Water and Wastewater Capital Improvement Plan
- Dallas Logistics Hub Development Submittal and Zoning Amendments for the City of Dallas,
- Dallas Logistics Hub Hutchins Comprehensive Plan, Rezoning, and Zoning Text Amendments,
- Dallas Logistics Hub Development Submittal, Comprehensive Plan, and Planned Development Amendments for the City of Lancaster.

Each of these plans looks at the specific needs of their city or development and does not address potential efficiencies through coordination with adjacent cities or developments. These plans provide adequate planning for improvements through 2030 for Dallas, Lancaster, Wilmer, and Hutchins and 2027 for the City of Ferris, but collectively do not cover the entire study area (see **Figure A-8**). Studies for the cities' impacted by the proposed growth of the Dallas Logistics Hub do include this growth in their water demand estimates. Future water supply improvements for portions of unincorporated Dallas County within the study area are not included within the various plans. The City of Ferris Planning Study, Volume 1 includes cost estimates for proposed improvements through 2027. The City of Hutchins Water, Wastewater, & Road Impact Fee Update includes cost estimates for proposed improvements through 2019. The City of Wilmer Water and Wastewater Capital Improvement Plan includes cost estimates for proposed improvements through 2020. The other plans do not provide cost estimates or identify funding sources to implement the proposed improvements.

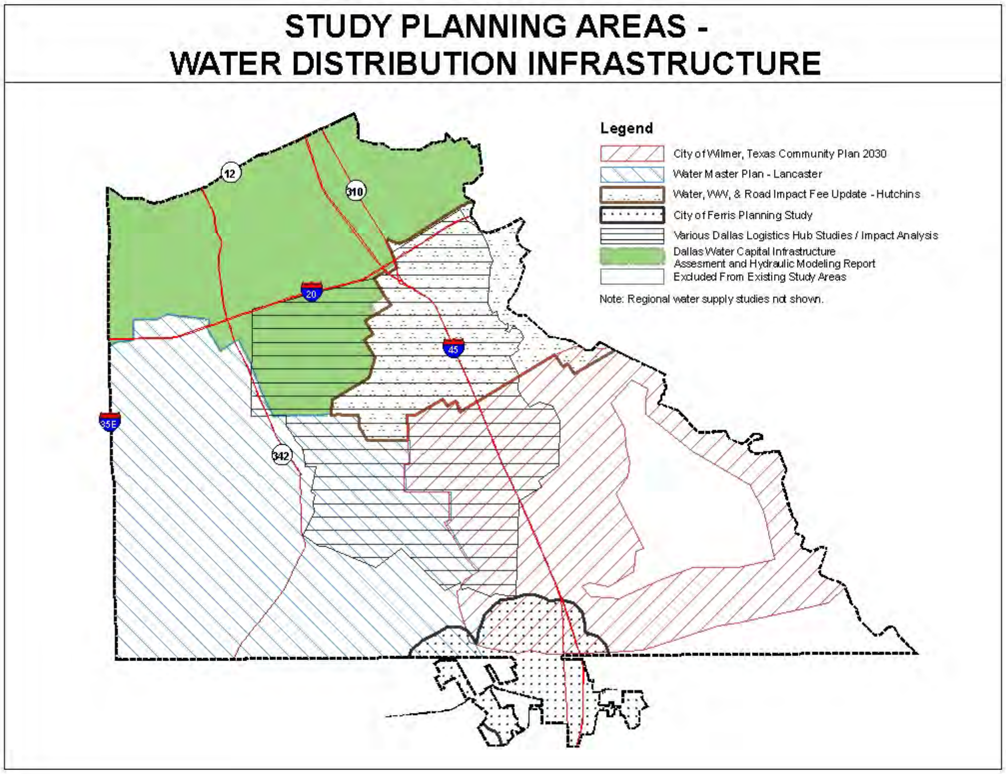


Figure A-8. Water Distribution Infrastructure

SANITARY SEWER

The DWU Comprehensive Waste Water Collection System Assessment updates the Dallas wastewater master plan through 2050 and addresses needs in the collection system associated with projected growth, regulatory compliance, infrastructure needs, and organizational challenges. This study addresses only the needs within the city limits of Dallas plus DWU's Southside Wastewater Treatment Plant which provides treatment to the cities of Hutchins and Wilmer as wholesale customers.

The planning documents for each municipality (including the developer-prepared plans for the Dallas Logistics Hub) provide more detailed water supply improvements including storage and distribution. These include the following:

- City of Ferris Planning Study: Volume 1
- City of Hutchins Water, Wastewater, & Road Impact Fee Update
- City of Lancaster Wastewater Master Plan
- City of Wilmer Community Plan 2030
- City of Wilmer Water and Wastewater Capital Improvement Plan
- Dallas Logistics Hub Development Submittal and Zoning Amendments for the City of Dallas,
- Dallas Logistics Hub Hutchins Comprehensive Plan, Rezoning, and Zoning Text Amendments,
- Dallas Logistics Hub Development Submittal, Comprehensive Plan, and Planned Development Amendments for the City of Lancaster.

Wastewater treatment for the cities in the Southern Dallas County Infrastructure Analysis Project area is provided by either Dallas Water Utilities or the Trinity River Authority (TRA). DWU and TRA have plans for expanding wastewater treatment plant capacity to meet the projected demand for 2030. The planning documents for the municipalities within the study area indicate no limitations to growth relative to wastewater treatment. Each of these plans looks at the specific needs of their city or development and does not address potential efficiencies through coordination with adjacent cities or developments. These plans provide adequate planning for improvements through 2030 for Dallas, Lancaster, Wilmer, and Hutchins and 2027 for the City of Ferris, but collectively do not cover the entire study area (see **Figure A-9**). The City of Ferris Planning Study, Volume 1 includes cost estimates for proposed improvements through 2027. The City of Hutchins Water, Wastewater, & Road Impact Fee Update includes cost estimates for proposed improvements through 2019. The City of Wilmer Water and Wastewater Capital Improvement Plan includes cost estimates for proposed improvements through 2020. The other plans do not provide cost estimates or identify funding sources to implement the proposed improvements. Future wastewater system improvements for portions of unincorporated Dallas County within the study area are not included within the various plans.

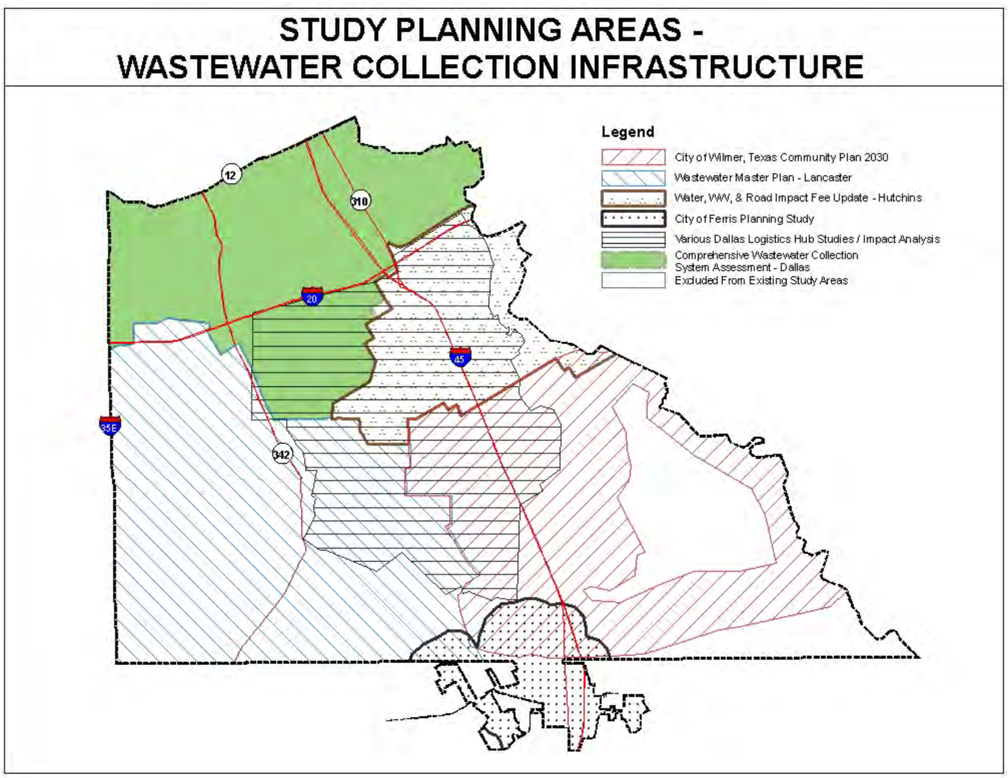


Figure A-9. Wastewater Collection Infrastructure

STORMWATER/DRAINAGE

The planning documents for each municipality provide little mention of stormwater issues. None of them go into detailed discussion of stormwater detention/retention, valley storage, or Best Management Practices. The following municipal plan includes a section on stormwater/drainage:

- City of Ferris Planning Study: Volume 1

Its section on storm drainage indicates that it is an evaluation, analysis, and planning report and that detailed design data has not been developed as a part of the report. It does not include recommended drainage improvements, their costs, or potential funding sources for any potential improvements. Since no specific improvements are proposed within the municipal plans that have been reviewed, they are not included within the shaded areas in **Figure A-10**.

The Allen Group prepared plans for the Dallas Logistics Hub provide more detailed improvements for stormwater/drainage improvements within the various cities in its project limits. These include the following:

- Dallas Logistics Hub Development Submittal and Zoning Amendments for the City of Dallas,
- Dallas Logistics Hub Hutchins Comprehensive Plan, Rezoning, and Zoning Text Amendments,
- Dallas Logistics Hub Development Submittal, Comprehensive Plan, and Planned Development Amendments for the City of Lancaster.

These plans provide planning for localized improvements (peak flow analysis, detention storage requirements, and proposed storm drainage systems) within the proposed development areas of the Dallas Logistics Hub, but do not cover the entire study area (see **Figure A-10**). These plans do not include areas within the cities of Dallas, Hutchins, Lancaster, and Wilmer that are outside the limits of the Dallas Logistics Hub. Cost estimates, prioritization of the proposed improvements and funding mechanisms are not identified. Also, future stormwater/drainage system improvements for major portions of unincorporated Dallas County within the study area are not included within the various plans.

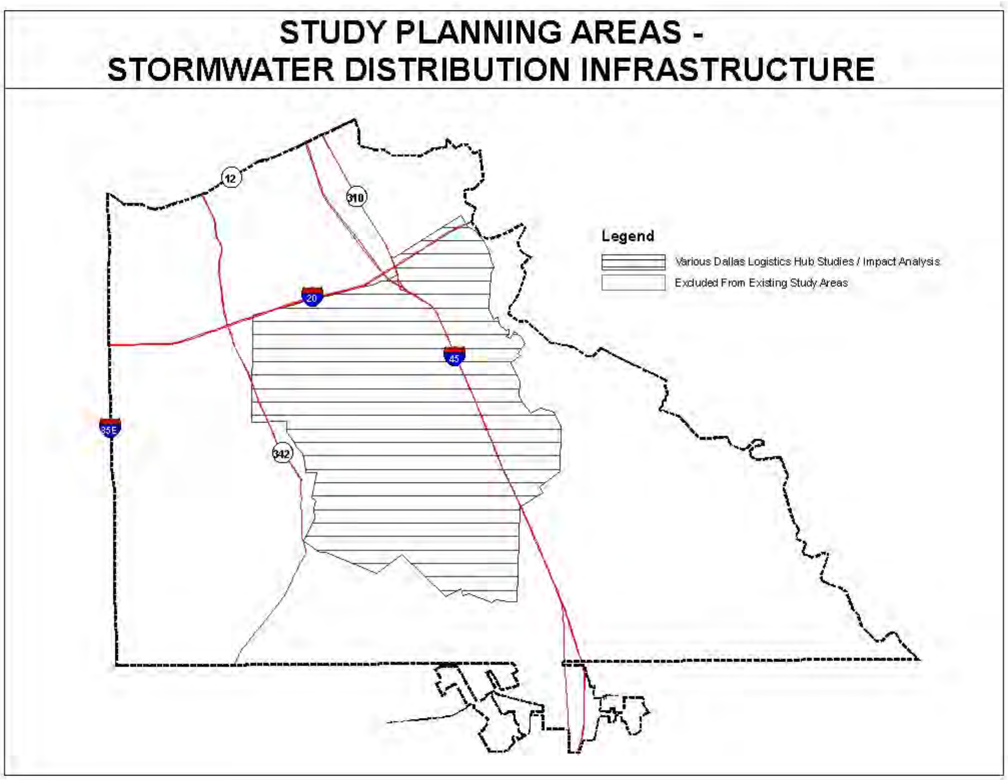


Figure A-10. Stormwater Distribution Infrastructure

PRIVATE/FRANCHISE UTILITIES

Due to the proprietary nature of private/franchise utility providers, no planning documents were obtained from Oncor (electricity provider), Atmos (natural gas provider), or Time Warner and Verizon (telecommunications providers). Information (for each of these utilities) which is available from public sources has been obtained (see **Figure A-11**). The natural gas lines indicated are from Texas Railroad Commission maps. The electric transmission lines are based upon the Oncor Transmission System Grid map. This only includes information on existing facilities and not information on additional improvements or facilities to be provided to serve the study area through 2030. Based upon initial discussions with Oncor and Atmos, each of these utilities will expand its network to serve prospective customers when new development is proposed. They do not plan for expansion of the distribution networks without a customer request to serve a new facility. The developer plans that have been reviewed for the Dallas Logistics Hub do not include planning for private/franchise utilities. Continuing efforts to obtain any relevant information for the purposes of this study will be made during Phase 2 (if it proceeds).

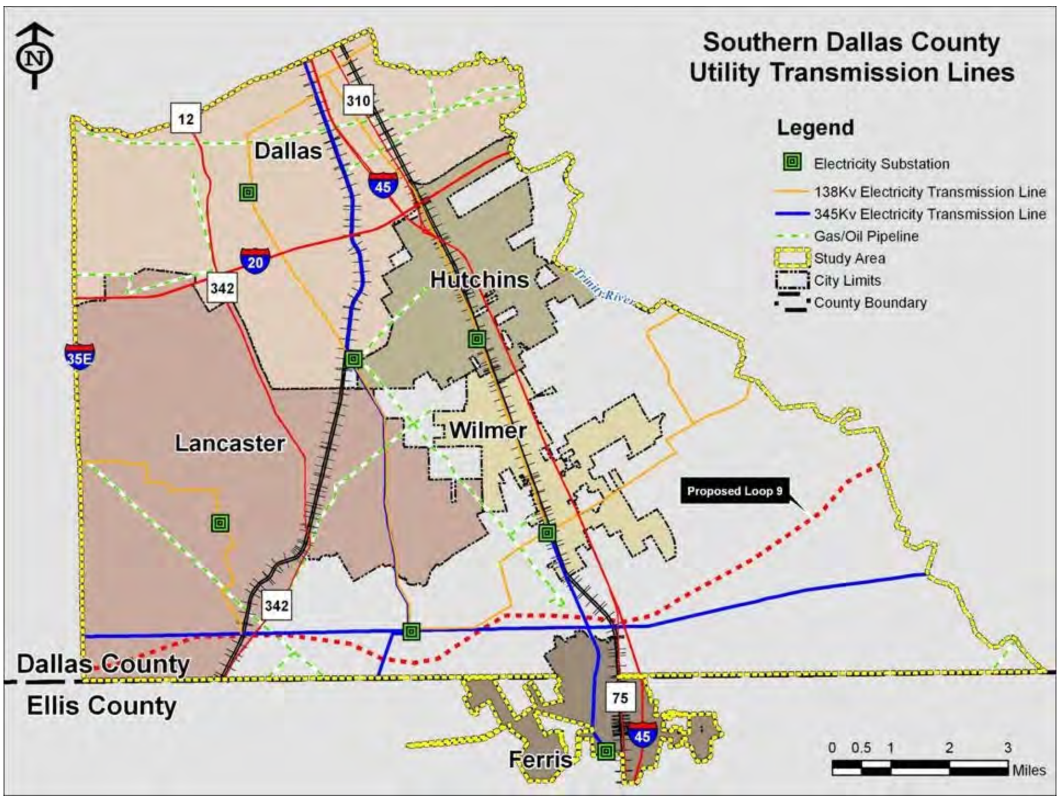


Figure A-11. Utility Transmission Lines

FINDINGS AND CONCLUSIONS

As stated in Section I (Project Purpose), the purpose of Phase 1 is to review available plans and studies for the study area to determine if current plans and studies are sufficient to guide future development. This analysis includes evaluating the following:

1. The contents of pertinent plans and studies regarding their relationship and applicability to this study.
2. The assessment of whether or not existing plans and studies satisfactorily identify the infrastructure needs of the study area to support its future growth through 2030.

The study team's review of existing documents indicates that there are several existing plans and studies that cover the entire Southern Dallas County Infrastructure Analysis project study area. These plans include Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area, 2009 Amendment, the 2005 Update to the City of Dallas Long Range Water Supply Plan, and the Final Report (Study Commission on Region C Water Supply). These documents address regional transportation and water supply needs which include the study area. Though regional in geographic coverage, they do not provide non-regionally significant roadway improvements necessary to meet access needs for the proposed density of light industrial, logistics, and other uses within the study area and the water plans do not provide adequate information on the water distribution system needs to serve the anticipated development through 2030. No wastewater collection, stormwater/drainage, or private/franchise utility plans have been reviewed which address the infrastructure needs to support the anticipated growth in the entire study area. There also are detailed plans for infrastructure for specific municipalities and/or proposed developments within the study area. In some cases these plans do provide adequate analysis and detail of needed improvements within the study area to support the anticipated growth through 2030. However, in aggregate these plans do not cover the entirety of the study area. Major portions are not addressed as indicated in Figures 6-11 above.

Collectively, this results in no comprehensive infrastructure framework to address the growth needs of the entire study area. The existing documents have:

- differing horizon years,
- varying geographic limits,
- varying level of detail for needed improvements,
- overlapping areas with conflicting recommendations in some cases, gaps in study boundaries, in some cases, that leave portions of the study area non-analyzed for various infrastructure needs,
- no consistent method of estimating proposed infrastructure costs,
- no prioritization of the proposed improvements throughout the study area
- no recommendations for phasing or sequencing of improvements, and
- limited discussion of available funding sources.

Without a consistent framework for infrastructure improvements for the study area in the areas of transportation, water supply, wastewater, stormwater/drainage, and private/franchise utilities, development will occur in a piecemeal and less sustainable manner which will lessen the economic benefits for the entire region. For these reasons, it is determined that current plans and studies are not sufficient to guide future development for the entire study area through the planning period of 2010 through 2030. The conclusion of this Phase 1 Historical Document Review Summary Report is that Phase 2 of the Southern Dallas County Infrastructure Improvement Analysis Project is necessary and should be performed.

ADDITIONAL DETAILED INFORMATION

The following pages contain detailed information on the individual documents that were reviewed as part of the historical document review task of the project.

Document: Chapter 51A:

Article XIII: Form Districts

Prepared For:

City of Dallas

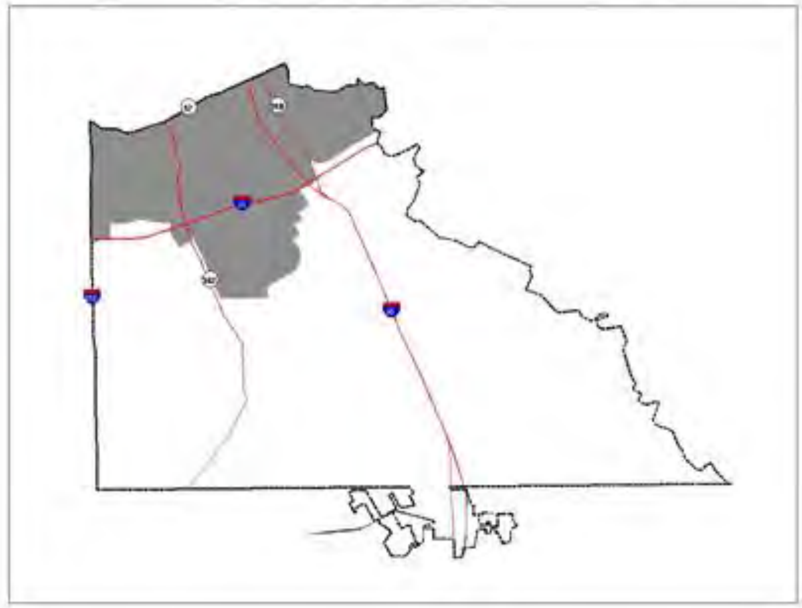
Study Period: Not Defined

Date: February 2009

Infrastructure Elements

Included:

None



Brief Description of Contents:

The purpose of this section of code is to provide an additional tool for the implementation of *forwardDallas!* It is intended to assist in creation of walkable urban neighborhoods where higher - density mixed uses and mixed housing-types promote less dependency on the automobile. This form-based code is appropriate for the guidelines spelled out in the UNT-Dallas area plan.

Document: Trinity River Corridor

Comprehensive Land Use Plan

Prepared For:

City of Dallas

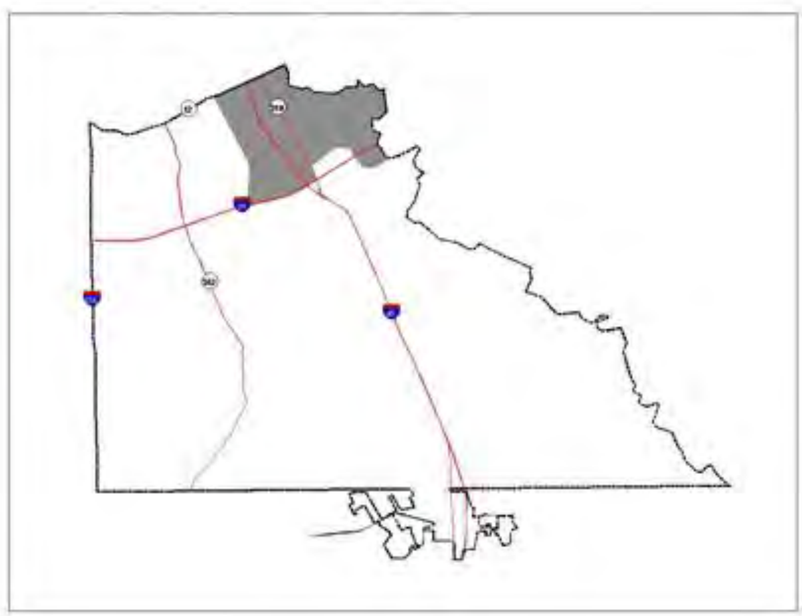
Study Period: 2009 to 2050

Date: December 2009

Infrastructure Elements

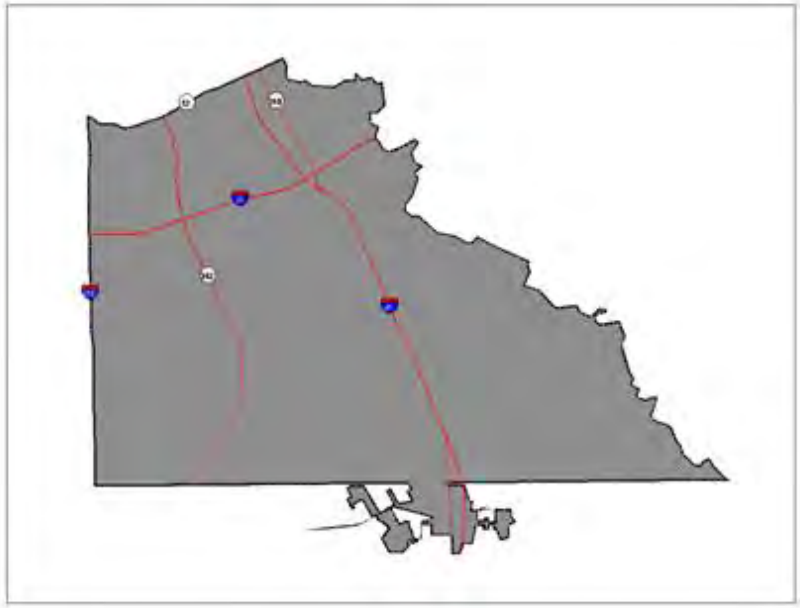
Included:

Transportation, Drainage



Brief Description of Contents:

Broad vision for the character this corridor should have in the future. It provides guidance about appropriate land uses and development patterns for the corridor. It includes details on urban form and design, retail centers, sites appropriate for business and manufacturing, job opportunities, and public improvements that provide flood protection, transportation and other important services to people and companies who choose to invest resources in this corridor.

Document: Southern Dallas Co. Texas: a Strategy for Developing The Southern Dallas Logistics Hub **Prepared For:** City of Dallas **Study Period:** Not Defined **Date:** June 2006 **Infrastructure Elements Included:** Transportation, Water Supply, Wastewater	

Brief Description of Contents:

Study sought to answer two primary questions; How can the interested localities: 1) optimize the vast economic and development potentials inherent in the study area, and 2) optimize the economic and development potential inherent in southern Dallas County while creating a dynamic live/ work/play environment that provides necessary services, programs, and opportunities? Study considers logistics, public policy, development strategies and implementation.

Document: Draft Dallas Intermodal Terminal Emissions Inventory **Prepared For:** City of Dallas **Study Period:** Not Defined **Date:** December 2007 **Infrastructure Elements Included:** None	

Brief Description of Contents: The City of Dallas and the Texas Commission for Environmental Quality (TCEQ) requested emission estimates be developed for the Dallas Intermodal Terminal for 2006 as well as projections for 2009 and 2012. This document provides annual and average ozone season day emission estimates for selected criteria pollutants (i.e., particulate matter (PM_{10}), nitrogen oxides (NO_x), volatile organic chemicals (VOC), and carbon monoxide (CO)) for the emission sources typically found at railway yards.

Document: Environmental Working Group Presentation

Prepared For:

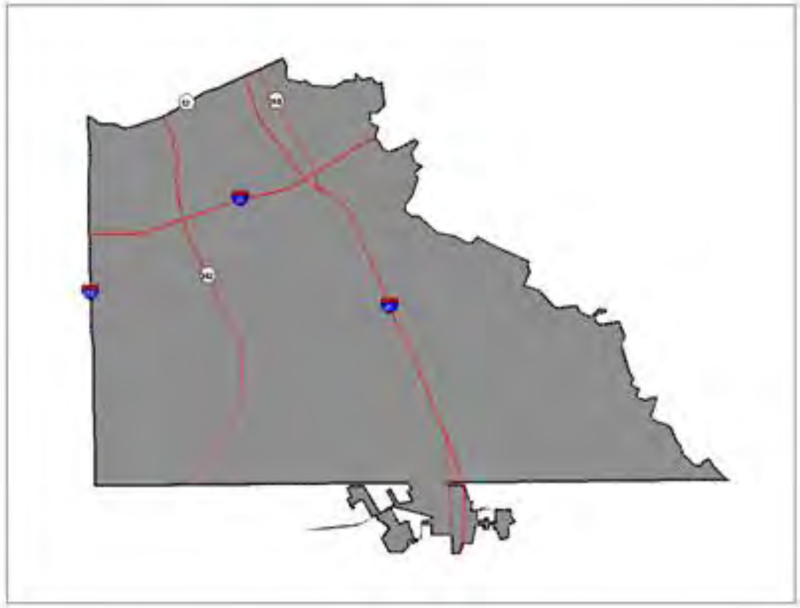
City of Dallas

Study Period: Not Defined

Date: January 2008

Infrastructure Elements Included:

Transportation, Water, Wastewater



Brief Description of Contents:

The Environmental Working Group was set up to identify and propose solutions to issues that would affect Southern Dallas County based upon anticipated development of the Inland Port. Areas covered in the presentation were Water and Wetlands, Environmental Justice, and Air Quality. Traffic increases were a primary concern - centered on anticipated growth for both rail and truck traffic.

Document: Environmental Working Group Draft Final Document

Prepared For:

City of Dallas

Study Period: Not Defined

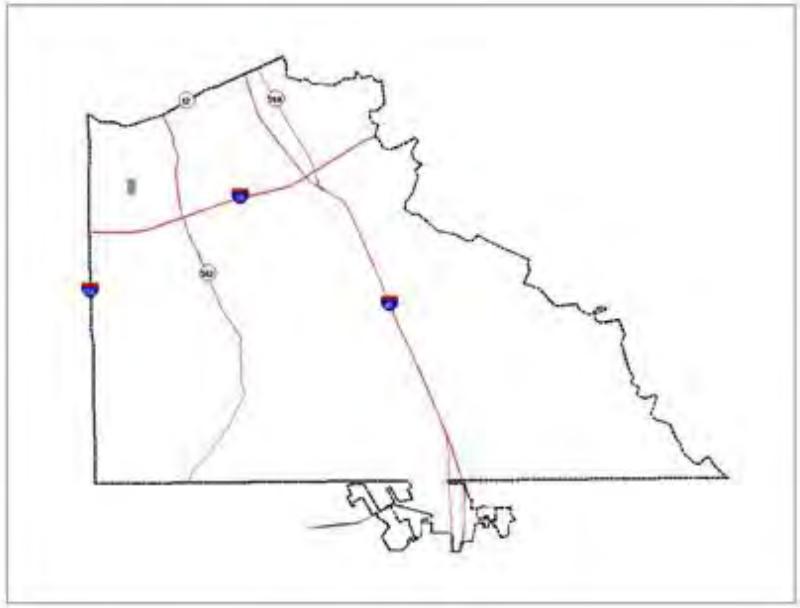
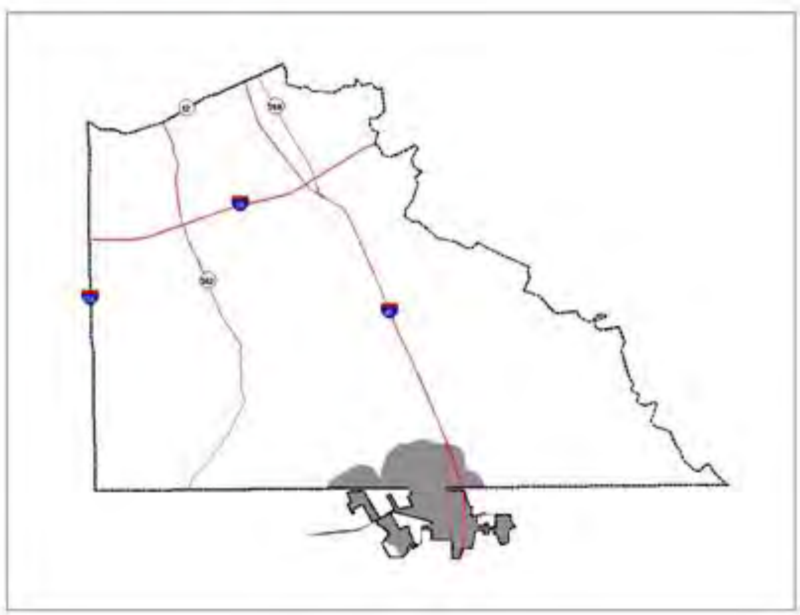
Date: June 2006

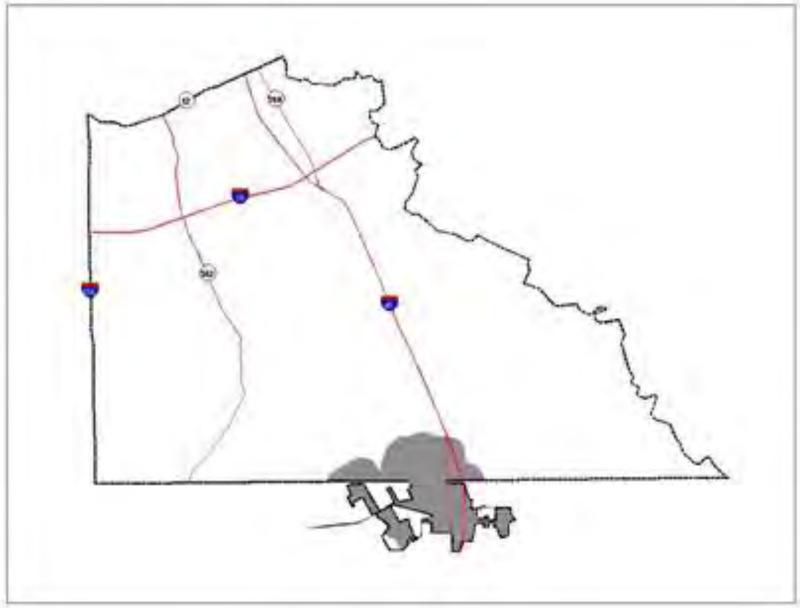
Infrastructure Elements Included:

Transportation, Water, Wastewater, Power

Brief Description of Contents:

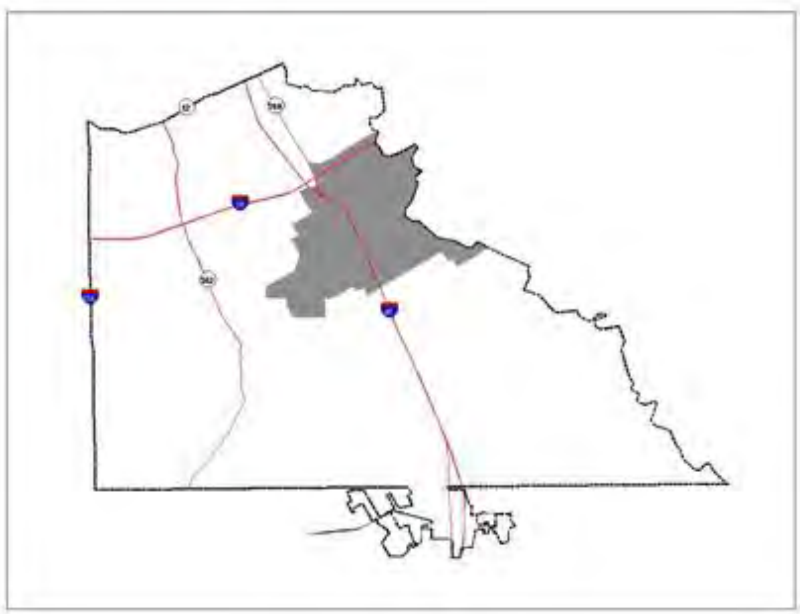
The EWG was set up to identify and propose solutions to issues that would affect Southern Dallas County based upon anticipated development of the Inland Port. Recommendations included phasing of construction, provision of interchanges and truck exits. Other recommendations included need for increased electric power for the entire IIPOD region and use of auxiliary power for truckers during rest periods. Another issue identified was the lack of energy efficiency standards for the area communities.

Document: The UNT-Dallas Area Plan Implementation Program **Prepared For:** City of Dallas **Study Period:** Not Defined **Date:** December 2009 **Infrastructure Elements Included:** Transportation	
Brief Description of Contents: This Implementation Program includes proactive action items to be undertaken by the City of Dallas that will steer growth in and around the UNT-Dallas campus. These strategic action items include: DART Light Rail Line extension, passing a Bond Program, and implementation of key infrastructure including roadways, water and sewer in the area of UNT-Dallas. These are identified to be completed within a 5 to 7 year period	
Document: City of Ferris Planning Study: Volume 1 **Prepared For:** City of Ferris **Study Period:** 2007 to 2027 **Date:** December 2007 **Infrastructure Elements Included:** Water, Wastewater, Transportation, Stormwater/Drainage	
Brief Description of Contents: This is a planning document for projected growth of Ferris between 2007 and 2027. It includes analysis of roadways, water system, wastewater system, and drainage. It also addresses current population distribution and 2027 projected population distribution. The plan includes evaluation of land use and zoning. It also includes a 20-year Capital Improvement Program.	

Document: City of Ferris Planning Study: Volume 2 **Prepared For:** City of Ferris **Study Period:** 2007 to 2027 **Date:** December 2007 **Infrastructure Elements Included:** Water, Wastewater, Transportation, Stormwater/Drainage	

Brief Description of Contents:

This is a planning document for projected growth of Ferris between 2007 and 2027. It includes analysis of roadways, water system, wastewater system, and drainage. It also addresses current population distribution and 2027 projected population distribution. The plan includes evaluation of land use and zoning. It also includes a 20-year Capital Improvement Program.

Document: Water, Wastewater & Road Impact Fee Update-Hutchins **Prepared For:** City of Hutchins **Study Period:** 2010 to Build-out **Date:** April 2010 **Infrastructure Elements Included:** Transportation, Water, Wastewater	

Brief Description of Contents:

Reviews anticipated growth through build-out and need for capital improvements for Roadways, Water and Wastewater. The report analyzes existing land use and projected land use at build-out. Proposed improvements and costs are identified.

Document: TWPD CWSRF-09

Application: City of Hutchins WW

System Improvements: PER

Prepared For:

City of Hutchins

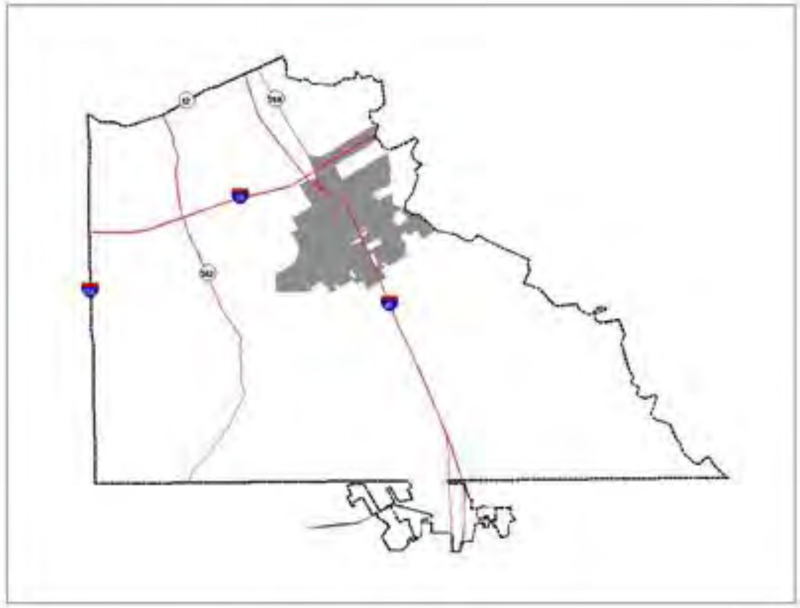
Study Period: Not Defined

Date: October 2008

Infrastructure Elements

Included:

Wastewater



Brief Description of Contents:

This is an application to Texas Water Development Board for financing/funding for wastewater system improvements. Several of the existing sanitary sewer lines in the City system are old and undersized for current demands. This can result in wet weather overflows. The improvements identified in the application will alleviate this situation.

Document: Design Standards for the Lancaster Campus District

Prepared For:

City of Lancaster

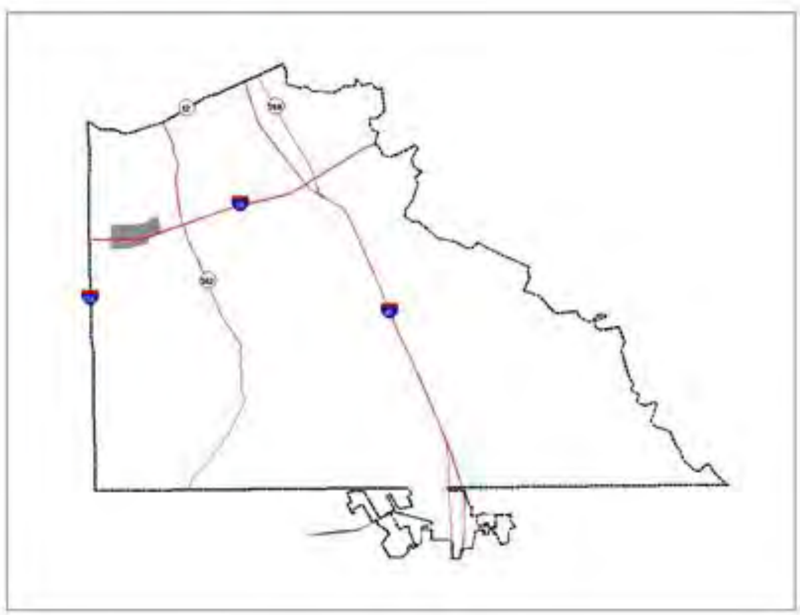
Study Period: Not Defined

Date: May 2006

Infrastructure Elements

Included:

Transportation



Brief Description of Contents:

The study includes a Campus District Vision Plan, a sub-district plan, a street framework plan, and an open space plan.

Document: Phase One-Due Diligence (for Downtown Dev. Plan)

Prepared For:

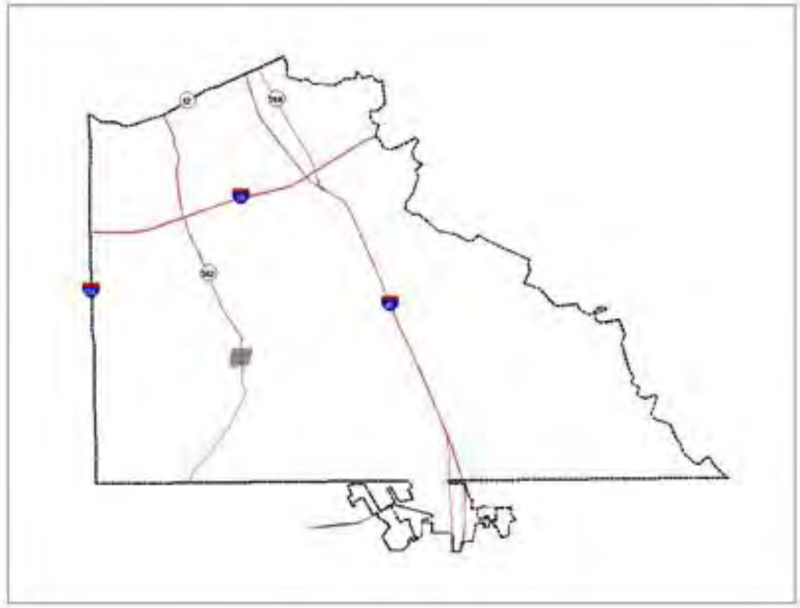
City of Lancaster

Study Period: 2006 to 2022

Date: 2006

Infrastructure Elements Included:

Transportation



Brief Description of Contents:

Lancaster's Downtown encompasses approximately 70 acres of office, retail, commercial and residential uses. This study includes performance of an Economic Analysis and creation of a Downtown Development Plan. This included Data Collection, Analysis and Strategy that related land uses to market potential, and an Economic Analysis that provided a reasonable estimate of development potential in the downtown area for the next 15 years.

Document: The Lancaster Medical District Master Plan

Prepared For:

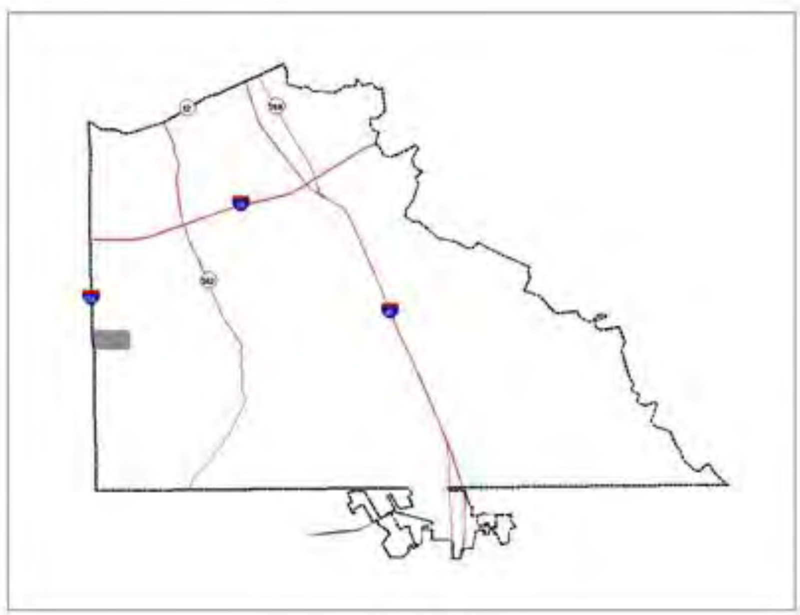
City of Lancaster

Study Period: 2006 to 2056

Date: 2006

Infrastructure Elements Included:

Transportation



Brief Description of Contents:

The Lancaster Medical District Master Plan serves as the vision for a strategic area defined in the City of Lancaster's Comprehensive Plan. The master plan seeks to fulfill the demand for medical and office space surrounding the Medical Center at Lancaster. It seeks to establish clear concepts for developing a strategic area that mixes commercial, office and residential uses in a manner that compliments the community and provides the highest and best land use.

Document: Master Thoroughfare Plan - Lancaster

Prepared For:

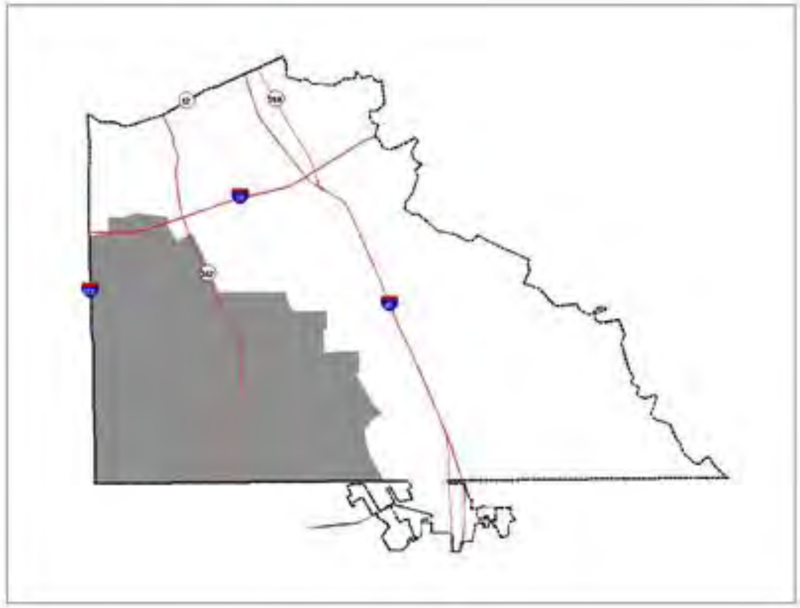
City of Lancaster

Study Period: 2010 to2025

Date: April 2006

Infrastructure Elements Included:

Transportation



Brief Description of Contents:

Thoroughfare Plan for city and ETJ based on 2025 demographic data. Plan identifies major arterials (two types), minor arterials, collectors, and local streets.Thoroughfare recommendations include new roadway segments and improvements to existing roadway segments.

Document: Water Master Plan – Lancaster

Prepared For:

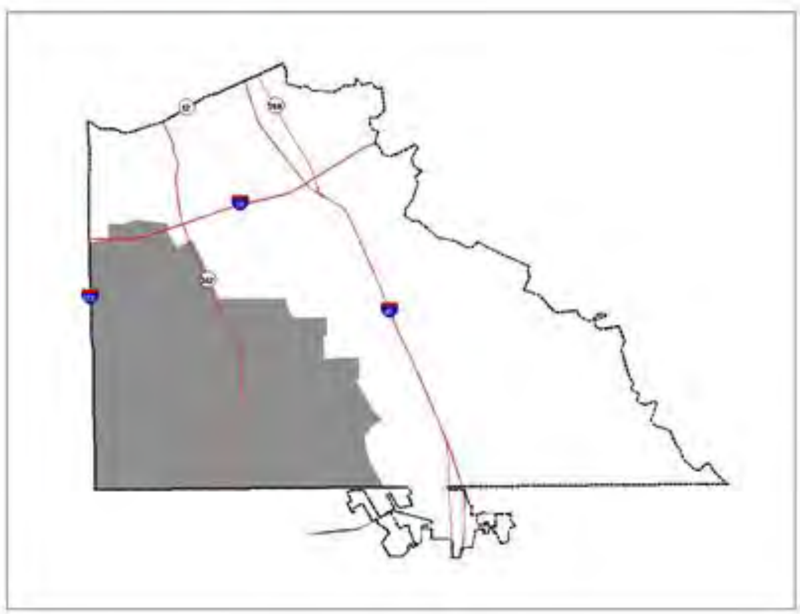
City of Lancaster

Study Period: 2007 to Build-out

Date: November 2007

Infrastructure Elements Included:

Water



Brief Description of Contents:

This is a Master Water Plan for the city from 2007 through build-out. It is based upon NCTCOG population projections. Calculations include an anticipated increase in daily average water demand from 5 MGD to 21 MGD between 2007 and ultimate build-out. Necessary system improvements are identified and implementation costs are estimated.

Document: Wastewater Master Plan - Lancaster

Prepared For:

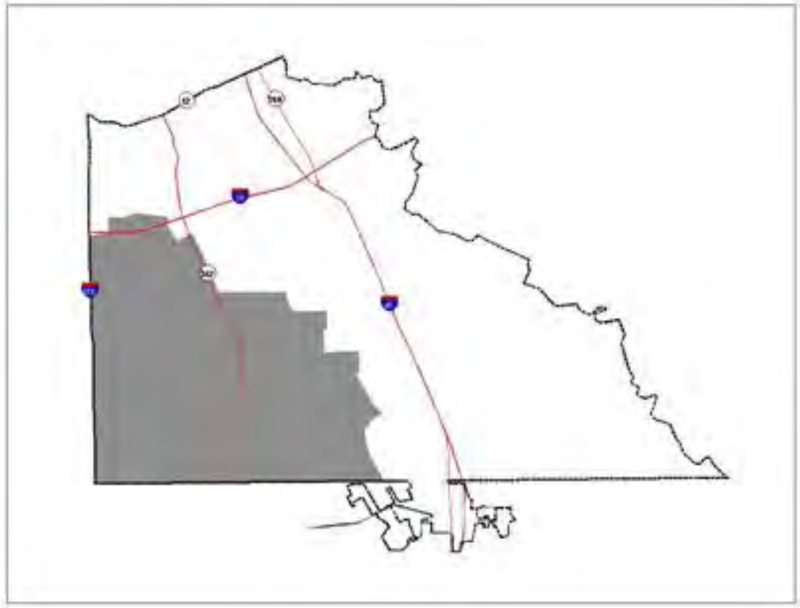
City of Lancaster

Study Period: 2006 to Build-out

Date: July 2006

Infrastructure Elements Included:

Wastewater



Brief Description of Contents:

This is a Master Wastewater Plan for the city from 2006 through build-out. It is based upon NCTCOG population projections. Calculations include an anticipated increase in daily average wastewater capacity needs from 4 MGD to 13 MGD between 2006 and ultimate build-out. Necessary system improvements are identified and implementation costs are estimated.

Document: Lancaster Regional Airport Master Plan

Prepared For:

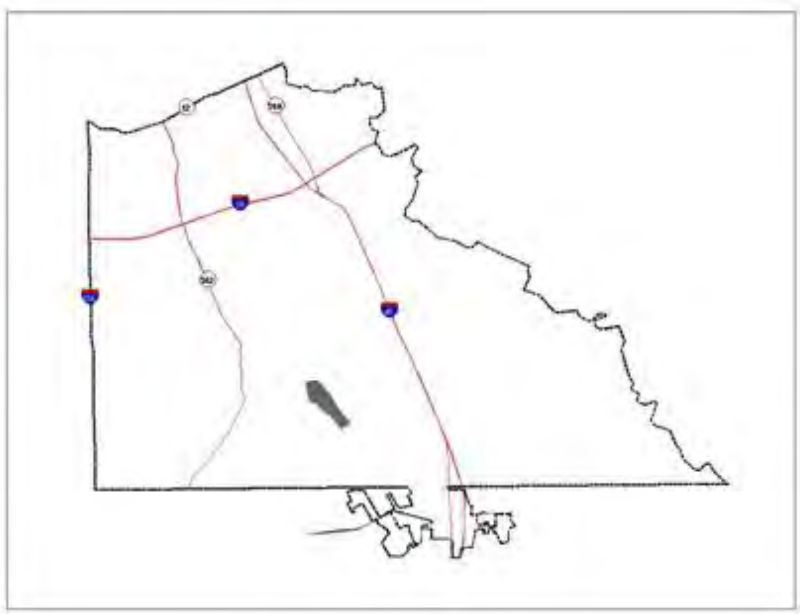
City of Lancaster

Study Period: 2010 to 2030

Date: February 2010

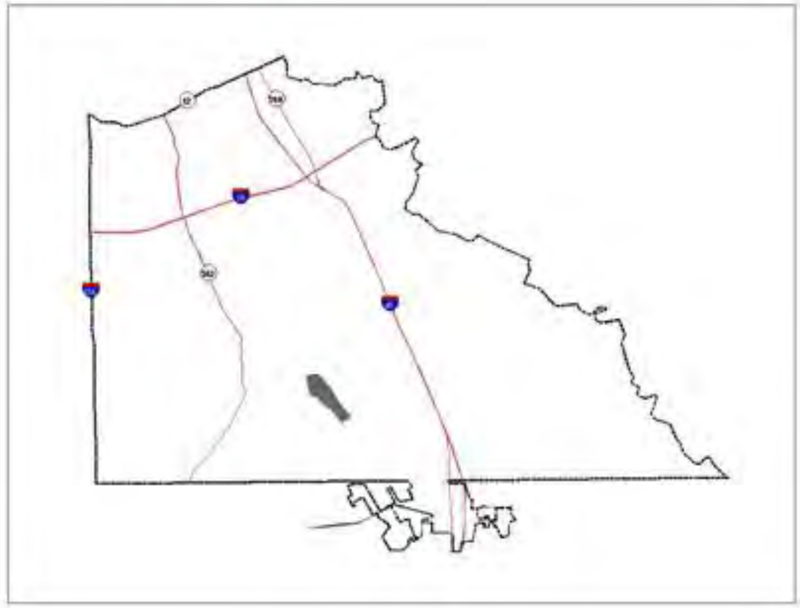
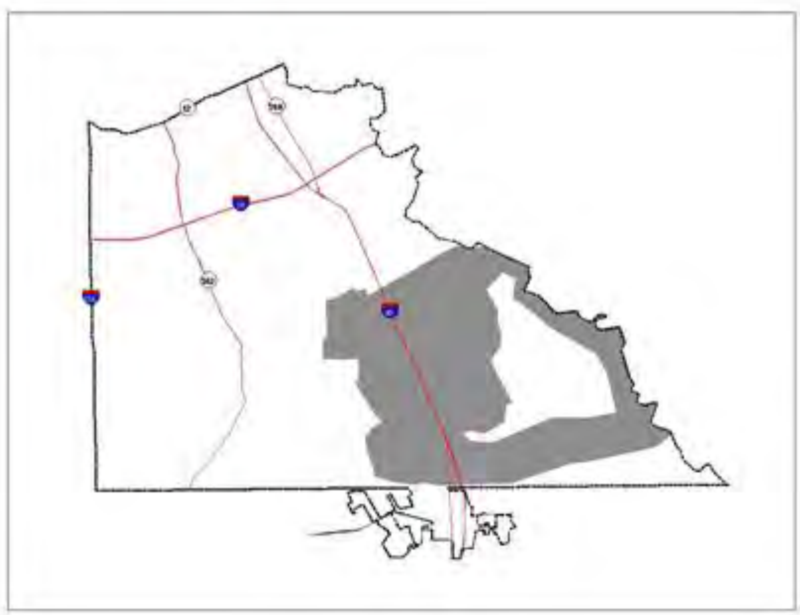
Infrastructure Elements Included:

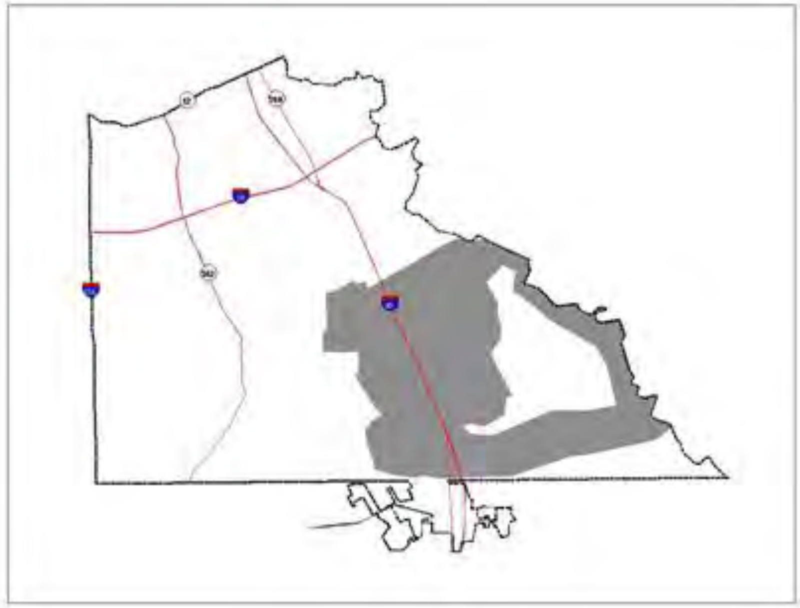
Transportation



Brief Description of Contents:

Master Plan includes inventory of current facilities, forecasts of aviation activity, air cargo analysis, demand capacity analysis and facility requirements, development concepts and alternatives analysis, enviornmental overview, airport plans, and implementation plan for projected airport growth through 2030.

Document: Lancaster Airport Sector Plan **Prepared For:** City of Lancaster **Study Period:** Not Defined **Date:** March 2007 **Infrastructure Elements Included:** Transportation	
Brief Description of Contents: Since the airport is an important economic engine for the City, this Plan protects existing land uses from airport uses, as well as protecting the airport from the surrounding land uses. The plan recommends creation of the LanPort District. Streets within the sector are governed by the current Thoroughfare Plan and minimum required development standards/architectural controls by the LanPort Zoning District and Development Standards.	
Document: City of Wilmer, Texas Community Plan 2030 **Prepared For:** City of Wilmer **Study Period:** 2009 to 2030 **Date:** June 2009 **Infrastructure Elements Included:** Transportation, Water, Wastewater	
Brief Description of Contents: This plan is a guide for physical development that fosters conservation and preservation of natural resources, sustainable, quality growth, quality housing and neighborhoods, appropriate infrastructure to support a growing community, and context sensitive development strategies that preserve the community's identity. Infrastructure and Economic Development were identified as two of the main focus areas to guide policy direction through 2030. Alternative transportation modes such as walking, biking, bus and light rail should be incorporated.	

Document: City of Wilmer Water and Wastewater Capital Improvement Plan **Prepared For:** City of Wilmer **Study Period:** 2005 to 2030 **Date:** 2010 **Infrastructure Elements Included:** Water, Wastewater	

Brief Description of Contents:

This Capital Improvements Plan identifies what water and wastewater improvements are needed to bring the existing systems into compliance with the Texas Commission on Environmental Quality (TCEQ) guidelines and expected future development. Even though the CIP is based on build-out conditions as well as the city's twenty year Comprehensive Plan 2030 proposed land use, emphasis is placed on what is needed within the next 10 years.

Document: 2005 Update to the City of Dallas Long Range Water Supply Plan **Prepared For:** City of Dallas – Dallas Water Utilities **Study Period:** 2010 to 2030 **Date:** December 2005 **Infrastructure Elements Included:** Water	

Brief Description of Contents:

The study projects future water supply demands and evaluates the supply needs for south Dallas County and the SDCIA project limits. The cities of Hutchins and Lancaster are existing customers of DWU. A portion of the Rockett SUD, which provides water supply to the city of Ferris, is a customer of DWU. The city of Wilmer is identified as a potential future customer of DWU.

Document: Dallas Water Capital Infrastructure Assessment and Hydraulic Modeling Report

Prepared For:

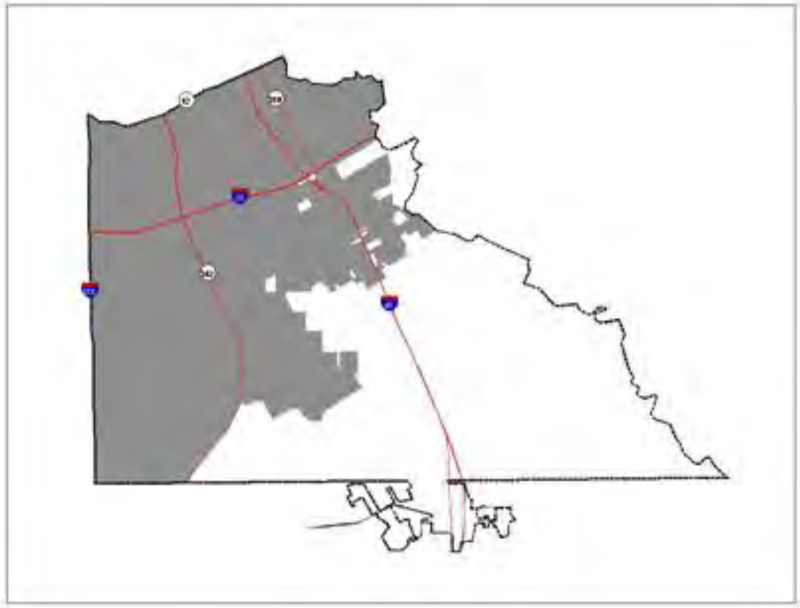
City of Dallas – Dallas Water Utilities

Study Period: Not Defined

Date: July 2007

Infrastructure Elements Included:

Water



Brief Description of Contents:

This study addresses capital funding needs for the treated water distribution system through 2030. Water use projections were developed for the City of Dallas and customer cities through 2050. This study examines Dallas's current infrastructure and looks at future planning that will need to be addressed. The City of Hutchins and Lancaster are wholesale customers of DWU. This study suggests that DWU will continue to supply these cities through the planning period.

Document: Comprehensive Wastewater Collection System Assessment

Prepared For:

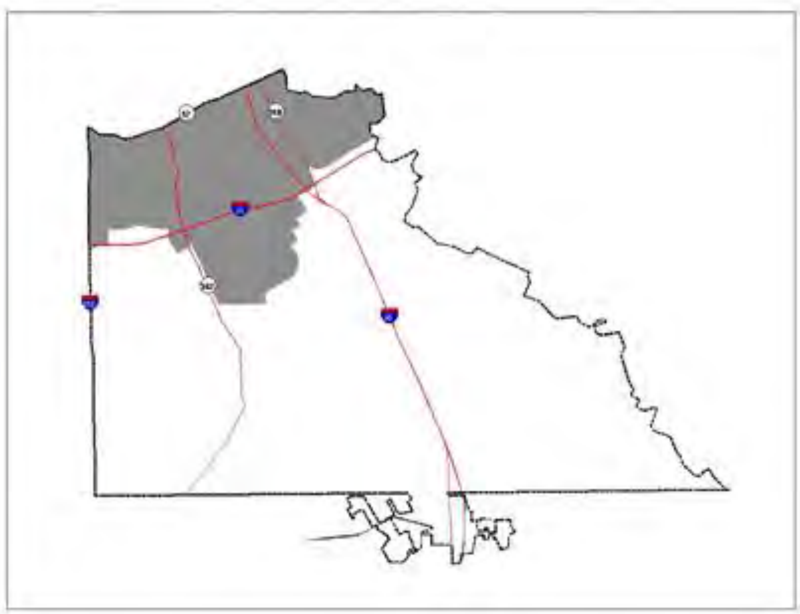
City of Dallas – Dallas Water Utilities

Study Period: 2007 to 2050

Date: October 2007

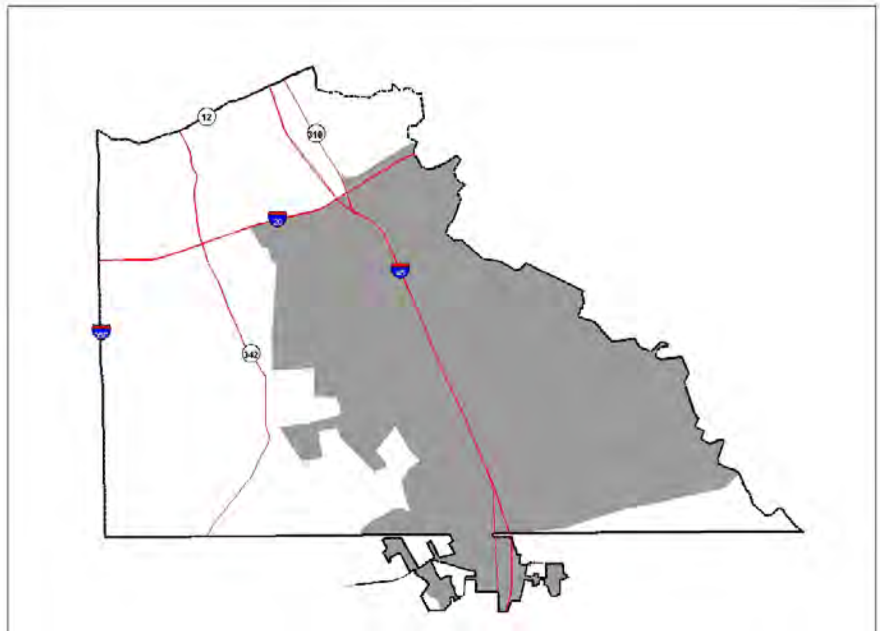
Infrastructure Elements Included:

Wastewater



Brief Description of Contents:

The objective of the CWWCSA was to update the Dallas wastewater master plan to address the needs in the collection system associated with growth, regulatory compliance, infrastructure needs and organizational challenges. This includes areas within the study area directly served by the Dallas Water Utilities and the cities of Hutchins and Wilmer which pump their wastewater to DWU's Southside Wastewater Treatment Plant.

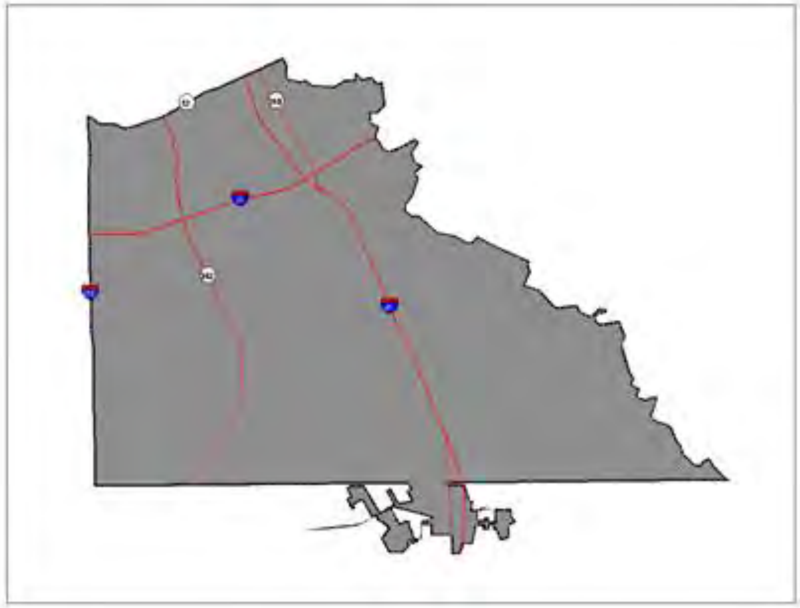
Document: Dallas County I-45 Waterline Project (Preliminary Draft) **Prepared For:** Dallas County **Study Period:** Not Defined **Date:** 2008 **Infrastructure Elements Included:** Water	

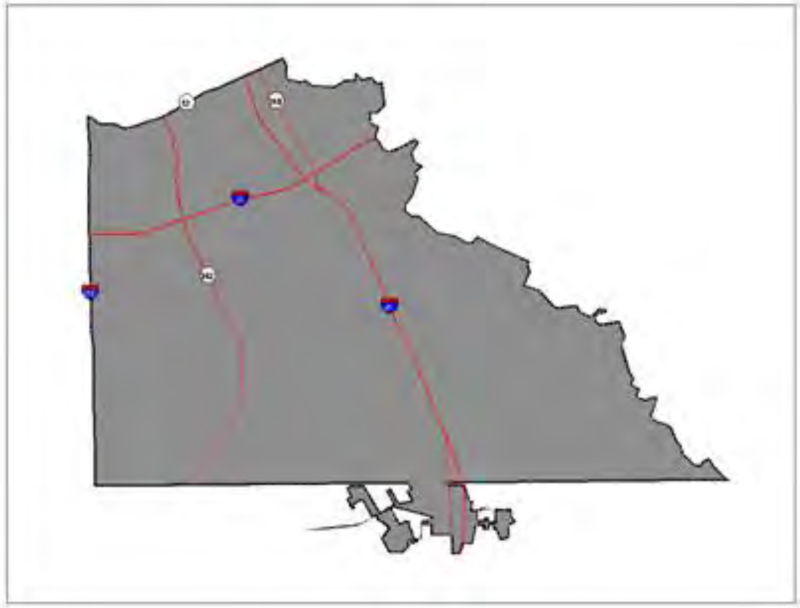
Brief Description of Contents:

Dallas County investigated having a 30" waterline built to provide water to the I-45 area, which includes the cities of Hutchins, Wilmer, and Ferris. This pipeline will connect to the 72 inch DWU line at Simpson Stuart Road and contains a total length of 46,600 linear feet. The line will have a capacity of 22.2 million gallons per day, which is sufficient to meet projected peak demands.

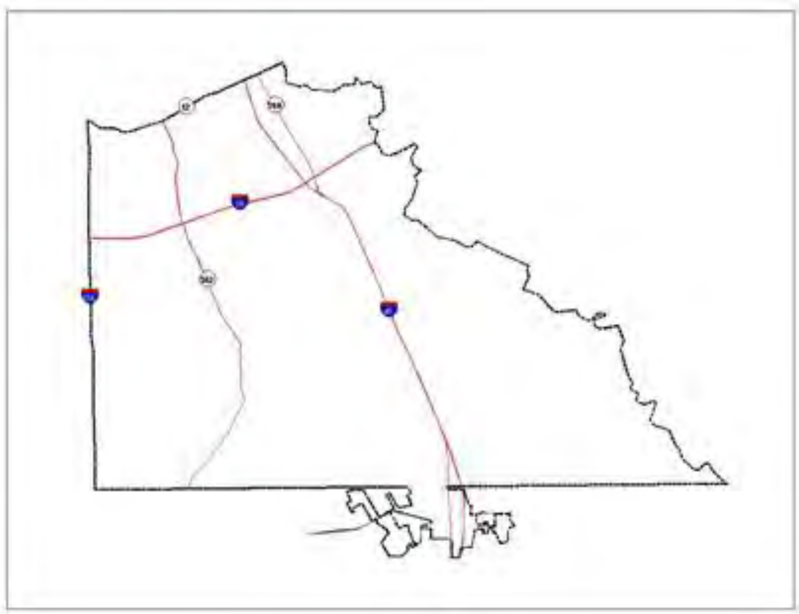
Document: DART 2030 Transit System Plan **Prepared For:** Dallas Area Rapid Transit (DART) **Study Period:** 2010 to 2030 **Date:** October 2006 **Infrastructure Elements Included:** Transportation	

Brief Description of Contents: The 2030 Transit System Plan recognizes DART's changing role as an operating agency which places greater emphasis on maintenance and system enhancement. This plan focuses on the role of each plan element, discussing how the existing, planned, and future transit elements can be cost-effectively integrated into the communities they serve. Recommendations were identified for the major modes operated by DART (rail, bus, HOV, paratransit), as well as for supporting systemwide mobility programs. Consideration is given to TSM/TDM solutions, as well as bicycle/pedestrian integration.

Document: A Re-Evaluation of Greater Dallas Chamber's Industrial Recruitment Targets **Prepared For:** Greater Dallas Chamber of Commerce **Study Period:** Not Defined **Date:** October 2006 **Infrastructure Elements Included:** None	
Brief Description of Contents: In a 2001 study prepared for the Greater Dallas Chamber, the UNTCenter for Economic Development and Research identified three target industries for recruting by th eGDC: (1) medical device and biopharmaceutical firms, (2) global financial services firms, and (3) computer and semiconductor manufacturing and suppliers. Data and computer management, logistics centers, headquarters, and data/call centers were identified as a "retention" targets. In 2006, UNT-CEDR updated their study. The update concludes that all should be retained with the exception of data/call centers. Adding publishing to the list of targets is also recommended.	
Document: Labor Market Assess. For Southern Dallas County with Emphasis on Key Target Industries **Prepared For:** Greater Dallas Chamber of Commerce **Study Period:** Not Defined **Date:** September 2004 **Infrastructure Elements Included:** None	
Brief Description of Contents: This report examines selected characteristics of the labor force available to firms located in the southern area of the City of Dallas, Texas. The report also compares occupational hiring patterns for a specified group of industries selected as targets of opportunity for recruitment and economic development efforts of the Greater Dallas Chamber of Commerce along with matching labor force availability.	

Document: Mobility 2030: The Metropolitan Transportation Plan for DFW Area, 2009 Amendment **Prepared For:** NCTCOG **Study Period:** 2009 to 2030 **Date:** 2009 **Infrastructure Elements Included:** Transportation	

Brief Description of Contents: This document includes regional growth and mobility, sustainable development, and multimodal transportation considerations. The DFW population was 5 million in 2000 and growth is projected to be 70% through 2030 (8.5 million). Employment is projected to grow 67% (5 million jobs) in that same period. Document includes consideration for regional aviation, regional bus/transit, goods movement, and accommodation of pedestrian/bicylce modes in the transportation system. Congestion mitigation through TDM and $1.097 billion of TSM measures is discussed. Specific rail and roadway improvement projects identified.

Document: Cotton Belt Conceptual Engineering and Funding Study **Prepared For:** NCTCOG **Study Period:** 2010 to 2030 **Date:** April 2010 **Infrastructure Elements Included:** Transportation	

Brief Description of Contents:

The primary purpose of the study was to support the potential early development of passenger rail service in the corridor. In general terms, it shows potential connection to the proposed DART Blue Line (which would serve UNT-Dallas and City of Lancaster) and the potential DART Waxahachie Line (which would serve the west side of IH 45 in the study area) and could connect to with each other in the southern portion of the study area.

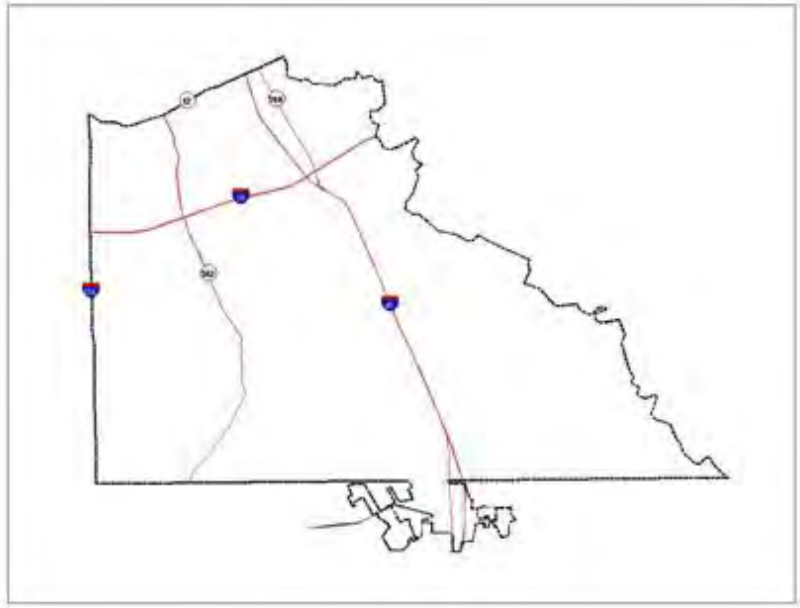
Document: Frisco Corridor Conceptual Engineering and Funding Study

Prepared For: NCTCOG

Study Period: 2010 to 2030

Date: May 2010

Infrastructure Elements Included: Transportation



Brief Description of Contents:

The primary study purpose is to support passenger rail service implementation within the corridor. The project includes conducting outreach with key stakeholders, identifying potential station locations, and examining alignment options. The study also identifies existing environmental conditions and identifies potential impacts. It also identifies potential funding options to expedite project implementation. It has no direct connection to the Southern Dallas County Infrastructure Analysis Project study area.

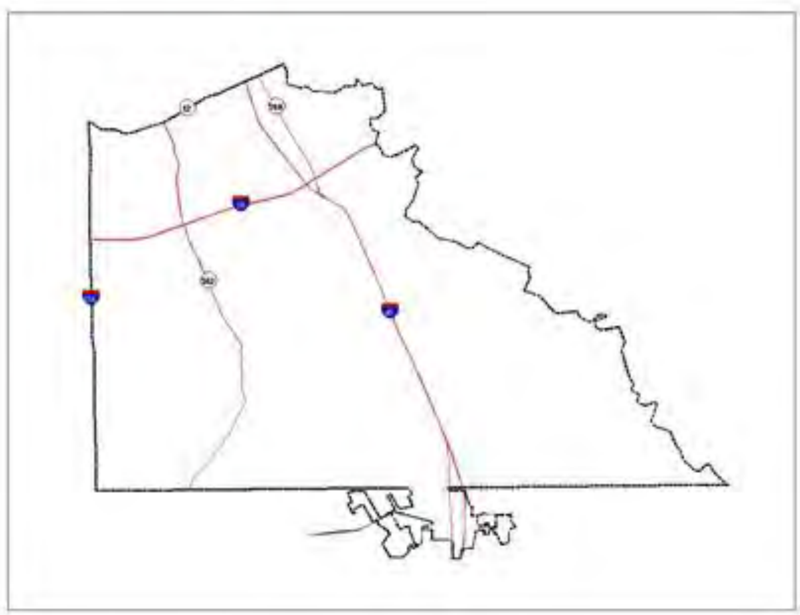
Document: McKinney Corridor Conceptual Engineering and Funding Study

Prepared For: NCTCOG

Study Period: 2010 to 2030

Date: July 2010

Infrastructure Elements Included: Transportation



Brief Description of Contents: The primary study purpose is to support passenger rail service implementation within the corridor. The project includes conducting outreach with key stakeholders, identifying potential station locations, and examining alignment options. The study also identifies existing environmental conditions and identifies potential impacts. It also identifies potential funding options to expedite project implementation. It has no direct connection to the Southern Dallas County Infrastructure Analysis Project study area.

Document: 2011-2014 Transportation Improvement Program

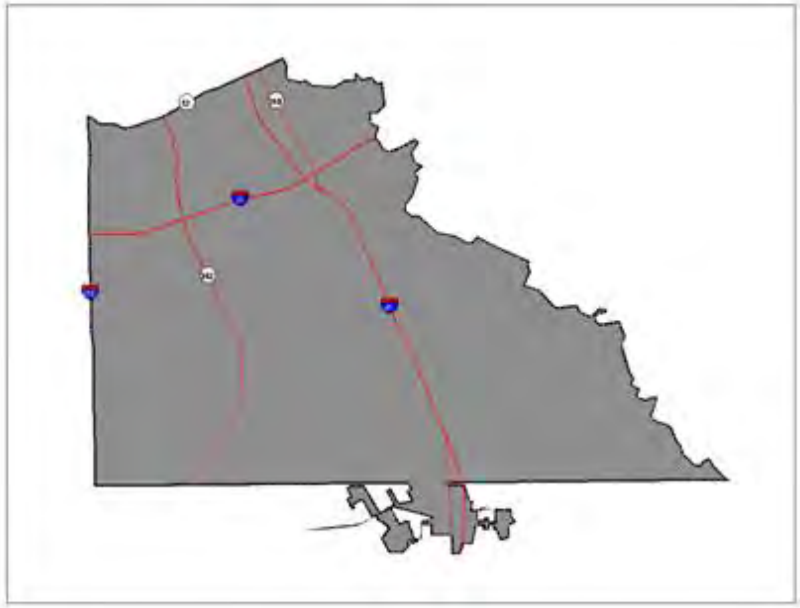
Prepared For: NCTCOG

Study Period: 2010 to 2030

Date: 2010

Infrastructure Elements Included:

Transportation



Brief Description of Contents: The Transportation Improvement Program (TIP) is a staged, multi-year program of projects approved for funding by federal, state, and local sources within the Dallas-Fort Worth metropolitan area. The TIP contains projects with committed funds in fiscal years 2011, 2012, 2013, and 2014. Improvement projects within the Study area include Loop 9, HOV project along IH 35E north of IH 20, interchange and grade separation projects along IH 45, ITS and intersection improvement projects along IH 20, a bicycle/pedestrian improvement project along IH 35E frontage roads, and traffic signal improvements at Loop 12 and IH 35E

Document: Rail Station Access Studies

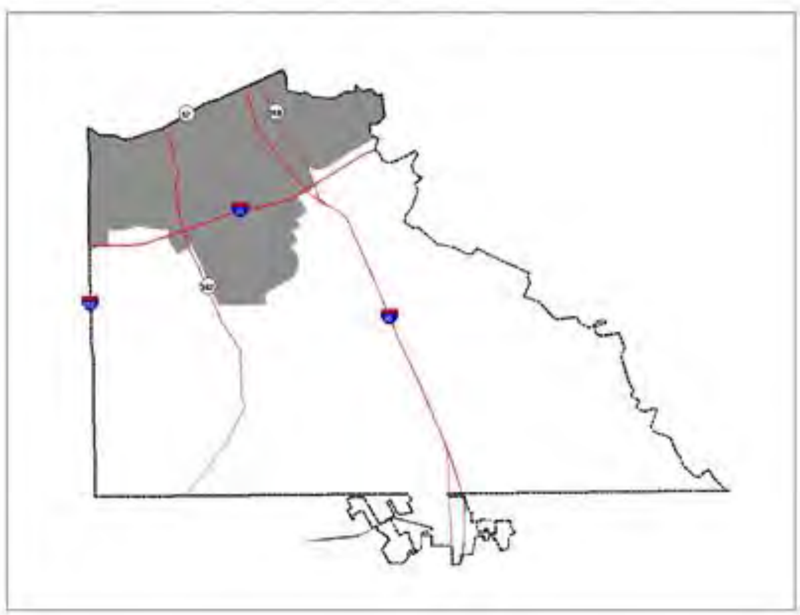
Prepared For: NCTCOG

Study Period: Not Defined

Date: 2002

Infrastructure Elements Included:

Transportation



Brief Description of Contents: This planning study is a needs assessment for bicycle and pedestrian access to and facilities at each DART station. The single DART station within the Southern Dallas County Infrastructure Analysis Project limits is the Ledbetter Station on the South Oak Cliff Segment of the DART Blue Line. The study identified bicycle facilities at the station and existing and proposed future sidewalks and bikeways providing access to the station.

Document: Dallas-Fort Worth Metroplex: America's Global Logistics Center

Prepared For:

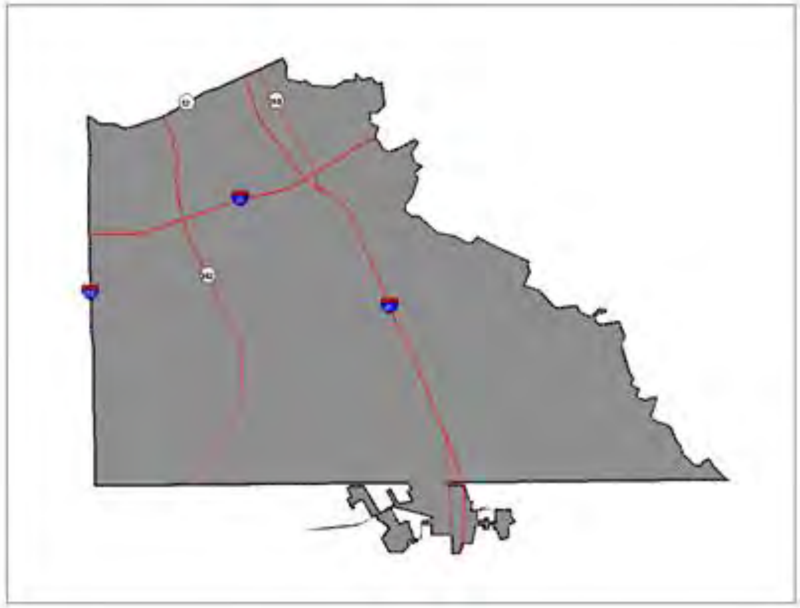
North Texas Commission

Study Period: Not Defined

Date: January 2007

Infrastructure Elements Included:

None



Brief Description of Contents:

Document is designed to promote the logistics capacity and capability in the D/FW area to businesses. It highlights existing logistics operations, the foreign trade zones, freeports and enterprise zones in the area. It discusses the need for educational institutions that provide logistics programs for undergraduates, graduates, and working professionals. The document also highlights quality of life issues that make the area attractive.

Document: Demographic Trends and Educational Attainment in the DFW Metro Area

Prepared For:

North Texas Future Fund

Study Period: Not Defined

Date: April 2004

Infrastructure Elements Included:

None

Brief Description of Contents:

This document is a study of anticipated population growth, educational attainment shifts, and the resultant policy implications and recommendations for the DFW metropolitan area.

Document: IIPOD Competitive Assessment and Opportunities Study

Prepared For:

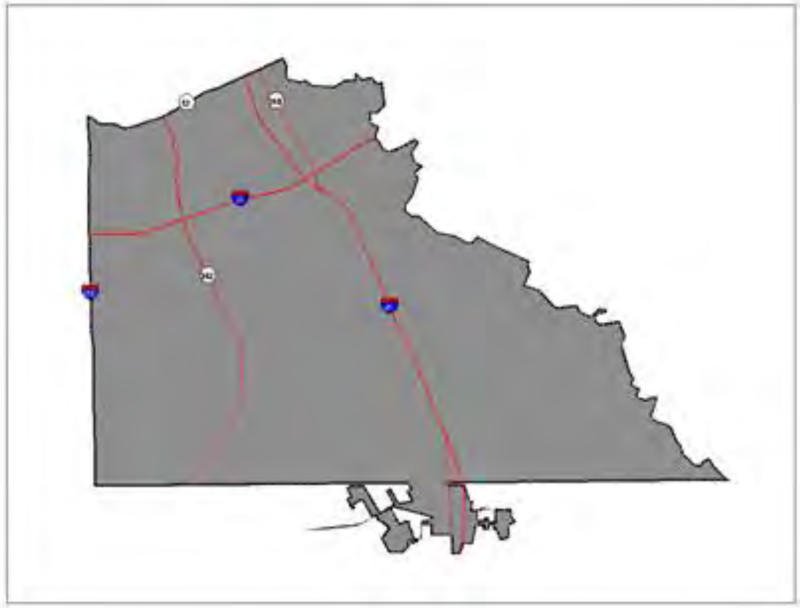
City of Dallas – Office of Economic Development

Study Period: Not Defined

Date: March 2009

Infrastructure Elements Included:

None



Brief Description of Contents: Extensive cargo mode split information by truck, air, and rail in the region. Detailed information is included in the study to identify cargo by mode for both inbound and outbound commodity groups. This report provides detail about projected cargo volumes for 2030 period. Data includes population trends, economic trends, shipper and industry conditions, existing ports and projected port capacities, and existing multimodal transportation infrastructure in the region. The study benchmarks the Dallas region agains two major national transportaiton hubs: Kansas City and Memphis.

Document: Final Report (Study Commission on Region C Water Supply)

Prepared For:

Texas Water Development Board (Region C)

Study Period: Not Defined

Date: 2009

Infrastructure Elements Included:

Water

Brief Description of Contents: The objective of the study is to evaluate various water supply alternatives to meet projected needs for Region C. The study included a review of existing literature, data gap analysis, and a socioeconomic evaluation of the alternatives. This study is only indirectly pertinent to the South Dallas County Infrastructure Analysis project; each of the reservoir options evaluated is a water supply option for DWU. Water demands are not a basis of the report; the evaluation is performed solely based on existing or potentially available water rights in existing and proposed reservoirs.

Document: Dallas Logistics Hub Dev. Submittal and Zoning Amend. For City of Dallas

Prepared For:

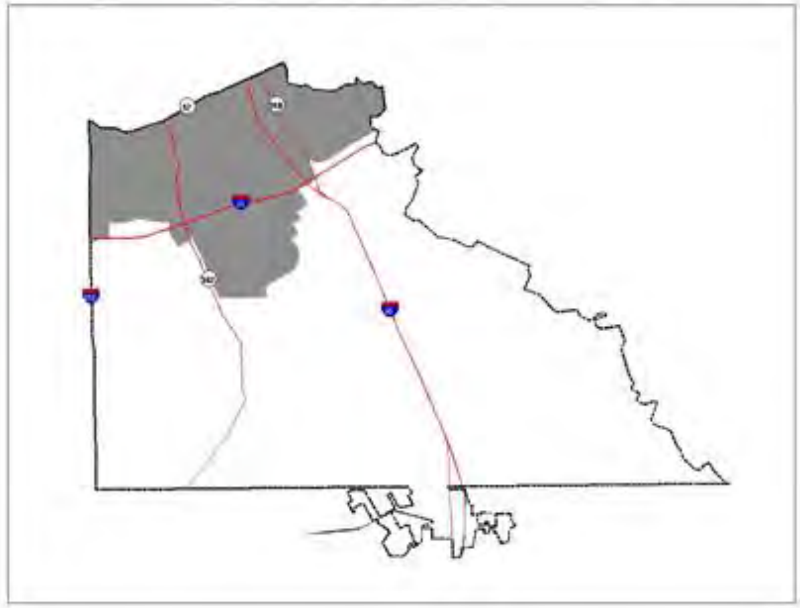
The Allen Group

Study Period: Not Defined

Date: July 2007

Infrastructure Elements Included:

Transportation, Water, Wastewater, Stormwater/Drainage



Brief Description of Contents:

The Dallas Logistics Hub is a nearly 6,000-acre master-planned mixed-use development in southern Dallas County. The project lies within Dallas County as well as the municipal jurisdictions of four cities: Dallas, Hutchins, Lancaster and Wilmer. This document includes adopted Special District Development Standards for the project area as well as requested amendments to the following: Master Thoroughfare Plan, Master Water Plan, Master Sewer Plan, and Master Drainage Plan.

Document: Dallas Logistics Hub Hutchins Comp. Plan, Rezoning and Zoning Text Amendments

Prepared For:

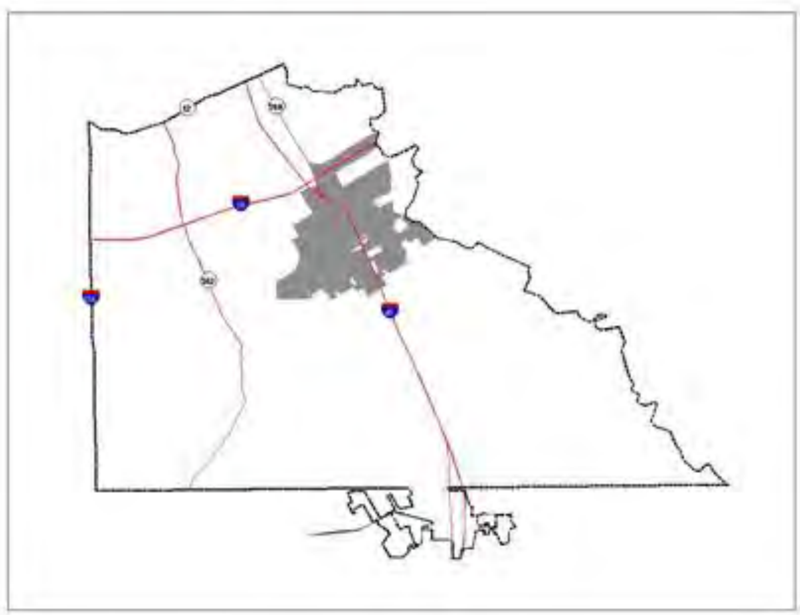
The Allen Group

Study Period: Not Defined

Date: July 2007

Infrastructure Elements Included:

Transportation, Water, Wastewater, Stormwater/Drainage



Brief Description of Contents: The Dallas Logistics Hub is a nearly 6,000-acre master-planned mixed-use development in southern Dallas County. The project lies within Dallas County as well as the municipal jurisdictions of four cities: Dallas, Hutchins, Lancaster and Wilmer. This document includes adopted Special District Development Standards for the project area as well as requested amendments to the following: Master Thoroughfare Plan, Master Water Plan, Master Sewer Plan, and Master Drainage Plan.

Document: Dallas Logistics Hub Dev. Submittal, Comp. Plan and Planned Dev Amend - Lancaster

Prepared For:

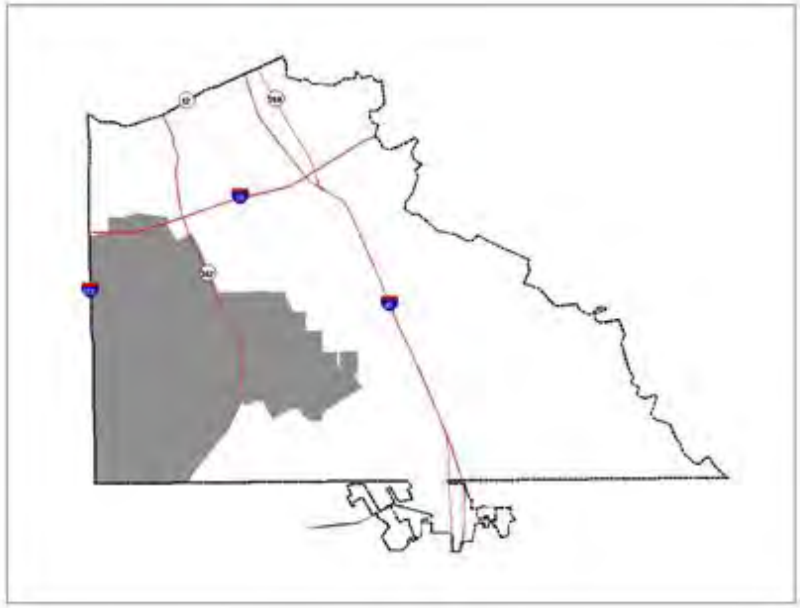
The Allen Group

Study Period: Not Defined

Date: July 2007 – March 2008

Infrastructure Elements Included:

Transportation, Water, Wastewater, Stormwater/Drainage



Brief Description of Contents: The Dallas Logistics Hub is a nearly 6,000-acre master-planned mixed-use development in southern Dallas County. The project lies within Dallas County as well as the municipal jurisdictions of four cities: Dallas, Hutchins, Lancaster and Wilmer. This document includes amendments to the Comprehensive Plan, Master Thoroughfare Plan, Master Water, Master Sewer Plan, Master Drainage Plan, Request for Special District, and Voluntary Annexation Request for the City of Lancaster.Documents also include Comperhensive Plan and Planned Development Ordinances.

Document: Dallas Logistics Hub Master Drainage Plan City of Wilmer

Prepared For:

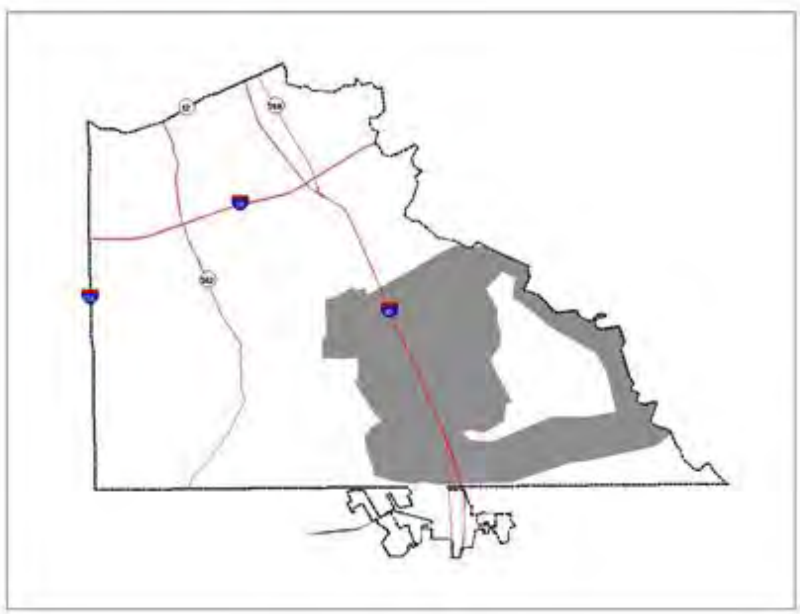
The Allen Group

Study Period: Not Defined

Date: July 2007

Infrastructure Elements Included:

Stormwater/Drainage



Brief Description of Contents: The Dallas Logistics Hub is a nearly 6,000-acre master-planned mixed-use development in southern Dallas County. The project lies within Dallas County as well as the municipal jurisdictions of four cities: Dallas, Hutchins, Lancaster and Wilmer. This document includes recommended stormwater/drainage improvements for the Dallas Logistics Hub within the City of Wilmer.

Document: Draft-Dallas Logistics Hub Southeast Dallas County Thirty-Year Impact Analysis

Prepared For:

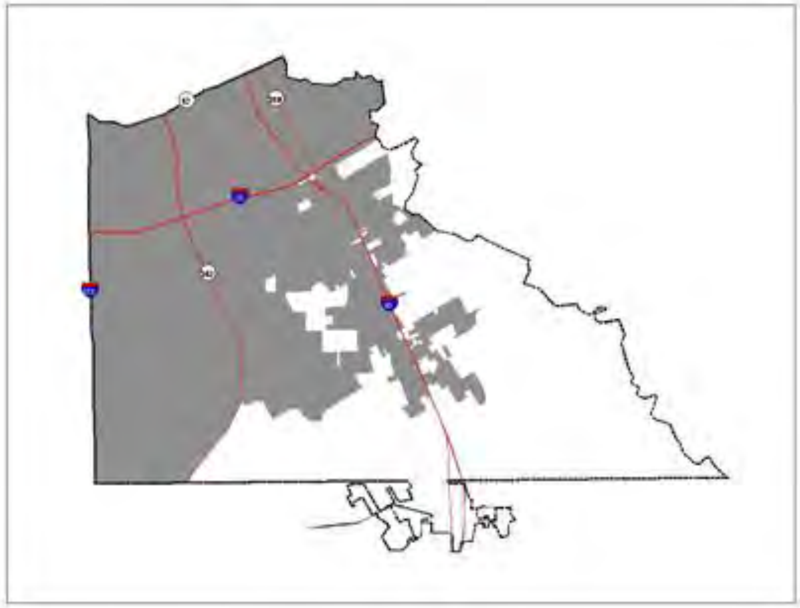
The Allen Group

Study Period: 2006 to 2035

Date: December 2006

Infrastructure Elements Included:

None



Brief Description of Contents:

This analysis is a thirty- year economic impact analysis which examines the impacts of the development of the Dallas Logistics Hub in southeast Dallas County. It studies economic, employment, and tax revenue impact of the proposed facility showing how this development will benefit the cities of Dallas, Hutchins, Lancaster, and Wilmer, as well as other local taxing jurisdictions and the State of Texas.

Document: The UNT Dallas Campus Master Plan 2005

Prepared For:

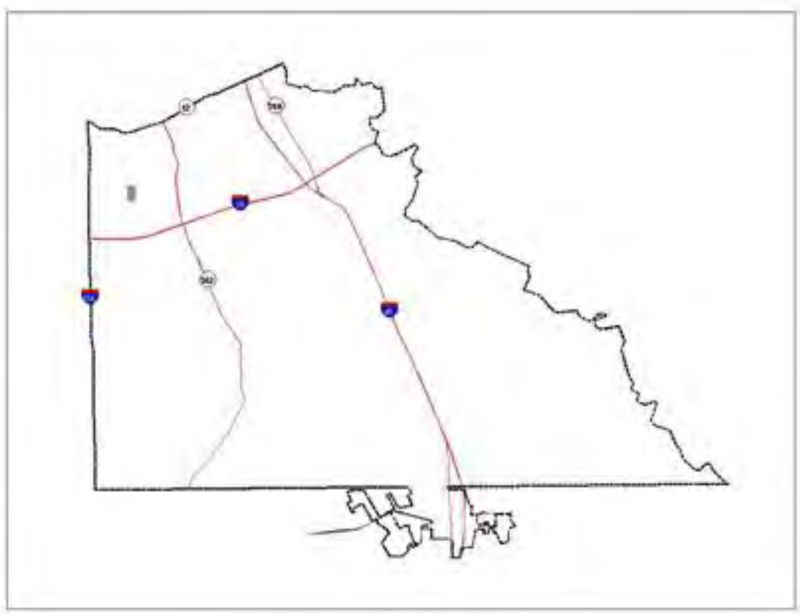
UNT - Board of Regents

Study Period: 2005 to 2030

Date: April 2006

Infrastructure Elements Included:

Transportation, Water, Wastewater, Stormwater/Drainage



Brief Description of Contents:

This is the planning document for development of University of North Texas at Dallas campus on 266 acres within the study area. It includes planning for transportation, water, wastewater, stormwater/drainage on the campus and immediately surrounding the campus.

Document: Targeting Business Opportunities in Southern Dallas **Prepared For:** UNT- Center for Economic Development & Research **Study Period:** Not Defined **Date:** April 2006 **Infrastructure Elements Included:** None	
Brief Description of Contents: Southern Dallas is ripe for new and expanded business investment. Importantly, companies locating or expanding in the southern sector have access to a large and readily available pool of talented individuals with a broad range of skills. Since many workers drive through southern Dallas on their way to and from work in other areas, many of them will respond to job opportunities closer to home. Finally, given that traffic congestion along major corridors leading into downtown Dallas is worsening, firms locating in southern Dallas should be able to compete effectively for workers within a 30-minute commute.	
Document: North Texas 2050 **Prepared For:** Vision North Texas **Study Period:** 2010 to 2050 **Date:** 2010 **Infrastructure Elements Included:** None	
Brief Description of Contents: Vision North Texas is a private, public and academic partnership created to serve as a forum for dialogue and action for the sixteen county region surrounding Dallas and Fort Worth. The *North Texas 2050* document describes the preferred future envisioned by Vision North Texas participants (including experts in many professional fields, interested residents, and regional leaders). It includes a proposed vision and twelve guiding principles. The study also identifies tools and techniques recommended for action to achieve its vision. The action package includes incentives, best practices, model ordinances and templates, technical assistance, benchmarks & indicators, new institutions/entities, regional coordination & collaboration, and communication.	

Appendix B

Public Involvement

The involvement of the public in the SDCIA project has been a priority of the PAC since the project's inception. To facilitate this effort, the input of Southern Dallas County residents has been sought throughout the development of the infrastructure analysis and report. Figure B-1 shows a timeline of public outreach events since the project's inception.

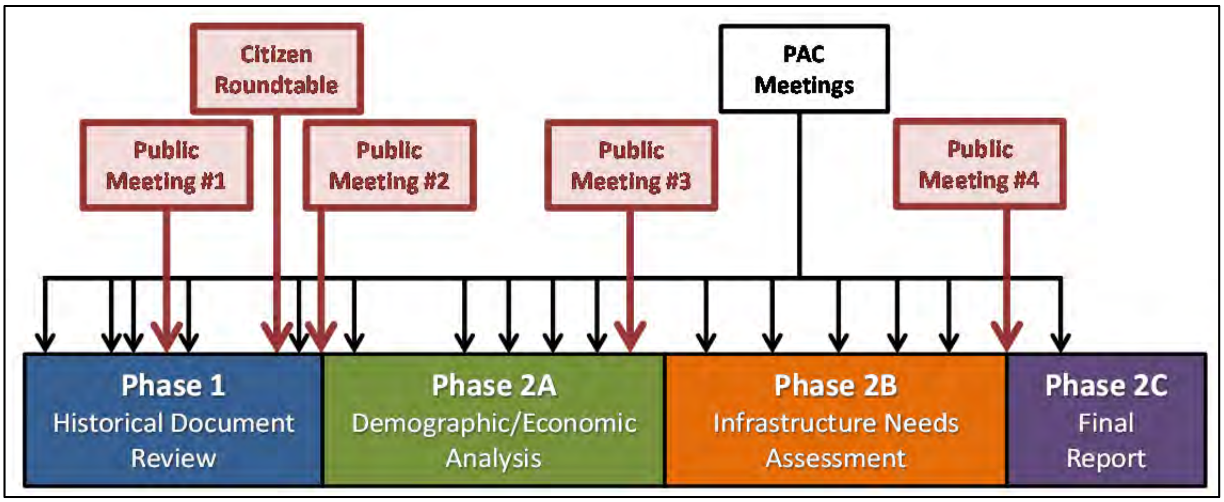


Figure B-1. Timeline of Public Involvement Activities

PROJECT ADVISORY COMMITTEE

A Project Advisory Committee (PAC) was developed to oversee the progress of the project and coordinate on a regular basis with the consultant team. Each of the local governments within the SDCIA area appointed representatives to participate on the PAC, which also included a private developer, a landowner and a representative from NCTCOG.

The following representatives comprised the SDCIA Project Advisory Committee:

- Heather Lepeska, City of Dallas
- Chuck Dart, City of Ferris
- Ronnie O'Brien, City of Hutchins
- Rona Stringfellow-Govan, City of Lancaster
- Mayor A. Hector Casarez, City of Wilmer
- Rick Loessburg, Dallas County
- Mike Rader, Developer
- Clyde Hargrove, Landowner
- Karla Weaver, NCTCOG

STAKEHOLDER INTERVIEWS

The PAC assisted the consultant team in identifying stakeholders that could be potential sources of information regarding additional studies and documents (including those currently in process), and future infrastructure and/or development plans within the study area. An individual meeting was conducted with the following stakeholders:

- City of Ferris
- City of Hutchins
- City of Lancaster
- City of Wilmer
- Dallas County

Several additional stakeholders were sent e-mail correspondence requesting their response with information regarding the study area infrastructure needs. Attachments to the e-mail included a copy of the project handout from the first public meeting, a stakeholder questionnaire, and a list of identified existing plans/studies. Several stakeholders were also contacted by telephone or in person. The following stakeholders were contacted by e-mail or telephone:

- The Allen Group
- B&M Sand & Gravel – Myre Construction Company
- Burlington Northern Santa Fe Railway (BNSF)
- Courtland Development
- Cushman & Wakefield of Texas
- Dallas Area Rapid Transit (DART)
- DC Logistics
- Duke Realty
- Citizens and study area residents
- First Industrial
- Garner Commercial
- Hargrove Real Estate
- Hillwood Partners
- IDI
- Industrial Works Management
- Joe and Laura Nash
- Neighborhood Group Representatives
- North Texas Turnpike Authority (NTTA)
- Oncor – Natural Gas Provider
- Prime Rail
- Prologis
- Ridge Properties Trust
- Schlacter Realty
- Shippers Warehouse
- Texas Department of Transportation (TxDOT)
- Texas Utilities – Electricity Provider
- Trinity Industries
- Union Pacific Railroad (UP)

Additional plans and studies along with other information received from stakeholders were reviewed and incorporated into the project effort. The stakeholder interview process provided multiple benefits during the project. This included identification and receipt of additional studies, additional knowledge of community issues regarding regional infrastructure needs, and direct outreach to individuals and groups within the study area to discuss the infrastructure study needs and purpose.

PUBLIC MEETINGS

Four public meetings were held at key points in the project's progress. The meetings were attended by the project team, PAC members, public officials and residents of the southern Dallas County area. All four public meetings were held on the campus of the University of North Texas at Dallas. Notifications of the meeting were made through the project website, by sending out postcards and via e-mail. Materials from each of the four public meetings, including presentations, flyers and newsletters can be found at the end of this appendix.

PUBLIC MEETING #1: OCTOBER 21, 2010

The purpose of this meeting was to present the public with an overview of the project purpose, scope and schedule and highlight how they could be involved. There were 69 attendees including the project team, PAC members and elected officials. David Millikan of CDM Smith gave a presentation discussing the scope and purpose of the project, detailing the tasks involved in Phase 1 and Phase 2 and outlining the overall schedule. He also discussed the roles of the project team members and the PAC. Following the presentation, meeting attendees were able to provide comments to the project team and ask questions.

PUBLIC MEETING #2: FEBRUARY 8, 2011

At the conclusion of the first phase of the study, a second public meeting was to held to present the findings of the historical document review (Phase 1) and discuss the upcoming demographic assessment and infrastructure analysis (Phase 2). There were a total of 26 attendees including the project team, PAC members and elected officials. CDM Smith staff gave a presentation summarizing the work completed to date and current status of the project. The primary focus of the presentation was a summary of the historical document review that had recently been completed. Because the results of the document review showed that Phase 2 of the project would be warranted, CDM Smith staff discussed the work that would comprise Phase 2, including the demographic and economic analyses and infrastructure needs assessment. Meeting attendees had the opportunity to ask questions and provide comments following the presentation.

PUBLIC MEETING #3: SEPTEMBER 27, 2011

The focus of this meeting was the presentation of the results of the demographic analysis and economic review for the SDCIA area and a discussion of the upcoming final portion of the project, a comprehensive infrastructure needs assessment for the area. There were a total of 51 attendees including the project team, PAC members and elected officials. CDM Smith staff gave a presentation summarizing the work that had been completed to date on the project. The results of the demographic analysis were discussed including population and employment forecasts, evaluation of land use plans in the area, a housing analysis and a labor market analysis. CDM Smith staff then discussed the upcoming infrastructure assessment and distributed public input forms to the meeting attendees. The forms allowed attendees to provide feedback to the project team regarding their opinions on where they think future development will occur in the SDCIA area and where infrastructure development may be potentially beneficial.

PUBLIC MEETING #4: JUNE 21, 2012

The purpose of the final public meeting was to present the results of the infrastructure capacity and needs assessment for the SDCIA project area. This included a review of existing infrastructure and project team recommendations for water, wastewater, stormwater, transportation and private utilities. There were a total of 85 attendees including the project team, PAC members and five elected officials.

A presentation summarizing the findings of the infrastructure assessment was given by multiple members of the project team. NCTCOG Director of Transportation Michael Morris made some opening remarks including a brief discussion of the impact and importance of South Loop 9 on the SDCIA area (including a statement regarding an upcoming renaming of the proposed corridor). Jayson Melcher, Philip Wheat and Russell Erskine of Halff Associates presented recommendations for water, wastewater and stormwater. Michael Copeland of CDM Smith spoke about transportation infrastructure recommendations, and Michael Carleton of Arredondo, Zepeda & Brunz discussed private utilities development in the SDCIA area.

Following the presentation, Michael Morris members of the project team responded to several questions from meeting attendees. After the question and answer session, project team members spoke informally with meeting attendees about the various infrastructure elements and the recommendations being made as part of the study.

ADDITIONAL PUBLIC OUTREACH EFFORTS

In addition to the efforts of the project advisory committee, the four public meetings and stakeholder interviews, several other public outreach activities have taken place as part of the SDCIA project. These have included a project website, project update newsletters and a citizen roundtable meeting.

PROJECT WEBSITE

Project information was made available to the public at the project website (www.nctcog.org/sdcia) on September 23, 2010. Current content includes a project description, a list of Project Advisory Committee members, project location map, project scope, tasks, schedule, a list of public outreach events, and a list of documents being reviewed. The website also provides contact information including a link allowing individuals to request being added to the project mailing list.

PROJECT NEWSLETTERS

Prior to the third and fourth public meetings, a project newsletter was posted on the project website. The purpose of the newsletter was to provide updates on the project's progress as well as provide details about the upcoming public meetings.

CITIZEN ROUNDTABLE MEETING

Sixty-four individuals on the SDCIA project mailing list were invited to participate in a round table discussion on Thursday, January 27, 2011 in the Gazebo Room of the Lancaster Recreation Center. The invitees were selected to ensure adequate representation from the study area citizens and neighborhood group representatives. Fourteen individuals attended the discussion. Project team representatives included Karla Weaver (NCTCOG) and Patrick Mandapaka (NCTCOG), Clovia English (City of Lancaster) and David Millikan (CDM Smith).

The project representatives introduced themselves, followed by self-introductions by the attendees. The handout materials were discussed. This included a four-page handout explaining the project limits, funding partners, project phases, and what the project will do and what it will not do. Also included in the meeting handout materials were a stakeholder questionnaire and a current version of the historical document index. These materials were also sent to each individual invited to the Citizen Stakeholder Round Table Discussion.

The attendees were generally familiar with the project scope and purpose as presented in the hand out from the Open House/Listening Session. Several attendees expressed appreciation for having the small group meeting for citizens so that they could ask questions and feel confident their opinions and thoughts were heard by the study team. The topics and issues raised during the meeting included the consideration of parks and open space as necessary infrastructure, the lack of sanitary sewer and use septic tanks in parts of the study area, flooding issues for Ten Mile Creek, a need for upgraded telecom and fiber optic cables within the study area and the need for additional public transportation options.

All attendees were informed of the then-upcoming Phase 1 Public Meeting which was held on Tuesday, February 8, 2011. Attendees were encouraged to notify others and invite additional attendees to the public meeting.

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Public Meeting #1 Materials

Southern Dallas County Infrastructure Analysis

Open House/Listening Session
Thursday, October 21, 2010
UNT-Dallas Campus

Meeting Summary

I. Meeting Objectives

The Open House/Listening Session was designed to accomplish the following objectives: introduce the project purpose, review the project scope, identify who is performing the study, and request relevant information from attendees.

II. Meeting Announcement Process

Notice of the meeting was distributed as follows:

- 280 postcards were mailed on October 4, 2010 to stakeholders on the Master Mailing List, including Project Advisory Committee (PAC) members, elected officials (city, county, state and federal), key government staff, large landowners, developers, neighborhood associations, civic organizations, and other interested individuals
- The remaining 70 postcards were mailed to the various PAC members for distribution
- Electronic version of the meeting notice was sent to the PAC members for distribution to local constituents and posting to their respective organization's website
- Electronic flyers (suitable for printing) were distributed to PAC members for distribution within their community. An English language version and a Spanish language version were both prepared and distributed.
- Notice was posted on the following websites:
    - NCTCOG
    - City of Dallas
    - City of Wilmer
- Electronic notice was sent to the following media entities:
    - Dallas Morning News
    - Ellis County Press (Ferris)
    - Waxahachie Daily Light
- The League of Women Voters sent an e-blast to its constituents on Oct. 18.

II. Meeting Location and Format

The meeting was held on the UNT-Dallas campus in the Building I atrium, located at 7300 Houston School Road, Dallas, TX 75241. The Open House was scheduled from 6:30 pm – 8:30 pm. Set-up was completed at 5:45 pm to accommodate early arrivals. The format was Open House style, with five exhibit areas set-up throughout the facility and seating areas for attendees to sit and write comments if desired. The five exhibits illustrated existing infrastructure in the following areas:

- City Boundaries and Transportation,
- Floodplains and Watersheds,
- Electric Distribution,
- Water Service, and
- IIPOD (International Inland Port of Dallas).

Project team members staffed sign-in tables at each of the two entrances to the facility. Each attendee was provided a meeting handout and a comment form. PAC and project team members were stationed at each exhibit to answer questions and listen to citizen concerns.

The auditorium directly off the atrium was used for a brief presentation which is further described below. The presentation started at 7:00 pm. It concluded about 7:25 pm. Discussion between the audience and project team continued in the auditorium until approximately 8:00 pm.

III. Attendance

Individuals began arriving slightly before 6 pm. Forty-eight (48) individuals attended the Open House, along with seven of the nine PAC members and fourteen (14) project team members.

IV. Presentation

Karla Weaver, NCTCOG, began the meeting by welcoming the attendees and providing background information about the project's origins and the Project Advisory Committee. She reviewed the purpose of the Open House/Listening Session, and then introduced David Millikan, consultant Project Manager.

Millikan went through a presentation that included a Project Overview (meeting objectives, project purpose, study area, product, phases and schedule), identified Who is Involved (project advisory committee, consultant team, you), and explained How to be Involved (meetings, website, contact information) He emphasized that the study would analyze existing infrastructure conditions, develop a regionally-coordinated plan of infrastructure improvements, provide an order-of-magnitude planning estimate of costs, identify potential funding sources, and take into account public comments. The study will not propose new zoning, recommend new financing/taxes, conduct an Environmental Impact Study, involve any detailed engineering or design, require partner cities/counties to adopt the findings, or recommend any changes to ongoing development or currently approved projects.

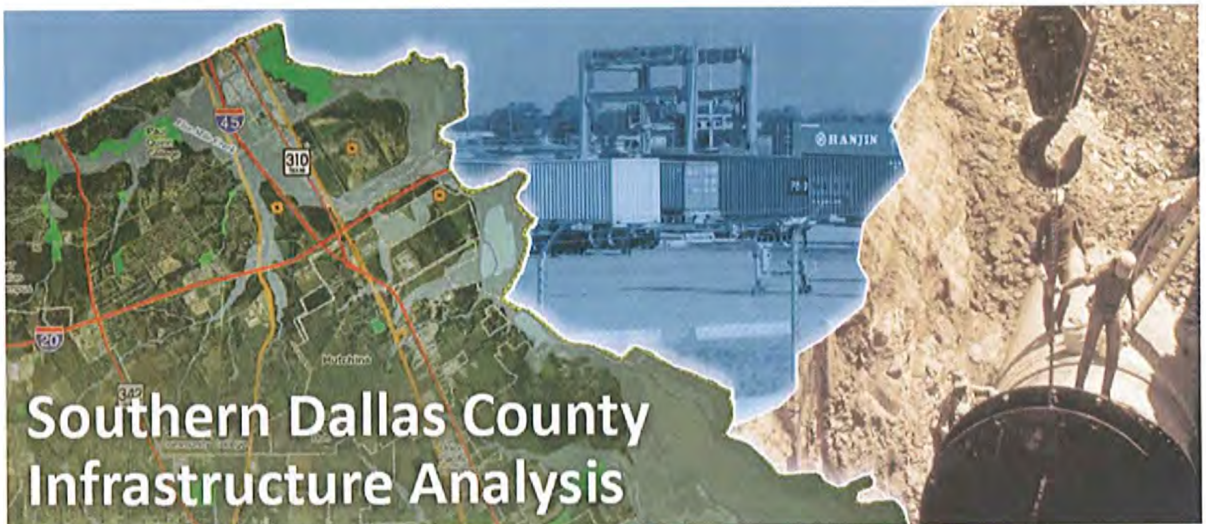
The presentation included a review of the components of both Phase 1 and Phase 2 of the project and the project schedule. He stressed the need for citizens to participate in the study process and described ways for the public to be involved. A discussion period ensued, after which the meeting in the auditorium was adjourned and attendees had the opportunity to view the exhibits and continue to dialogue with project team members in the exhibit areas. Five (5) written comments were received. The Open House ended at 8:30 pm.

V. Discussion Question and Answers

A summary of the Discussion Questions and Answers is included in the Attachments.

VI. Attachments

- Open House/Listening Session Announcement Postcard
- Open House/Listening Session Announcement Flyer
    - i. English language version
    - ii. Spanish language version
- Open House/Listening Session Handout
- Open House/Listening Session Comment Form
- Open House/ Listening Session Exhibits
- Open House/Listening Session Presentation
- Open House/Listening Session Discussion Questions and Answers
- Selected Open House/Listening Session Photographs



Southern Dallas County Infrastructure Analysis

Open House Listening Session

Thursday, October 21, 2010
6:30 – 8:30 p.m.
UNT Dallas Campus, in the Atrium
7300 Houston School Road
Dallas, TX 75241

Project Partners:
North Central Texas Council of Governments, County of Dallas
Cities of Dallas, Ferris, Hutchins, Lancaster, Wilmer

What is needed to help Southern Dallas County and the Inland Port area prosper? More roads? More freight connections? Better telecommunications?

Come tell us what you think are the critical INFRASTRUCTURE issues and needs. This is the first meeting for this study and we need to hear your thoughts.

Open House style meeting, Thursday, Oct. 21, 6:30 - 8:30 pm (brief presentation at 7 pm). Come view the exhibits and give your feedback to project team members.

NCTCOG
P.O. Box 5888
Arlington, TX 76005-5888

For questions on the meeting, special accommodations due to a disability, or language translation, contact Alva Baker at (214) 428-6432 or by email at Bcaabaker@aol.com, at least 72 hours prior to the meeting. Reasonable accommodations will be made.

Para preguntas, arreglos especiales debido a una discapacidad o para servicio de interpretación, por favor comuníquese con Alva Baker al (214) 428-6432 o por correo electrónico: Bcaabaker@aol.com por lo menos 72 horas antes de la junta. Se cumplirán arreglos razonables.

Southern Dallas County Infrastructure Analysis

What infrastructure is needed to help Southern Dallas County and the Inland Port area prosper?

- View exhibits
- Ask questions of project team members
- Tell us what you think are the critical INFRASTRUCTURE issues and needs

This is the first meeting for this study and we need to hear your thoughts

OPEN HOUSE/LISTENING SESSION

Thursday, October 21, 2010
6:30 pm – 8:30 pm
Brief presentation at 7:00 pm

UNT Dallas Campus, in the Atrium
7300 Houston School Road
Dallas, TX 75241

Southern Dallas County Infrastructure Analysis Project Partners
Cities of Dallas, Ferris, Hutchins, Lancaster, and Wilmer
Dallas County, North Central Texas Council of Governments

For questions on the meeting, special accommodations due to a disability, or language translation, contact Alva Baker at (214) 428-6432 or by email at bcaabaker@aol.com, at least 72 hours prior to the meeting. Reasonable accommodations will be made.

Para preguntas, arreglos especiales debido a una discapacidad o para servicio de interpretacion, por favor communiquese con Jorge Barrero-Rojas al (817) 915-3457 o por correo electronico: jbarrerorojas@wilbursmith.com por lo menos 72 horas antes de la junta. Se cumpliran arreglos razonables.

Análisis de Infraestructura del Sur del Condado de Dallas

¿Qué infraestructura se necesita para ayudar a que el sur del Condado de Dallas y el Puerto Interior prosperen?

- Observe las Exhibiciones
- Haga preguntas a los miembros del equipo de trabajo
- Cuéntenos cuáles cree que son los problemas y las necesidades más críticas a nivel de infraestructura

Esta es la primera reunión de este estudio y necesitamos escuchar sus opiniones/sugerencias

JORNADA DE PUERTAS ABIERTAS

Jueves, Octubre 21, 2010

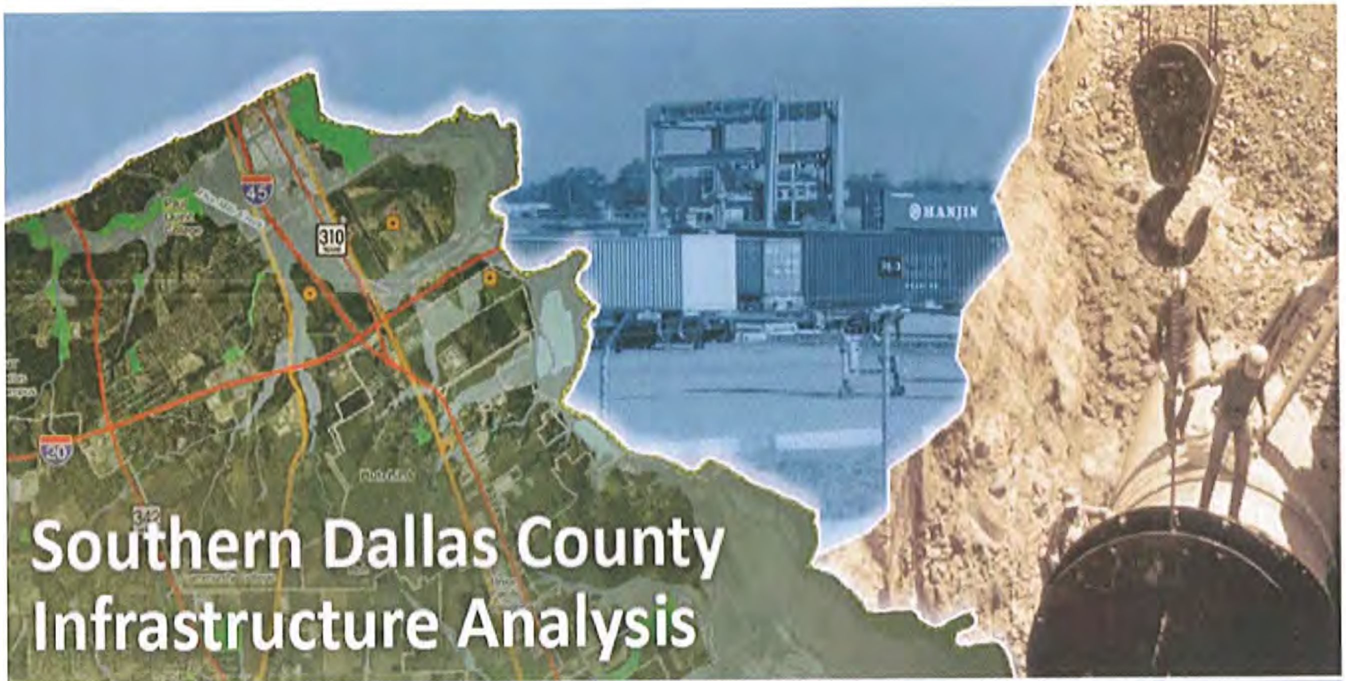
6:30 pm – 8:30 pm

Presentación Breve a las 7:00 pm

Campus de la Universidad del Norte de Texas (UNT)
Dallas Campus, en el Atrio
7300 Houston School Road
Dallas, TX 75241

Socios del Proyecto para el Análisis de Infraestructura del sur del Condado de Dallas
Ciudades de Dallas, Ferris, Hutchins, Lancaster y Wilmer.
Condado de Dallas, Consejo de Gobiernos del Norte-Centro de Texas.

Para preguntas, arreglos especiales debido a una discapacidad o para servicio de interpretación, por favor comuníquese con Jorge Barrero-Rojas al (817) 915-3457 o por correo electrónico: jbarrerorojas@wilbursmith.com por lo menos 72 horas antes de la junta. Se cumplirán arreglos razonables.



Southern Dallas County Infrastructure Analysis

Open House/Listening Session

October 21,2010

Lead Consultant:

Wilbur Smith ASSOCIATES

Funding Partners:
Cities of Dallas, Ferris, Hutchins, Lancaster, Wilmer
County of Dallas, North Central Council of Governments

For additional information please contact:
David Millikan, Project Manager
dmillikan@wilbursmith.com
c/o 2401 South Blvd, Dallas, TX 75215

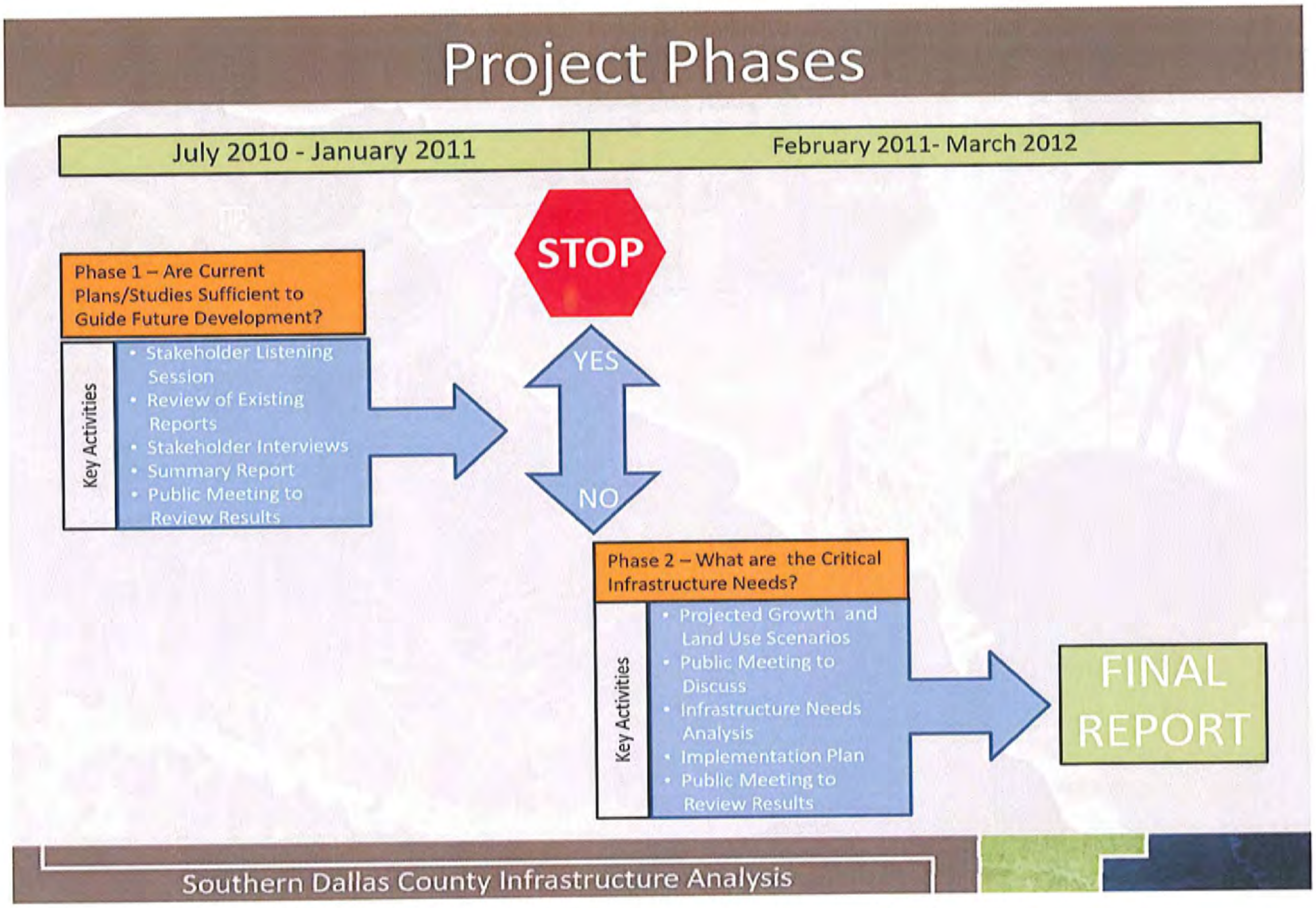
There is much interest and activity in development in the Southern Dallas County area. A critical planning element is the provision of infrastructure to support growth. Several jurisdictions are impacted, but there is no single cohesive and regional plan for infrastructure.

The cities of Dallas, Ferris, Hutchins, Lancaster, and Wilmer, along with Dallas County and the North Central Texas Council of Governments, have partnered to conduct an analysis of Southern Dallas County infrastructure which will create a development framework and implementation program that will result in a high-quality well-integrated Inland Port in Southern Dallas County that spurs additional high-quality and orderly commercial, industrial, and residential development.

The intent of the project is to perform an infrastructure needs assessment of the identified area which will facilitate regionally-coordinated infrastructure planning for the jurisdictions within the study area and sound development for the region. The analysis will focus on infrastructure related to transportation, water supply, sanitary sewer, stormwater/drainage, and private/franchise utilities.

This study is intended to support all current and on-going efforts to promote development in the study area. It is not a rework of prior studies but a step forward in the planning process to ensure that the infrastructure that is required to support development has been identified and planned.

Study Process



Phase 1:

<u>July 2010 –January 2011</u>

Listening Session – Tonight

Stakeholder Interviews

October/November

Phase 1 Summary Report

December 2010

Public Meeting

December 2010/January 2011

Phase 2 (if needed):

<u>February 2011–March 2012</u>

Future Scenario Development – Feb/April 2011

Public Meeting – April/May 2011

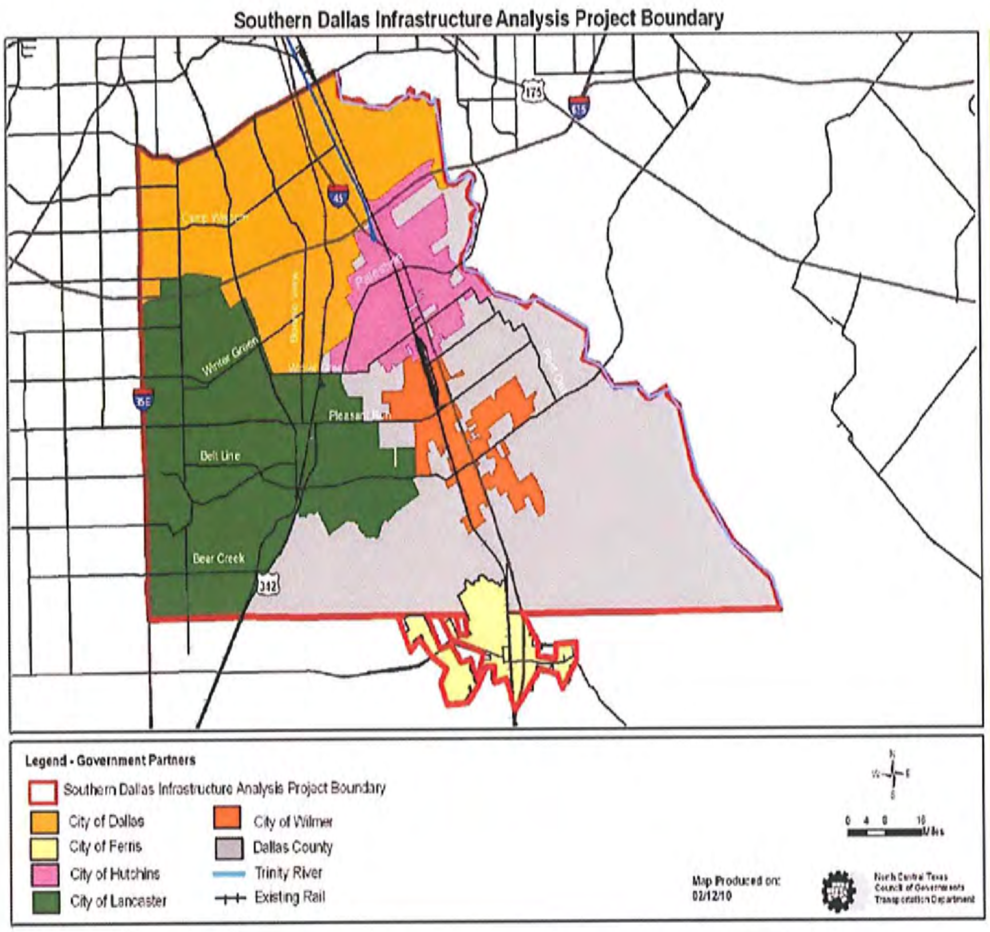
Demographic Analysis – May/July 2011

Infrastructure Needs Analysis and Staging Plan

December 2011

Public Meeting – December 2011/January 2012

Final Report – March 2012



Study Area

West: Interstate 35E

North: Loop 12

East: Trinity River

South: Dallas County/Ellis County Line (including all of Ferris

This Study Will

- Analyze existing Infrastructure conditions
- Develop a regionally coordinated plan of infrastructure improvements
- Provide order-of-magnitude planning estimates of costs
- Identify potential funding sources
- Take into account your thoughts

This Study Won't

- Propose new zoning
- Recommend new financing/taxes
- Conduct an Environmental Impact Study
- Involve any detailed engineering/design
- Require cities/counties to adopt findings
- Recommend any changes to ongoing development or currently approved projects

How to Be Involved

- Visit website and join mailing list:
  - www.nctcog.org/sdcia
- Attend future public meetings:
  - Anticipated Dates
    - Phase 1 Public Meeting – Dec '10/Jan '11
    - Phase 2 (if needed)
      - Initial Public Meeting – Spring '11
      - Final Public Meeting – Late '11/Early '12

Project Advisory Committee Members

- City of Dallas – Heather Lepeska
- City of Ferris – Chuck Dart
- City of Hutchins – Ronnie O'Brien
- City of Lancaster – Clovia English
- City of Wilmer – Hon. Jeff Steele
- Dallas County – Rick Loessberg
- North Central Council Of Governments – Karla Weaver
- Representative of Developers – Mike Rader
- Representative of Landowners – Clyde Hargrove

Lead Consultant

- Wilbur Smith Associates -- David Millikan

Comment Form
Southern Dallas County Infrastructure Analysis
October 21, 2010 Listening Session

About the Study

1. Are there any studies or plans that should be considered as this study moves forward? If yes, please identify.

2. Are there any constraints that you are aware of that would make development in the study area challenging? If so, please identify location and constraint.

3. Please provide any comments about the issues/needs in the study area with regard to supporting future growth for the following:

transportation	
water supply	
sanitary sewer	
storm water/drainage	
private/franchise utilities	
other (identify)	

Please turn over

About the Study – Cont'd.

Use the remainder of this space for additional comments about the study

About the Meeting

The objective of tonight's meeting is to introduce the project purpose, to identify who is performing the study, and to seek relevant information from the public.

1. Was today's meeting location convenient and adequate? _____ Yes _____ No

   If No, how could it be improved? ______________________________

2. On a scale of 1 (poor) to 10 (excellent),
   a. How well were the objectives of today's meeting communicated? ____________
   b. How well were the objectives achieved? ____________
   c. How would you rate today's meeting in terms of opportunities for you to provide input on the information received? ____________

3. How could the meeting process be improved? ______________________________

   ____

Thank you!

If you would like to be added to the mailing list and did not already provide the contact information on the sign-in sheet, please provide the following information (optional):

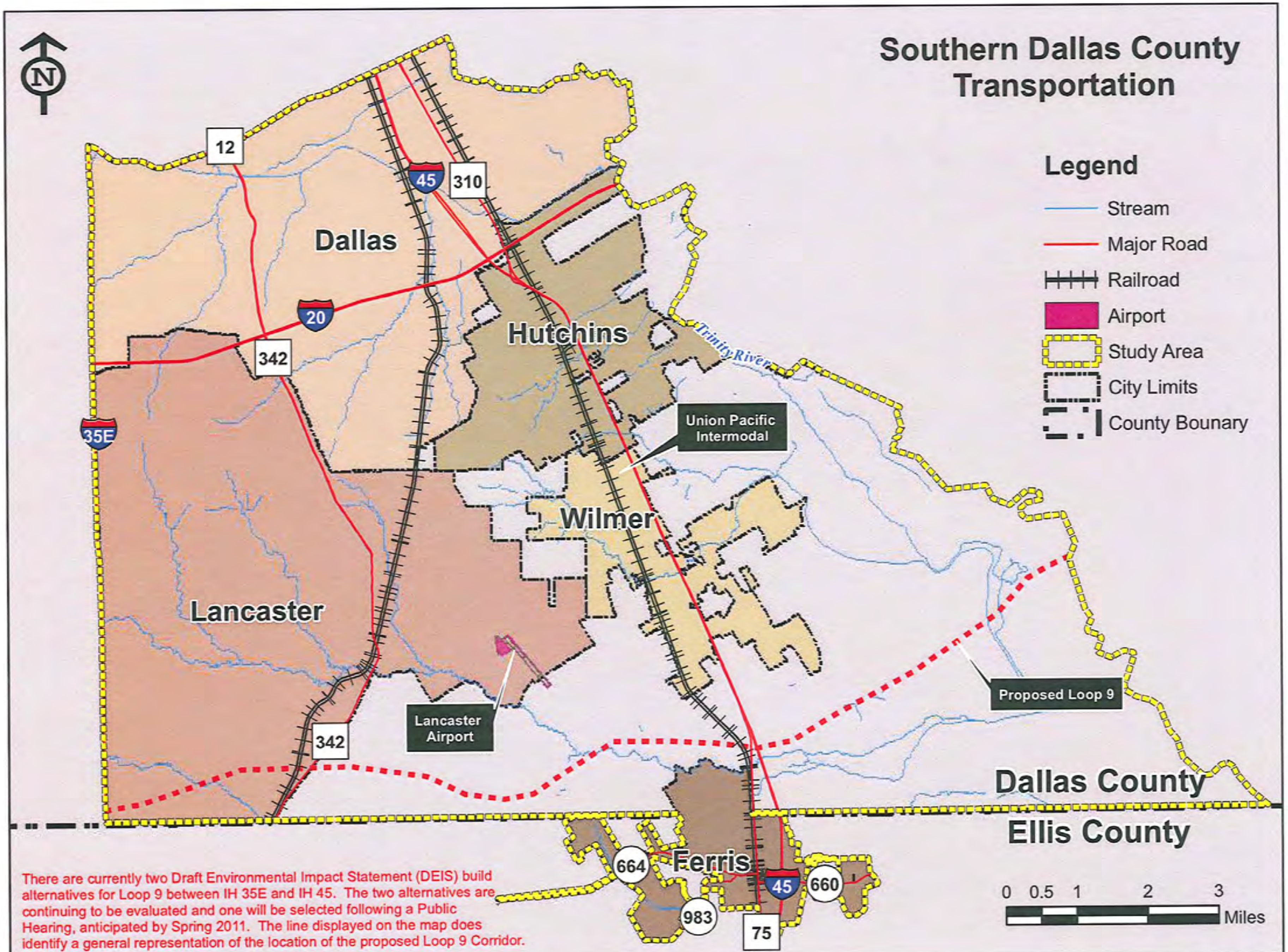
Name (please print): ____________________ Mailing Address: ____________________

E-mail Address: ____________________ ____________________

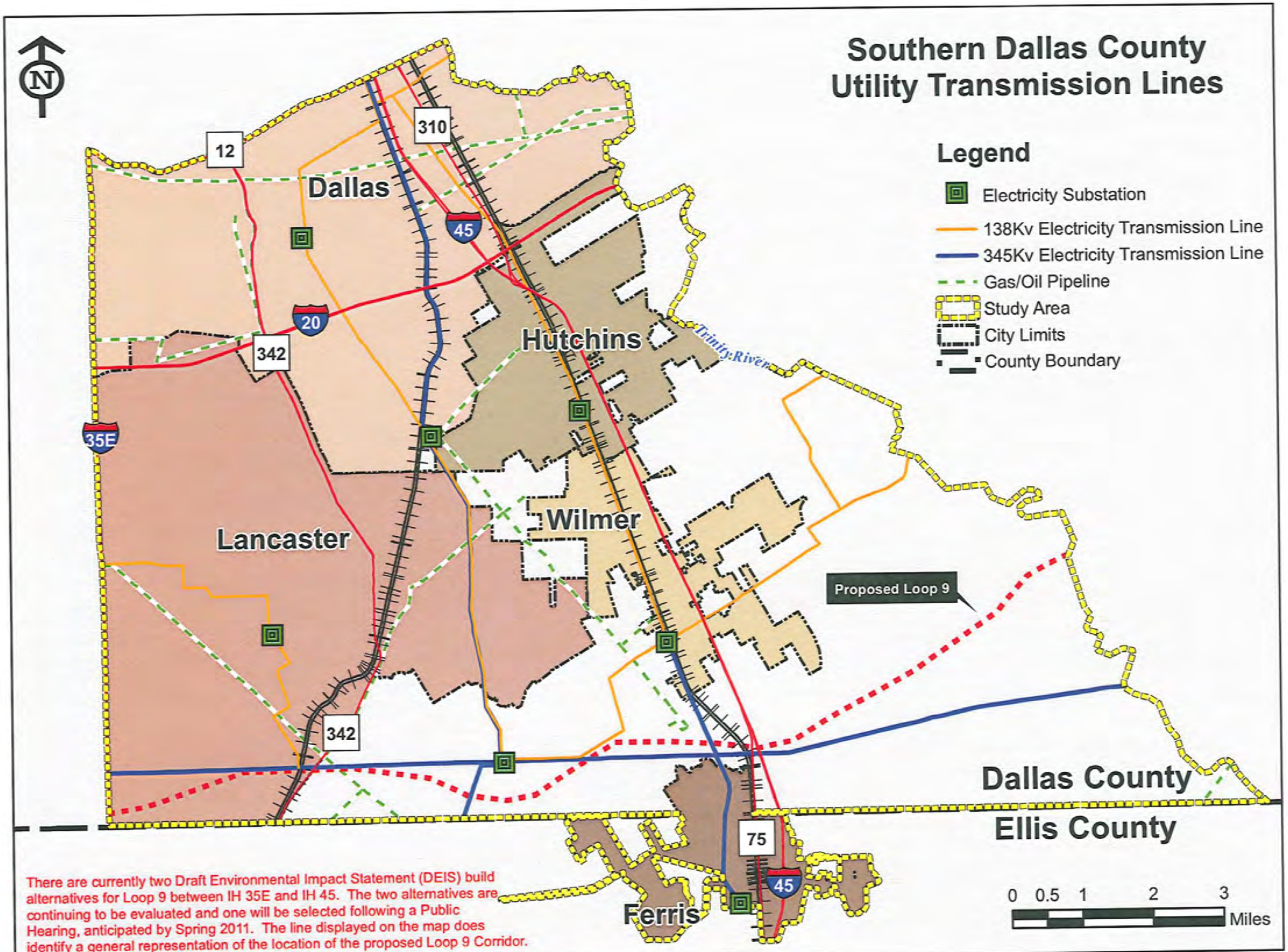
Return Form to: David Millikan, Project Manager

e-mail: dmillikan@wilbursmith.com

mail: c/o 2401 South Blvd, Dallas, TX 75215



All infrastructure shown on this exhibit is existing, unless noted otherwise.



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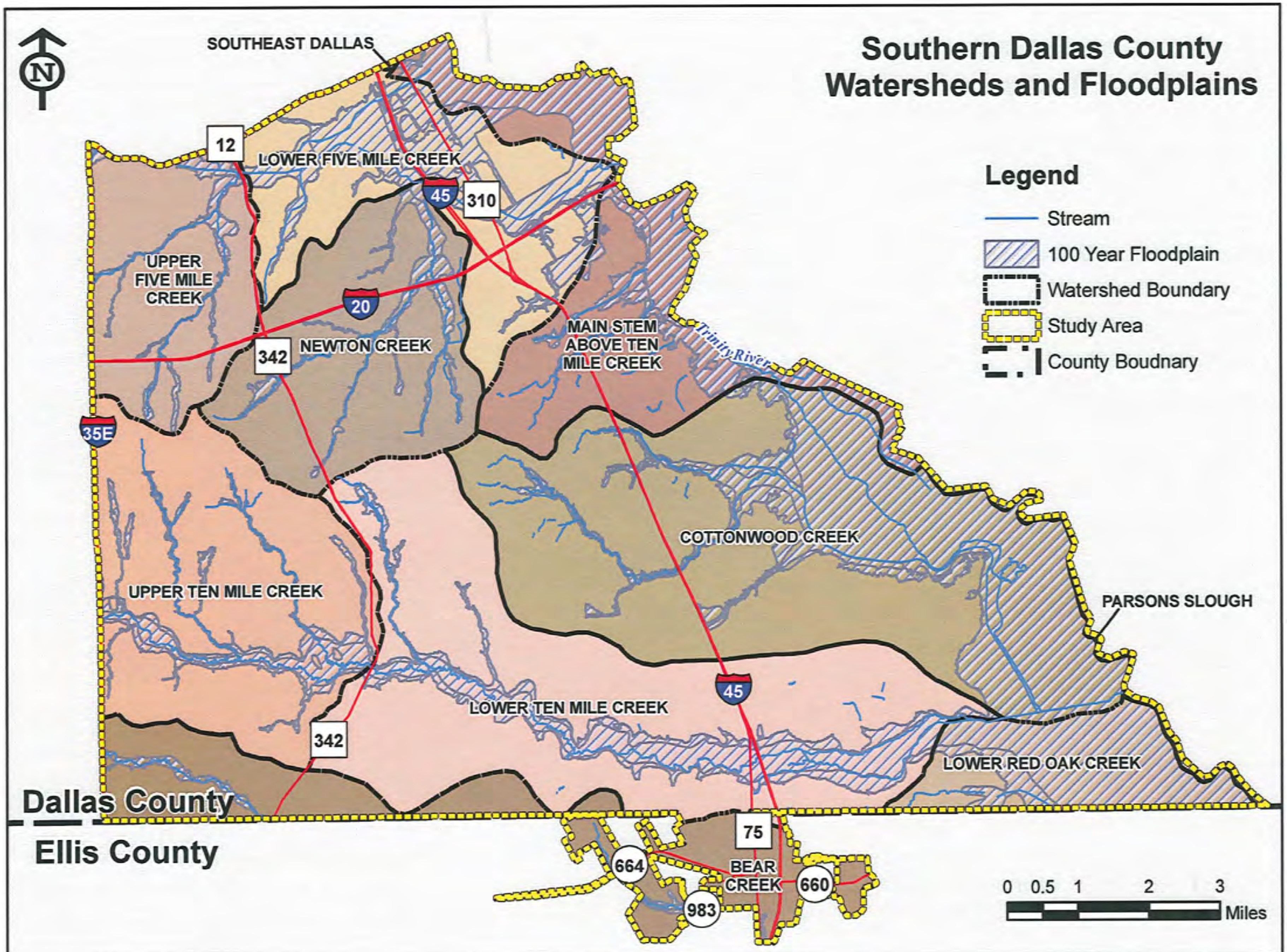

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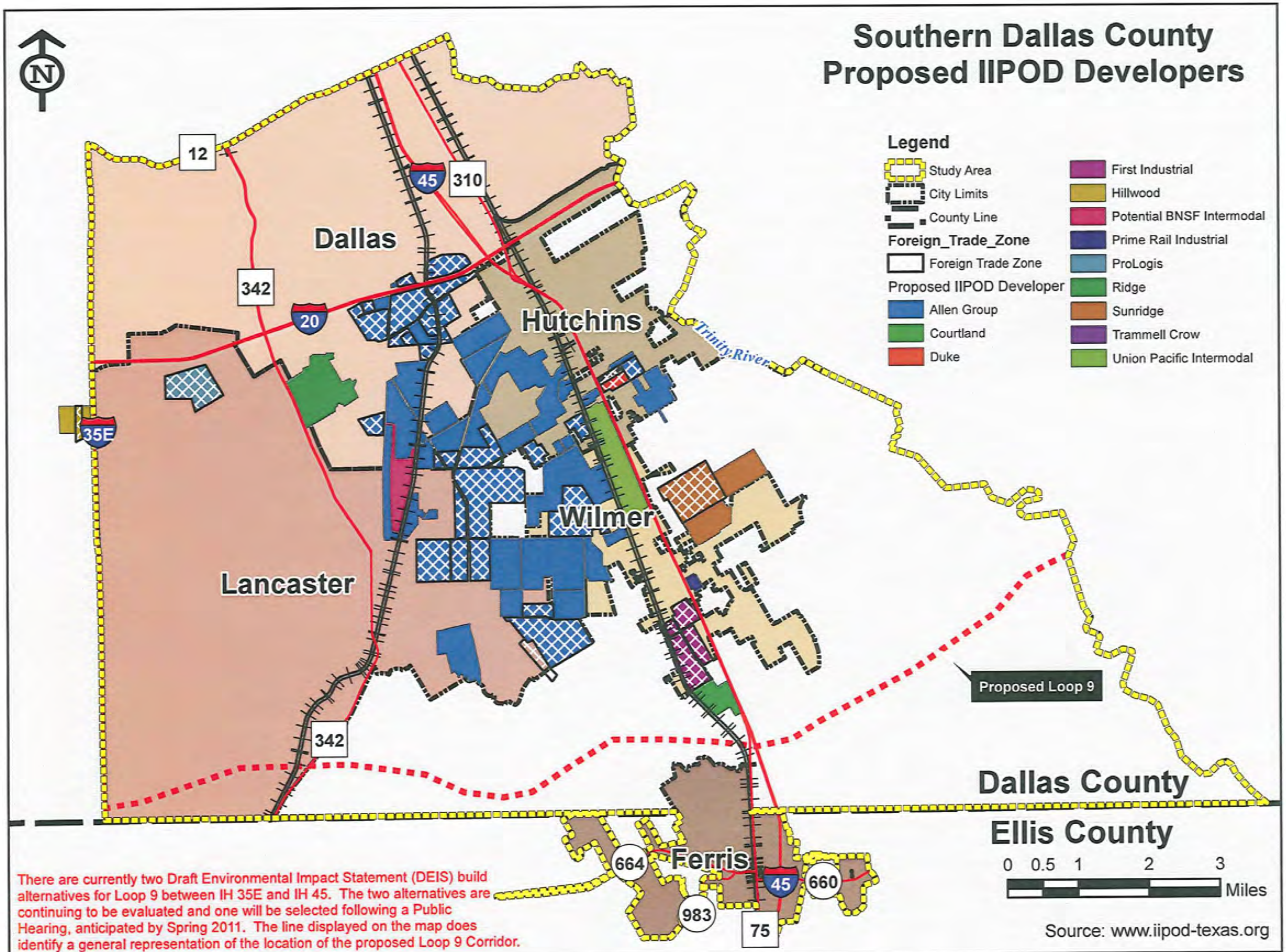
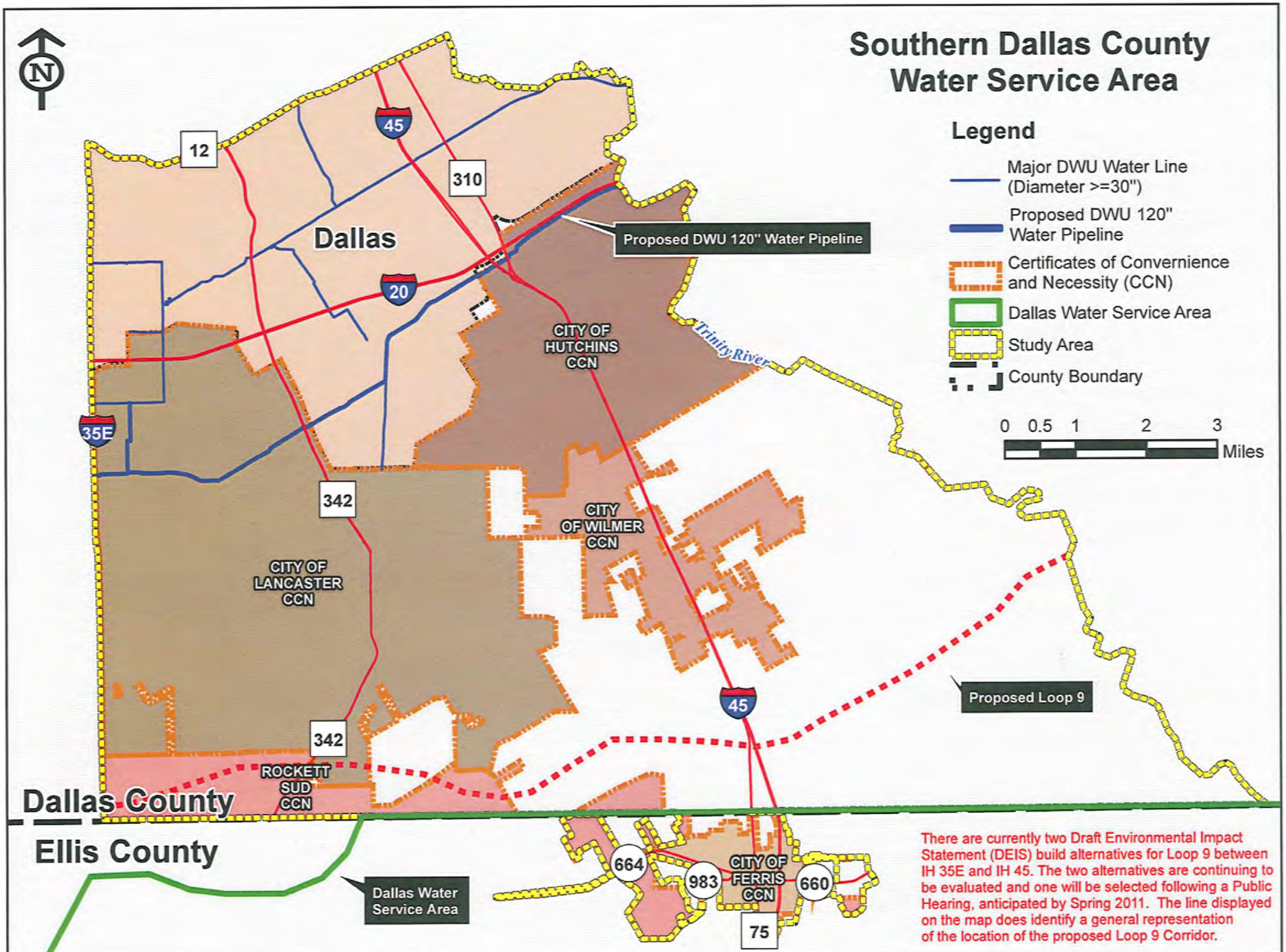
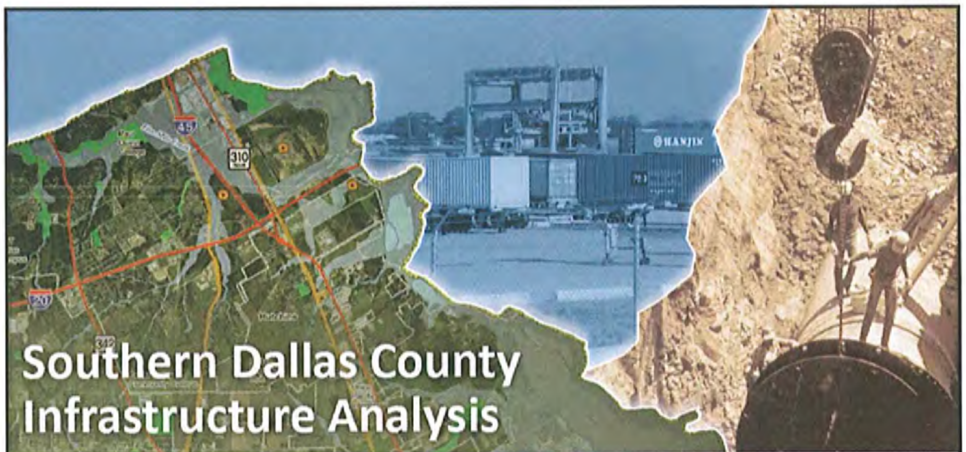


All infrastructure shown on this exhibit is existing, unless noted otherwise.



All infrastructure shown on this exhibit is existing, unless noted otherwise.
The 120" water line along the south side of IH 20 is proposed by Dallas Water Utilities. It is currently under design with right of way acquisition under way.



Southern Dallas County Infrastructure Analysis

Open House/Listening Session

October 21,2010

Lead Consultant:

Wilbur Smith ASSOCIATES

Project Partners:

Cities of Dallas, Ferris, Hutchins, Lancaster, and Wilmer,
County of Dallas, North Central Texas Council of Governments

1

Presentation Overview

- **Project Overview**
  - Meeting Objectives
  - Project Purpose
  - Study Area
  - Product
  - Phases and Schedule
- **Who is Involved**
  - Project Advisory Committee (PAC) Partners
  - Consultant Team
  - You
- **How to be Involved**
  - Meetings
  - Website
  - Contact

Southern Dallas County Infrastructure Analysis

2

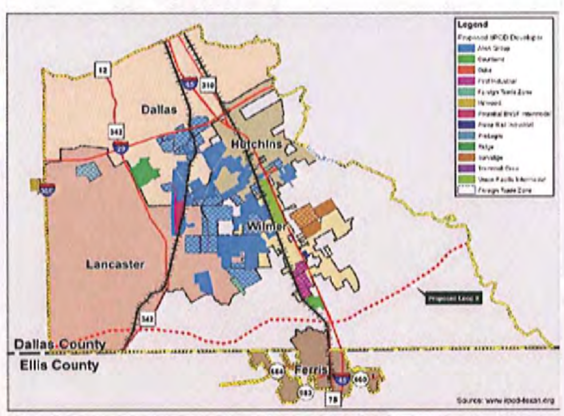
Meeting Objectives

- ➢ **Introduce project purpose**
- ➢ **Identify who is performing the study**
- ➢ **Request relevant information from attendees**

Southern Dallas County Infrastructure Analysis 2

Project Purpose

- ➢ **Support growth of a high-quality, well-integrated Inland Port in Southern Dallas County**



Southern Dallas County Infrastructure Analysis 3

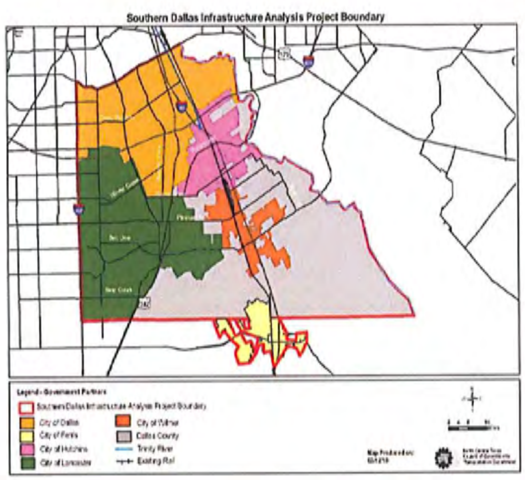
Project Purpose –Cont.

- Spur additional high-quality and orderly commercial, industrial, and residential development

Study Area

Project Limits

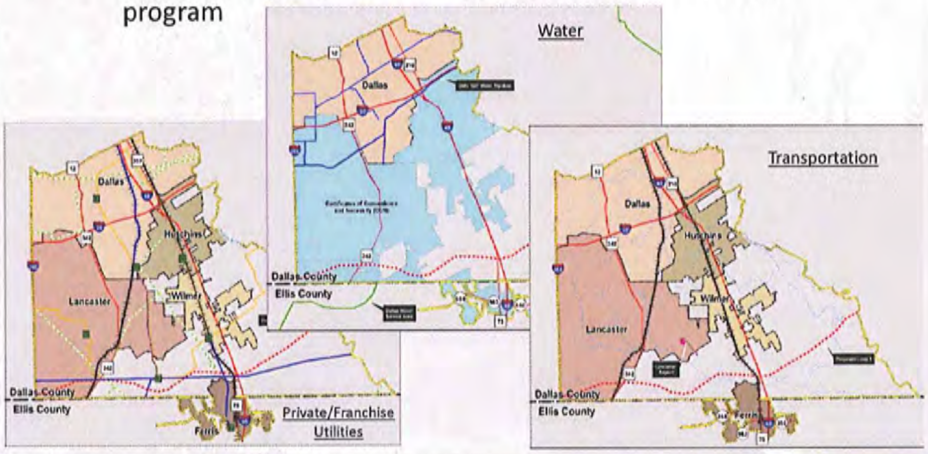
- West: Interstate 35 E
- North: Loop 12
- East: Trinity River
- South: Dallas County/ Ellis County Line (including all of Ferris)



Product

➢ Creation of an Infrastructure Analysis Report

- Provide a development framework and implementation program



Product -Purpose

- ➢ **Facilitate regionally-coordinated infrastructure planning for the jurisdictions**
- ➢ **Facilitate sound development for the region**

Product Focus

➢ **Focus on Infrastructure**
- Transportation
- Water supply
- Sanitary sewer
- Storm water/drainage
- Private/franchise utilities

This Study Will

➢ **Analyze existing Infrastructure conditions**

➢ **Develop a regionally-coordinated plan of infrastructure improvements**

➢ **Provide order-of-magnitude planning estimates of costs**

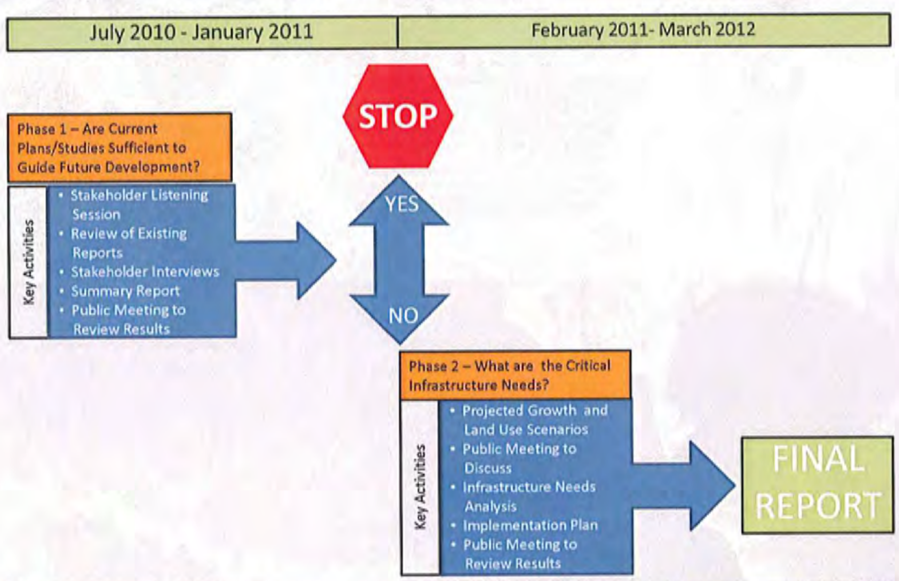
➢ **Identify potential funding sources**

➢ **Take into account your thoughts**

This Study Won't

- Propose new zoning
- Recommend new financing/taxes
- Conduct an Environmental Impact Study
- Involve any detailed engineering/design
- Require cities/counties to adopt findings
- Recommend any changes to ongoing development or currently approved projects

Project Phases



Preliminary Project Schedule

Phase 1:
July 2010 –January 2011

Listening Session – Tonight

Stakeholder Interviews
October/November

Phase I Summary Report
December 2010

Public Meeting
December 2010/January 2011

Preliminary Project Schedule

Phase 2 (if necessary):
February 2011–March 2012

Future Scenario Development – Feb/April 2011

Open House – April/May 2011

Demographic Analysis – May/July 2011

Infrastructure Needs Analysis and Staging Plan
December 2011

Public Meeting – December 2011/January 2012

Final Report – March 2012

Who Is Involved

➢ Project Advisory Committee

- City of Dallas
- City of Ferris
- City of Hutchins
- City of Lancaster
- City of Wilmer
- Dallas County
- North Central Texas Council of Governments
- Major Landowner Representative
- Developer Representative

Who Is Involved

➢ Consultant Team

- Wilbur Smith Associates
- Halff Associates
- Baker Consulting Associates
- Arredondo Zepeda & Brunz
- Insight Research Corporation
- Weinstein/Clower Associates

➢ You

- Residents
- Employers
- Employees

Who Is Involved

- **Additional Stakeholders**
  - **Transportation Agencies**
  - **Educational Institutions**
  - **Utility Providers/Agencies**
  - **Railroads**
  - **Developers**
  - **Landowners**

How to Be Involved

- **Tonight**
  - **Provide name and contact information to join mailing list**
  - **Review the exhibits to familiarize yourself with project scope and process**
  - **Provide information on additional**
    - regional plans and/or studies that have been prepared for the study area
    - natural or man-made constraints on properties within study area that should be considered in projecting future infrastructure needs through 2030

How to Be Involved

➢Tonight

- **Provide your comments on current and future infrastructure needs for the study area**
  - transportation
  - water supply
  - sanitary sewer
  - storm water/drainage
  - private/franchise utilities

How to Be Involved

➢Future Meetings

- **By signing up tonight, you will be notified for all future project public meetings**

➢Project Website

- www.nctcog.org/sdcia

➢Contact

- **David Millikan, Consultant Project Manager**
- dmillikan@wilbursmith.com
- **c/o 2401 South Blvd, Dallas, TX 75215**

Southern Dallas County Infrastructure Analysis
Open House/Listening Session
University of North Texas - Dallas Campus - Atrium
7300 Houston School Road, Dallas, TX 75241
October 21, 2010
Audience Questions

1. **How can residents participate in the project discussions and PAC meetings? How can neighborhood groups participate in meetings? There is some concern that the information will not "trickle down" to the community in a timely or complete manner. Will the PAC members have advance knowledge and inside information on future infrastructure improvements?**
   Answer: The Project Advisory Committee (PAC) and the study team are having teleconferences on a biweekly basis to inform the PAC of the study team's progress and to obtain confirmation on direction as the study proceeds. The PAC is an advisory committee to guide the consultant team in performance of the study and to distribute information back to their agency and/or constituents. Much of the information discussed on the teleconferences is preliminary in nature and not ready for distribution to the public at large. For this reason, the biweekly teleconferences are not open to public participation. The best manner for citizens and businesses to stay informed is through regularly visiting the project website (www.nctcog.org/sdcia). Contact information is also provided on the website to reach the NCTCOG project staff and the consultant team.
   Since no specific projects in specific locations are being developed in this study, no individual (PAC member or other) should have advance knowledge about the location or size of any specific infrastructure improvements.

2. **Will public meetings be used only to inform the citizens of decisions that have already been made leaving the community out of the decision –making process? This topic was raised several times during the discussion period.**
   Answer: Just as the Open House/Listening Session on October 21 was provided to inform and seek information from the public, the goal of the study is to provide updates to the public at critical times and to seek the public's input prior to finalizing recommendations. The Public Meeting still to be held during Phase 1 will present the study team's findings regarding the sufficiency of the current plans/studies to guide future development. The public comments received at this event will be considered in preparation of the Historic Document Review Summary Report which is the conclusion of Phase 1.

   If the project proceeds to Phase 2, there will be two additional Public Meetings. One will occur to present the various land use scenarios developed by the study team to use in determining future infrastructure needs. Public comments will be considered by the study team in determining which scenario will be used in the infrastructure needs analysis. The study team will use this scenario to estimate the amount and cost of future infrastructure to support the projected growth through 2030. This information will be presented at a second Public Meeting during Phase 2. Upon receipt of comments at this Public Meeting, the study team will prepare the final report incorporating the comments received. The final report will be made available to the public. The goal of this study is not to define specific improvements in specific locations, but to identify the quantity and anticipated costs of infrastructure improvements and to identify the general area in which the improvements are needed. As information is developed as outlined above, it will be shared with the public requesting comments and feedback prior to finalizing study team recommendations.

3. **Time is of the essence to develop the region if it wants to be competitive with Alliance and with other areas of the state and the country. Previous planning efforts have failed after getting embroiled in politics. Is there a united political approach to move the study and development forward? Are elected officials supportive of the process?**
   Answer: The previously proposed study for this area was more comprehensive and included planning in areas beyond infrastructure needs. When the earlier study was proposed, there was a lack of agreement on what should be done and some misinformation communicated on what was proposed to be done. For these reasons, the earlier study attempt was halted.
   During the two year period since the earlier study attempt, NCTCOG worked closely with local officials and interested parties in the study area to define the scope of a study that will be beneficial to and agreeable to all parties. The Southern Dallas County Infrastructure Analysis project is based upon a common understanding and written agreements between NCTCOG and the Cities of Dallas, Ferris, Hutchins, Lancaster, and Wilmer and Dallas County. This commitment and participation are evidence of local elected official support of this study.

4. **Will there be an environmental impact statement for such a large study? Concern was stated about holding all future improvements and developments to the same environmental standards and not allowing some jurisdictions to have lax standards in order to attract more development while diminishing environmental quality for residents.**
   Answer: This study, if it proceeds with Phase 2, is a strategic infrastructure needs analysis, not a detailed work program that must be adopted. It will identify the quantity and anticipated costs of infrastructure improvements and identify the general area in which the improvements are needed. If local jurisdictions or other entities choose to advance any of these infrastructure improvements, environmental investigations (if necessary) would be incorporated at that time.

5. **Concern was expressed that some areas have been negatively impacted by the location of landfills, sewage treatment plants, and poor drainage. This is compounded by concern that large, well-funded operations will get deals with local governments that result in development that is not a good neighbor to existing residents and neighborhoods.**
   Answer: Existing local, regional, and state agencies have authority to regulate locations of public and private development. This study, if it proceeds to Phase 2, will identify the quantity and anticipated costs of infrastructure improvements necessary to support anticipated growth of the

study area through 2030 and identify the general area in which the improvements are needed. The efforts on this study will be at a high-level needs analysis. Decisions of specific locations for any of the improvements will be made in the future by existing local, regional, and state agencies which have authority over these matters.

6. **How long will it take for the first projects recommended by the study "to turn dirt"?**
Answer: This study is a strategic needs analysis, indicating general improvements and costs. It is not for project specific planning or design and will not produce any projects ready for construction (turn dirt). It is anticipated that the study's recommendations for future infrastructure improvements will be advanced by appropriate agencies and the private sector into future design and construction projects.

7. **Can citizens review the list of data and documents being reviewed by the consultant?**
Answer: Yes. A list of the documents being reviewed by the study team will be posted to the website along with the information presented to the public at the Open House/Listening Session on October 21, 2010.


10/21/2010


10/21/2010


10/21/2010


10/21/2010

Public Meeting #2 Materials

Southern Dallas County Infrastructure Analysis

Phase 1 Public Meeting
Tuesday, February 8, 2011
UNT-Dallas Campus

Meeting Summary

I. Meeting Objectives

The Phase 1 Public Meeting was designed to accomplish the following objectives: review the project purpose, present Phase 1 Historic Document Summary Report and its findings, review Phase 2 project scope, and request comments and relevant information from attendees.

II. Meeting Announcement Process

Notice of the meeting was distributed as follows:

- Postcards were mailed on January 28, 2011 to 165 stakeholders on the Master Mailing List, including Project Advisory Committee (PAC) members, elected officials (city, county, state and federal), key government staff, large landowners, developers, neighborhood associations, civic organizations, and other interested individuals without email addresses. Electronic postcards were sent on January 31 to 95 individuals on the Master Mailing List with email addresses.
- Electronic flyers (suitable for printing) were distributed to PAC members for distribution within their community. An English language version and a Spanish language version were both prepared and distributed.
- Notice was posted on the following websites:
    - NCTCOG
    - City of Dallas
    - City of Wilmer
- Electronic notice was sent to the following media entities:
    - Dallas Morning News
    - Ellis County Press (Ferris)
    - Waxahachie Daily Light
- The League of Women Voters sent an e-blast to its constituents on ????

III. Meeting Location and Format

The meeting was held on the UNT-Dallas campus in the Building I atrium, located at 7300 Houston School Road, Dallas, TX 75241. Within the City of Dallas Limits, the name of Houston School Road has been changed to University Hills Boulevard. This street name will be used in future notices if the UNT-Dallas campus is utilized. The Public Meeting was scheduled from 6:30 pm – 8:30 pm. Set-up was completed at 6:00 pm to accommodate early arrivals. The format was Open House style, with exhibits (display boards) set-up throughout the facility and seating areas for attendees to sit and write comments if desired. The five exhibits illustrated the geographic limits of existing local and regional infrastructure plans in the following areas:

- Transportation Infrastructure,
- Water Distribution Infrastructure,
- Wastewater Collection Infrastructure, and
- Storm Water Infrastructure.

Project team members staffed sign-in tables at each of the two entrances to the facility. Each attendee was provided a comment form. PAC and project team members were available at each exhibit to answer questions and listen to citizen comments.

The auditorium directly off the atrium was used for a presentation which is further described below. The presentation started at 7:00 pm. It concluded about 7:35 pm. Discussion between the audience members and project team members continued in the until approximately 8:00 pm.

IV. Attendance

Individuals began arriving slightly before 6 pm. Twelve (12) individuals attended the Phase 1 Public Meeting, along with five of the nine PAC members and nine (9) project team members.

V. Presentation

David Millikan, consultant Project Manager with Wilbur Smith Associates, began the meeting by welcoming the attendees and providing a recap of project activities since the Open House/Listening Session on October 21, 2010.

Millikan went through a presentation that included a Project Overview (study area, meeting objectives, project purpose, where we are, Phase 1 draft report, Phase 2 will and won't, and what's next), and explained how to be involved (comments, meetings, website, and contact information). A copy of the presentation is included in the attachments to this meeting summary report.

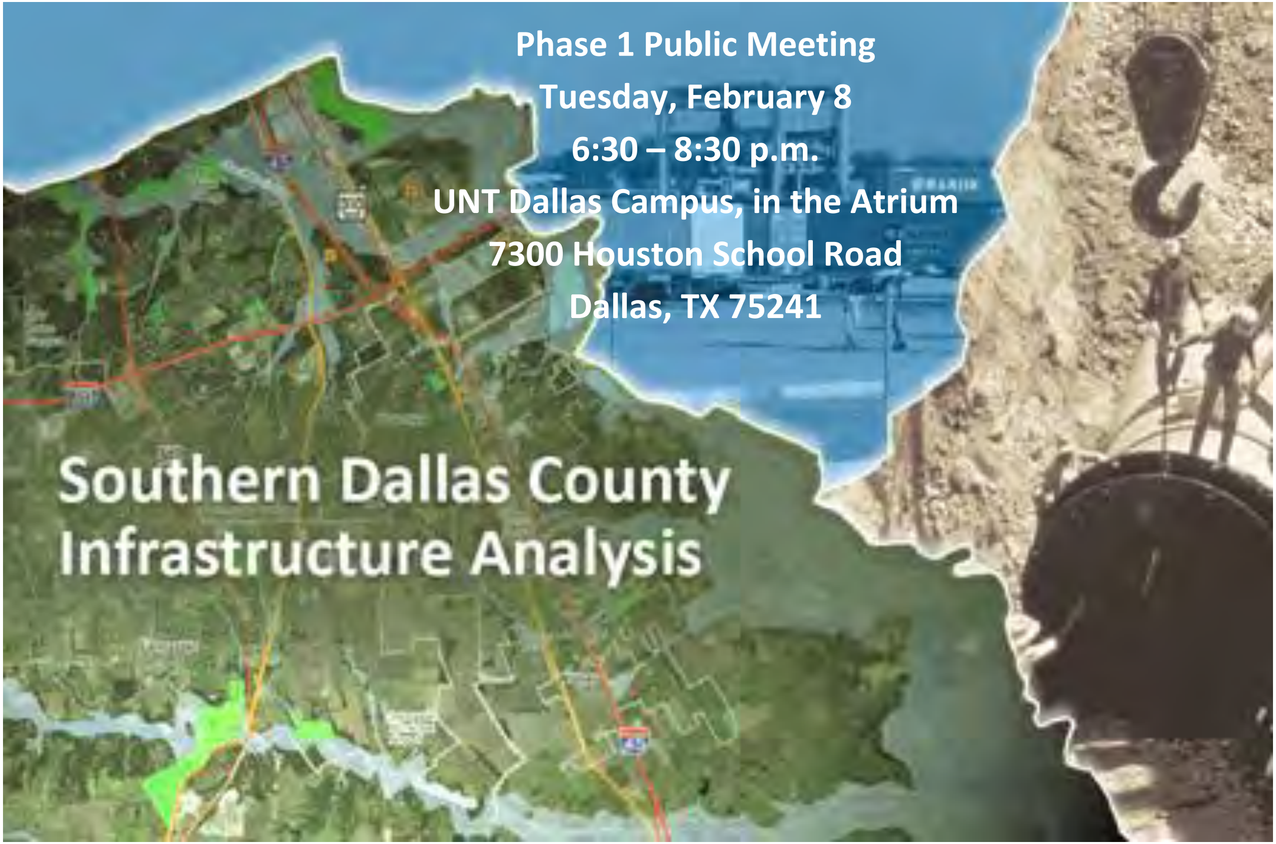
He stated that the project is approaching completion of Phase 1 with this Public Meeting and presentation of the draft Historic Document Summary Report. Upon completion of the Public Meeting, finalizing the Historic Document Summary Report to address comments, and approval of the Summary Report by the Project Advisory Committee, the PAC will determine whether the project should proceed into Phase 2 or not.

Mr. Millikan then presented an overview of the draft Historic Document Summary Report. The conclusion is that there is no comprehensive framework to address the needs of the entire study area through 2030. The findings and reasons for this conclusion are identified in the draft report. The draft report recommends that Phase 2 should proceed.

The presentation included an overview of what Phase 2 will include and what it does not include. A schedule of these activities was presented. Mr. Millikan stressed the need for citizens to participate in the study process and described ways for the public to be involved. No (0) written comments were received from participants at the Phase 1 Public Meeting. The Open House ended at 8:15 pm.

VI. Attachments

- Phase 1 Public Meeting Announcement Postcard
- Phase 1 Public meeting Announcement Flyer
    1. English language version
    2. Spanish language version
- Phase 1 Public Meeting Comment Form
- Phase 1 Public Meeting Exhibits
- Phase 1 Public Meeting Presentation
- Selected Phase 1 Public Meeting Photographs



Project Partners:

Cities of Dallas, Ferris, Hutchins, Lancaster, Wilmer

North Central Texas Council of Governments, Dallas County

What infrastructure is needed to help Southern Dallas County and the Inland Port area prosper?

Come to the **Phase 1 Public Meeting** presenting the Draft Historic Document Summary Review and tell us what you think are the critical INFRASTRUCTURE issues and needs.

NCTCOG
P.O. Box 5888
Arlington, TX 76005-5888

Open House style meeting,
Tuesday, Feb. 8, 6:30 - 8:30 pm
(presentation at 7 pm).

Address label

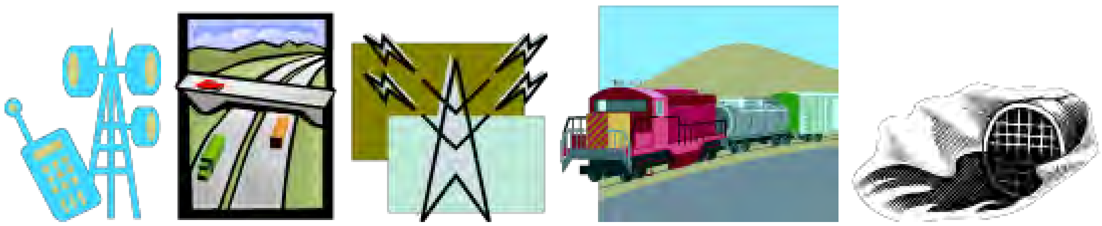
A copy of the draft report will be posted on the Project Website one-week prior to the Public Meeting (www.nctcog.org/sdcia)

For questions on the meeting, special accommodations due to a disability, or language translation, contact Alva Baker at (214) 428-6432 or by email at Bcaabaker@aol.com, at least 72 hours prior to the meeting. Reasonable accommodations will be made.

Para preguntas, arreglos especiales debido a una discapacidad o para servicio de interpretación, por favor comuníquese con Jorge Barrero-Rojas al (817) 915-3457 o por correo electrónico: jbarrerorojas@wilbursmith.com por lo menos 72 horas antes de la junta. Se cumplirán arreglos razonables.

Southern Dallas County Infrastructure Analysis

What infrastructure is needed to help Southern Dallas County and the Inland Port area prosper?



- View Exhibits
- Ask questions and discuss project with team members
- Tell us what you think are the critical INFRASTRUCTURE issues and needs
- Presentation of Draft Historic Document Summary Review at 7:00 pm

(Draft report will be posted on the Project Website one week prior to the Public Meeting at www.nctcog.org/sdcia)

PUBLIC MEETING

Tuesday, February 8, 2010
6:30 pm – 8:30 pm

UNT Dallas Campus, in the Atrium
7300 Houston School Road
Dallas, TX 75241

Southern Dallas County Infrastructure Analysis Project Partners
Cities of Dallas, Ferris, Hutchins, Lancaster, and Wilmer
Dallas County, and North Central Texas Council of Governments

For questions on the meeting, special accommodations due to a disability, or language translation, contact Alva Baker at (214) 428-6432 or by email at bcaabaker@aol.com, at least 72 hours prior to the meeting. Reasonable accommodations will be made.

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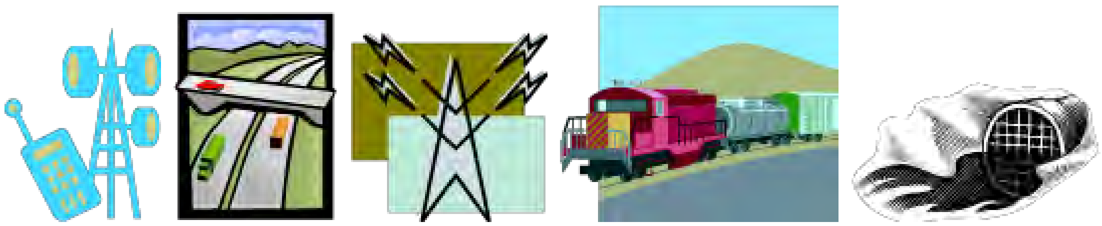
El Análisis de Infraestructura del sur de Condado de Dallas

¿Qué infraestructura se necesita para ayudar a que el sur del Condado de Dallas y el Puerto Interior prosperen?



- Observe las Exhibiciones
- Haga preguntas a los miembros del equipo de trabajo
- Cuéntenos cuáles cree que son los problemas y las necesidades más críticas a nivel de infraestructura
- Presentación del borrador del documento "Historic Document Summary Review" a las 7:00 pm

(El borrador del reporte será publicado en la página web del proyecto una semana antes de la Reunión Pública en www.nctcog.org/sdcia)

REUNION PÚBLICA

Martes, Febrero 8, 2011
6:30 pm – 8:30 pm

Campus de la Universidad del Norte de Texas (UNT)
Dallas Campus, en el Atrio
7300 Houston School Road, Dallas, TX 75241

Socios del Proyecto para el Análisis de Infraestructura del sur de Condado de Dallas
Ciudades de Dallas, Ferris, Hutchins, Lancaster, and Wilmer
Condado de Dallas, y Consejo de Gobiernos del Norte-Centro de Texas

Para preguntas, arreglos especiales debido a una discapacidad o para servicio de interpretacion, por favor communiquese con Jorge Barrero-Rojas al (817) 915-3457 o por correo electronico: jbarrerorojas@wilbursmith.com por lo menos 72 horas antes de la junta. Se cumpliran arreglos razonables.

Comment Form

Southern Dallas County Infrastructure Analysis

February 8, 2011 Public Meeting

About the Study

1. Do the Public Meeting presentation and draft Historic Document Summary Report clearly state the purpose and scope of the Phase 1 study?

2. Upon review of the draft Historic Document Summary Report, are there any Phase 1 elements that you feel were not adequately addressed? If so, please explain.

3. For use during Phase 2, please provide any comments about the issues/needs in the study area with regard to supporting future growth for the following:

transportation	
water supply	
sanitary sewer	
storm water/drainage	
private/franchise utilities	
other (identify)	

Please turn over

About the Study – Cont'd.

Additional information can be found on the project website: www.nctcog.org/sdcia. Use the remainder of this space for additional comments about the Public Meeting presentation or the draft Historic Document Summary Report.

About the Meeting

1. Was today's meeting location convenient and adequate? _____ Yes _____ No

   If No, how could it be improved? ____

2. On a scale of 1 (poor) to 10 (excellent),
   a. How well were the objectives of today's meeting communicated? ____________________
   b. How well were the objectives achieved? _________________
   c. How would you rate today's meeting in terms of opportunities for you to provide input on the information received? _________________

3. How could the meeting process be improved? ____
   ____

Thank you!

If you provided your name and e-mail address when you entered the meeting, you do not need to complete the information below. If you did not and would like to be added to the mailing list please provide the following information (Optional):

Name (please print): __________________________ Mailing Address: __________________________

E-mail Address: ______________________________ _______________________________________

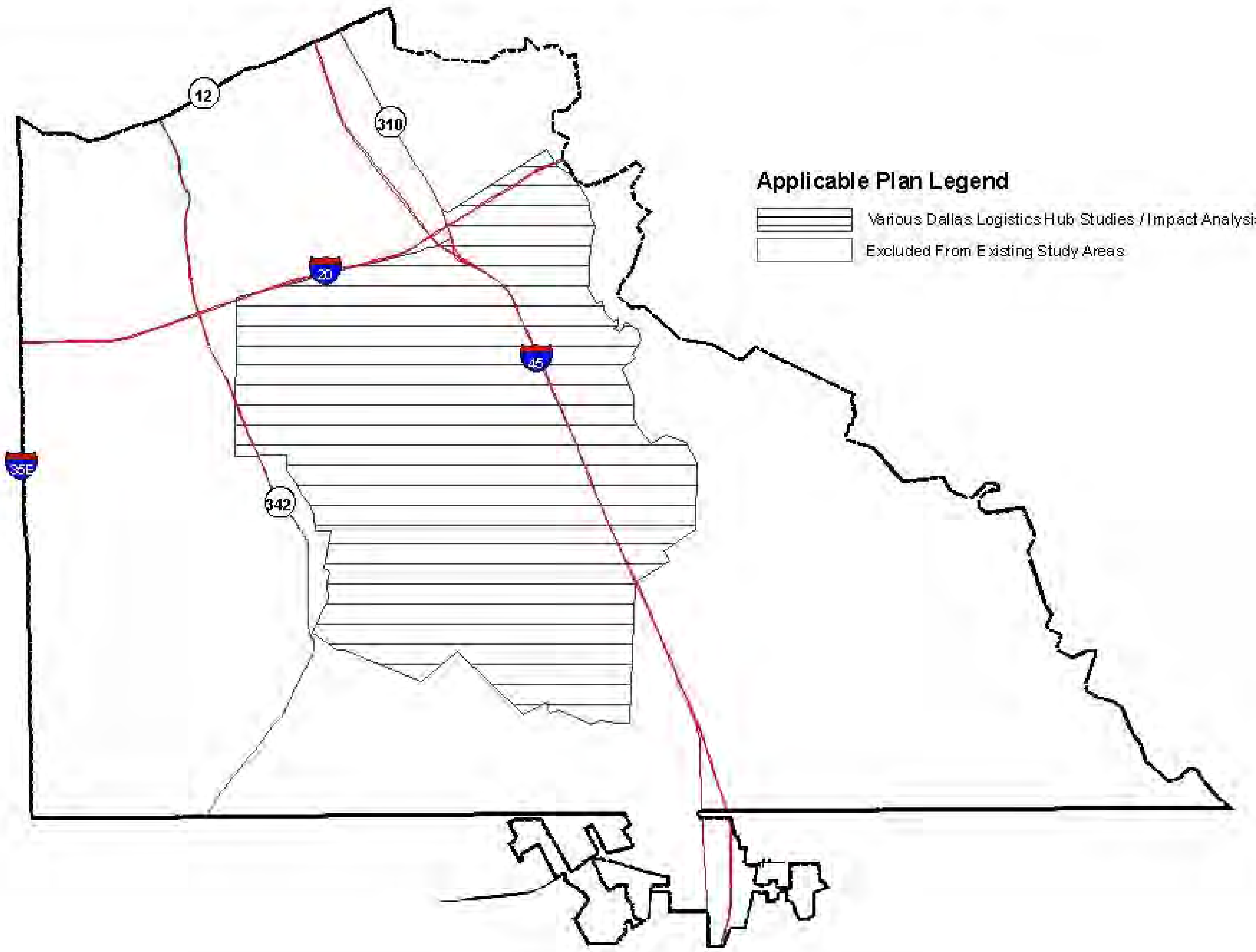
Please return completed form to:

David Millikan, Project Manager

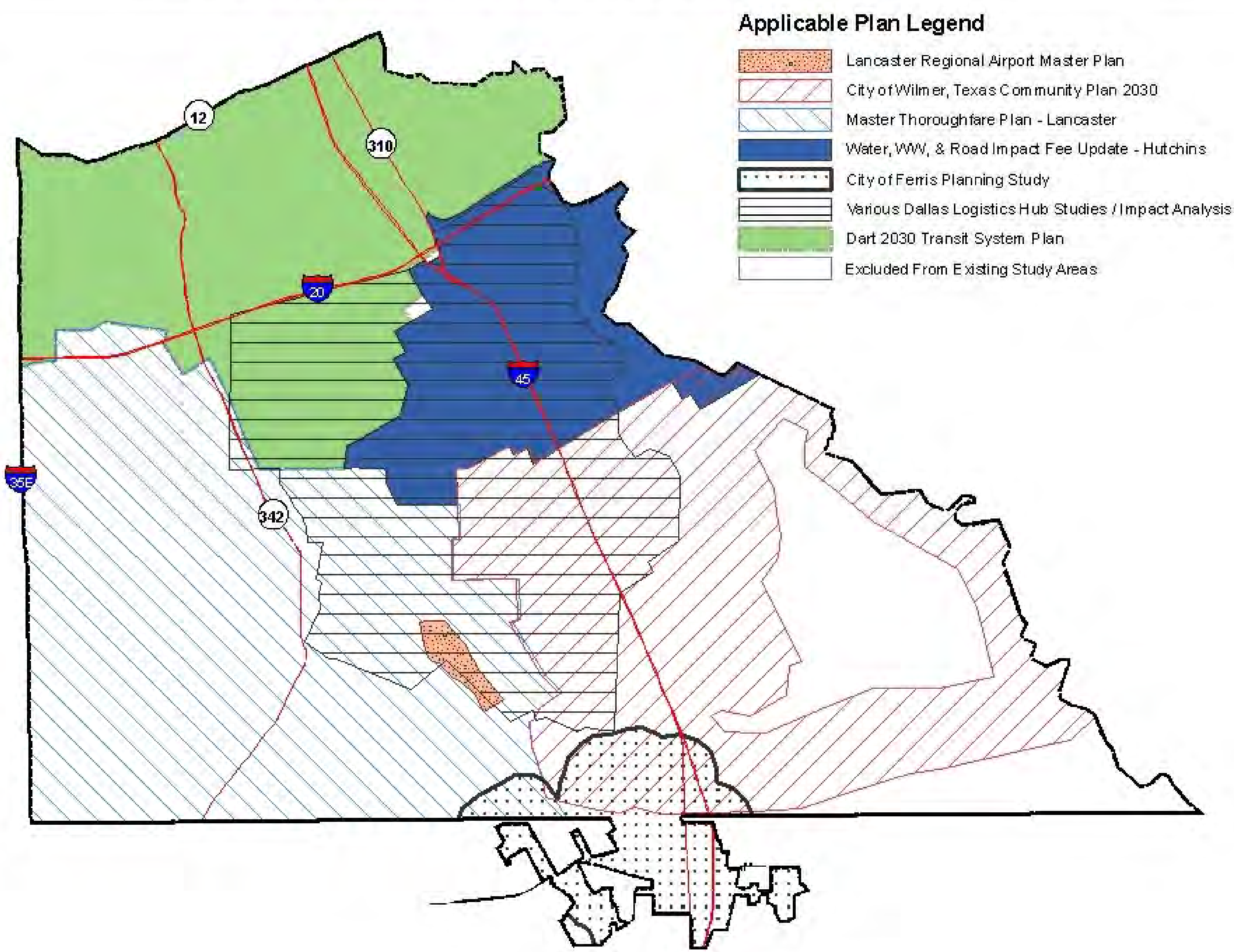
Email: dmillikan@wilbursmith.com

Mail: c/o 2401 South Blvd, Dallas, TX 75215

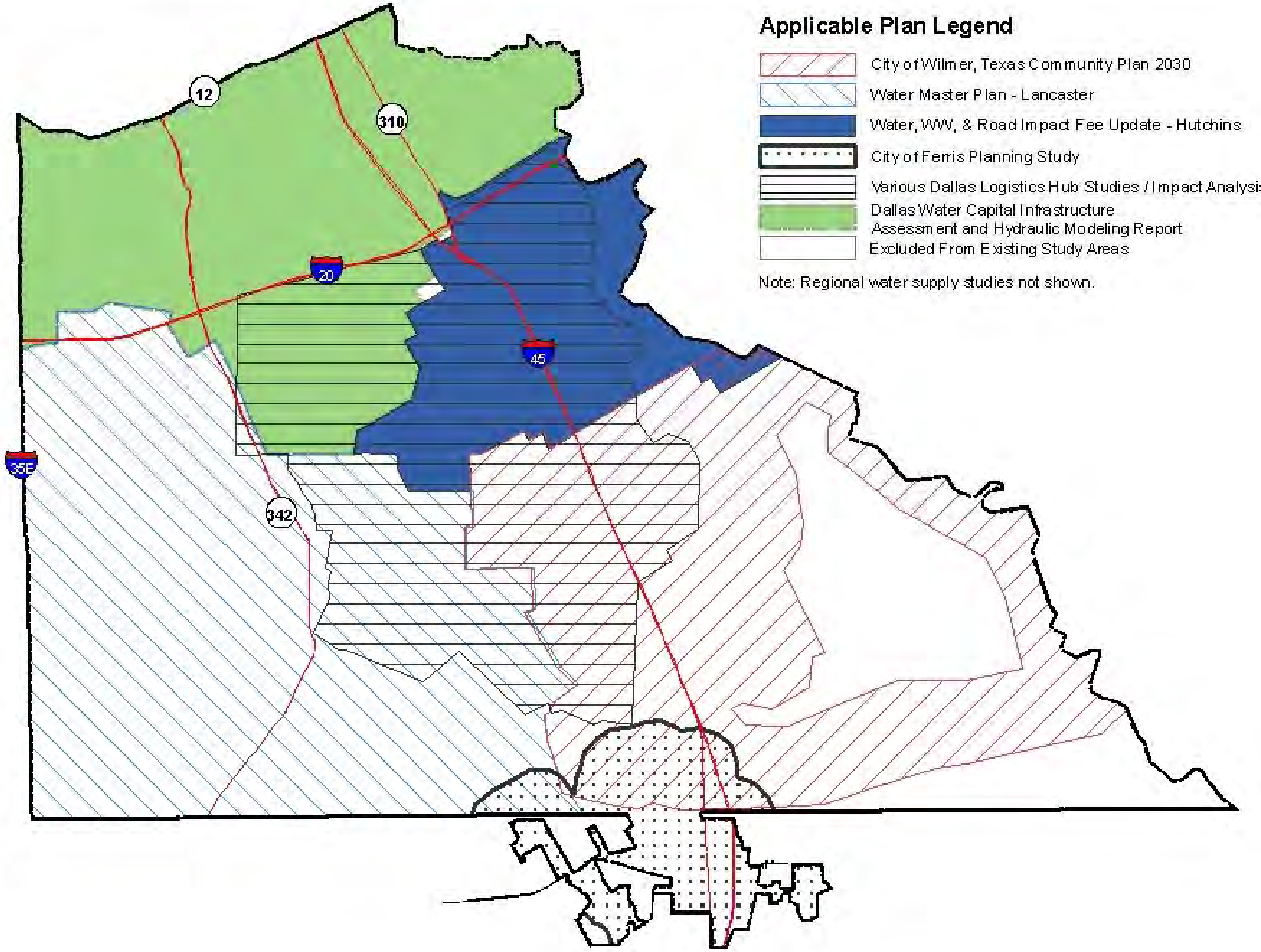
STUDY PLANNING AREAS - STORMWATER INFRASTRUCTURE



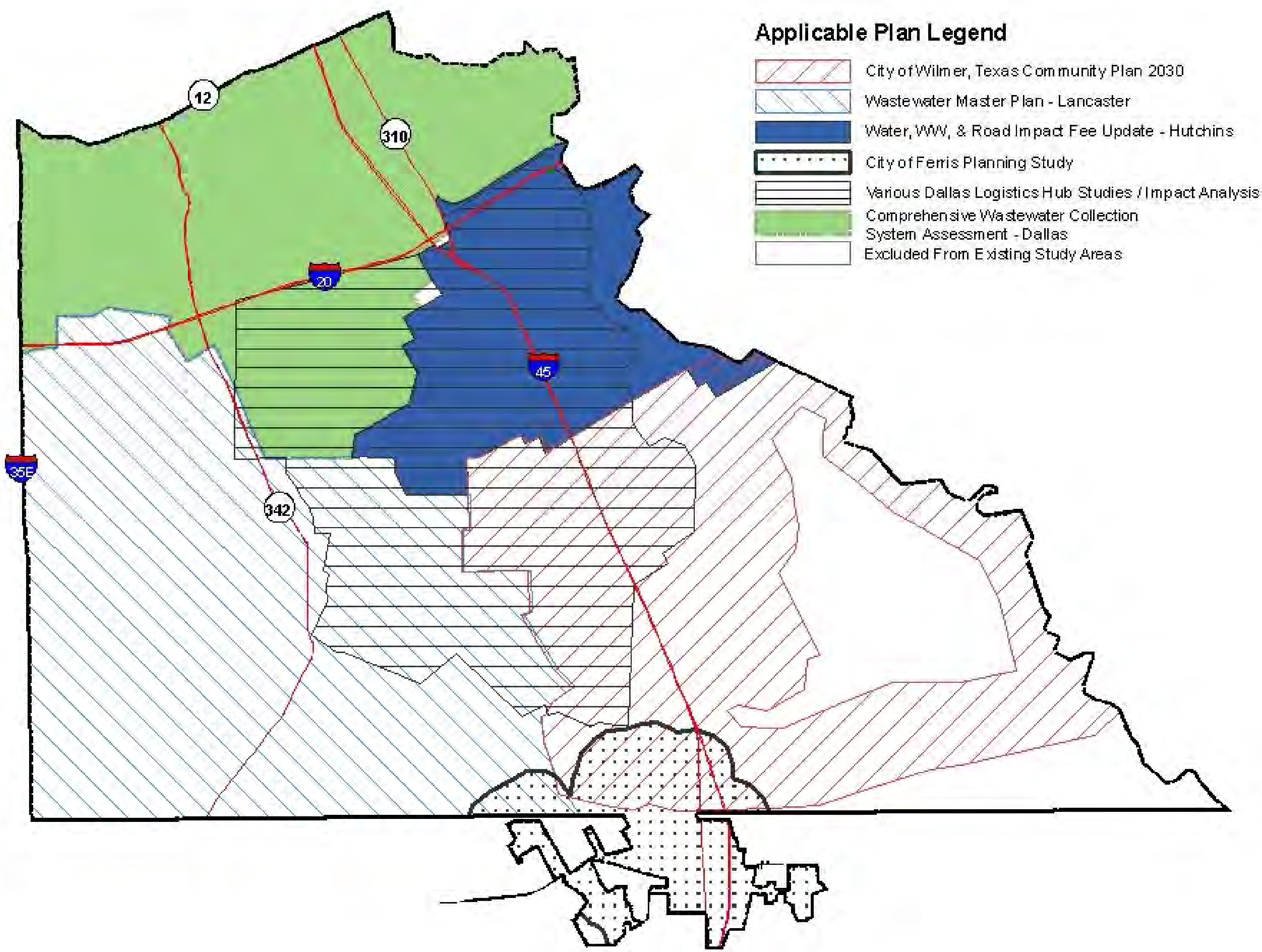
STUDY PLANNING AREAS - TRANSPORTATION INFRASTRUCTURE

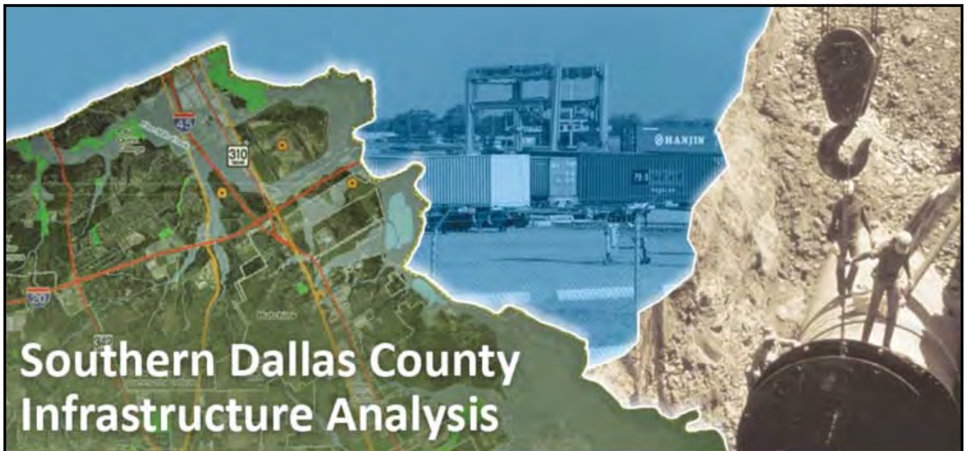


STUDY PLANNING AREAS - WATER DISTRIBUTION INFRASTRUCTURE



STUDY PLANNING AREAS - WASTEWATER COLLECTION INFRASTRUCTURE





Southern Dallas County Infrastructure Analysis

Phase 1 Public Meeting

February 8, 2011

Lead Consultant:

Wilbur Smith ASSOCIATES

Project Partners:

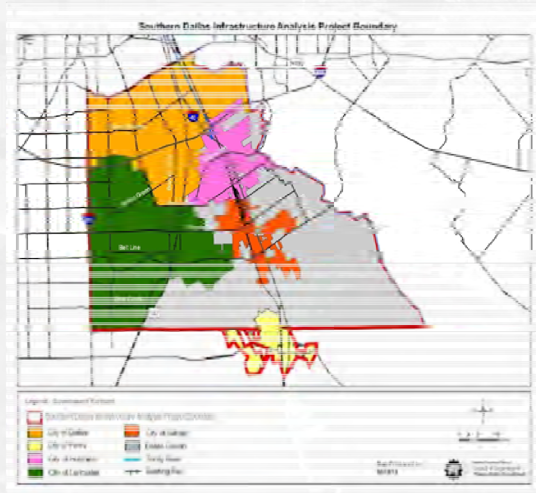
Cities of Dallas, Ferris, Hutchins, Lancaster, and Wilmer,
County of Dallas, and North Central Texas Council of Governments

Presentation Overview

- **Project Overview**
  - Study Area
  - Meeting Objectives
  - Project Purpose
  - Where We Are
  - Phase 1 Draft Report
  - Phase 2 Will and Won't
  - What's Next
- **How to be Involved**
  - Comments
  - Meetings
  - Website
  - Contact

Study Area

- **Project Limits**
  - West: Interstate 35 E
  - East: Trinity River
  - North: Loop 12
  - South: Dallas County/ Ellis County Line (including all of Ferris)

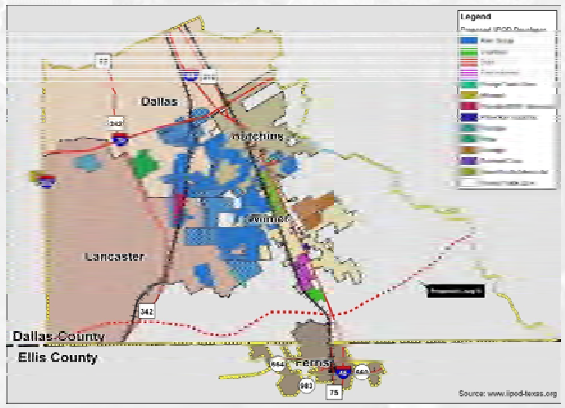


Meeting Objectives

- **Review of project purpose**
- **Present Phase 1 Report and findings**
- **Phase 2 project scope**
- **Next steps**

Project Purpose

- Support growth of a high-quality, well-integrated Inland Port in Southern Dallas County



Project Purpose

- Spur additional high-quality and orderly commercial, industrial, and residential development

Project Purpose

➢ Focus on Infrastructure

- Transportation
- Water supply
- Sanitary sewer
- Storm water/drainage
- Private/franchise utilities

Where We Are

Phase 1:
July '10 - February '11

Listening Session - October '10

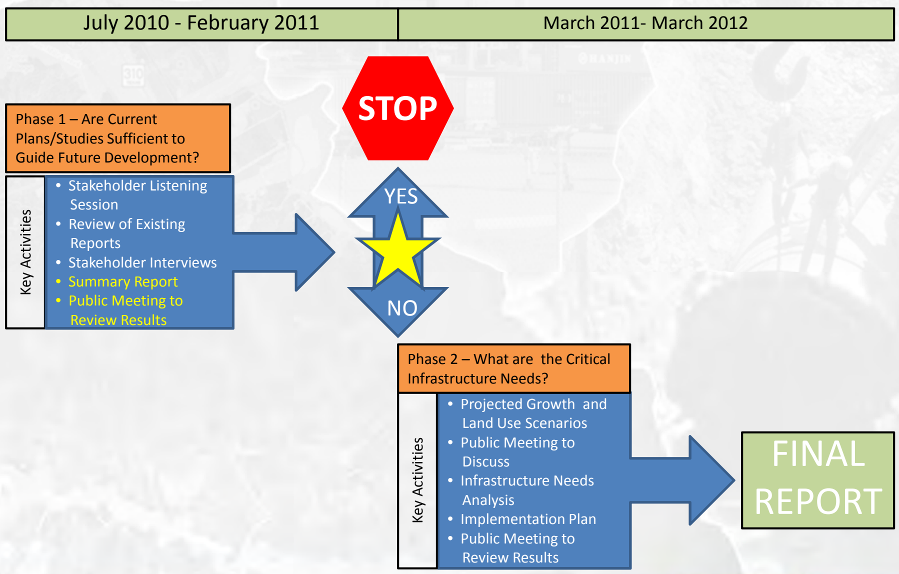
Existing Document Review
September '10 - December '10

Stakeholder Interviews
October '10 - January '11

Phase I Summary Report
December '10 - January '11

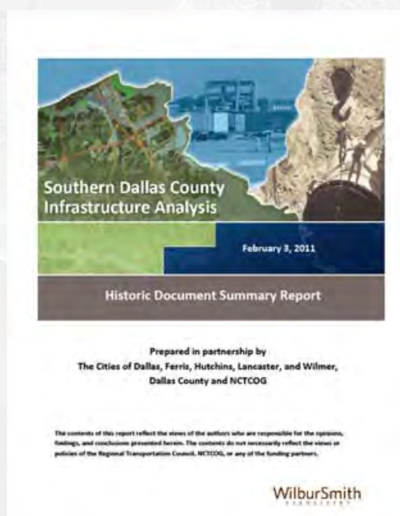
Public Meeting
February 8, 2011

Where We Are



Phase 1 Draft Report

- **Report Structure**
  - **Project Purpose**
  - **Project Background**
  - **Historic Document Review**
  - **Stakeholder Interview Summary**
  - **Public Outreach Activities**
  - **Applicability of Existing Documents**
  - **Findings and Conclusions**
  - **Appendix**



Phase 1 Draft Report

➢ Historic Document Review

- **Reviewed 45 Existing Plans and Studies**
- **Prepared or Updated Between 2002 and 2010**

Examples:

Agency	Document Title	Date Completed or Adopted	Planning Horizon Year
City of Dallas	Southern Dallas County Texas: A Strategy for Developing the Southern Dallas Logistics Hub ^	Jun-06	Not Defined
City of Ferris	City of Ferris Planning Study: Volume 1 ^	Dec-07	2027
City of Hutchins	Water, Wastewater, & Road Impact Fee Update ^	Apr-10	Build-out
City of Lancaster	Master Thoroughfare Plan* ^	Apr-06	2025
City of Wilmer	City of Wilmer Water and Wastewater Capital Improvement Plan* ^	2010	2030
Dallas County	Dallas County I-45 Waterline Project (Preliminary Draft)* ^	2008	Not Defined
NCTCOG	Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area, 2009 Amendment ^	2009	2030

Phase 1 Draft Report

➢ Stakeholder Interviews

- **7 Funding Partners**
- **27 Additional Phase 1 Stakeholders Contacted**
  (Major Landowners, Developers, Transportation & Utility Agencies)
- **Citizen and Neighborhood Group Round Table**
- **9 Additional Phase 2 Stakeholders Identified**
  (Educational Institutions and Additional Utility Providers)
- **Benefits**
  - **Received additional studies and plans**
  - **Additional knowledge of community issues**
  - **Direct outreach to individuals and groups**

Phase 1 Draft Report

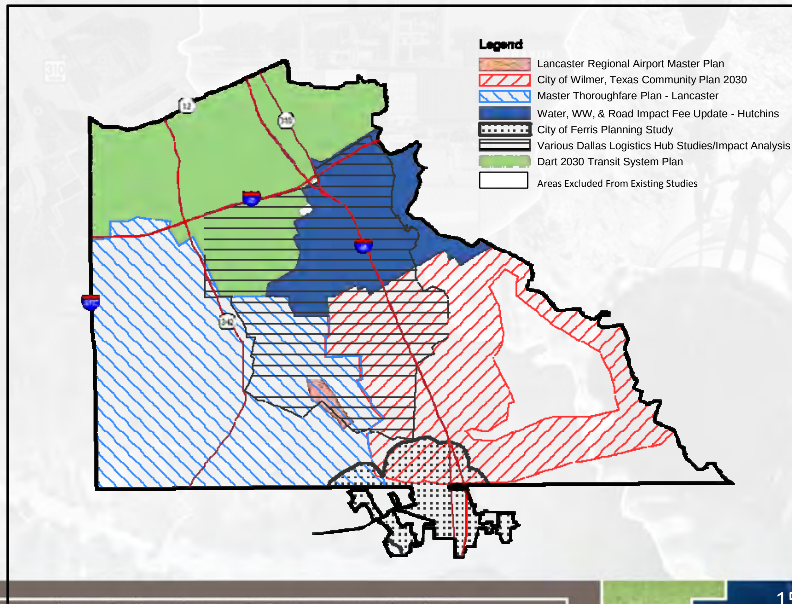
- **Public Outreach**
  - Project Website
  - Open House/Listening Session
    - October 21, 2010
  - Public Meeting
    - February 8, 2011
  - Benefits
    - Additional knowledge of community issues
    - Interaction with individuals and groups

Phase 1 Draft Report

- **Applicability of Existing Documents**

  Transportation
    - Mobility 2030: The Metropolitan Transportation Plan
    - 2011 – 2014 Transportation Improvement Program
    - America's Global Logistics Center
    - DART 2030 Transit System Plan
    - Municipal Plans
    - Dallas Logistics Hub Plans
    - Lancaster Regional Airport Plans

Transportation Infrastructure

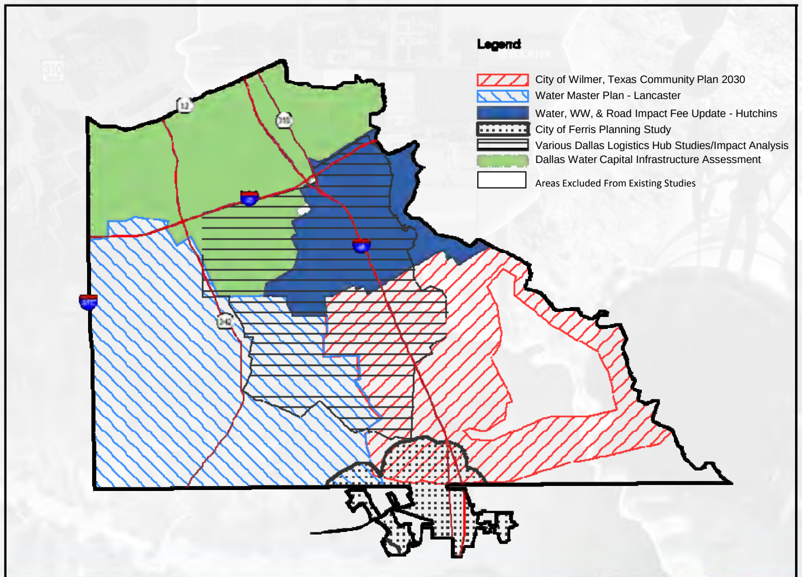


Phase 1 Draft Report

- **Applicability of Existing Documents**

  <u>Water</u>
  - **2005 Dallas Water Supply Plan**
  - **2007 Dallas Capital Infrastructure Assessment**
  - **Region C Water Supply Final Report**
  - **Municipal Plans**
  - **Dallas Logistics Hub Plans**

Water Distribution Infrastructure



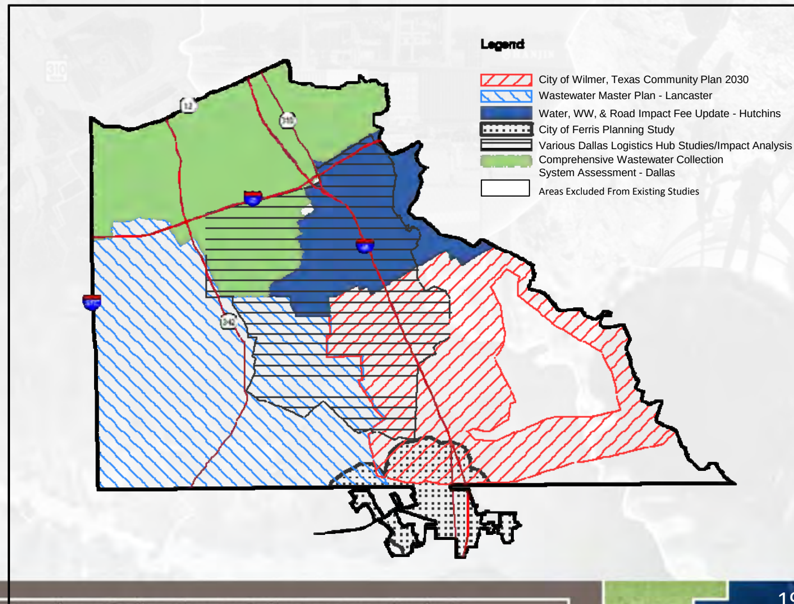
Phase 1 Draft Report

➢ **Applicability of Existing Documents**

<u>Wastewater</u>

- **DWU Comprehensive Wastewater Assessment**
- **Municipal Plans**
- **Dallas Logistics Hub Plans**

Wastewater Collection Infrastructure



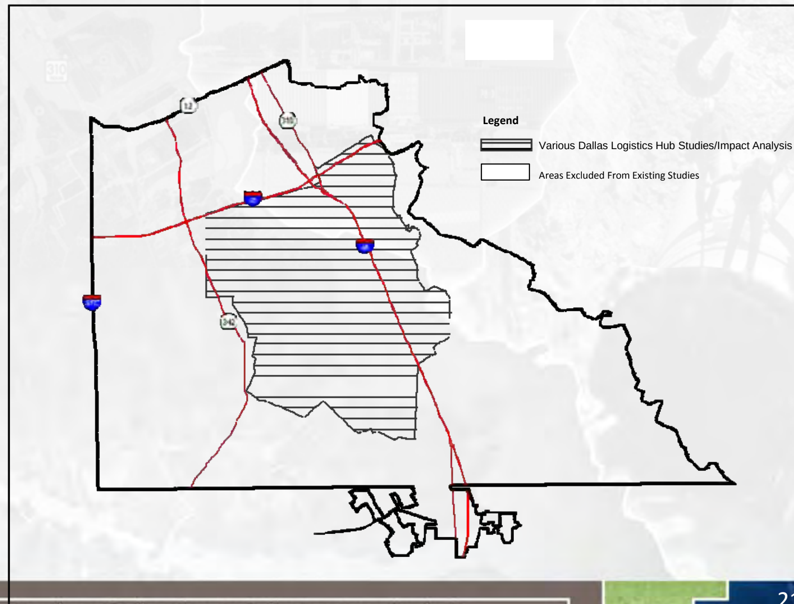
Phase 1 Draft Report

- **Applicability of Existing Documents**

  Storm water/Drainage

  - **City of Ferris Planning Study**
  - **Dallas Logistics Hub Plans**

Storm water Infrastructure

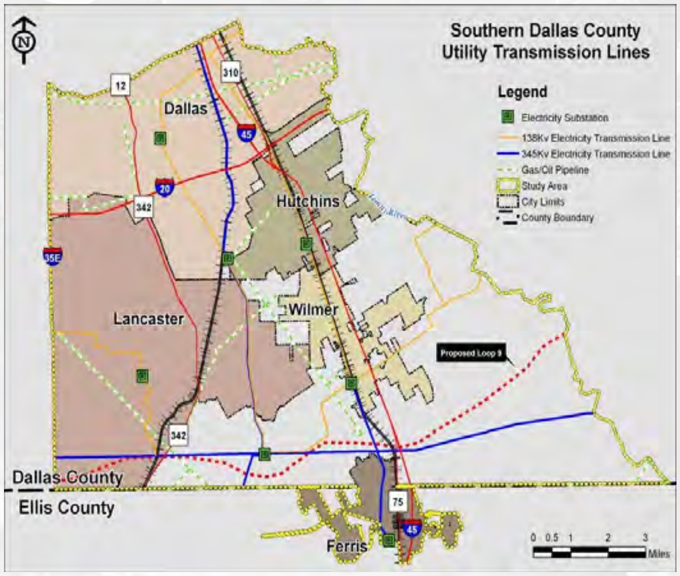


Phase 1 Draft Report

- **Applicability of Existing Documents**

  Private/Franchise Utilities
  - **No planning documents were obtained**
  - **Utilities expand networks to new customer requests**
  - **Continue efforts in Phase 2**

Phase 1 Draft Report



Phase 1 Draft Report

- **Findings and Conclusions**
  - **Among existing documents there are:**
    - **differing horizon years**
    - **varying geographic limits**
    - **varying level of detail**
    - **overlapping areas with conflicting recommendations**
    - **gaps in study boundaries**
    - **no consistent method of estimating cost,**
    - **Few prioritize the proposed improvements**
    - **Few recommend phasing or sequencing**
    - **limited discussion of available funding sources**

Phase 1 Draft Report

- **Findings and Conclusions**
  - **Some regional plans for water and transportation**
    - **At high level regional planning**
    - **Not enough detail for SDCIA needs**
  - **Detailed plans for municipalities or a development**
    - **Adequate for some areas of study area**
    - **Major portions of study area not addressed**
  - **No comprehensive framework to address the growth needs of the entire study area through 2030**
  - **Recommendation - Phase 2 should proceed**

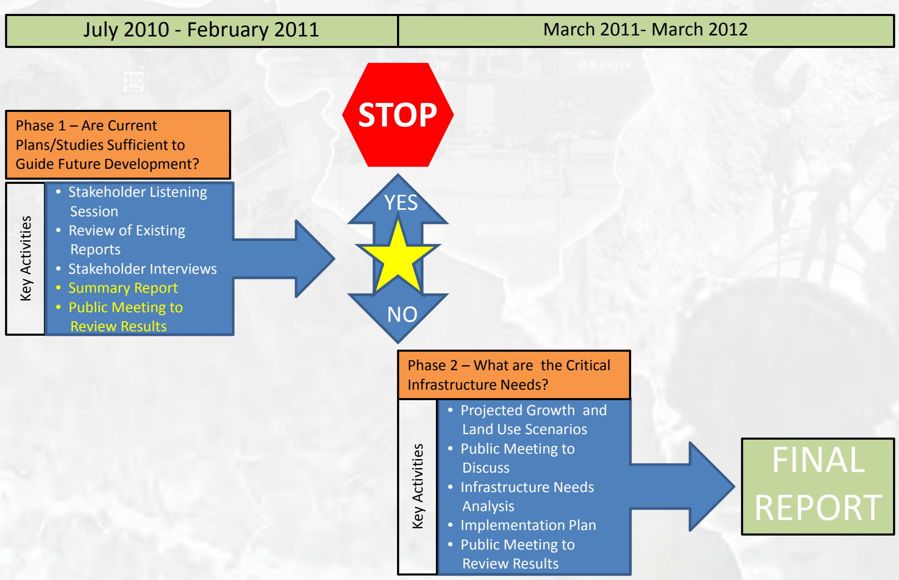
Phase 2 Will

- **Analyze existing infrastructure conditions**
- **Develop a regionally-coordinated plan of infrastructure improvements**
- **Provide order-of-magnitude planning estimates of cost**
- **Identify potential funding sources**
- **Take into account your thoughts**

Phase 2 Won't

- Propose new zoning
- Recommend new financing/taxes
- Conduct an Environmental Impact Study
- Involve any detailed engineering/design
- Require cities/counties to adopt findings
- Recommend any changes to ongoing development or currently approved projects

What's Next



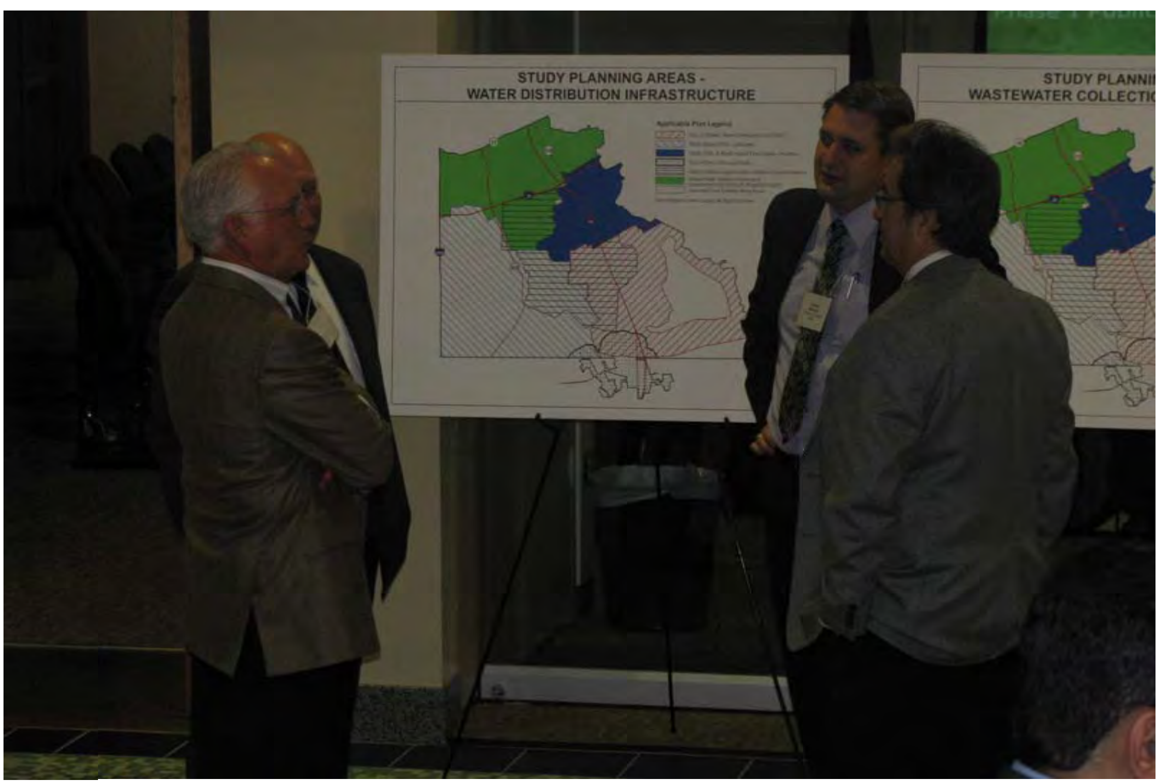
What's Next

Phase 2
March '11 - March '12

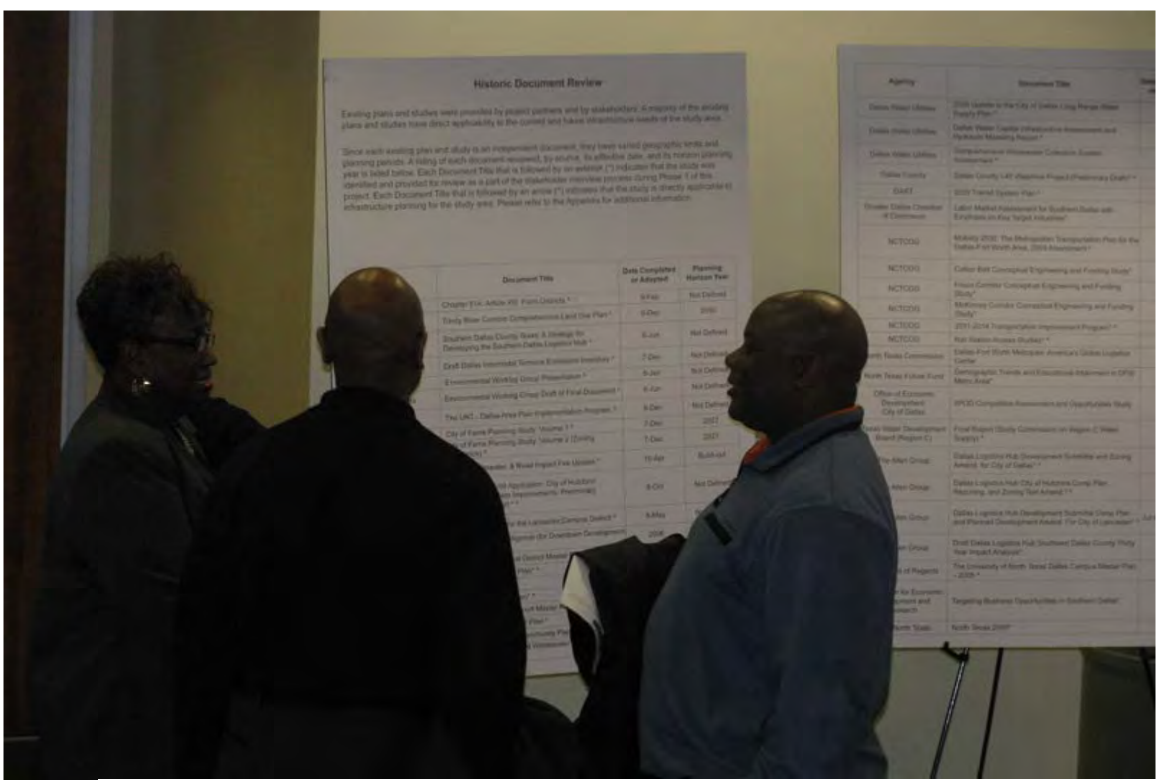
Future Scenario Development - March/April '11
Open House - May '11
Demographic Analysis - May/July '11
Infrastructure Needs Analysis and Staging Plan July '11 - December '11
Public Meeting - January '12
Final Report - March '12

How to Be Involved

- **Comments Tonight or Online**
  - **By February 22, 2011**
- **Future Meetings**
  - **By signing up tonight, you will be notified for all future project public meetings**
- **Project Website**
  - www.nctcog.org/sdcia
- **Contact**
  - **David Millikan, Consultant Project Manager**
  - dmillikan@wilbursmith.com
  - **c/o 2401 South Blvd, Dallas, TX 75215**


STUDY PLANNING AREAS -
WATER DISTRIBUTION INFRASTRUCTURE


Southern Dallas County
Infrastructure Analysis
Phase 1 Public Meeting
February 8, 2011
Lead Consultant:
Wilbur Smith
Project Partners:
Cities of Dallas, Ferris, Hutchins, Lancaster, and Wilmer,
County of Dallas, and North Central Texas Council of


Historic Document Review

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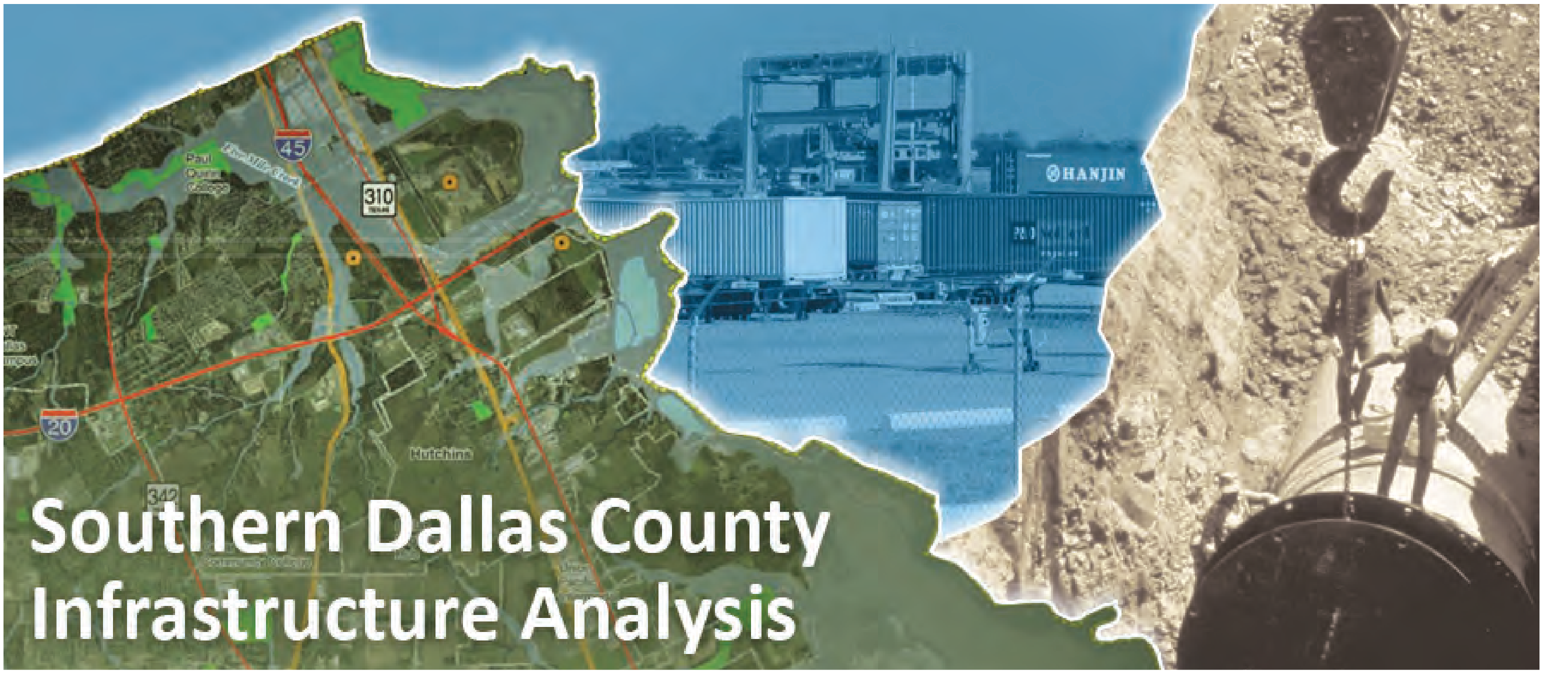
Public Meeting #3 Materials

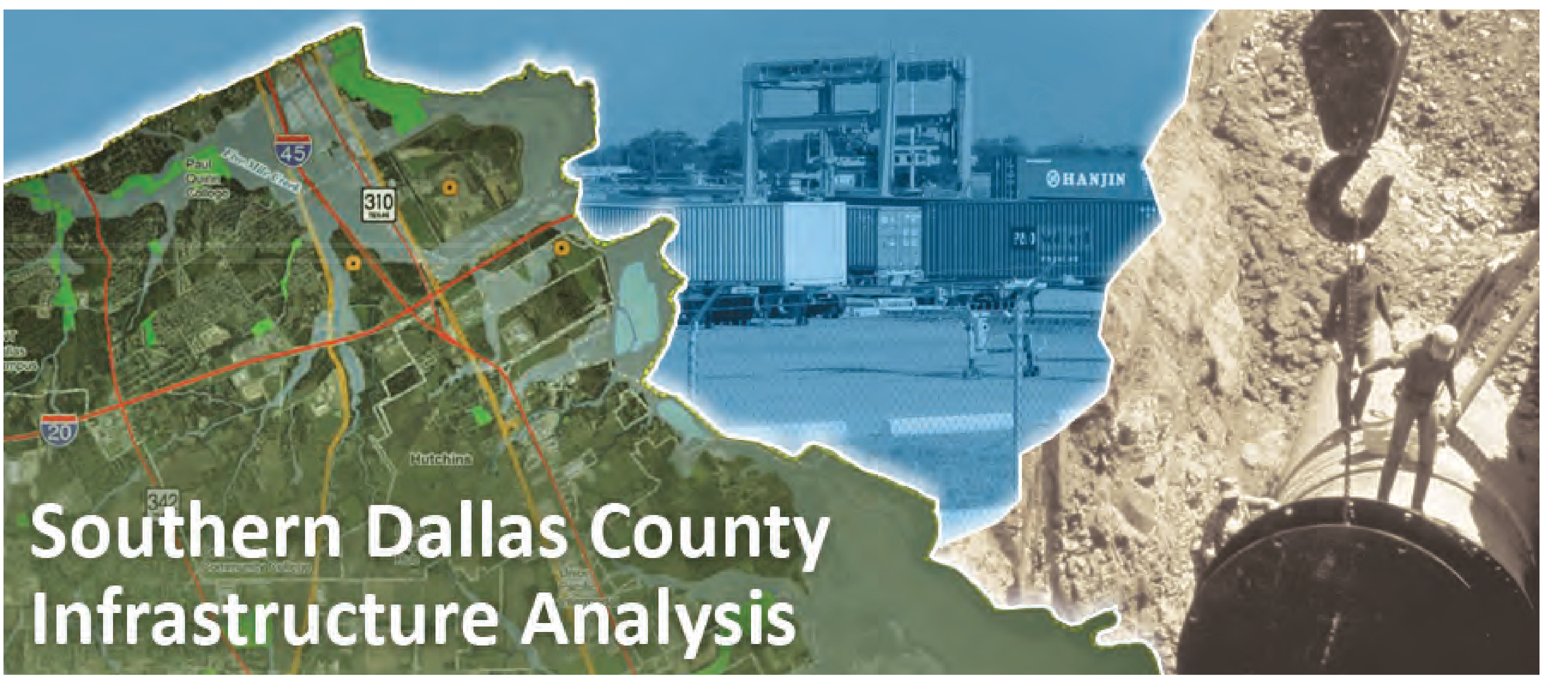


Southern Dallas County Infrastructure Analysis

Phase 2 Public Meeting

Tuesday, September 27th
7:00 - 9:00 p.m.
UNT Dallas Campus, in the Atrium
7300 University Hills Blvd.
Dallas, TX 75241

Project Partners:
Cities of Dallas, Ferris, Hutchins, Lancaster, Wilmer
North Central Texas Council of Governments, Dallas County



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North Central Texas Council of Governments, Dallas County

What is needed to help Southern Dallas County and the Inland Port area prosper?

Come to the **Phase 2 Public Meeting** presenting the growth constraints and the process leading up to the study area's draft preferred scenario-the potential growth and development activities that will be used to estimate infrastructure needs and costs. Please share with us what you think are the critical INFRASTRUCTURE issues and needs.

Phase 2 Public Meeting,
Tuesday, September 27th, 7:00 - 9:00 pm (presentation at 7:30 pm).

Please visit our Project Website at www.nctcog.org/sdcia

NCTCOG
P.O. Box 5888
Arlington, TX 76005-5888

For questions on the meeting, special accommodations due to a disability, or language translation, contact Alva Baker at (214) 428-6432 or by email at Bcaabaker@aol.com, at least 72 hours prior to the meeting. Reasonable accommodations will be made.

Para preguntas, arreglos especiales debido a una discapacidad o para servicio de interpretación, por favor communiquese con Teresa Kendrick al (512) 592-3838 o por correo electrónico: Tkendrick@wilbursmith.com por lo menos 72 horas antes de la junta. Se cumplirán arreglos razonables.

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Southern Dallas County Infrastructure Analysis

Project

Southern Dallas County Infrastructure Analysis Project Partners
Cities of Dallas, Ferris, Hutchins, Lancaster, and Wilmer;
Dallas County; and the North Central Texas Council of Governments

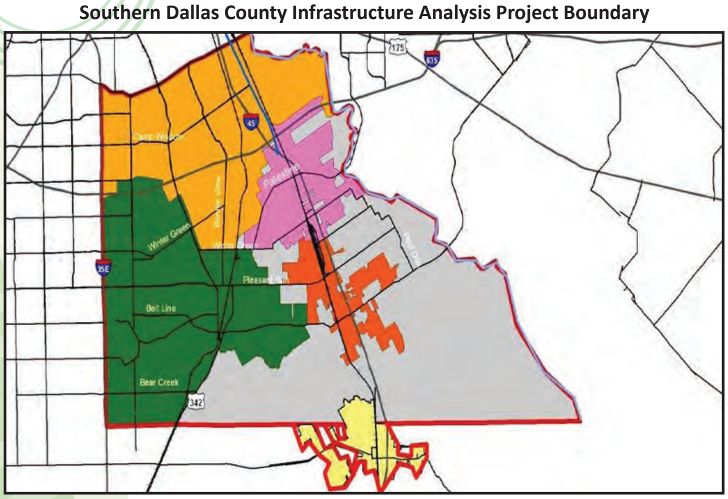
Project – Purpose
- Facilitate long-range planning for the jurisdictions
- Facilitate sound development for the region

Product Focus
- Transportation
- Potable water
- Sanitary sewer
- Stormwater drainage
- Private/franchise utilities

Product
Creation of an Infrastructure Analysis Report

Study Area
West: Interstate 35E
North: South Loop 12
East: Trinity River
South: Dallas County-Ellis County line including the City of Ferris

Southern Dallas County Infrastructure Analysis Project Boundary



Background

Efforts are underway to complete a Southern Dallas County Infrastructure Analysis. The purpose of the Southern Dallas County Infrastructure Analysis project is to support growth of a high-quality, well integrated Inland Port in Southern Dallas County; and to spur additional high-quality and orderly industrial, commercial, and residential development. Phase 1, which began in August 2010, focused on an inventory and historic review of available existing, recent, and ongoing plans and studies performed in Southern Dallas County to determine if these current studies and plans were sufficient to guide future growth and development. Phase 2 then builds on the work to determine what are the critical infrastructure needs to guide future growth and development.

Project Progress

During the last public meeting held on February 8, 2011 at the University of North Texas Dallas campus, the Phase 1 draft report findings and conclusions were presented (to view draft report please go to www.nctcog.org/sdcia). In the months since the February 2011 public meeting consultants have:

- Incorporated Phase 1 data into a base map for the Study Area, which includes existing land uses.

- Developed and analyzed project growth and development alternatives, utilizing existing zoning and land use plans to create a "currently planned" future growth and development scenario for the Study Area.

- Used the 2035 forecast population and employment numbers from the recently approved 2035 Regional Mobility Plan to determine whether these forecast numbers can be contained within the "currently planned" future growth and development scenario. Alternative growth and development scenarios have also been developed for consideration.

Save the Date – September 27th

Please mark on your calendar the next public meeting for the Southern Dallas County Infrastructure Analysis. **The public meeting will take place on Tuesday, September 27, 2011, from 7:00 pm to 9:00 pm at the Atrium in University of North Texas Dallas campus.** The campus is located at 7300 University Hills Blvd. in Dallas just south of East Camp Wisdom Road. This will be a meeting starting at 7 pm where citizens can view exhibits, ask questions and discuss the project with team members, and share what you think are the critical INFRASTRUCTURE issues and needs to help Southern Dallas County and the Inland Port area prosper. **The presentation will start at 7:30 pm** and focus on the growth constraints and the process leading up to the draft Preferred Scenario for the Study Area.

For questions on the meeting, special accommodations due to a disability, or language translation, please contact Alva Baker at (214) 428-6432 or by email at bcaabaker@aol.com, at least 72 hours prior to the meeting. Reasonable accommodations will be made.

Para preguntas, arreglos especiales debido a una discapacidad o para servicio de interpretación, por favor communiquese con Teresa Kendrick al (512) 592-3838 o por correo electrónico: tkendrick@wilbursmith.com por lo menos 72 horas antes de la junta. Se cumplirán arreglos razonables.

Please visit our Project Website at www.nctcog.org/sdcia for more information on this project.

Southern Dallas County Infrastructure Analysis

Phase 2-Public Meeting

University of North Texas-Dallas Campus

September 27, 2011

Lead Consultant:

WilburSmith ASSOCIATES

Project Partners:
North Central Texas Council of Governments, County of Dallas, Cities of Dallas, Ferris, Hutchins, Lancaster, Wilmer

Presentation Overview

- **Project Overview**
- **Phase 2 Work Performed to Date**
  - Growth and Development Alternatives
  - NCTCOG's Forecast Data and the Future Land Use Plans
  - Additional Stakeholder Interviews
  - Housing Analysis
  - Labor Market Analysis
- **Next Steps**
  - High-Medium-Low Population & Employment
  - Infrastructure Need and Capacity Analysis
  - Infrastructure Analysis Report
- **How to be Involved**

Project Overview

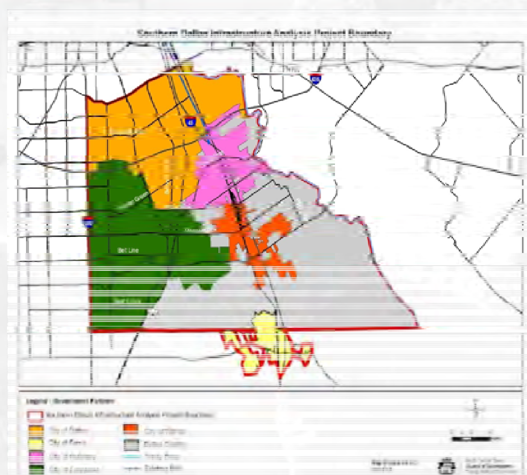
Project Purpose

- **Support growth of a high-quality, well-integrated Inland Port in Southern Dallas County**
- **Spur additional high-quality and orderly commercial, industrial, and residential development**

Project Overview

Study Area

- **Project Limits**
  - West: Interstate 35 E
  - North: Loop 12
  - East: Trinity River
  - South: Dallas County/
  - Ellis County Line
  - (including all of Ferris)



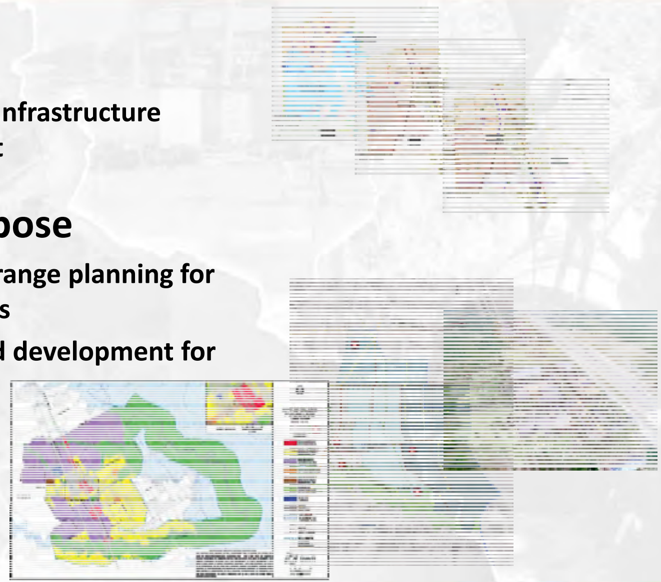
Project Overview

Product

- Creation of an Infrastructure Analysis Report

Product purpose

- Facilitate long-range planning for the jurisdictions
- Facilitate sound development for the region



Project Overview

Product Focus

- Focus on Infrastructure
  - Transportation
  - Potable water
  - Sanitary sewer
  - Storm water/drainage
  - Private/franchise utilities

Project Overview

What This Study Will Do…

- Facilitate funding by developing long-range plan of improvements
- Provide list of necessary infrastructure improvements
- Provide order-of-magnitude planning estimates of costs
- Identify potential funding sources
- Take into account your thoughts

What This Study Won't Do…

- Propose new zoning
- Recommend new financing/taxes
- Conduct an Environmental Impact Study
- Involve any detailed engineering/design
- Require cities/counties to adopt findings

Project Overview

Preliminary Project Schedule

Phase I:
July 2010 –February 2011

Listening Session

Stakeholder Interviews
October-November

Phase I Summary Report
December 2010

Public Meeting
February 2011

Project Overview

Preliminary Project Schedule

Phase II:
March 2011–May 2012

Demographic Analysis and Future Scenario Development – March-October 2011

Infrastructure Needs Analysis and Staging Plan October 2011-January 2012

Public Meeting – February 2012

Final Report – May 2012

Project Overview

Who Is Involved

➢ **Project Advisory Committee**

- North Central Texas Council of Governments
- City of Dallas
- City of Ferris
- City of Hutchins
- City of Lancaster
- City of Wilmer
- Dallas County

Project Overview

Who Is Involved (cont.)

- **Consultant Team**
  - Wilbur Smith Associates
  - Halff Associates
  - Baker Consulting Associates
  - Arredondo Zepeda & Brunz
  - Insight Research Corporation
  - Weinstein-Clower Associates
- **You**

Phase 2 Work Performed to Date

Growth and Development Alternatives

- **Using existing zoning and future land use plans, developed a "Currently Planned" future growth and development scenario and map for the Study Area**
- **Using the "Currently Planned" scenario, planners estimated the potential population and employment that could support this scenario**
- **These estimates were compared to NCTCOG's Executive Board approved 2040 forecast of population and employment**
  - These estimates were used in the development of the adopted Metropolitan Transportation Plan, Mobility 2035
- **The "Currently Planned" scenario was able to contain the NCTCOG approved forecasted population and employment**
- **The "Currently Planned" future scenario would be used to analyze future infrastructure needs and costs; however, …**

Phase 2 Work Performed to Date

NCTCOG's Population & Employment Forecasts

(model based)

vs.

Future Land Use Plans

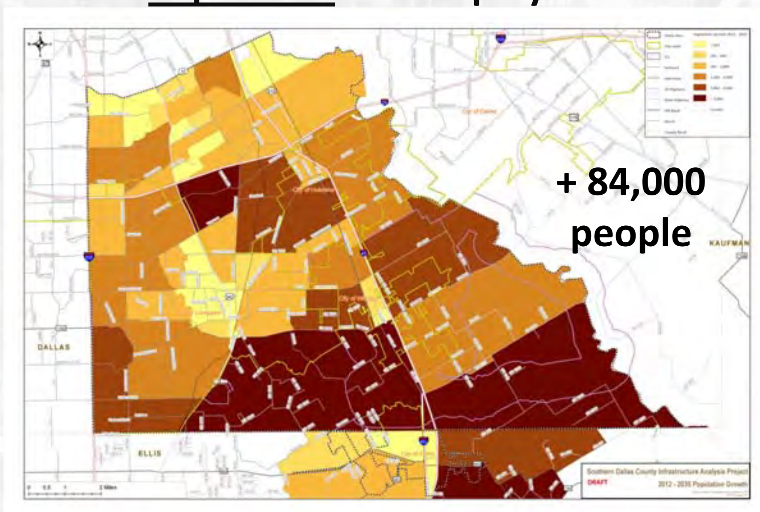
(planning process based)

Phase 2 Work Performed to Date

NCTCOG's Population and Employment Forecasts

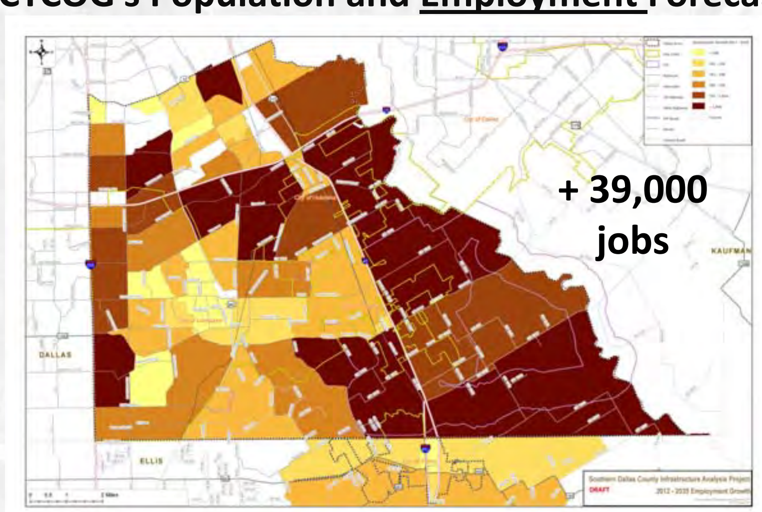
Phase 2 Work Performed to Date

NCTCOG's Population and Employment Forecasts



Phase 2 Work Performed to Date

NCTCOG's Population and Employment Forecasts



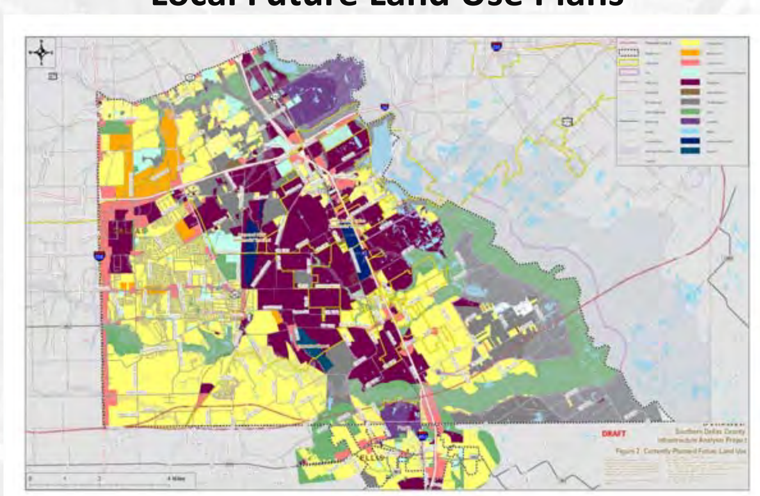
Phase 2 Work Performed to Date

Local Future Land Use Plans

- **City of Dallas:** Trinity River Corridor Comprehensive Land Use Plan (to year 2050) and IIPOD, 2011
- **City of Ferris:** Planning Studies, 2007 - 2027 (to year 2027)
- **City of Hutchins:** Ultimate Land Use Plan (to year 2041), 2009 Water, Wastewater, and Roadway Impact Fee Update
- **City of Lancaster:** 2002 Comprehensive Plan (to year 2020)
- **City of Wilmer:** Community Plan 2030 (to year 2030)
- **UNT Dallas** Area Plan, 2009 (to year 2015)

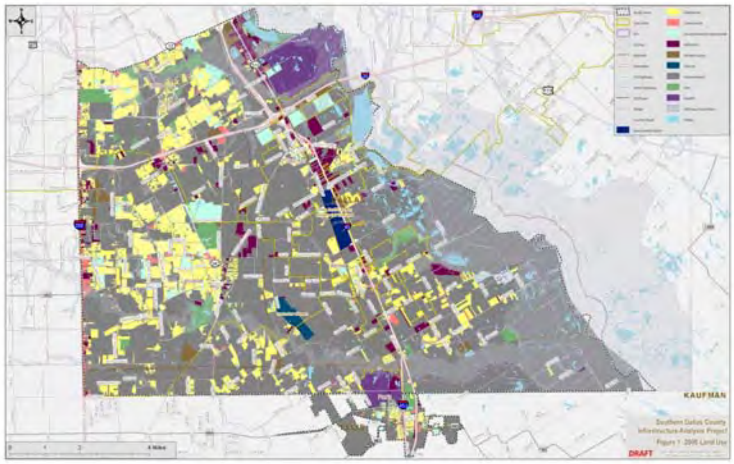
Phase 2 Work Performed to Date

Local Future Land Use Plans



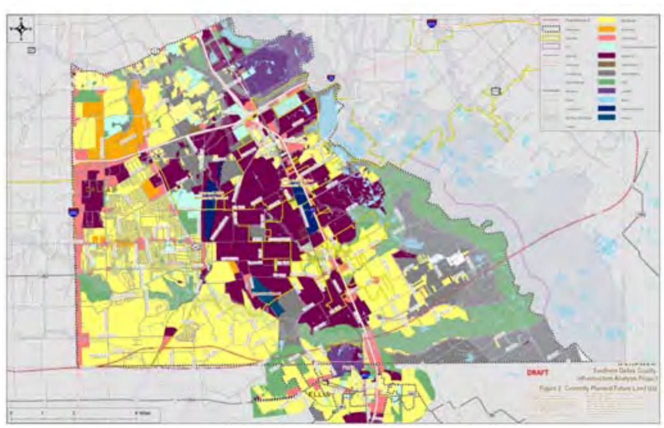
Phase 2 Work Performed to Date

Existing (2005) Land Use



Phase 2 Work Performed to Date

Future Land Use – Existing Land Use = Future Potential Development Areas



Phase 2 Work Performed to Date

Subtle Differences to be Reconciled

Future Land Use Plans

Industrial Land Uses

But….

Regional Model

6,300 more people

Phase 2 Work Performed to Date

Additional Stakeholder Interviews

- **Due to current economic conditions in the national, state, and local economy**
- **Focus will be on major property owners and developers**
  - Current and future activity
  - Timing
  - Access to capital

Phase 2 Work Performed to Date

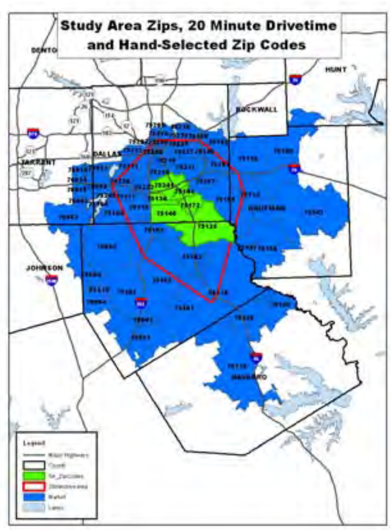
Housing Analysis

- **Insight Research and Weinstein-Clower Associates**
- **Analyze future demand for housing by types and price points**
- **Identify opportunities and constraints for locating residential uses within Study Area**
- **Housing data sources include:**
  - Housing reports from cities
  - NCTCOG demographic projections
  - Appraisal data
  - Residential market research
- **Employment-Housing Balance Analysis**

Phase 2 Work Performed to Date

Labor Market Analysis

- **Weinstein-Clower Associates**
- **Analyze market area by zip code**
- **Combination of available labor force and projected labor force**
- **Target industries**
  - Confirm whether there are enough people with skills sets
  - Identify those skills sets which are lacking to support target industries



Next Steps

High-Medium-Low Population and Employment

- Insight Research
- Following stakeholder interviews
- Based on work performed in housing analysis and the growth and development alternatives
- Employment projections will be analyzed by three employment types – basic, retail, and service classifications
- Distribute high-medium-low population and employment estimates in the Study Area
- By traffic survey zones (TSZ)

Next Steps

Infrastructure Needs and Capacity Analysis

- Refine the anticipated future growth and development scenario
- Finalize distribution of population and employment for the anticipated future growth and development scenario
- Prepare the Capital Infrastructure Improvement Staging Plan (CIISP)
  - Timing for recommended improvements
  - Funding options from existing sources
  - Study Area priorities
- Prepare a draft technical report documenting the technical analysis performed, including preparation of the CIISP
  - Draft Technical Report will be presented public at the Phase 2 Final Public Meeting (February 2012) for review and public input

Next Steps

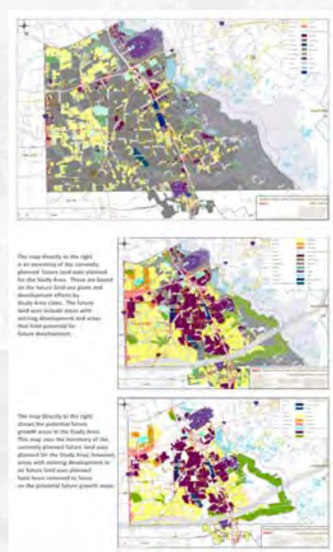
Infrastructure Analysis Report

- **The Infrastructure Analysis Report will be developed following the February 2012 public meeting. It will:**
  - Combine previously prepared technical assessments, technical reports, and findings developed in Phase 1 and 2
  - Identify the resources available
  - Identify the potential to combine / leverage resources with financial partnerships
  - Identify like interests to achieve prioritization of needed infrastructure

How to Be Involved

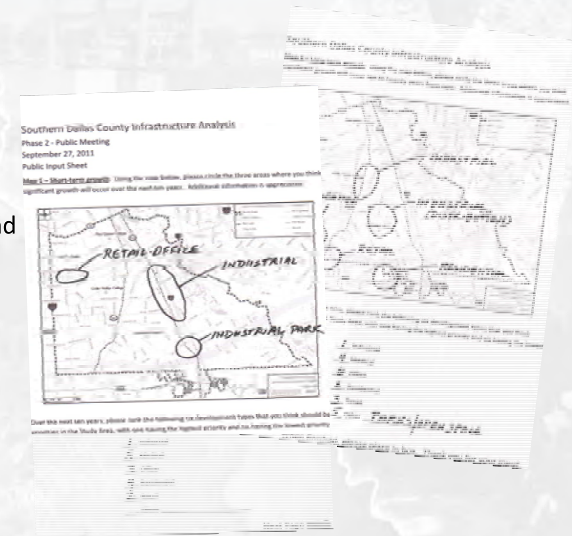
Tonight

- Please be sure to provide your name and contact information for the mailing list.
- On the separate handout sheet titled 'Public Input Sheet,' please review the three maps located in hall and respond to the questions and maps on both sides of the handout sheet. Please leave your public input sheet in the box located next to the three maps.
- Comment Sheets are meant to solicit your input concerning current and future infrastructure needs for the study area is desired and appreciated.



How to Be Involved

- **Tonight**
  - Sample of how the Public Input Sheet could be filled out.
  - Help Identify Where, How Much, What Kind of Development you envision/anticipate



How to Be Involved

- **Future Meetings**
  - **By signing up tonight, you will be notified for the future project public meetings**
- **Project Website**
  - www.nctcog.org/sdcia

Thank You!

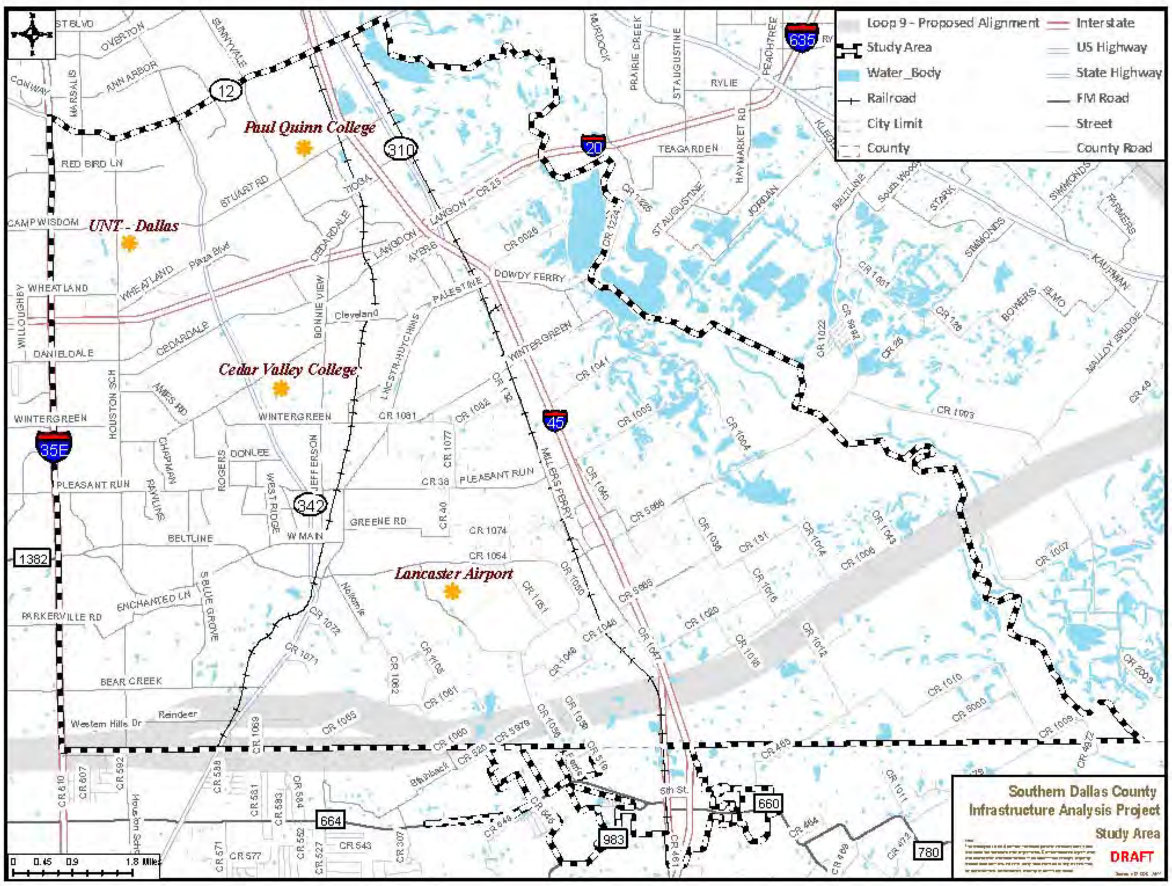
Southern Dallas County Infrastructure Analysis

Phase 2 - Public Meeting

September 27, 2011

Public Input Sheet

Map 1 – Short-term growth: Using the map below, please circle the three areas where you think significant growth will occur over the next ten years. Additional information is appreciated.



Over the next ten years, please rank the following six development types that you think should be priorities in the Study Area, with one having the highest priority and six having the lowest priority:

____ Industrial

____ Medical

____ Office

____ Residential

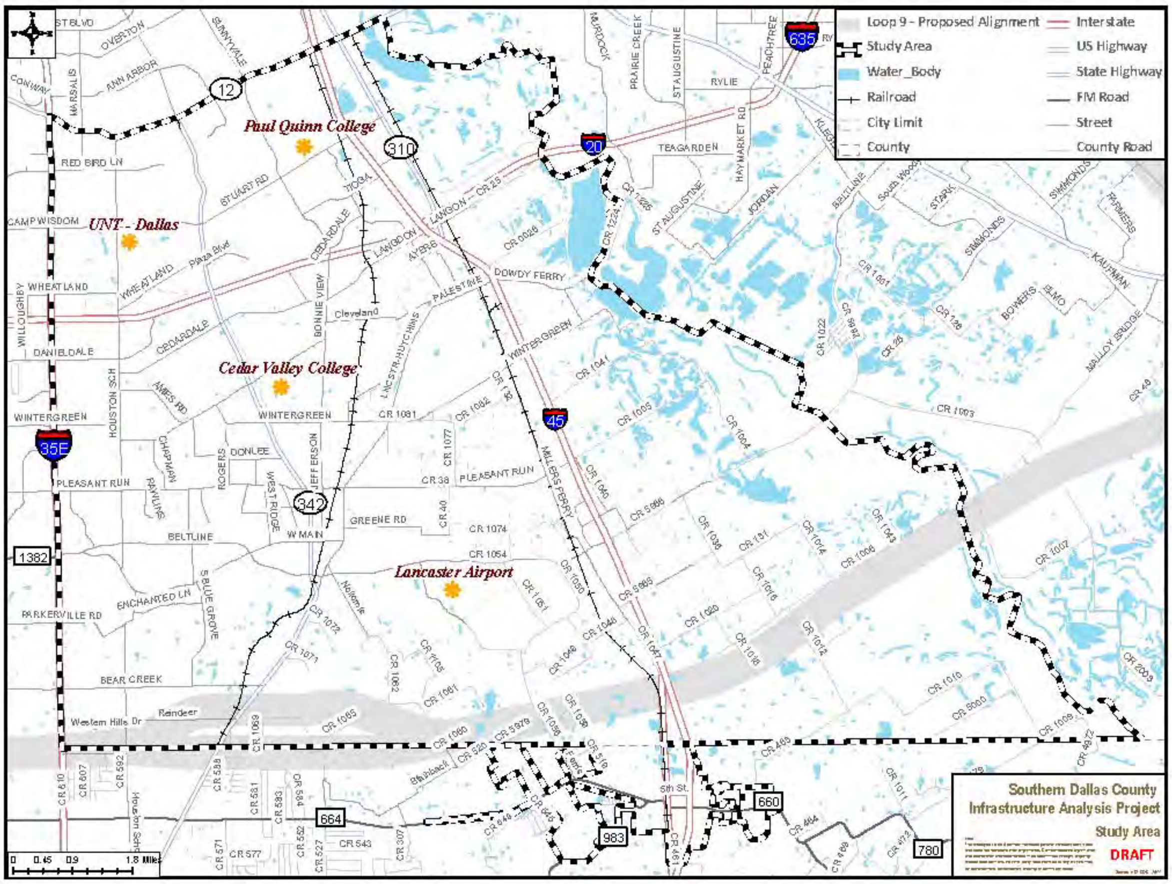
____ Retail

____ Other ________________________

Next Page

Southern Dallas County Infrastructure Analysis

<u>Map 2 – Long-term growth</u>: Using the map below, please circle the three areas where you think significant growth will occur ten to twenty years from now. Additional information is appreciated.



Ten to twenty years from now, please rank the following six development types that you think should be priorities in the Study Area, with one having the highest priority and six having the lowest priority:

____ Industrial

____ Medical

____ Office

____ Residential

____ Retail

____ Other _________________________

When finished, please place in box. Thank you for your input.

Southern Dallas County Infrastructure Analysis

Phase 2 - Public Meeting

September 27, 2011

Comment Sheet

Please provide any additional information, or ask any questions and someone from the project team will get back to you with a response.

____

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Please provide your contact information if you asked a question and would like a response.

Name: ____

Email address: ____

Phone number: ____

When finished, please place in box. Thank you for your input.

Southern Dallas County Infrastructure Analysis

Phase II Public Meeting
Tuesday, September 27, 2011 - at UNT-Dallas Campus

<u>Transcription of Written Comments from Citizens</u>

The following three (3) written comments were received during the September 27, 2011 Public Meeting:

Comment 1:

Pleasant Run Rd. from Pinto Rd. east to Sunrise, the road and right of way is owned by the county. Lancaster plans to annex to the center line from the south. The city of Wilmer owns a water line and fire hydrants in the south side of Pleasant Run Rd. right of way from Sunrise west to at least Pinto Rd. After the Lancaster annexation to the center of the road, the city of Wilmer water line and fire hydrants will be in the city of Lancaster. Will these Wilmer assets transfer to Lancaster? Which city will provide water services to the residential houses along the north side of the road? Have these issues been addressed in the interlocal agreement between Lancaster and Wilmer? The residences on the north side of the road are within the city limits of Wilmer. So if Lancaster ends up serving customers on this stretch of Pleasant Run Rd., they will be serving residences in Wilmer. The Wilmer TCEQ CNN requires Wilmer to service these customers. Has this been addressed?

Comment 2:

Cedar Valley College is planning a Visioning session on Oct. 25, 2011, 8:00 am – 1:00 pm. The focus is to bring together stakeholders, city leaders, employers, community groups, EDCs and chambers with college leaders to discuss the future employment needs of the Southern Sector.

Would it be possible to have someone from NCTCOG participate to provide insights into development plans that will affect economic development and employment opportunities?

Comment 3:

*describe why intermodal is a collection of 2 separated sections w/residential in middle.

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Public Meeting #4 Materials

Southern Dallas County Infrastructure Analysis

Public Meeting

Thursday, June 21, 2012

UNT-Dallas Campus

Meeting Summary

Meeting Objective

The purpose of the final public meeting was to present the results of the infrastructure capacity and needs assessment for the SDCIA project area. This included a review of existing infrastructure and project team recommendations for water, wastewater, stormwater, transportation and private utilities.

Meeting Announcement

Notice of the meeting was distributed as follows:

- Postcards were mailed to stakeholders on the Master Mailing List, including Project Advisory Committee (PAC) members, elected officials (city, county, state and federal), key government staff, large landowners, developers, neighborhood associations, civic organizations, and other interested individuals
- A newsletter summarizing the project status and announcing the public meeting was posted on the SDCIA website

Meeting Location and Format

The meeting was held on the UNT-Dallas campus in Room 138 of Building II, located at 7400 University Hills Boulevard, Dallas, TX 75241. The public meeting was scheduled from 6:30 pm – 9:00 pm. Five exhibit areas were set up on the east side of the room in an open house style, and the west side of the room was used for the formal presentation. The five exhibits illustrated existing infrastructure in the following areas:

- Water
- Wastewater
- Stormwater
- Transportation
- Private Utilities

Project team members staffed sign-in tables outside the room. Each attendee was provided a comment form. Project team members were stationed at each exhibit to answer questions and listen to citizen concerns.

Attendance

There were a total of 85 attendees including the project team, PAC members and five elected officials.

Presentation

A presentation summarizing the findings of the infrastructure assessment was given by multiple members of the project team. NCTCOG Director of Transportation Michael Morris made some opening remarks including a brief discussion of the impact and importance of South Loop 9 on the SDCIA area (including a statement regarding an upcoming renaming of the proposed corridor). Jayson Melcher, Philip Wheat and

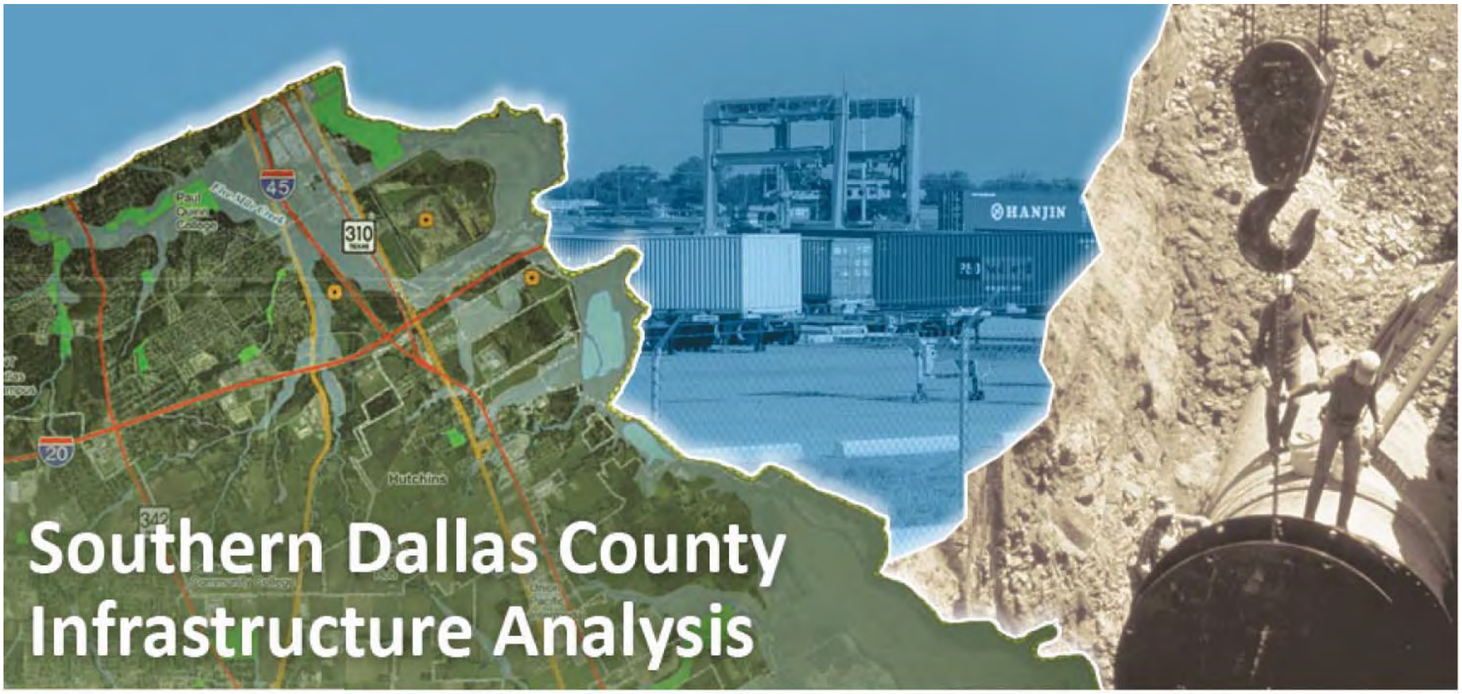
Russell Erskine of Halff Associates presented recommendations for water, wastewater and stormwater. Michael Copeland of CDM Smith spoke about transportation infrastructure recommendations, and Michael Carleton of Arredondo, Zepeda & Brunz discussed private utilities development in the SDCIA area.

Following the presentation, Michael Morris members of the project team responded to several questions from meeting attendees. After the question and answer session, project team members spoke informally with meeting attendees about the various infrastructure elements and the recommendations being made as part of the study.

Audience Questions

The project team received audience questions on the following topics:

- Perceived inferior telecom service in the SDCIA area versus the rest of Dallas-Fort Worth
- The planned of alignment of Loop 9 and its connection to Interstate Highway 45
- Expected benefits of constructing Loop 9 to the area
- Reliability of cell phone service near Paul Quinn College
- The anticipated impact of Loop 9 on Lancaster Airport and vice versa
- The effect of Loop 9 on economic development in the area
- Potential assistance from NCTCOG
- Bridge repairs needed in the area due to flooding concerns



Southern Dallas County Infrastructure Analysis

Public Meeting

Thursday, June 21, 6:30 – 9:00 PM
UNT-Dallas Campus, Bldg. II – Room 138
7400 University Hills Blvd.
Dallas, TX 75241

Project Partners:
Cities of Dallas, Ferris, Hutchins, Lancaster, Wilmer
North Central Texas Council of Governments, Dallas County

NCTCOG
PO BOX 5888
ARLINGTON, TX 76005-5888

Your participation is vital in identifying the key infrastructure improvements needed to help foster economic development in Southern Dallas County and the Inland Port area.

PHASE II PUBLIC MEETING
Thursday, June 21, 6:30 – 9:00 pm
Presentation at 7:00 pm

UNT-Dallas Campus, Building II – Room 138
7400 University Hills Blvd., Dallas, TX 75241

Come and see a presentation of the draft infrastructure improvement plan for the Southern Dallas County area through 2035.

The draft infrastructure analysis report will be made available for download at our project website: www.nctcog.org/sdcia one week prior to the meeting.

For questions on the meeting, special accommodations due to a disability, or language translation, contact Alva Baker at (214) 428-6432 or by email at Bcaabaker@aol.com, at least 72 hours prior to the meeting. Reasonable accommodations will be made.

Para preguntas, arreglos especiales debido a una discapacidad o para servicio de interpretación, por favor comuníquese con Daniel Alanis al (214) 346-2862 o por correo electrónico: alanisdo@cdmsmith.com por lo menos 72 horas antes de la junta. Se cumplirán arreglos razonables.

Southern Dallas County Infrastructure Analysis

Newsletter – Spring 2012

Save the Date – June 21, 2012

Please mark on your calendar the next public meeting for the Southern Dallas County Infrastructure Analysis. The public meeting will take place on Thursday, June 21, 2012, from 6:30 pm to 9:00 pm in Building II, Room 138 on the University of North Texas-Dallas campus. The UNT-Dallas campus is located at 7300 University Hills Boulevard in Dallas just south of East Camp Wisdom Road.

The meeting will begin at 6:30 pm, during which time citizens can view exhibits, ask questions and discuss the project with team members. Attendees are also invited to share opinions on the critical infrastructure issues and needs of Southern Dallas County and the Inland Port area. A presentation of the infrastructure analysis will begin at 7:00 pm and will focus on the project team's recommended improvements to the water, sewer, stormwater, transportation and private utility systems in the Southern Dallas County area.

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Please visit our Project Website at www.nctcog.org/SDCIA for more information on this project.

Project Details

Project Partners
Cities of Dallas, Ferris, Hutchins, Lancaster and Wilmer, Dallas County and the North Central Texas Council of Governments

Project – Purpose

- Facilitate sound development for the region
- Help each jurisdiction's development of long range plans

Project – Focus

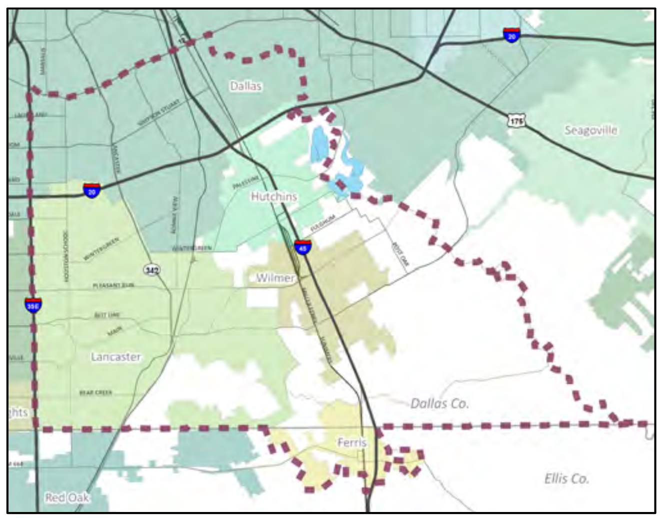
- Potable water
- Sanitary sewer
- Stormwater drainage
- Transportation
- Private/franchise utilities

Project Progress

At the last public meeting held on September 27, 2011, the project team presented economic and land use information for the Southern Dallas County area and discussed the upcoming infrastructure assessment. In the months since the September 2011 public meeting, consultants have:

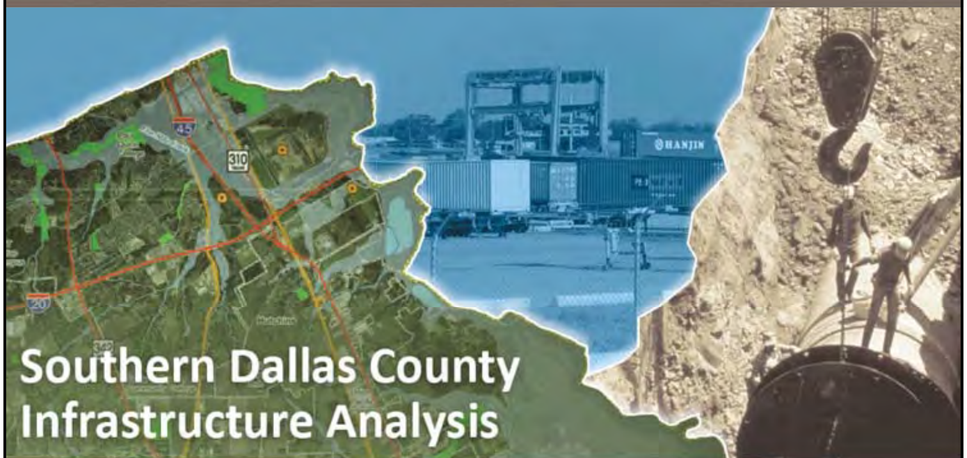
- Reviewed all current infrastructure plans in the Southern Dallas County area, including potable water, sanitary sewer, stormwater drainage, transportation and private utilities
- Projected Southern Dallas County's future infrastructure demands based on forecasted population and employment in the study area
- Made recommendations of infrastructure investments needed in water, sewer, stormwater, transportation and private utilities systems that will be needed to support the future development and growth of the Southern Dallas County area
- Developed a draft infrastructure analysis report summarizing the infrastructure analysis effort. The draft report is available for download at the SDCIA project website: www.nctcog.org/SDCIA

Southern Dallas County Infrastructure Analysis Study Area



Background

As a culmination of the Southern Dallas County Infrastructure Analysis project, the study team has developed a draft infrastructure analysis report. The purpose of the project is to analyze the key infrastructure improvements that are needed to support industrial, commercial and residential development in the Southern Dallas County area. This includes the support and infrastructure needs of the International Inland Port of Dallas (IIPOD).



Southern Dallas County Infrastructure Analysis

Public Meeting

Thursday, June 21, 2012

Project Partners:
Cities of Dallas, Ferris, Hutchins, Lancaster, Wilmer
North Central Texas Council of Governments, Dallas County

From Planning to Implementation

- **<u>Infrastructure Analysis</u> created as a framework**
- **Projects need to be implemented**
- **Moving forward can help secure funding (current and future)**
  - Ex: Pleasant Run Road – grade separation

Where Do We Go From Here?

- Finalize <u>Infrastructure Analysis</u> with feedback from you
- Sponsors meeting on how to move forward
- Obtain feedback from the development community

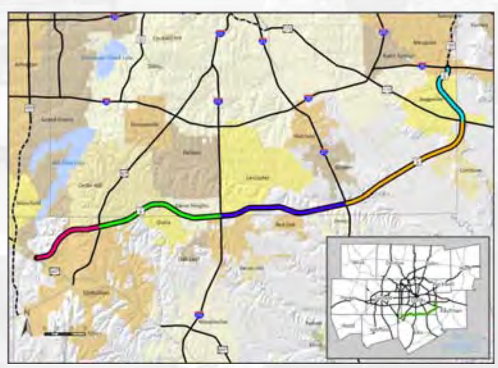
Loop 9 As the Key?

Additional Funds
-State
-Local Govt.
-Private Sect.

Loop 9
$50M

Short Term Infrastructure Loans

Transportation Reinvestment Zones



Presentation Overview

- **Project Overview**
- **Infrastructure Analysis Results**
  - Water
  - Wastewater
  - Stormwater
  - Transportation
  - Private Utilities
- **Next Steps**
- **How to Be Involved**

Project Overview

Project Purpose

- **Facilitate sound development for the region**
- **Help each jurisdiction's development of long range plans**

Project Overview

Project Advisory Committee

- City of Dallas
- City of Ferris
- City of Hutchins
- City of Lancaster
- City of Wilmer
- Dallas County
- Developer
- Landowner
- North Central Texas Council of Governments

Project Timeline

Today

Phase 1	Phase 2A	Phase 2B	Phase 2C
Historical Document Review	Demographic/Economic Analysis	Infrastructure Needs Assessment	Final Report

Project Overview

What This Study Does…

- **Facilitates funding by developing a long-range plan of improvements**
- **Provides list of necessary infrastructure improvements**
- **Provides order-of-magnitude planning estimates of costs**
- **Identifies potential funding sources**
- **Takes into account your thoughts**

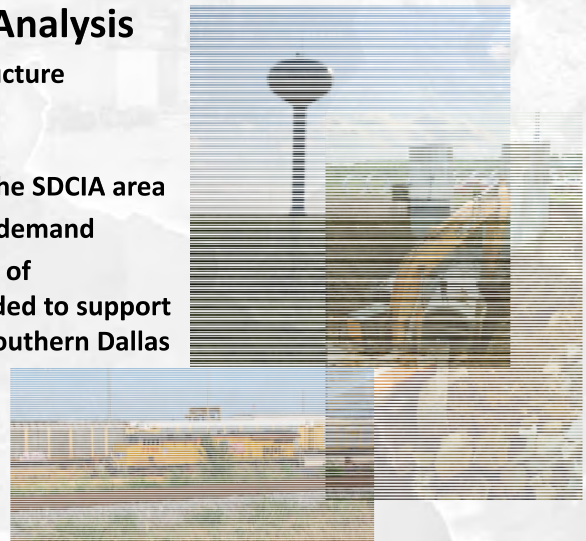
What This Study Doesn't Do…

- **Propose new zoning**
- **Recommend new financing/taxes**
- **Conduct an Environmental Impact Study**
- **Involve any detailed engineering/design**
- **Require cities/counties to adopt findings**

Project Overview

Infrastructure Analysis

- Review of infrastructure currently in place
- Review of planned improvements in the SDCIA area
- Forecast of future demand
- Recommendations of infrastructure needed to support future growth in Southern Dallas County



Water Infrastructure Assessment

Jayson Melcher

Halff Associates

Projected Water Demands

- 2035 Demand Used to Size Future Storage and Pumping
- 2060 Demand Used to Size Future Water Supply Pipeline

City	Existing Max Day Demand (mgd)	2035 Max Day Demand (mgd)	2060 Max Day Demand (mgd)
Ferris	1.0	7.3	10.0
Hutchins	2.2	8.0	9.9
Lancaster	9.1	31.0	40.7
Wilmer	0.6	4.1	8.4
Total	12.9	53.1	72.8

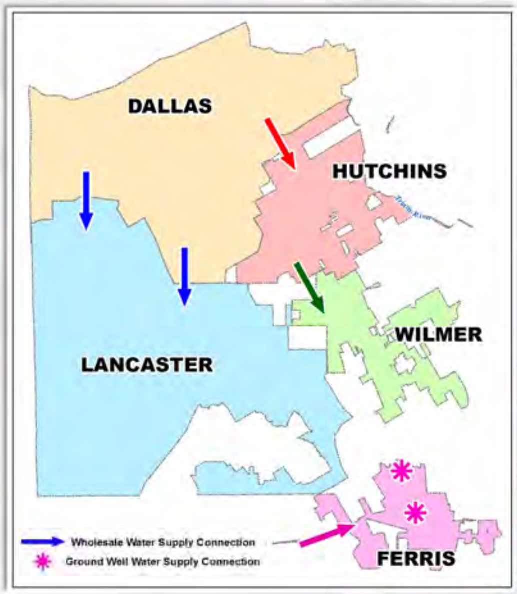
Source: Existing: Data provided by each city; 2035 and 2060: Calculated based on population projections

mgd = Million Gallons per Day

Existing Supply Inventory

- Existing Water Supplied by Ground Wells, Dallas Water Utilities, and Rockett Special Utility District
- Supply Capacity
  - Ferris: 0.7 mgd
  - Hutchins: 2.5 mgd
  - Lancaster: 30 mgd
  - Wilmer: 1.3 mgd
- Total: 34.5 mgd

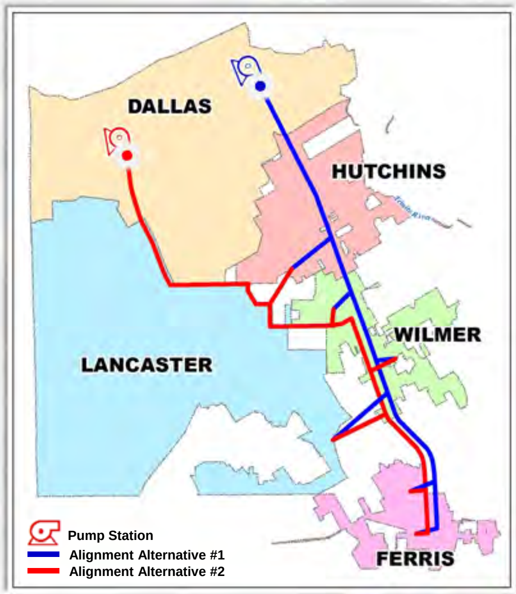
mgd = Million Gallons per Day



Water Supply Infrastructure Needed

- 2010 Supply Capacity (35 mgd) vs. 2060 Water Demand (73 mgd)
- 10+ Mile Long Water Supply Pipeline from Dallas to Each SDCIA City – Two Options
- Minimum Two Water Supply Connections for Each City
- 40 mgd Pump Station Upgrade at Connection Point with DWU's Existing Water System

mgd = Million Gallons per Day



Existing Distribution Inventory

- All Cities Currently Meet Minimum Texas Commission on Environmental Quality Requirements
- Assumed Minimum Emergency Capacities:
  - Elevated Storage: 0.21 MG
  - Ground Storage: 0.42 MG
  - Pump: 3.4 mgd

City	Elevated Storage (MG)	Ground Storage (MG)	Pumping Capacity (mgd)
Dallas	0.5	25.8	168
Ferris	0.4	0.8	1.6
Hutchins	1.3	0.5	4.4
Lancaster	3.0	9.5	23.5
Wilmer	0.30	0.12	1.9

Source: Data provided by each city

MG = Million Gallons
mgd = Million Gallons per Day

Distribution Infrastructure Needed

- Needed 2035 Infrastructure Upgrades
- Sized to Meet Minimum TCEQ Requirements and Emergency Demands

City	Elevated Storage (MG)	Ground Storage (MG)	Pumping Capacity (mgd)
Dallas	*	*	*
Ferris	2.0	4.0	15.0
Hutchins	1.5	2.5	17.3
Lancaster	7.0	8.0	65.4
Wilmer	2.5	3.0	8.2

MG = Million Gallons
mgd = Million Gallons per Day

*DWU planned infrastructure impacting the Study Area includes 120-inch pipeline, Wintergreen Pump Station and Reservoir, and Hutchins water supply connection replacement

Summary and Recommendations

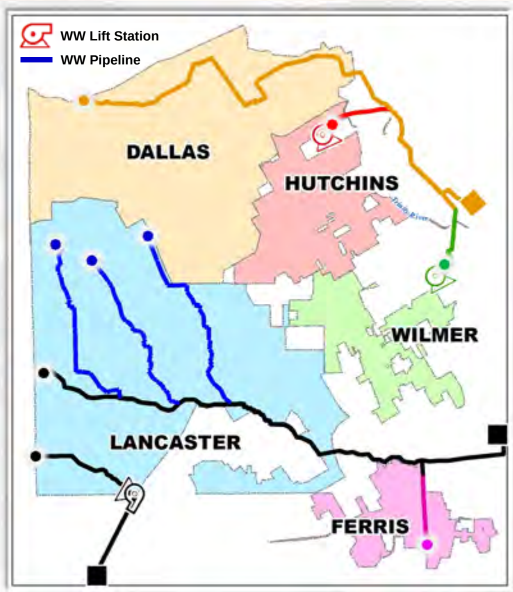
- Water Supply
  - Each city in the Study Area will require additional water supply infrastructure to meet future demands
  - Ferris and Wilmer are projected to need additional water supply within 5 years
- Water Distribution Infrastructure
  - All existing water systems meet State requirements
  - Ferris and Wilmer need additional capacity now to meet large emergency demands
  - Dallas and Lancaster planned water infrastructure is sufficient to meet the demands projected in this Study.
  - This Study recommends additional water infrastructure to augment the plans in Ferris, Hutchins and Wilmer
- Estimated construction cost: $150 million over 25-years.

Wastewater Infrastructure Assessment

Philip Wheat
Halff Associates

Existing WW Infrastructure Inventory

- Study Area Wastewater Flows are Conveyed to Dallas Water Utilities and Trinity River Authority
- DWU Serves Dallas, Hutchins, and Wilmer
- TRA Serves Ferris and Lancaster



DWU and TRA collect and convey flows from outside of the Study Area.

Projected Wastewater Flows

- 2035 Flow Used to Size Future Interceptors and Lift Stations
- 750 Gallons Per Day of Inflow and Infiltration (I&I)

City	Existing Peak Flow (mgd)	2035 Peak Flow (mgd)
Dallas	11.0*	25.0*
Ferris	1.4	8.0
Hutchins	3.1	9.0
Lancaster	15.0	39.0
Wilmer	0.4	5.2

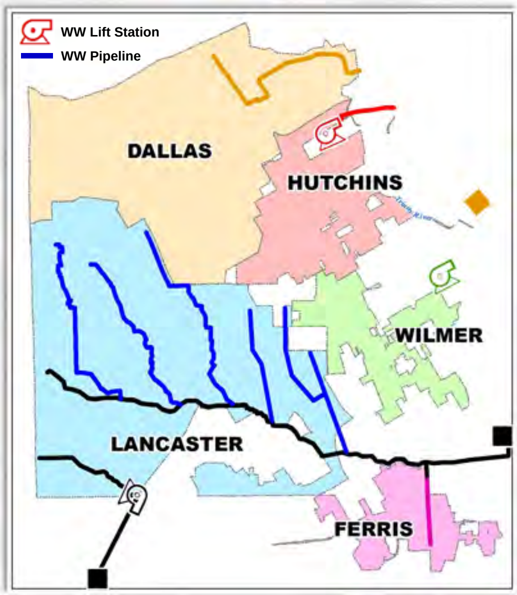
Source: Existing: Data provided by each city; 2035: Calculated based on population projections.

mgd = Million Gallons per Day

*Dallas flow estimates are from within the Study Area only.

Wastewater Infrastructure Needed

- 40+ Miles of Wastewater Pipeline Needed Collectively to Meet Future Demands
- 47.8 mgd of Pump Capacity Collectively



mgd = Million Gallons per Day

Summary and Recommendations

- Each utility in the Study Area will require additional wastewater infrastructure to meet future flow rates.
  - Increased pipe capacity required in Dallas, Ferris, Hutchins, Lancaster and TRA
  - Increased capacity for primary lift stations in Hutchins, Wilmer, and TRA
- Estimated construction cost: $150 million over 25-years.

Stormwater Infrastructure Assessment

Russell Erskine
Halff Associates

Floodplain Ordinances and Regulations

- Existing Ordinances and Regulations
- National Flood Insurance Program
- Higher Standards
- Corridor Development Certificate (Trinity River Only)

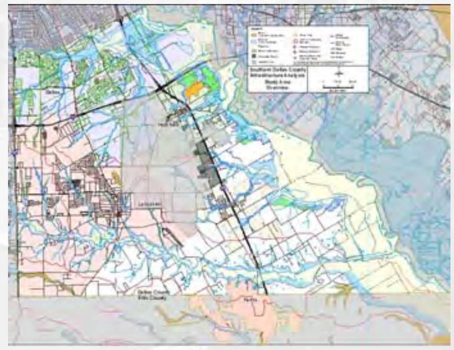
City/County	NFIP Criteria (Minimum Required)
City of Dallas	Exceeds
City of Ferris	Meets
City of Hutchins	Meets
City of Lancaster	Exceeds
City of Wilmer	Meets
Dallas County	Meets

Stormwater Ordinances

- Stormwater is Minimally Addressed
- Dallas 100-year design or storm of record
- Lancaster 25-year and 100-year

Stormwater Inventory

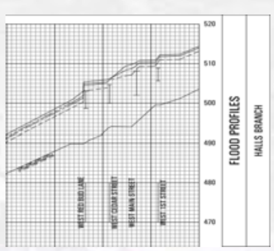
- Existing Features and Facilities
- Limited Information Available
- FEMA Information
  - 65 streams totaling approx. 220 miles in length
  - Updates are Needed
- Public Safety/Welfare

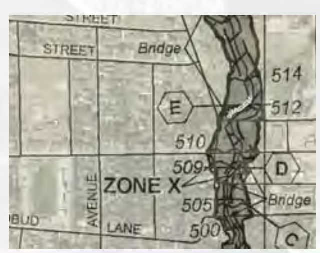


City/Community	No. of Bridges/Culverts	No. of Bridges/Culverts Overtopped by the 10-year Storm Event	No. of Bridges/Culverts Overtopped by the 100-year Storm Event
City of Dallas	46	7	13
City of Ferris	3	0	0
City of Hutchins	27	9	11
City of Lancaster	34	18	20
City of Wilmer	20	5	11
Dallas County	6	2	2
Total	136	41	57

Stormwater Infrastructure Needed

- Bridge/Culvert Replacements
  - Danger Classification/Replacement Priority
    - 10 - High, 21 - Medium, 26 - Low
- Channel Restoration and Floodplain Reclamation
- Master Drainage Plans





Summary

- For development consistency across the SDCIA area, communities should adopt floodplain criteria that exceed the NFIP minimum.
- Further investigations required in areas where stormwater inventory is lacking.
- FEMA flood profiles and maps do not agree, and an update of the hydrology/hydraulic models in the area needs to occur.
- Reconstruct bridges/culverts overtopped by the 100-year event for the safety and welfare of the public.
- Implement planned infrastructure features of the Dallas Logistics Hub and Lower Five Mile Creek.
- Prepare Master Drainage Study for the SDCIA area not included in the Dallas Logistics Hub study area.
- Estimate of probable construction/study cost: $100 million

Transportation Infrastructure Assessment

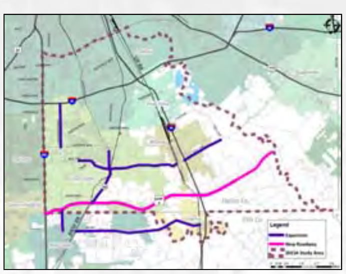
Michael Copeland

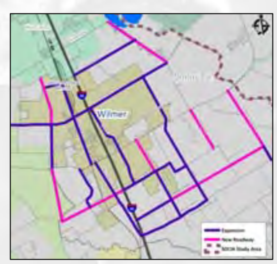
CDM Smith

Current Transportation Inventory

Planned Roadway Improvements

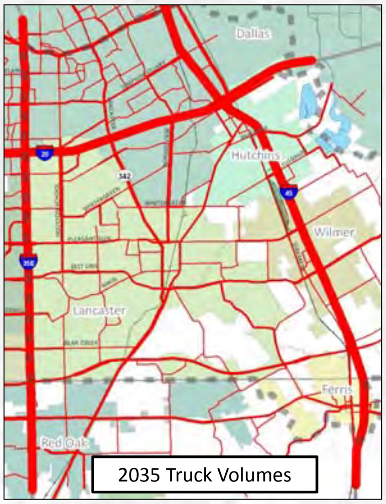
- Mobility 2035
- City of Dallas Thoroughfare Plan
- City of Hutchins Roadway Capital Improvement Plan
- City of Lancaster Master Thoroughfare Plan
- City of Wilmer Community Plan



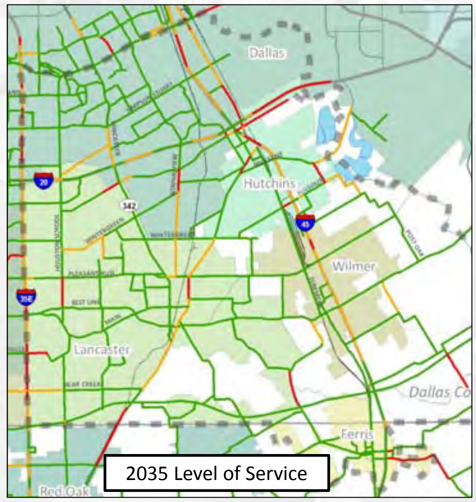


Future Roadway Needs Assessment

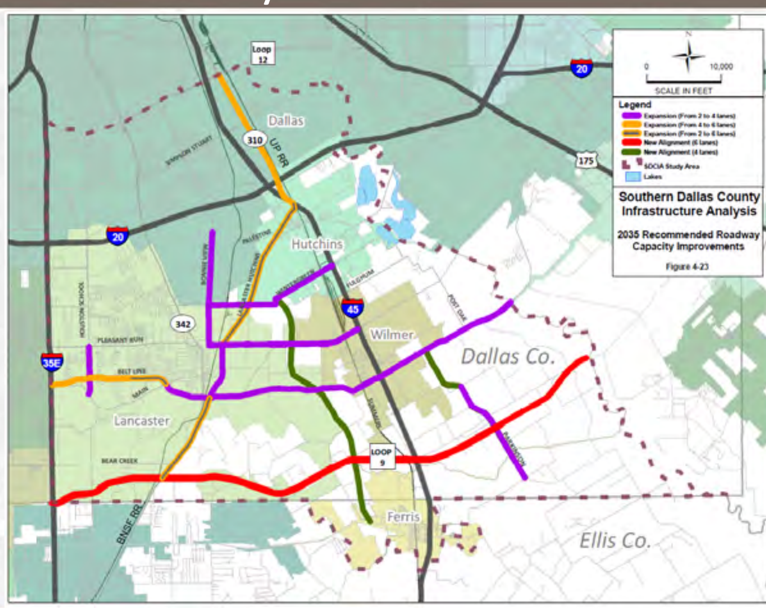
Freight Demands



Passenger Car Demands



Roadway Recommendations



Private Sector Utilities Assessment

Michael Carleton
Arredondo, Zepeda & Brunz

Electricity

- Complex system that brings power from generators across the state to the local community
- Oncor is the provider of transmission services to the Southern Dallas area and has responsibility for transmission lines and substations
- Major transmission lines do intersect the region that can be tapped for future substations
- Oncor has no short-term plans for project development unless a major users is in need of power immediately
- Mid-term needs will be for substations where specific needs are identified
- Planning with Oncor critical to assuring available power when needed

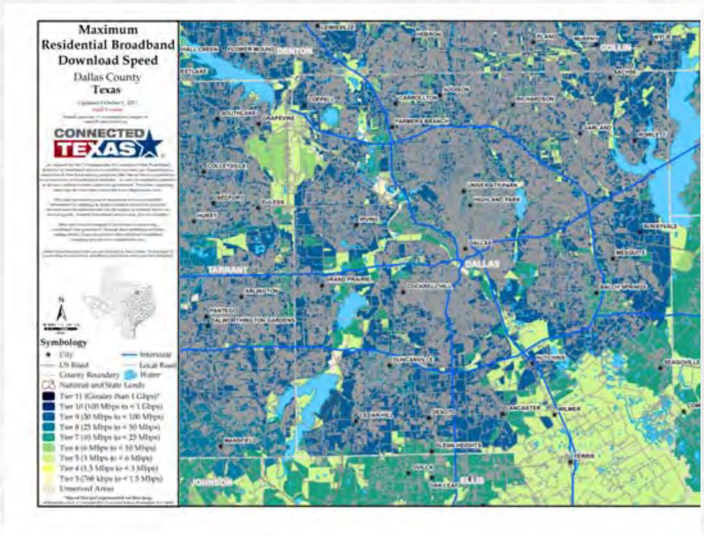
Natural Gas

- Natural gas industry is experiencing significant change due to increased supply of natural gas
- Atmos is the provider of natural gas service in this region and has franchise agreements with each of the cities
- Natural gas infrastructure includes transmission pipelines, compressor stations and city-gate and delivery facilities
- Major pipelines do intersect the region that can be tapped for any size user of natural gas
- Atmos does not have immediate plans for infrastructure improvements in the region, unless a major user is identified
- City-gate facilities and delivery pipelines will be required in mid-term to meet specific demands as region grows
- Planning with Atmos before natural gas is needed so pipelines can be secured and constructed

Telecommunications

- Wide range of services provided to customers – telephone, broadband, wifi, cable, etc
- Technology continues to move at an amazing speed in terms of what is available
- Big differences in the level of service between urban and rural areas largely because larger customer base allows for greater investment in an area where capital costs can be recovered
- There is a need for capital investments in the rural areas, but it will be dependent on increased customer base to justify investments
- Rural areas should continue to explore public programs to expand services

Telecommunications



Municipal Solid Waste Management

- Solid waste services include solid waste collection, recycling, composting and landfill disposal
- This service is a combination of both public and private sector services
- There is long-term sufficient disposal capacity in the region
- Wide range of recycling services offered in urban settings, rural settings have more basic service
- City of Dallas now has policy that all waste generated in the city (residential and commercial) is to be directed to the City's landfill

Next Steps

Project Timeline

Today

Phase 1	Phase 2A	Phase 2B	Phase 2C
Historical Document Review	Demographic/Economic Analysis	Infrastructure Needs Assessment	Final Report

Final Project Report

- Compilation of all aspects of study
  1) Historical Review and Inventory
  2) Demographic and Economic Analysis
  3) Infrastructure Analysis

How to Be Involved

➢ Comment form

- **Please give us your comments and questions**
  - **In writing tonight – leave forms in the comment box**
  - **By email later – by July 9**

Patrick Mandapaka - pmandapaka@nctcog.org

➢ Project Website

- www.nctcog.org/sdcia
- Full draft infrastructure analysis report available for download

Thank You!

Southern Dallas County Infrastructure Analysis

Phase 2 - Public Meeting

June 21, 2012

Your comments are important to us. Please provide any additional information, comments or suggestions for the project team to consider while finalizing the infrastructure analysis report.

____

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Please let us know of any infrastructure issues/needs in the study related to transportation, water supply, sanitary sewer, storm drainage or private utilities that were not identified or addressed in the infrastructure analysis report.

____

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Optional: Please provide your contact information in case the project team needs to contact you for clarification on your comments or suggestions.9232

Name: ____

Email address: ____

Phone number: ____

Mailing address: ____

When finished, please place in the comments box or send comments to:

Patrick Mandapaka
pmandapaka@nctcog.org

Thank you for your input.

Southern Dallas County Infrastructure Analysis

Phase II Public Meeting
Tuesday, September 27, 2011 - at UNT-Dallas Campus

<u>Transcription of Written Comments from Citizens</u>

The following three (3) written comments were received during the September 27, 2011 Public Meeting:

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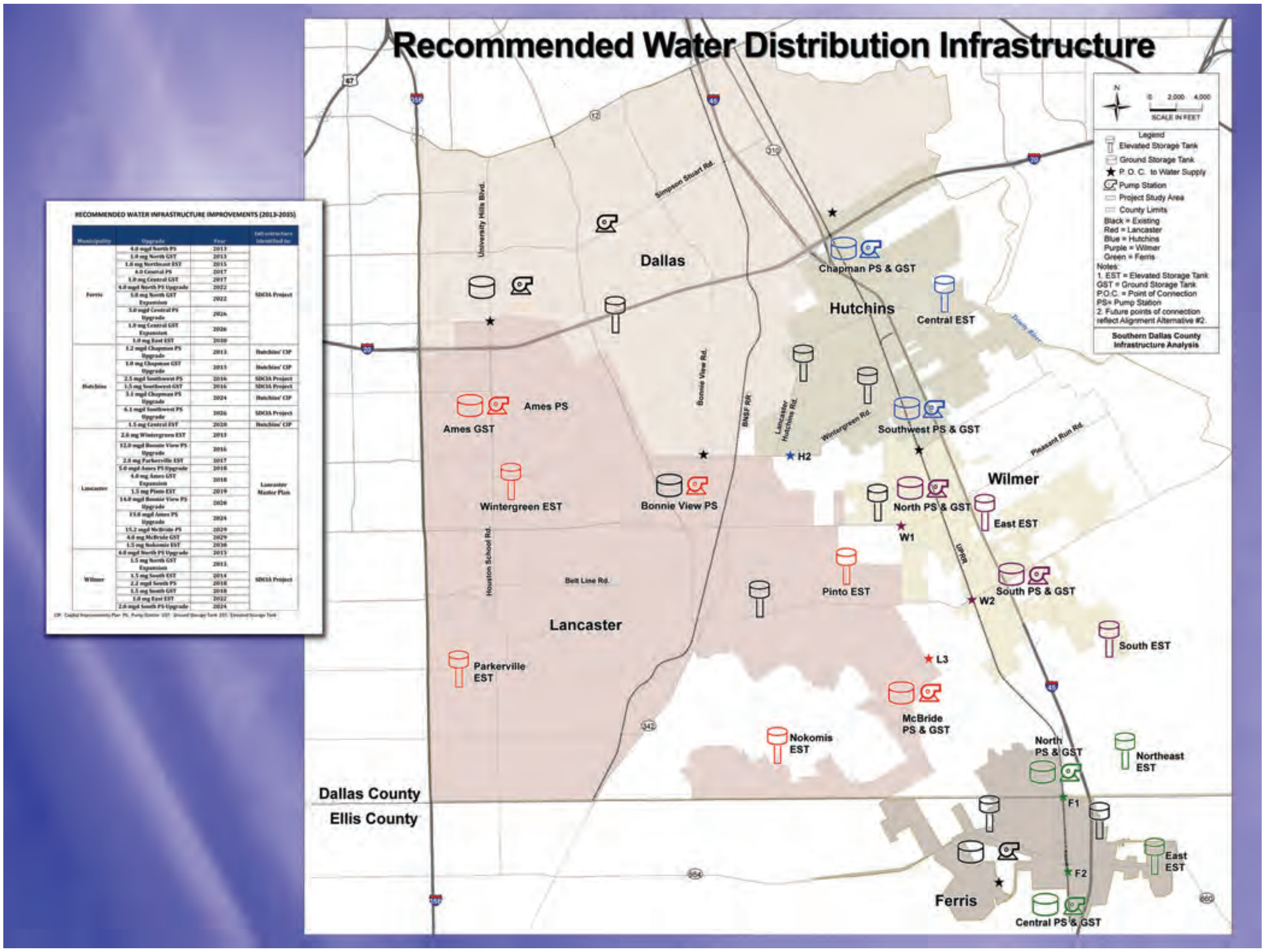
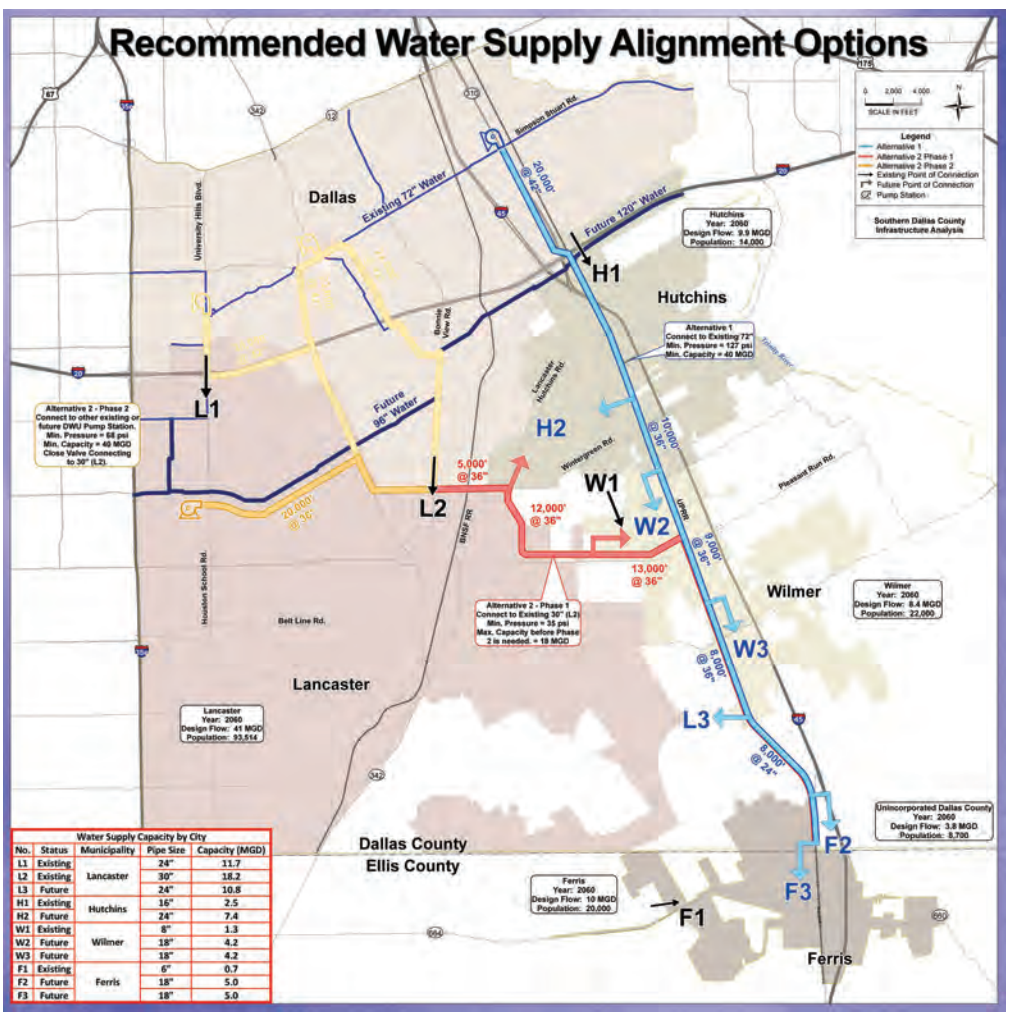
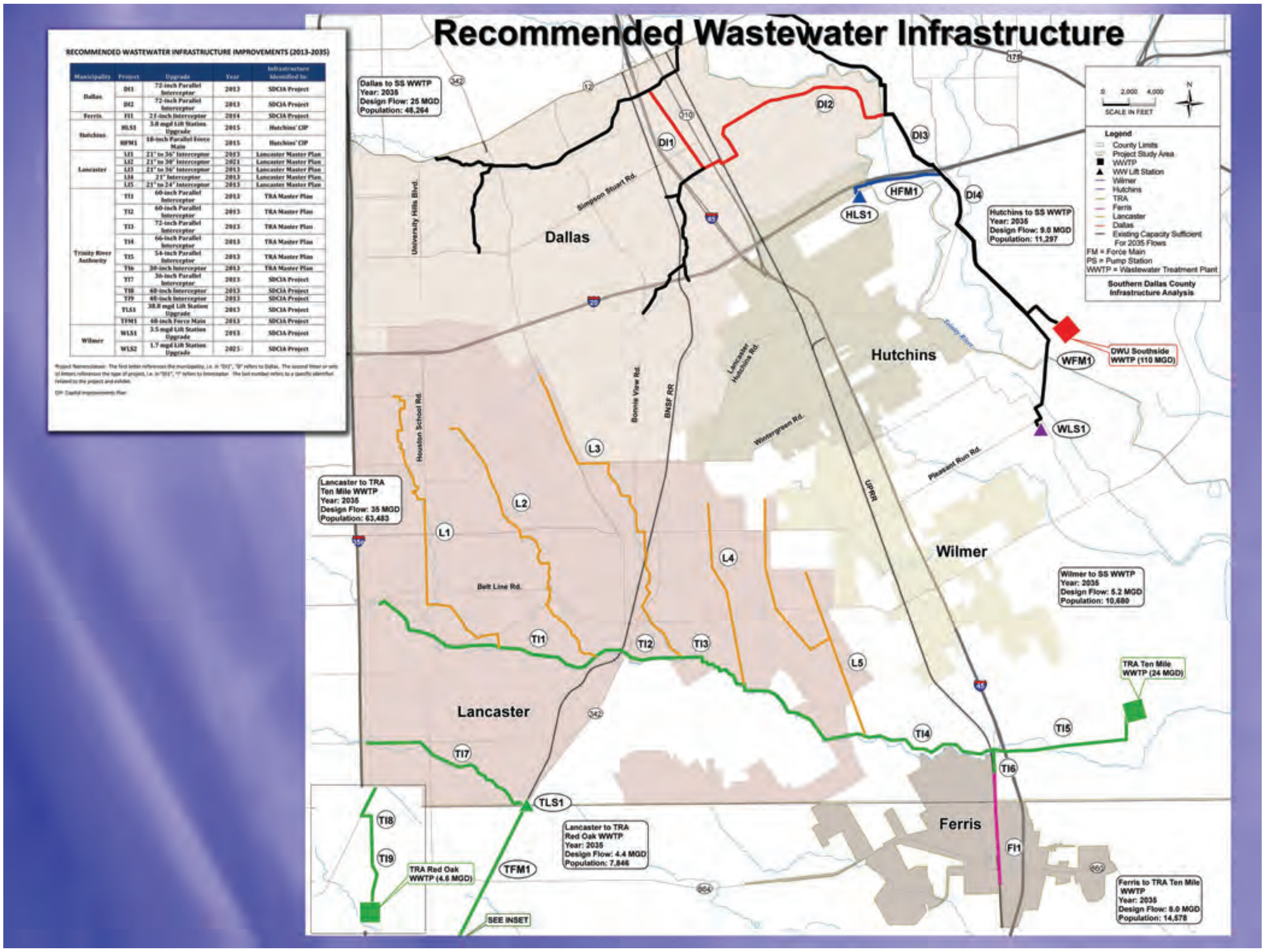
Comment 3:

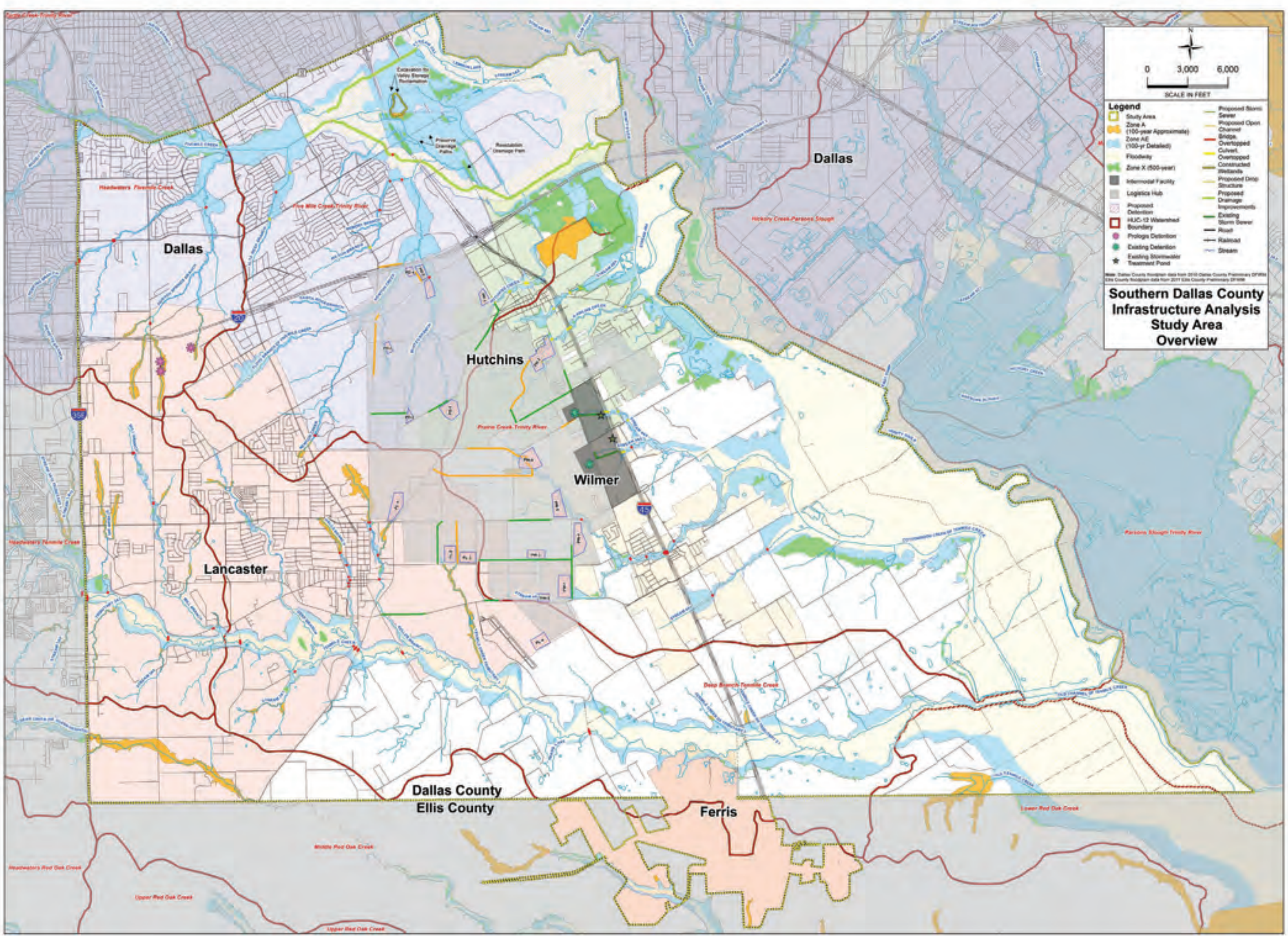
*describe why intermodal is a collection of 2 separated sections w/residential in middle.


Recommended Water Distribution Infrastructure
RECOMMENDED WATER INFRASTRUCTURE IMPROVEMENTS (2013-2035)
Legend
Elevated Storage Tank
Ground Storage Tank
P.O.C. to Water Supply
Pump Station
Project Study Area
County Limits
Black = Existing
Red = Lancaster
Blue = Hutchins
Purple = Wilmer
Green = Ferris
Notes:
1. EST = Elevated Storage Tank
GST = Ground Storage Tank
P.O.C. = Point of Connection
PS= Pump Station
2. Future points of connection reflect Alignment Alternative #2.
Southern Dallas County Infrastructure Analysis
Dallas
Hutchins
Chapman PS & GST
Central EST
Ames PS
Ames GST
Southwest PS & GST
Wintergreen EST
Bonnie View PS
North PS & GST
Wilmer
East EST
Pinto EST
South PS & GST
Lancaster
South EST
Parkerville EST
McBride PS & GST
Nokomis EST
North PS & GST
Northeast EST
Dallas County
Ellis County
East EST
Ferris
Central PS & GST
H2
W1
W2
L3
F1
F2
University Hills Blvd.
Simpson Stuart Rd.
Bonnie View Rd.
Houston School Rd.
Belt Line Rd.
Pleasant Run Rd.
Wintergreen Rd.
Lancaster Hutchins Rd.


Recommended Water Supply Alignment Options
Legend
Alternative 1
Alternative 2 Phase 1
Alternative 2 Phase 2
Existing Point of Connection
Future Point of Connection
Pump Station
Southern Dallas County Infrastructure Analysis
Dallas
Existing 72" Water
Future 120" Water
Future 96" Water
Hutchins Year: 2060 Design Flow: 9.9 MGD Population: 14,000
Hutchins
Alternative 1 Connect to Existing 72" Water Min. Pressure = 127 psi Min. Capacity = 40 MGD
20,000' @ 42"
10,000' @ 36"
9,000' @ 36"
8,000' @ 36"
8,000' @ 24"
Alternative 2 - Phase 2 Connect to other existing or future DWU Pump Station. Min. Pressure = 68 psi Min. Capacity = 40 MGD Close Valve Connecting to 30" (L2)
20,000' @ 36"
5,000' @ 36"
12,000' @ 36"
13,000' @ 36"
Alternative 2 - Phase 1 Connect to Existing 30" (L2) Min. Pressure = 35 psi Max. Capacity before Phase 2 is needed. = 18 MGD
H1
H2
L1
L2
L3
W1
W2
W3
F1
F2
F3
Wilmer
Wilmer Year: 2060 Design Flow: 8.4 MGD Population: 22,000
Lancaster
Lancaster Year: 2060 Design Flow: 41 MGD Population: 93,514
Unincorporated Dallas County Year: 2060 Design Flow: 3.8 MGD Population: 8,700
Ferris Year: 2060 Design Flow: 10 MGD Population: 20,000
Dallas County
Ellis County
Ferris
Water Supply Capacity by City
No. | Status | Municipality | Pipe Size | Capacity (MGD)
L1 | Existing | Lancaster | 24" | 11.7
L2 | Existing | | 30" | 18.2
L3 | Future | | 24" | 10.8
H1 | Existing | Hutchins | 16" | 2.5
H2 | Future | | 24" | 7.4
W1 | Existing | Wilmer | 8" | 1.3
W2 | Future | | 18" | 4.2
W3 | Future | | 18" | 4.2
F1 | Existing | Ferris | 6" | 0.7
F2 | Future | | 18" | 5.0
F3 | Future | | 18" | 5.0



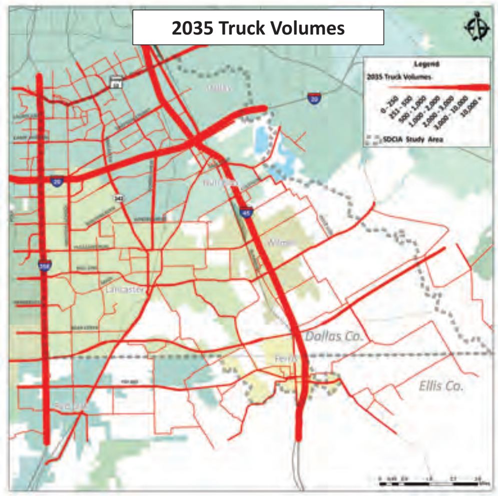
Municipality	Project	Upgrade	Year	Infrastructure Identified by:
Dallas	DI1	72-inch Parallel Interceptor	2013	SDCIA Project
	DI2	72-inch Parallel Interceptor	2013	SDCIA Project
Ferris	FI1	21-inch Interceptor	2014	SDCIA Project
Hutchins	HLS1	3.8 mgd Lift Station Upgrade	2015	Hutchins' CIP
	HFM1	18-inch Parallel Force Main	2015	Hutchins' CIP
Lancaster	LI1	21" to 36" Interceptor	2013	Lancaster Master Plan
	LI2	21" to 30" Interceptor	2021	Lancaster Master Plan
	LI3	21" to 36" Interceptor	2013	Lancaster Master Plan
	LI4	21" Interceptor	2013	Lancaster Master Plan
	LI5	21" to 24" Interceptor	2013	Lancaster Master Plan
Trinity River Authority	TI1	60-inch Parallel Interceptor	2013	TRA Master Plan
	TI2	60-inch Parallel Interceptor	2013	TRA Master Plan
	TI3	72-inch Parallel Interceptor	2013	TRA Master Plan
	TI4	66-inch Parallel Interceptor	2013	TRA Master Plan
	TI5	54-inch Parallel Interceptor	2013	TRA Master Plan
	TI6	30-inch Interceptor	2013	TRA Master Plan
	TI7	36-inch Parallel Interceptor	2013	SDCIA Project
	TI8	48-inch Interceptor	2013	SDCIA Project
	TI9	48-inch Interceptor	2013	SDCIA Project
	TLS1	38.8 mgd Lift Station Upgrade	2013	SDCIA Project
	TFM1	48-inch Force Main	2013	SDCIA Project
Wilmer	WLS1	3.5 mgd Lift Station Upgrade	2013	SDCIA Project
	WLS2	1.7 mgd Lift Station Upgrade	2025	SDCIA Project

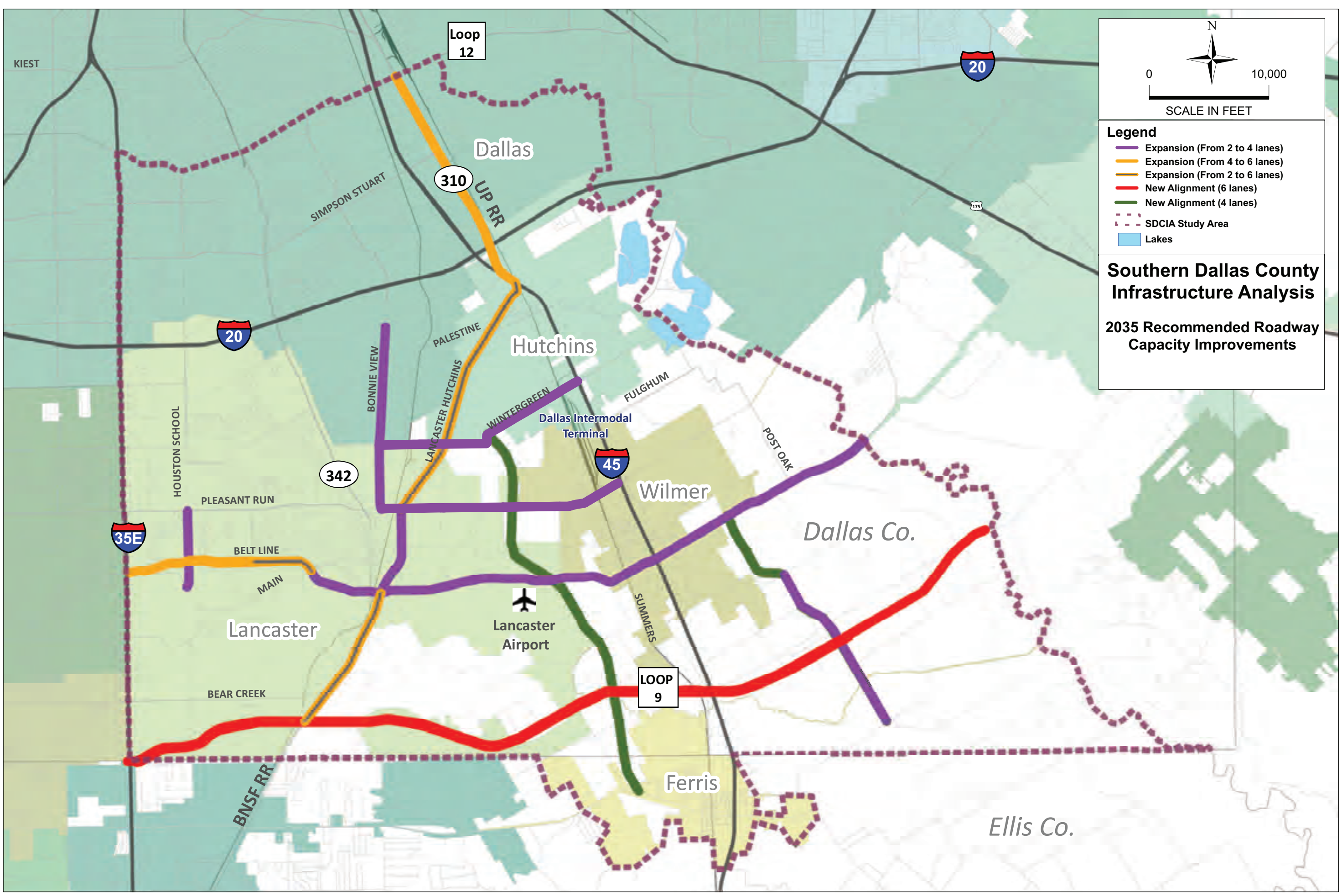



2012 Level of Service
Dallas Co.
Ellis Co.


2035 Level of Service
Dallas Co.
Ellis Co.


2012 Truck Volumes
Dallas Co.
Ellis Co.


2035 Truck Volumes
Dallas Co.
Ellis Co.


N
0
10,000
SCALE IN FEET
Legend
Expansion (From 2 to 4 lanes)
Expansion (From 4 to 6 lanes)
Expansion (From 2 to 6 lanes)
New Alignment (6 lanes)
New Alignment (4 lanes)
SDCIA Study Area
Lakes
Southern Dallas County Infrastructure Analysis
2035 Recommended Roadway Capacity Improvements
KIEST
Loop 12
20
Dallas
310
UP RR
SIMPSON STUART
PALESTINE
Hutchins
BONNIE VIEW
LANCASTER HUTCHINS
WINTERGREEN
Dallas Intermodal Terminal
FULGHUM
POST OAK
45
Wilmer
342
HOUSTON SCHOOL
PLEASANT RUN
35E
BELT LINE
MAIN
Lancaster
Lancaster Airport
SUMMERS
Dallas Co.
LOOP 9
BEAR CREEK
BNSF RR
Ferris
Ellis Co.

Appendix C

Detailed Water Cost Estimates

Water Supply Transmission Main, Alignment Alternative #1 Estimated Construction Cost (2012 $)

Item	Quantity	Unit Cost	Total Cost
42" Water Pipe	20,000 lf	$290	$4,800,000
36" Water Pipe	27,000 lf	$240	$3,990,000
24" Water Pipe	8,000 lf	$180	$2,880,000
BOTOC[1] Construction	1,500 lf	$700	$1,050,000
ROW Acquisition[2]	55,000 lf	$10	$550,000
Pavement Repair	24,600 lf	$50	$1,230,000
Booster PS (40 mgd)	1 LS	$9,200,000	$9,200,000
		Subtotal	$25,750,000
		25% Contingency	$6,440,000
		Professional Services	$3,860,000
		Total	**$36,100,000**

[1]BOTOC – By Other Than Open Cut, i.e tunneling, boring, etc.

[2]ROW Acquisition – Assumes a 40 foot wide permanent easement.

Water Supply Transmission Main, Alignment Alternative #2 Estimated Construction Cost (2012 $)

Item	Quantity	Unit Cost	Total Cost
Phase 1			
42" Water Pipe	5,000 lf	$290	$1,450,000
36" Water Pipe	33,000 lf	$240	$7,920,000
24" Water Pipe	8,000 lf	$180	$1,440,000
ROW Acquisition	46,000 lf	$10	$460,000
Pavement Repair	18,900 lf	$50	$950,000
		Subtotal	$12,220,000
		25% Contingency	$3,060,000
		Professional Services	$1,830,000
		Total Phase 1	**$17,100,000**
Phase 2			
42" Water Pipe	28,000 lf	$290	$8,120,000
BOTOC Construction	700 lf	$700	$490,000
ROW Acquisition	28,000 lf	$10	$280,000
Pavement Repair	27,300 lf	$50	$1,370,000
Booster PS (40 mgd)	1 LS	$9,200,000	$9,200,000
		Subtotal	$19,460,000
		25% Contingency	$4,870,000
		Professional Services	$2,920,000
		Total Phase 2	**$27,300,000**
		Total, Both Phases	**$44,400,000**

Appendix D

Detailed Wastewater Cost Estimates

Dallas:

Dallas Interceptors Cost Estimate within Study Area (Project DI1)

Item	Quantity	Unit Cost	Total Cost
72" Wastewater	7,300 lf	$900	$6,570,000
Pavement Repair	100 lf	$50	$10,000
Right-of-Way Acquisition	7,300 lf	$10	$70,000
		Subtotal	$6,650,000
		25% Contingency	$1,660,000
		Professional Services	$1,000,000
		Inflation	$370,000
		Total	**$9,680,000**

BOTOC = by other than open cut, lf = linear feet

Dallas Interceptors Cost Estimate within Study Area (Project DI2)

Item	Quantity	Unit Cost	Total Cost
72" Wastewater	18,000 lf	$900	$16,200,000
BOTOC Construction	500 lf	$700	$350,000
Pavement Repair	3,800	$50	$190,000
Right-of-Way Acquisition	18,000 lf	$10	$180,000
		Subtotal	$16,920,000
		25% Contingency	$4,230,000
		Professional Services	$2,540,000
		Inflation	$950,000
		Total	**$24,640,000**

Ferris:

Ferris Interceptor Cost Estimate (Project FI1)

Item	Quantity	Unit Cost	Total Cost
21" Wastewater	10,600 lf	$170	$1,800,000
Pavement Repair	350 lf	$50	$20,000
Right-of-Way Acquisition	10,600 lf	$10	$110,000
		Subtotal	$1,930,000
		25% Contingency	$480,000
		Professional Services	$290,000
		Inflation	$220,000
		Total	**$2,920,000**

Hutchins:

Hutchins Lift Station Cost Estimate (Project HLS1)

Item	Quantity	Unit Cost	Total Cost
Lift Station Upgrade (3.8 mgd)	1 ls	$450,000	$450,000
		Subtotal	$450,000
		25% Contingency	$110,000
		Professional Services	$70,000
		Inflation	$300,000
		Total	**$930,000**

Hutchins Force Main Cost Estimate (Project HFM1)

Item	Quantity	Unit Cost	Total Cost
18" Force Main	7,800 lf	$155	$1,210,000
BOTOC Construction	500 lf	$4,834,000	$350,000
Right-of-Way Acquisition	7,800 lf	$700	$80,000
		Subtotal	$1,640,000
		25% Contingency	$410,000
		Professional Services	$250,000
		Inflation	$290,000
		Total	**$2,590,000**

Lancaster:

Lancaster Interceptor Cost Estimate (Project LI1)

Item	Quantity	Unit Cost	Total Cost
36" Wastewater	1,000 lf	$240	$240,000
33" Wastewater	1,700 lf	$225	$380,000
30" Wastewater	1,200 lf	$210	$250,000
27" Wastewater	11,000 lf	$195	$2,150,000
24" Wastewater	4,600 lf	$180	$830,000
21" Wastewater	6,000 lf	$170	$1,020,000
Right-of-Way Acquisition	25,500 lf	$10	$260,000
		Subtotal	$5,130,000
		25% Contingency	$1,280,000
		Professional Services	$770,000
		Inflation	$290,000
		Total	**$7,470,000**

Lancaster Interceptor Cost Estimate (Project LI2)

Item	Quantity	Unit Cost	Total Cost
30" Wastewater	4,000 lf	$210	$840,000
27" Wastewater	4,000 lf	$195	$780,000
24" Wastewater	7,000 lf	$180	$1,260,000
21" Wastewater	3,000 lf	$170	$510,000
Right-of-Way Acquisition	18,000 lf	$10	$180,000
		Subtotal	$3,570,000
		25% Contingency	$890000
		Professional Services	$540,000
		Inflation	$2,120,000
		Total	**$7,120,000**

Lancaster Interceptor Cost Estimate (Project LI3)

Item	Quantity	Unit Cost	Total Cost
36" Wastewater	3,000 lf	$240	$720,000
27" Wastewater	2,000 lf	$195	$390,000
24" Wastewater	4,800 lf	$180	$860,000
21" Wastewater	15,000 lf	$170	$2,550,000
Right-of-Way Acquisition	24,800 lf	$10	$250,000
		Subtotal	$4,770,000
		25% Contingency	$1,190,000
		Professional Services	$720,000
		Inflation	$270,000
		Total	**$6,950,000**

Lancaster Interceptor Cost Estimate (Project LI4)

Item	Quantity	Unit Cost	Total Cost
21" Wastewater	5,000 lf	$170	$850,000
Right-of-Way Acquisition	5,000 lf	$10	$50,000
		Subtotal	$900,000
		25% Contingency	$230,000
		Professional Services	$140,000
		Inflation	$50,000
		Total	**$1,320,000**

Lancaster Interceptor Cost Estimate (Project LI5)

Item	Quantity	Unit Cost	Total Cost
24" Wastewater	8,800 lf	$180	$1,580,,000
21" Wastewater	300 lf	$170	$50,000
Right-of-Way Acquisition	9,100 lf	$10	$90,000
		Subtotal	$1,720,000
		25% Contingency	$430,000
		Professional Services	$260,000
		Inflation	$100,000
		Total	**$2,510,000**

TRA:

TRA Interceptors Cost Estimate (Project TI1)

Item	Quantity	Unit Cost	Total Cost
60" Wastewater	13,200 lf	$650	$8,580,000
Pavement Repair	200 lf	$50	$10,000
Right-of-Way Acquisition	13,200 lf	$10	$130,000
		Subtotal	$8,720,000
		25% Contingency	$2,180,000
		Professional Services	$1,310,000
		Inflation	$490,000
		Total	**$12,700,000**

TRA Interceptors Cost Estimate (Project TI2)

Item	Quantity	Unit Cost	Total Cost
60" Wastewater	12,000 lf	$650	$7,800,000
Pavement Repair	100 lf	$50	$5,000
Right-of-Way Acquisition	12,000 lf	$10	$120,000
		Subtotal	$7,925,000
		25% Contingency	$1,980,000
		Professional Services	$1,190,000
		Inflation	$440,000
		Total	**$11,535,000**

TRA Interceptors Cost Estimate (Project TI3)

Item	Quantity	Unit Cost	Total Cost
72" Wastewater	13,000 lf	$900	$11,700,000
Pavement Repair	100 lf	$50	$5,000
Right-of-Way Acquisition	13,000 lf	$10	$130,000
		Subtotal	$11,835,000
		25% Contingency	$2,960,000
		Professional Services	$1,780,000
		Inflation	$660,000
		Total	**$17,235,000**

TRA Interceptors Cost Estimate (Project TI4)

Item	Quantity	Unit Cost	Total Cost
66" Wastewater	9,800 lf	$800	$7,840,000
Right-of-Way Acquisition	9,800 lf	$10	$100,000
		Subtotal	$7,940,000
		25% Contingency	$1,990,000
		Professional Services	$1,190,000
		Inflation	$440,000
		Total	**$11,560,000**

TRA Interceptors Cost Estimate (Project TI5)

Item	Quantity	Unit Cost	Total Cost
54" Wastewater	10,300 lf	$500	$5,150,000
BOTOC Construction	1,700 lf	$700	$1,190,000
Pavement Repair	50 lf	$50	$3,000
Right-of-Way Acquisition	10,300 lf	$10	$100,000
		Subtotal	$6,443,000
		25% Contingency	$1,610,000
		Professional Services	$970,000
		Inflation	$360,000
		Total	**$9,383,000**

TRA Interceptors Cost Estimate (Project TI6)

Item	Quantity	Unit Cost	Total Cost
30" Wastewater	2,300 lf	$210	$480,000
Pavement Repair	50 lf	$50	$3,000
Right-of-Way Acquisition	2,300 lf	$10	$20,000
		Subtotal	$503,000
		25% Contingency	$130,000
		Professional Services	$80,000
		Inflation	$60,000
		Total	**$773,000**

TRA Red Oak Interceptors Cost Estimate (Project TI7)

Item	Quantity	Unit Cost	Total Cost
36" Wastewater	13,200 lf	$240	$3,170,000
Pavement Repair	150 lf	$50	$8,000
Right-of-Way Acquisition	13,200 lf	$10	$130,000
		Subtotal	$3,308,000
		25% Contingency	$830,000
		Professional Services	$500,000
		Inflation	$190,000
		Total	**$4,828,000**

TRA Red Oak Interceptors Cost Estimate (Projects TI8 and TI9)

Item	Quantity	Unit Cost	Total Cost
48" Wastewater	10,300 lf	$400	$4,120,000
Pavement Repair	8,100 lf	$50	$410,000
Right-of-Way Acquisition	4,100 lf	$10	$40,000
		Subtotal	$4,565,000
		25% Contingency	$1,140,000
		Professional Services	$680,000
		Inflation	$260,000
		Total	**$6,645,000**

TRA Red Oak Lift Station Cost Estimate (Project TLS1)

Item	Quantity	Unit Cost	Total Cost
Lift Station Upgrade (38.8 mgd)	1 ls	$3,880,000	$3,880,000
		Subtotal	$3,880,000
		25% Contingency	$970,000
		Professional Services	$580,000
		Inflation	$220,000
		Total	**$5,650,000**

TRA Red Oak Force Main Cost Estimate (Project TFM1)

Item	Quantity	Unit Cost	Total Cost
48" Force Main	13,200 lf	$400	$5,280,000
Pavement Repair	1,300 lf	$50	$65,000
Right-of-Way Acquisition	12,200 lf	$10	$120,000
BOTOC Construction	100 lf	$700	$70,000
		Subtotal	$5,535,000
		25% Contingency	$1,380,000
		Professional Services	$830,000
		Inflation	$310,000
		Total	**$8,055,000**

Wilmer:

Wilmer Lift Station Cost Estimate (Project WLS1)

Item	Quantity	Unit Cost	Total Cost
Lift Station Upgrade (3.5 mgd)	1 ls	$450,000	$450,000
		Subtotal	$450,000
		25% Contingency	$110,000
		Professional Services	$70,000
		Inflation	$30,000
		Total	**$660,000**

Wilmer Lift Station Cost Estimate (Project WLS2)

Item	Quantity	Unit Cost	Total Cost
Lift Station Upgrade (1.7 mgd)	1 ls	$120,000	$120,000
		Subtotal	$120,000
		25% Contingency	$30,000
		Professional Services	$20,000
		Inflation	$110,000
		Total	**$280,000**

Appendix E

Detailed Stormwater Cost Estimates

Recommend Structure Replacements and Cost Estimates – City of Dallas

Current Mapped/ Studied Streams	Road	Recommen-dation	Cost	25% Contingency	Professional Services	Total Cost
Alta Mesa Branch	Persimmon Rd.	New Bridge	$200,000	$50,000	$30,000	$280,000
	Tracy Rd.	New Bridge	$200,000	$50,000	$30,000	$280,000
	Simpson Stuart Rd.	New Culvert	$30,000	$7,500	$4,500	$42,000
Ricketts Branch	Camp Wisdom Rd.	New Bridge	$460,000	$115,000	$69,000	$644,000
	Camp Wisdom Rd.	New Bridge	$460,000	$115,000	$69,000	$644,000
	IH 35E Service	New Bridge	$370,000	$92,500	$55,500	$518,000
	IH 35E Service	New Bridge	$360,000	$90,000	$54,000	$504,000
Runyon Springs Branch	Crouch Rd.	New Bridge	$430,000	$107,500	$64,500	$602,000
Whites Branch	Langdon Rd.	New Bridge	$180,000	$45,000	$27,000	$252,000
Wilson Branch						
	J J Lemmon Rd.	New Bridge	$250,000	$62,500	$37,500	$350,000
	Tioga St.	New Bridge	$310,000	$77,500	$46,500	$434,000
	Bonnie View Rd.	New Bridge	$880,000	$220,000	$132,000	$1,232,000
Woody Branch	Loop 12 (LEDBETTER DR.)	New Bridge	$1,870,000	$467,500	$280,500	$2,618,000
						Grand Total
						$8,400,000

Recommended Structure Replacements and Cost Estimates – City of Hutchins

Current Mapped/ Studied Streams	Road	Recommen-dation	Cost	25% Contingency	Professional Services	Total Cost
Hutchins Creek	Denton Street	New Culvert	$170,000	$42,500	$25,500	$238,000
	J J Lemmon St.	New Bridge	$160,000	$40,000	$24,000	$224,000
	Main Street	New Bridge	$210,000	$52,500	$31,500	$294,000
	Millers Ferry Rd.	New Bridge	$310,000	$77,500	$46,500	$434,000
Rawlins Creek	Dowdy Ferry Rd.	New Bridge	$170,000	$42,500	$25,500	$238,000
	IH 45	New Bridge	$2,210,000	$552,500	$331,500	$3,094,000
	Main Street	New Bridge	$330,000	$82,500	$49,500	$462,000
Stream 4A4	Goode Road	New Bridge	$180,000	$45,000	$27,000	$252,000
	IH 45	New Bridge	$1,010,000	$252,500	$151,500	$1,414,000
Stream 4B4	Austin Street	New Culvert	$40,000	$10,000	$6,000	$56,000
	Crestridge Drive	New Culvert	$60,000	$15,000	$9,000	$84,000
	Denton Street	New Culvert	$50,000	$12,500	$7,500	$70,000
						Grand Total
						$6,860,000

Recommended Structure Replacements and Cost Estimates – City of Lancaster

Current Mapped/ Studied Streams	Road	Recommen-dation	Cost	25% Contingency	Professional Services	Total Cost
Halls Branch	1ST St.	New Bridge	$210,000	$52,500	$31,500	$294,000
	4TH St.	New Bridge	$210,000	$52,500	$31,500	$294,000
	6TH St.	New Bridge	$200,000	$50,000	$30,000	$280,000
	Cedar St.	New Bridge	$210,000	$52,500	$31,500	$294,000
	Main St.	New Bridge	$240,000	$60,000	$36,000	$336,000
	Redbud Ln.	New Bridge	$220,000	$55,000	$33,000	$308,000
Keller Branch	Jefferson St.	New Bridge	$210,000	$52,500	$31,500	$294,000
	Main St.	New Bridge	$250,000	$62,500	$37,500	$350,000
	Pleasant Run Rd.	New Bridge	$200,000	$50,000	$30,000	$280,000
Mill Branch	Houston School Rd.	New Bridge	$240,000	$60,000	$36,000	$336,000
	Wintergreen Rd.	New Bridge	$160,000	$40,000	$24,000	$224,000
Stream 3A1	Tenmile Rd.	New Bridge	$220,000	$55,000	$33,000	$308,000
Stream 3A6	Beltline Rd.	New Bridge	$2,010,000	$502,500	$301,500	$2,814,000
Tenmile Creek	Bluegrove Rd.	New Bridge	$1,560,000	$390,000	$234,000	$2,184,000
	Houston School Rd.	New Bridge	$1,490,000	$372,500	$223,500	$2,086,000
	IH 35E Service	New Bridge	$2,170,000	$542,500	$325,500	$3,038,000
	IH 35E Service (County Highway 1382)	New Bridge	$2,650,000	$662,500	$397,500	$3,710,000
	Nokomis Rd.	New Bridge	$1,550,000	$387,500	$232,500	$2,170,000
	Old Red Oak Rd.	New Bridge	$1,500,000	$375,000	$225,000	$2,100,000
	SH 342	New Bridge	$1,880,000	$470,000	$282,000	$2,632,000
						Grand Total
						$24,322,000

Recommended Structure Replacements and Cost Estimates – City of Wilmer

Current Mapped/ Studied Streams	Road	Recommen-dation	Cost	25% Contingency	Professional Services	Total Cost
Cottonwood Creek of Tenmile Creek	Goode Rd.	New Bridge	$320,000	$80,000	$48,000	$448,000
	IH 45	New Bridge	$1,150,000	$287,500	$172,500	$1,610,000
	IH 45 Service Rd.	New Bridge	$310,000	$77,500	$46,500	$434,000
	IH 45 Service Rd.	New Bridge	$320,000	$80,000	$48,000	$448,000
	Millers Ferry Rd.	New Bridge	$400,000	$100,000	$60,000	$560,000
	Pleasant Run Rd.	New Bridge	$300,000	$75,000	$45,000	$420,000
Stream 4A1	Goode Rd.	New Bridge	$240,000	$60,000	$36,000	$336,000
Stream 4A5	Goode Rd.	New Bridge	$150,000	$37,500	$22,500	$210,000
	IH 45	New Bridge	$1,000,000	$250,000	$150,000	$1,400,000
Tenmile Creek	Ferris Rd.	New Bridge	$1,530,000	$382,500	$229,500	$2,142,000
						Grand Total
						$8,008,000

Recommended Structure Replacements and Cost Estimates – Dallas County

Current Mapped/ Studied Streams	Road	Recommen-dation	Cost	25% Contingency	Professional Services	Total Cost
Stream 4A1	Geller Rd.	New Bridge	$240,000	$60,000	$36,000	$336,000
Stream 4A4	Fulghum Rd.	New Bridge	$170,000	$42,500	$25,500	$238,000
						Grand Total
						$574,000

Proposed Infrastructure Needs Per Dallas Logistics Hub Master Drainage Plan– City of Dallas

Proposed Pond/ Open Channel	Description	Cost	25% Contingency	Professional Services	Total Cost
Pond D-1	74 acre-feet	$390,000	$97,500	$58,500	$546,000
Pond D-2	100 acre-feet	$530,000	$132,500	$79,500	$742,000
Pond D-3	52 acre-feet	$280,000	$70,000	$42,000	$392,000
Pond D-4	39 acre-feet	$210,000	$52,500	$31,500	$294,000
Pond D-5	171 acre-feet	$910,000	$227,500	$136,500	$1,274,000
Open Channel - R-D6A	Length: 1570; Bottom Width 14; Side Slopes 4:1	$60,000	$15,000	$9,000	$84,000
Open Channel - R-D8A	Length: 1700; Bottom Width 10; Side Slopes 4:1	$170,000	$42,500	$25,500	$238,000
Open Channel - R-D6C	Length: 2160; Bottom Width 15; Side Slopes 4:1	$80,000	$20,000	$12,000	$112,000

Storm Sewer/ Culvert Crossing	Description	Cost	25% Contingency	Professional Services	Total Cost
Storm Sewer R-D7	Length: 2780; Size: 72" RCP; Number of boxes: 1	$650,000	$162,500	$97,500	$910,000
Storm Sewer R-D11	Length: 3755; Size: 6'x6' RCB; Number of boxes: 2	$2,400,000	$600,000	$360,000	$3,360,000

Proposed Infrastructure Needs Per Dallas Logistics Hub Master Drainage Plan – City of Hutchins

Proposed Pond/Open Channel	Description	Cost	25% Contingency	Professional Services	Total Cost
P H-1	60 acre-feet	$320,000	$80,000	$48,000	$448,000
P H-2	180 acre-feet	$960,000	$240,000	$144,000	$1,344,000
Open Channel R-H7	Length: 4640; Bottom Width 25; Side Slopes 4:1	$340,000	$85,000	$51,000	$476,000
Open Channel R-H14	Length: 3725; Bottom Width 10; Side Slopes 4:1	$120,000	$30,000	$18,000	$168,000
Storm Sewer/Culvert Crossing	**Description**	**Cost**	**25% Contingency**	**Professional Services**	**Total Cost**
Storm Sewer R-H5B	Length: 4450; Size: 6'x4' RCB; Number of boxes: 1	$1,210,000	$302,500	$181,500	$1,694,000
Storm Sewer R-H7A	Length: 740; Size: 5'x4' RCB; Number of boxes: 2	$410,000	$102,500	$61,500	$574,000

Proposed Infrastructure Needs Per Dallas Logistics Hub Master Drainage Plan – City of Lancaster

Proposed Pond/Open Channel	Description	Cost	25% Contingency	Professional Services	Total Cost
P L-1	155 acre-feet	$830,000	$207,500	$124,500	$1,162,000
P L-2	96 acre-feet	$510,000	$127,500	$76,500	$714,000
P L-3	100 acre-feet	$530,000	$132,500	$79,500	$742,000
P L-4	60 acre-feet	$320,000	$80,000	$48,000	$448,000
Open Channel R-L9	Length: 3200; Bottom Width 25; Side Slopes 4:1	$150,000	$37,500	$22,500	$210,000
Open Channel R-L10	Length: 3110; Bottom Width 35; Side Slopes 4:1	$80,000	$20,000	$12,000	$112,000
Open Channel R-L2B	Length: 2160; Bottom Width 15; Side Slopes 4:1	$160,000	$40,000	$24,000	$224,000

Storm Sewer/Culvert Crossing	Description	Cost	25% Contingency	Professional Services	Total Cost
Storm Sewer R-L6A	Length: 810; Size: 6'x4' RCB; Number of boxes: 1	$220,000	$55,000	$33,000	$308,000
Culvert Crossing J-L7	Length: 1725; Size: 12'x5' RCB; Number of boxes: 4	$130,000	$32,500	$19,500	$182,000

Proposed Infrastructure Needs Per Dallas Logistics Hub Master Drainage Plan – City of Wilmer

Proposed Pond/Open Channel	Description	Cost	25% Contingency	Professional Services	Total Cost
P W-1	154 acre-feet	$820,000	$205,000	$123,000	$1,148,000
P W-2	91 acre-feet	$480,000	$120,000	$72,000	$672,000
P W-3	68 acre-feet	$360,000	$90,000	$54,000	$504,000
P W-4	124 acre-feet	$660,000	$165,000	$99,000	$924,000
P W-5	167 acre-feet	$890,000	$222,500	$133,500	$1,246,000
P W-6	158 acre-feet	$840,000	$210,000	$126,000	$1,176,000
Open Channel R-W6A	Length: 2365; Bottom Width 40; Side Slopes 4:1	$200,000	$50,000	$30,000	$280,000
Open Channel R-W6B	Length: 1070; Bottom Width 40; Side Slopes 4:1	$90,000	$22,500	$13,500	$126,000
Open Channel R-W6C	Length: 3485; Bottom Width 20; Side Slopes 4:1	$260,000	$65,000	$39,000	$364,000
Open Channel R-W11	Length: 1970; Bottom Width 65; Side Slopes 4:1	$220,000	$55,000	$33,000	$308,000
Open Channel R-W11 A	Length: 3275; Bottom Width 40; Side Slopes 4:1	$370,000	$92,500	$55,500	$518,000
Open Channel R-W11 B	Length: 1165; Bottom Width 10; Side Slopes 4:1	$130,000	$32,500	$19,500	$182,000
Open Channel R-W11 C	Length: 1785; Bottom Width 20; Side Slopes 4:1	$200,000	$50,000	$30,000	$280,000
Open Channel R-W11 D	Length: 3000; Bottom Width 20; Side Slopes 4:1	$340,000	$85,000	$51,000	$476,000
Open Channel R-W19	Length: 1645; Bottom Width 30; Side Slopes 4:1	$30,000	$7,500	$4,500	$42,000
Storm Sewer/Culvert Crossing	**Description**	**Cost**	**25% Contingency**	**Professional Services**	**Total Cost**
Storm Sewer R-W6D	Length: 1135; Size: 6'x4' RCB; Number of boxes: 1	$310,000	$77,500	$46,500	$434,000
Storm Sewer R-W8B	Length: 4565; Size: 7'x4' RCB; Number of boxes: 1	$1,900,000	$475,000	$285,000	$2,660,000
Culvert Crossing J-W8	Length: 4345; Size: 12'x5' RCB; Number of boxes: 8	$260,000	$65,000	$39,000	$364,000

Appendix F

Funding Options for Water, Wastewater and Stormwater

WATER AND WASTEWATER

Capital funds for water and wastewater infrastructure can originate from multiple sources. Some funding sources are generated by the utility or municipality, which can include user rates, special assessments, and ad valorem taxes. Other funding sources are obtained from outside entities and include debt , grants, development charges and developer contributions. A brief summary of each potential funding source follows.

UTILITY RATES

Rates paid by utility customers provide a revenue source for a utility to operate and maintain the existing utility system, but they can also be used to finance capital improvements. A portion of the user charge can fund annual programs to replace aging infrastructure, or can they can fund reserves used to finance improvements to serve new development and growth. Rates can also be used to repay debt service.

SPECIAL ASSESSMENTS

Infrastructure constructed for a specific purpose or for a specific area can be funded through special assessments levied by special improvements districts. The capital costs of the improvements are recouped by a special assessment to each property owner served by the improvements. The assessment can be based on property acreage, building square footage, or other similar method.

AD VALOREM TAXES

These taxes are levied on the assessed values of individual properties throughout the taxing authority's district, whether they are connected to the utility system or not. This can be advantageous because properties that will be served in the future contribute to the infrastructure that will serve them. While the revenue from ad valorem taxes is consistent and predictable, it is not constant throughout the year.

DEBT

Funding major infrastructure projects through loans (from public or private agencies) or bonds (debt instruments issued by investors) is common. Issuing debt allows the municipality or utility to fund all of a project or several projects. Debt instruments cost more in the long-term because of the associated interest rate, but the principle and interest can be repaid over a period of time of 20 years or more.

GRANTS AND LOW INTEREST LOANS

Grants are funding sources that do not require repayment. Low and no interest loans require repayment, but are less expensive than other debt instruments with higher interest rates. Several state and federal agencies offer grants as well as low interest and no interest loans. The Texas Water Development Board (TWDB) implements the Clean Water State Revolving Fund and Drinking Water State Revolving Fund, which provide low interest loans for wastewater and water infrastructure, respectively. The TWDB offers other grant and loan programs, as does the US Department of Agriculture, the US Department of Housing and Urban Development.

STORMWATER

For stormwater infrastructure, a flood protection planning grant financed through the TWDB Research and Planning Fund offers the opportunity to conduct evaluations of structural and nonstructural solutions to flooding problems and protection needs for the entire watershed. FEMA funding sources include Hazard Mitigation Grant Program and Flood Mitigation Assistance. A local source of funding includes Dallas County's Community Development Block Grant.

DEVELOPMENT CHARGES

Commonly known as impact or tap fees, this funding source is an equitable way to fund new improvements in developing areas because the fees are levied against new users who necessitate the infrastructure. Existing rate payers share less of the financial burden for infrastructure from which they may receive little benefit. While equitable, the revenue from development charges may be inconsistent from year to year. Impact fee revenue may also take time to accumulate sufficiently to fund major projects. Therefore, other funding sources, such as debt, may be necessary in areas with immediate infrastructure needs.

DEVELOPER CONTRIBUTIONS

Developers frequently fund the construction of infrastructure needed to serve their sites, such as wastewater collectors and water distribution lines. These contributions can be significant for large developments or for sites that are not adjacent to existing facilities; infrastructure extensions to serve new development provide service to all properties between the existing and new development. Developer agreements also commonly require for infrastructure to be oversized to serve other local future development. Developer funded or constructed infrastructure should be inspected by the local utility prior to acceptance.

Appendix G

Transportation Policy and Design Strategies

CONTEXT SENSITIVE SOLUTIONS

To address the need to describe freight systems which account for the population distress which may result, an analysis of environmental justice (EJ) census blocks may be conducted. Historical assignment of freight activities has proven to be in these areas. These areas typically lack the ability to offset, reduce, or eliminate this assignment due to economic or other factors. Existing EJ blocks are reviewed in association with where freight activity exists and proposed routes associated with freight movement occur. Having a better understanding of these patterns, future planning of freight corridors can work to minimize the continued effects the presence of these movements in these areas generate.

In 2010, the Atlanta Regional Commission proposed, and was adopted by a multi-jurisdictional board, a comprehensive, non-interstate oriented truck route system. The system provided assigned routes on existing roadways for future commercial vehicle travel. This travel being further defined as cross-regional movements, seeking to control not the final mile, but the movement from one area of freight activity to another within the metropolitan area.

The analysis incorporates two distinct identification practices. These describe parcels within Environmental Justice (EJ) Census Blocks and Land Use Designations. All parcels within a one mile buffer, one half mile on either side of the proposed roadway are reviewed in light of these two assignments. The outcome of this analysis is to evaluate the presence of each, within individual jurisdictions, and provide general assignment of route segments into one of four values:

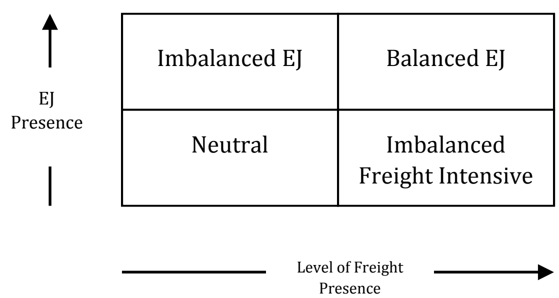


Figure D-1. Four Box Assessment for Retention, by EJ and Freight Intensity

- Balanced EJ: Segments with EJ Census Block presence with moderate or high Freight Intensive Land Use designations. This retains a low potential for removal.
- Imbalanced EJ : Segments with EJ Census Block presence with limited or no Freight Intensive Land Use designations. Potential is highest for removal.
- Imbalanced Freight Intensive: Segments with no EJ presence with moderate or high Freight Intensive Land Use designations. This has the least potential for removal.
- Neutral: Segments with no EJ presence with limited or no Freight Intensive Land Use designations. These present minimal obstacle to truck route placement

Examined within the context of the Atlanta Strategic Truck Route Master Plan (ASTRoMaP) purpose, these four values assess the degree of potential removal of the roadway from the ASTRoMaP.

With truck access to local roads governed by "need", areas with higher freight presence will continue to receive higher levels of truck volume with or without incorporation within the truck route network. This does not automatically exclude the possibility of removal of a given segment based on EJ association. The potential for non-incorporation occurs where an alternative roadway may exist, satisfying the needs of access and not traversing through an already designated EJ census block. The alternative must be closely evaluated, so as not to generate two routes; the original corridor which is still required to perform the "final mile" delivery role and the alternative that is in close proximity for through movement but still requires the "final mile" route selection.

A reasonable approach dictates that where there is the possibility of environmental issues, the network should be cognizant of this eventuality. Route designation should reflect the desire to mitigate the invasive nature of truck traffic by establishing alternative routes to the proposed RPFHN network.

At the lowest level of Freight Intensive activity and presence of EJ, Balanced EJ, the corridors or segments of roadway have the most likely opportunity to be removed. The opposite end of the spectrum, Imbalanced Freight Intensive, where Freight Intensive activity is most dense and EJ blocks are not present, the possibility of removal is at its lowest.

All land use designated parcels carry the possibility for freight induced traffic. Residential, of all types, generate not only household goods movement, but also supporting parcel and light truck deliveries, with seasonal influences such as holidays and periods of non-academic activities increasing flow volumes. In addition, other parcels such as specialty or green areas, i.e. cemeteries and parks, would be low level freight generators. To view an illustration, **Figure D-2** provides the legend for each activity level by land use.

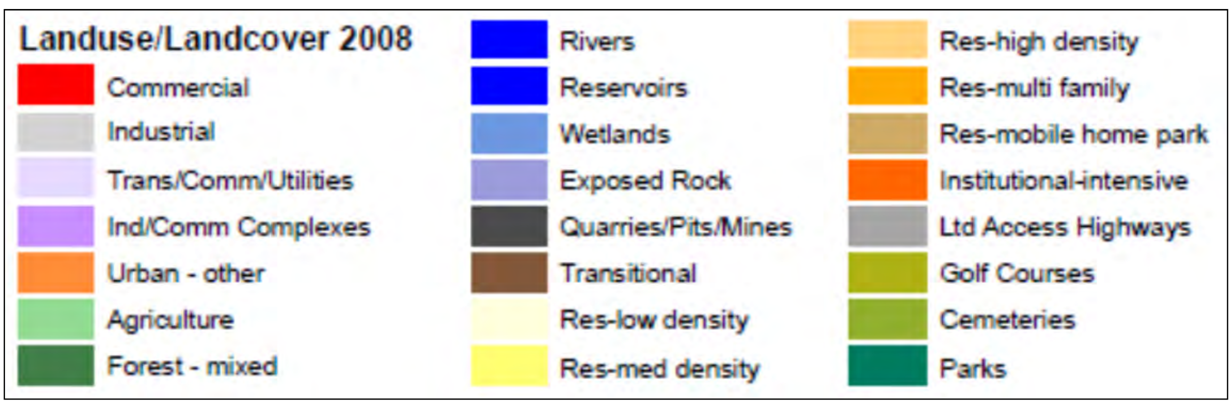


Figure D-2. Land Use Activity Levels and Land Use Designation Legend

LAND USE DESIGNATIONS	FREIGHT INTENSIVE
Commercial	Yes
Industrial	Yes
Transportation, Communications, Utilities	Yes
Industrial, Commercial Complexes	Yes
Urban - Other	
Agriculture	Yes
Forest - Mixed	Yes
Rivers	
Reservoirs	
Wetlands	
Exposed Rock	
Quarries/Pits/Mines	Yes
Transitional	Yes
Residential - Low Density	
Residential - Medium Density	
Residential - High Density	
Residential - Multi-Family	
Residential Mobile Home Park	
Institutional - Intensive	Yes
Limited Access Highways	
Golf Courses	
Cemeteries	
Parks	

A graphic overlay of the proposed routes within each county in the region, with EJ census block information and land use designations are produced. An example is illustrated in **Figure D-3**. The color representation of land uses in areas not within an EJ census block are subdued. The vibrant areas allow the planner to recognize the presence of EJ census blocks and evaluate those areas for moderate to high levels of freight activity.

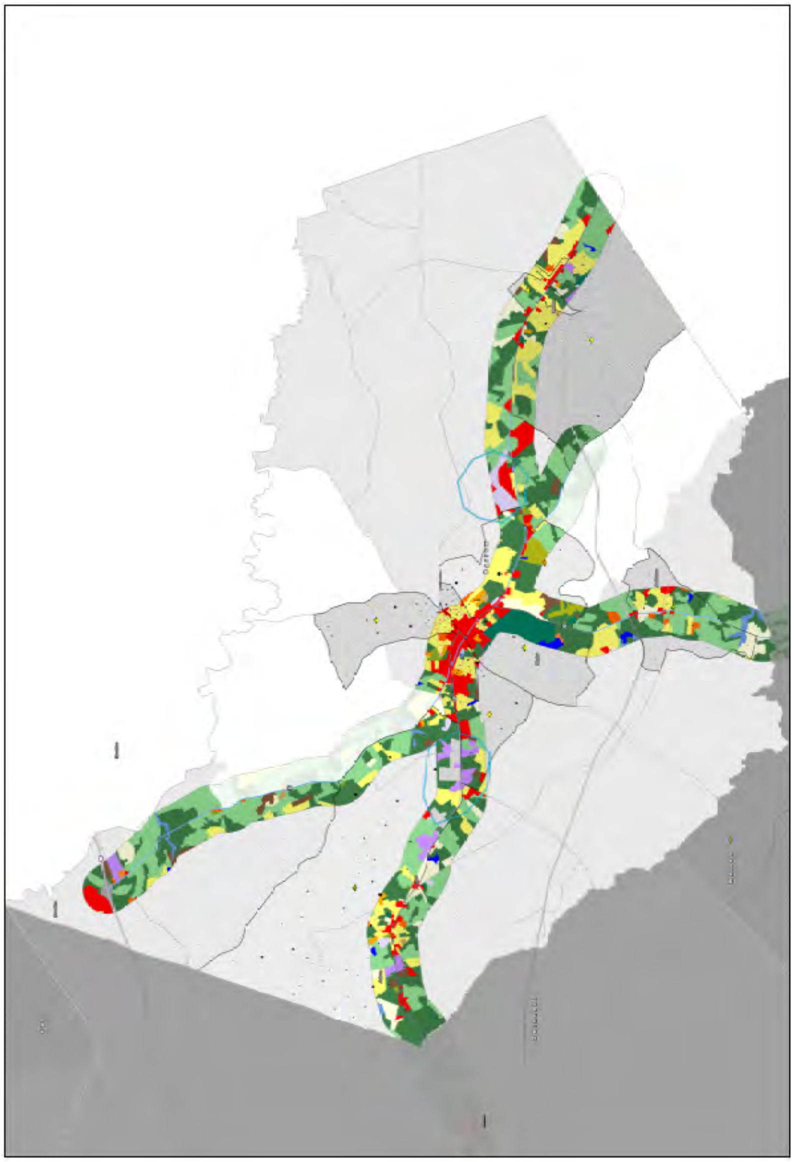


Figure D-3. Barrow County, EJ Census Block and Land Use Designation

With these portions of the corridors known, the planner may more readily address corridor assignment for goods movement.

ACCESS MANAGEMENT

Access management is an increasingly popular set of techniques used by state and local agencies to control access to major thoroughfares. The result is a more safe and efficient roadway network for users. Without access management, roadways could see an increase in traffic congestion, accidents, and pollution from vehicle emissions. In order to create a sample access management policy for the Atlanta Regional Commission (ARC) for use by its member jurisdictions, research of other access management strategies in various states and locales that already have access management plans in place revealed some best and worst practices. Many states currently have access management policies that are used to regulate and control access to thoroughfares. Most, if not all, of these policies are derived from the Transportation Research Board's (TRB) *Access Management Manual*, which was published in 2003. According to TRB's website (http://www.trb.org), TRB annually engages more than 7,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest by participating on TRB committees, panels, and task forces. TRB describes ten (10) principles of access management, which were derived from their expertise in transportation. They include the following:

1. Provide a Specialized Roadway System: Design and manage roadways according to their primary functions.
2. Limit Direct Access to Major Roadways: Roadways that serve higher volumes of through traffic need more access control to preserve their function.
3. Promote Intersection Hierarchy: An efficient transportation network provides appropriate transitions from one functional classification to another. This results in a series of intersection types that range from the junction of two freeways or a freeway and a major arterial to a driveway connecting to a local street.
4. Locate Signals to Favor Through Movements: Long, uniform spacing of intersections on major roadways enhances the ability to coordinate signals and to ensure continuous movement of traffic at the desired speed.
5. Preserve the Functional Area of Intersections and Interchanges: The functional area of an intersection or interchange is the area that is critical to its safe and efficient operation. Access connections too close to these intersections or interchange ramps can cause serious traffic conflicts.
6. Limit the Number of Conflict Points: A less complex driving environment is accomplished by limiting the number and type of conflicts between vehicles, vehicles and pedestrians, and vehicles and bicyclists. **(Figure D-4)**
7. Separate Conflict Areas: Separating conflict areas helps to simplify the driving task and contributes to improved traffic operations and safety.
8. Remove Turning Vehicles from Through Traffic Lanes: Turning lanes reduce the severity and duration of conflicts between turning vehicles and improves the safety and efficiency of intersections.
9. Use Nontraversable Medians to Manage Left Turn Movements: Nontraversable medians and other techniques that minimize left turns are effective in improving roadway safety and efficiency. **(Figure D-5)**

11. Provide a Supporting Street and Circulation System: Well-planned communities provide a supporting network of local and collector streets to accommodate development, as well as unified property access and circulation systems. Interconnected street and circulation systems support alternative modes of transportation and provide alternative routes for bicyclists, pedestrians, and drivers.

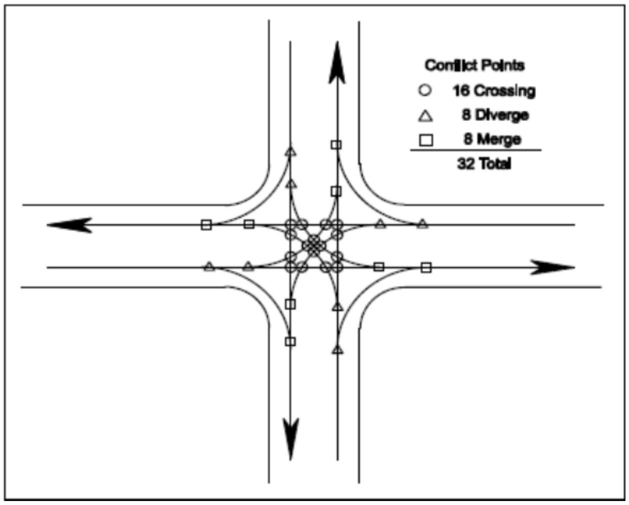


Figure D-4. Typical Points of Conflict, Intersection
Source: TRB Access Management Manual, 2003

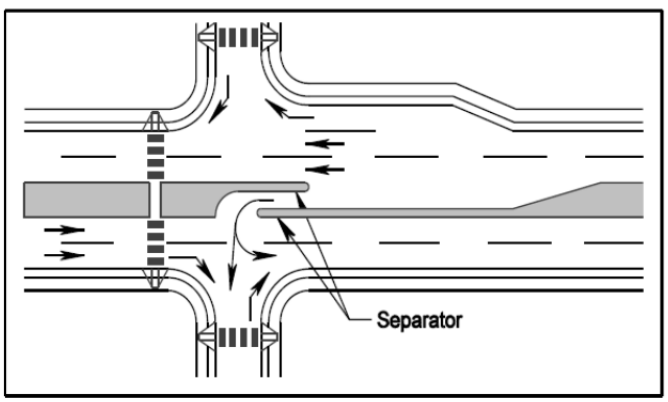


Figure D-5. Illustration of Directional Median Opening for Left turn and U-turn
Source: TRB Access Management Manual, 2003

FUNCTIONAL CLASS ASSIGNMENT

Many metropolitan areas, without formally designated truck route systems, possess the need to review roadway designation or assigned functional classes where commercial traffic is present. Functional class assignment is based on the intended use of the roadway, which in turn, is reflected in design and construction. Though few commercial vehicle (CMV) operators are attuned to functional class, segments of the truck routing software industry assignment levels of preference based on this classification system. In review of potential bottlenecks in Indianapolis IN examples of functional class review proved informative.

Figure D-6 illustrates the local roads providing access to a freight generating facility and the associated functional classes for the roadways adjacent and leading to the facility. It is important to note that the highlighted section of S Keystone Avenue is classified as Other Principal Arterial. This functional class is typically anticipated to carry a greater load of commercial vehicles.

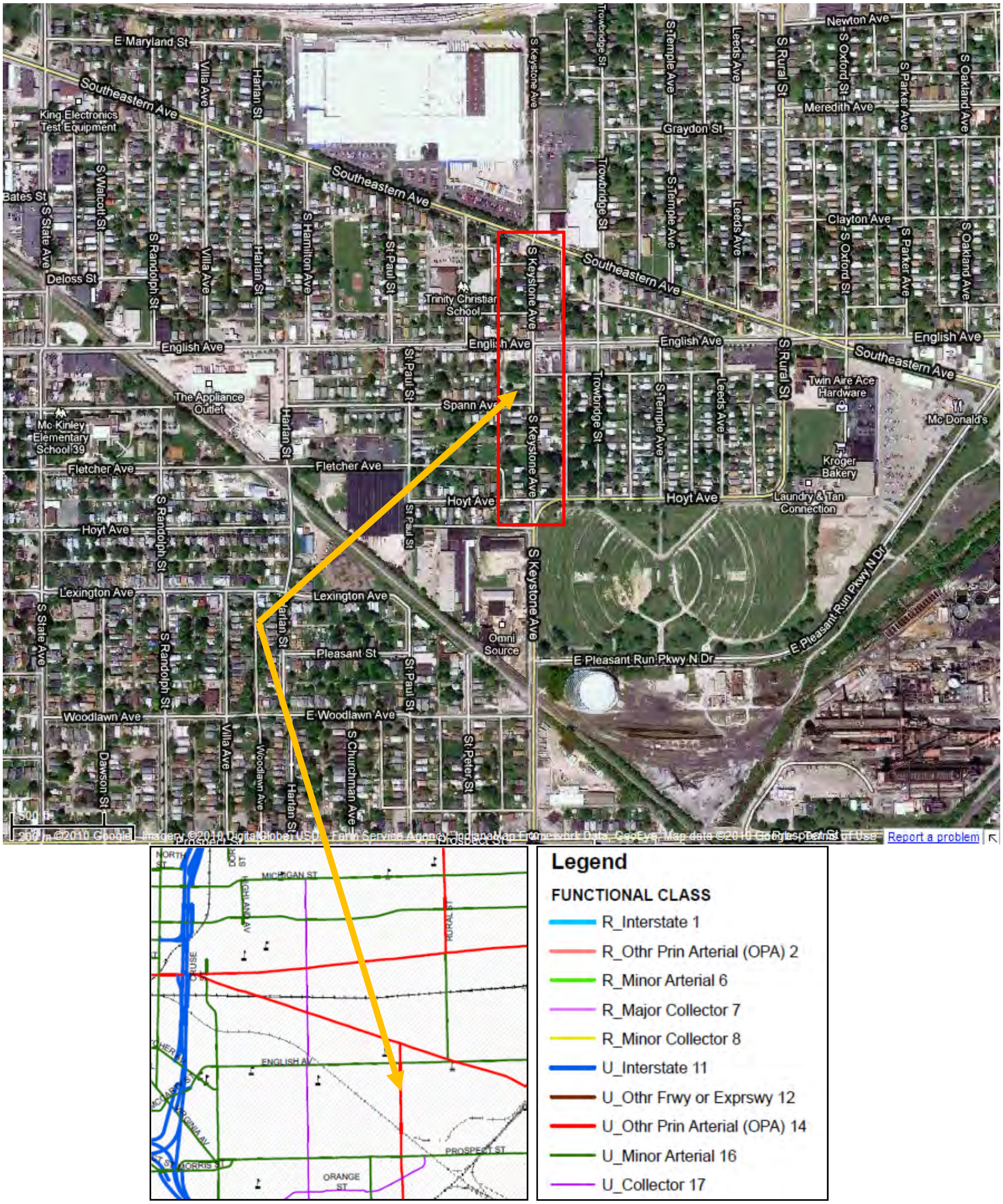


Figure D-6. Road Map and Functional Class Associated with Warehousing Activity, Indianapolis IN

Source: Google Maps, INDOT, Wilbur Smith Associates

Figure D-7 provides a street level view of that segment.

Figure D-7. Street Level View of S Keystone Avenue, as Noted in Figure D-6
Source: Google Maps

Though a strategy for the implementation of a functional class review is not developed, recognition of such review needs provides Indianapolis and other metropolitan areas the basis for justifying such a process.

SIGNAGE PRACTICES

A low cost solution to those issues generating bottlenecks where truck traffic enters non-friendly roadway design is the failure to provide adequate advance notice, for the truck driver, to special considerations adjacent to or on the roadway and provide sufficient time for decision making. Each opportunity to communicate conditions to the truck driver requires increased separation between the vehicle and the event than for the average automobile. Where conditions require alternative route selection or driving action, an additional consideration is that the truck driver must have adequate roadway and an adequate traffic interaction zone to remedy a poor decision.

Restricted or posted weight limits on bridges, left turn exits, prohibited routes and minimum vertical clearances are the more common scenarios faced by drivers unfamiliar with local road conditions. In each case where inadequate placement has reduced reaction time, once recognized, the driver is presented with either radical vehicle movement or continuing on, possibly into areas not "truck friendly". Each of these alternatives may present a regularly recurring episode and thus open to mitigation condition.

Public and private sector interaction may generate ordinance development and promote awareness where the shipper or receiver may not have adequately signed a property. The lack of visibility to signs erected by a warehousing or manufacturer may contribute greatly to a given bottleneck are **Figure D-8**. As truck traffic slows to avoid missing an intended turn-in, all traffic is slowed. The greater the truck traffic utilizing a specific entrance, in conjunction with significant general traffic volumes, the greater the issues of congestion and safety.

Figure D-8. Truck Entrance Identification to a Local Indianapolis Business
Source: Google Maps

The Manual on Uniform Traffic Control Devices (MUTCD) 2009 provides guidance not only for the type and size of signage, but also on placement. To illustrate where signage placement adheres to this guidance, yet may not be adequate for larger commercial vehicles, a less than adequate minimum vertical clearance exists where VA-5 diverges from US 60 (East Main Street) **(Figure D-9).**

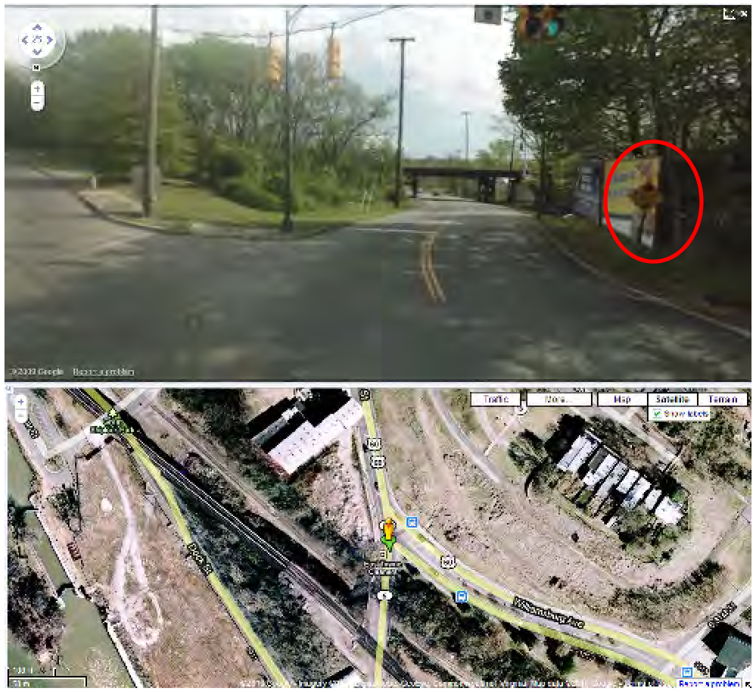


Figure D-9. Minimum Vertical Clearance, VA-5 near US-60

Section 2C.27 of the MUTCD discusses conditions and placement of the Low Clearance sign. Sub section 03 notes:

Section 2C.27 Low Clearance Signs (W12-2 and W12-2a)

Standard:

01 **The Low Clearance (W12-2) sign (see Figure 2C-5) shall be used to warn road users of clearances less than 12 inches above the statutory maximum vehicle height.**

Guidance:

02 *The actual clearance should be displayed on the Low Clearance sign to the nearest 1 inch not exceeding the actual clearance. However, in areas that experience changes in temperature causing frost action, a reduction, not exceeding 3 inches, should be used for this condition.*

03 *Where the clearance is less than the legal maximum vehicle height, the W12-2 sign with a supplemental distance plaque should be placed at the nearest intersecting road or wide point in the road at which a vehicle can detour or turn around.*

04 *In the case of an arch or other structure under which the clearance varies greatly, two or more signs should be used as necessary on the structure itself to give information as to the clearances over the entire roadway.*

05 *Clearances should be evaluated periodically, particularly when resurfacing operations have occurred.*

Option:

06 The Low Clearance sign may be installed on or in advance of the structure. If a sign is placed on the structure, it may be a rectangular shape (W12-2a) with the appropriate legend (see Figure 2C-5).

The placement itself, as seen in **Figure D-10,** does not provide visibility to the sign, until a vehicle has begun to enter the intersection.

Figure D-10. View Southeast on E. Main Street

The sign is placed immediately upon entering the travel lane leading to the low clearance, providing a shorter vehicle reaction time to safely shift from that direction, thus avoiding the obstacle. A longer and larger vehicle, more apt to be impacted by the obstacle, and subsequent placement, may have already begun to execute the turn. To immediately correct direction, the driver will either stop or rapidly change direction; both will delay the flow of traffic and possibly generate unsafe driving responses from other vehicles. Should the truck not execute these and choose to continue until safely passing through the intersection, inadequate space is provided for turning around, leaving only the unsafe backing, into the intersection, to rectify the decision.

FREIGHT ORIENTED DEVELOPMENT

Areas of greater freight activity do occur where other forms of vehicles operate frequently. Retail outlets and large employment facilities are examples of locations which attract greater than normal commercial vehicle traffic. This traffic supplies the goods and services necessary for the sustainment of these companies. The employed work force, though in many situations mass transit is available and utilized, contributes to the traffic volumes with personal vehicles.

Many solutions to mitigate the effects of this greater traffic volume require a level of density or collection of these activities in a common area. One attraction of mass transit utilization is "taking people where they want to go". As establishments, e.g employment, residential, shopping, are dispersed, the cost to provide mass transportation increases. With this comes elongated transport times, which detracts for the rider experience and lessens the likelihood of use. Freight or goods movement solution are typically faced with similar needs.

The concept of "City Logistics", further encompassing freight villages or collective freight communities, is dependent on the congregation of industrial, manufacturing, and other heavy freight intensive locations to be co-located. This minimizes the number of corridors needed to support these activities. MetroPlan Orlando, the Orlando FL MPO, has promoted a number of efforts oriented toward the establishment of the "freight village" concept.

Extracted from the MetroPlan Orlando 2030 LRTP, a freight village is a facility where access is provided to rails, trucks, ports, and/or airports. These facilities enhance the integration and connectivity of the transportation system for people and freight as well as large scale manufacturing. Freight villages serve as economic drivers by offering lower logistics costs and creating jobs in warehouses, distribution centers, manufacturing, packaging plants, and other value-added businesses. Many sites have been promoted throughout the MPO.

TYPES OF DELAYS

Two forms of delay exist, non-recurring and recurring. Non-recurring are delays caused by single episode events. These may be a crash completely or partially blocking a given length of roadway until clean-up efforts are concluded; or a special event such as a weather delay or sporting event. Each delay can be somewhat unique. This uniqueness may not allow for the road user to adapt their route selection to avoid and thus delay is incurred.

Recurring delays are typically not representative of a single event. These are conditions that exist repetitively and are predictable to some degree. Common illustrations are infrastructural; lane reduction, inadequately timed signals, and restrictive turning radii, as they relate to truck navigation of an intersection. These are also inclusive of non-"concrete" causes; rush hour, presence of schools or residential areas, and industrial or commercial zones, where the arrival and departure of work shifts can disrupt otherwise navigable travel.

The Federal Highway Administration (FHWA) describes the contribution to delays or congestion by recurring conditions as 45 percent. This includes five percent as poor signal timing and forty percent as bottleneck, **Figure D-11**.

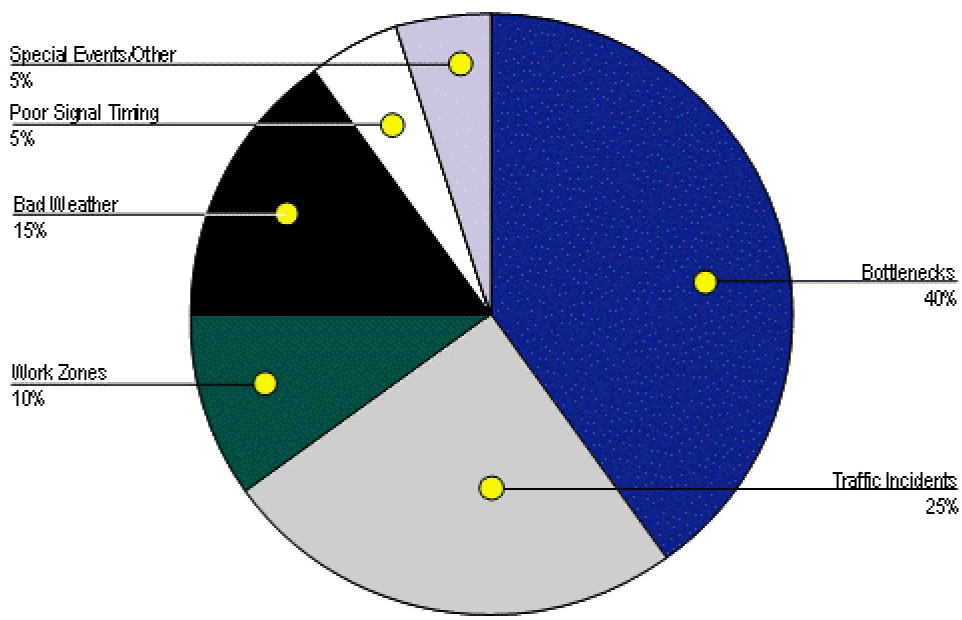


Figure D-11. Sources of Congestion (National Summary) 2002

Source: U.S. Department of Transportation, July 30, 2010, http://ops.fhwa.dot.gov/congestion_report/chapter3.htm

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