Indirect Impacts Technical Report

SL 288

From IH 35W to IH 35

CSJs: 2250-02-013 & 2250-02-014

Denton County, Texas

August 2019

The environmental review, consultation and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 16, 2014, and executed by the Federal Highway Administration and TxDOT.

Table of Contents

1.0 INTRODUCTION 1

2.0 INDUCED GROWTH EFFECTS 2

2.1 STEP 1 – DEFINE METHODOLOGY 3

2.2 STEP 2 – DEFINE AREA OF INFLUENCE AND STUDY TIMEFRAME 3

2.3 STEP 3 – IDENTIFY AREAS SUBJECT TO INDUCED GROWTH IN THE AOI 7

2.3.1 Quantification of Developable Land 7

2.3.2 Planning Expert Questionnaire and Responses 10

2.4 STEP 4 – DETERMINE IF GROWTH IS LIKELY TO OCCUR IN THE INDUCED GROWTH AREAS 11

2.4.1 Population Trends 11

2.4.2 Likelihood of Induced Growth on Developable Land 13

2.5 STEP 5 – IDENTIFY RESOURCES SUBJECT TO INDUCED GROWTH IMPACTS 15

2.6 STEP 6 - IDENTIFY MITIGATION 16

3.0 ENCROACHMENT-ALTERATION EFFECTS 19

4.0 CONCLUSION 20

5.0 REFERENCES 21

List of Figures

Figure 1: Area of Influence 5

Figure 2: Developable Land in the AOI 8

List of Tables

Table 1: Acres of Land Available for Development within the AOI 7

Table 2: Indirect Effects Questionnaire Recipients 10

Table 3: Year Structure Built/Percent Built by Decade for Jurisdictions in the AOI, ... 12

Table 4: Current and Historic Population Growth in the AOI, 1990–2017 12

Table 5: Projected Population Growth in the AOI, 2010–2050 13

Table 6. EMST Vegetation Types within the AOI 16

Table 7: SGCNs within Developable Land in AOI 17

List of Appendices

Appendix A: Indirect Effects Questionnaire

Appendix B: Indirect Effects Questionnaire Responses

1.0 Introduction

The Texas Department of Transportation (TxDOT), in conjunction with Denton County, is proposing the construction of a four-lane new location frontage road system for State Loop (SL) 288 from Interstate Highway (IH) 35W south of Denton to IH 35 north of Denton, in Denton County, Texas. The distance of the proposed project is approximately 9.0 miles. The proposed project right-of-way (ROW) would include a median that would accommodate the future construction of an ultimate mainlane facility. Construction of the ultimate mainlane facility would be based on projected traffic and funding and would require additional environmental analysis prior to construction.

The new location SL 288 frontage road system would include a northbound and southbound frontage road facility. For rural areas, the facility would consist of two travel lanes (one 12-foot wide lane and one 14-foot wide lane for bicycle accommodation) and 8-foot wide inside and outside shoulders in each direction, with open ditch drainage. For urbanized areas, the facility would consist of two travel lanes (one 12-foot wide lane and one 14-foot wide lane for bicycle accommodation) in each direction, with curb and gutter drainage. The facility would also include 6-foot wide sidewalks along both sides of the road throughout the project limits. The proposed project ROW would include a median (variable width) that would accommodate the future construction of an ultimate mainlane facility.

The proposed project would also construct intersections at six (6) major cross roads as follow: John Paine, Farm-to-Market Road (FM) 2449, Tom Cole/FM 1515, Jim Christal Road, US Highway (US) 380, and Masch Branch Road. In addition, the proposed project would construct a grade separation at the KCS Railroad and would tie into the grade separations at IH 35 and IH 35W.

The proposed SL 288 project (frontage road system) would likely be constructed in two phases based on traffic needs and project funding. A logical sequence for staging the various elements for construction of the new location frontage road system could be as follows:

- Phase 1 would construct a single two-lane, two-way frontage road, and would also acquire the proposed ROW to accommodate the frontage roads and the future ultimate mainlane facility.

- As traffic warrants and funding becomes available, Phase 2 would involve the construction of the two-lane frontage road, which would include the conversion of the two-way frontage road built in Phase 1 to a one-way operation, and the construction of grade separations at specific high-volume intersections.

- Phase 3 (a separate project) would involve the construction of the ultimate mainlane facility in both directions. Construction of the ultimate mainlane facility would be based on projected traffic and funding and would require additional environmental analysis prior to construction.

The project area includes approximately 26.6 acres of existing roadway ROW, 401.5 acres of proposed ROW, 1.2 acres of proposed permanent drainage easements, and 13.2 acres of proposed ROW by others.

This technical report was developed using TxDOT's Guidance: Indirect Impacts Analysis (TxDOT 2019) and the 2002 National Cooperative Highway Research Program (NCHRP) Report 466 Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects (NCHRP 2002). This analysis was also developed using the American Association of State Highway and Transportation Officials' (AASHTO) Practitioner's Handbook 12: Assessing Indirect Effects and Cumulative Impacts under NEPA (AASHTO 2011).

The National Environmental Policy Act (NEPA) of 1969 established the requirements for indirect and cumulative impact analysis and is administered by the Council on Environmental Quality (CEQ). NEPA defines indirect effects as those that are ". . . caused by an action and occur later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water, and other natural systems, including ecosystems" (40 CFR §1508.8).

In accordance with TxDOT guidance, the current analysis is focused on project-induced development effects, which are also called induced growth or land-use effects (NCHRP 2002 and TxDOT 2019). Induced growth effects are most often related to changes in accessibility to an area, which in turn affects the area's attractiveness for development. Transportation projects may provide new or improved access to adjacent land or may induce development on surrounding land by causing a reduction in the time-cost of travel (NCHRP 2002). Transportation projects may also affect the rate at which planned development is implemented.

NCHRP Report 466 identifies three categories of induced growth effects:

1. Effects of projects planned to serve specific land development
2. Effects of projects likely to stimulate complementary development
3. Effects of projects likely to influence interregional locational decisions

2.0 Induced Growth Effects

The need for an induced growth analysis was determined based on the results from TxDOT's Scope Development Tool (TxDOT 2015), Risk Assessment for Indirect Impacts (TxDOT 2014a) and the parameters outlined by the Induced Growth Indirect Impacts Decision Tree (TxDOT 2014b). The findings from the Scope Development Tool are as follows: The purpose and need for the project does not include economic development. The proposed project would not serve a specific development, however, economic development or new opportunities for growth and development

are cited as benefits of the project. The AOI also has land available for development, is experiencing population growth, and would experience increased access and mobility due to the proposed project; therefore, an indirect impacts analysis is required.

2.1 Step 1 – Define Methodology

A planning judgment approach was the primary form of analysis used to identify development trends and the potential impact of the proposed project on regional land use patterns. The data collection techniques utilized were the administering of questionnaires (see **Appendix A** and **Appendix B**) and follow up communication with planning professionals and elected officials in the project vicinity. Collaborative judgment was utilized to the extent that several professionals were contacted as part of this analysis, including representatives from agencies such as municipal planning departments. Geographic Information Systems (GIS)-based cartographic techniques were utilized to quantify the amounts of developed land, developable land, and undevelopable land.

Section 2.3.1 includes a discussion of currently developed land within the Area of Influence (AOI) versus land available for development within the AOI. A summary of the questionnaire responses received is included in **Section 2.3.2**. The cartographic technique exercise utilized GIS software to analyze data collected remotely and in the field, combined with various constraints layers and the proposed alignment outline. In addition, the results of questionnaires sent to planning experts were incorporated to the extent the information could be mapped.

Land that is already planned or platted for development was not included in the total amount of developable land as it is assumed that this land will be developed (see **Table 1**). The land available for development was identified through cartographic analysis and questionnaires, and its development is considered possible but not necessarily probable (as opposed to land that is already planned or platted, which is considered probable and reasonably foreseeable, regardless of whether the proposed project is constructed). The purpose of this indirect effects analysis is to determine if future development could be causally linked to the proposed SL 288 project.

2.2 Step 2 – Define Area of Influence and Study Timeframe

Indirect effects associated with a project can occur at a distance in time or space from the project itself (NCHRP 2002). The area studied for indirect effects will be referred to as the AOI in order to distinguish it from the study areas used to assess the direct effects of the proposed project. An AOI is developed by looking at the geographic area in which the proposed project could have the potential to increase mobility or accessibility and the areas in which development patterns could change as a result of the improved mobility or accessibility. The AOI for the proposed new location frontage road system for SL 288 covers approximately 45 square miles (28,775 acres) in Denton County, Texas. The AOI is located west of IH 35 and IH 35W and intersects the cities of Denton and Krum, the Town of Ponder, and unincorporated areas of Denton County. The proposed project area lies within the Denton City limits. The City of Krum is located approximately 2.5 miles west of the

proposed project area's northern terminus. The Town of Ponder is located approximately 5 miles west of the proposed project's southern terminus. The AOI was delineated based on developable land and future land use plans for municipalities located adjacent to the proposed project area, as well as existing major roadways located adjacent to the proposed project area. See **Figure 1** for a map of the AOI.

IH 35 and IH 35W define the eastern boundary of the proposed project's AOI, as they are the nearest north-south major roadways located east of the proposed project area. Robson Ranch Road defines a portion of the southern AOI boundary for the proposed project, as it is the nearest east-west roadway with access to IH 35W that is located south of the proposed project area. The AOI then extends north to bypass the Robson Ranch Texas subdivision, located north of Robson Ranch Road, as this area is already developed. After bypassing the Robson Ranch Texas subdivision, the southern AOI boundary continues west along Robson Ranch Road. At the western terminus of Robson Ranch Road, the AOI extends north along Florence Road until it reaches Blair Road, which is the nearest east-west roadway that extends to FM 156. The AOI boundary then follows Blair Road until it reaches FM 156. The largely undeveloped areas that are located east of FM 156, west of Florence Road, and south of FM 2449 are included in the proposed project AOI due to the proximity of the proposed project area, as well as the most recent future land use map for The Town of Ponder designating these areas to be used for low-density residential development. Development of these areas could be induced by the proposed project due to increased connectivity near the proposed project area. FM 156 defines the western boundary of the proposed project's AOI, as it is the nearest north-south major roadway located west of the proposed project area. FM 1173 defines the northern boundary of the proposed project's AOI, as it is the nearest east-west major roadway with access to IH 35 that is located north of the proposed project area. The City of Krum suggested adding the northeast quadrant of the city north of FM 1173 and east of FM 156 to include six development projects as this section of town would experience impacts as a result of the project. The revised AOI boundary suggested by the City of Krum is shown on **Figure 1**.

The temporal boundary for induced growth effects analysis spans from the modern growth of the region and ends in 2050, five years later than the planning horizon for the North Central Texas Council of Governments (NCTCOG) Metropolitan Transportation Plan – (MTP) Mobility 2045.

Figure 1: Area of Influence

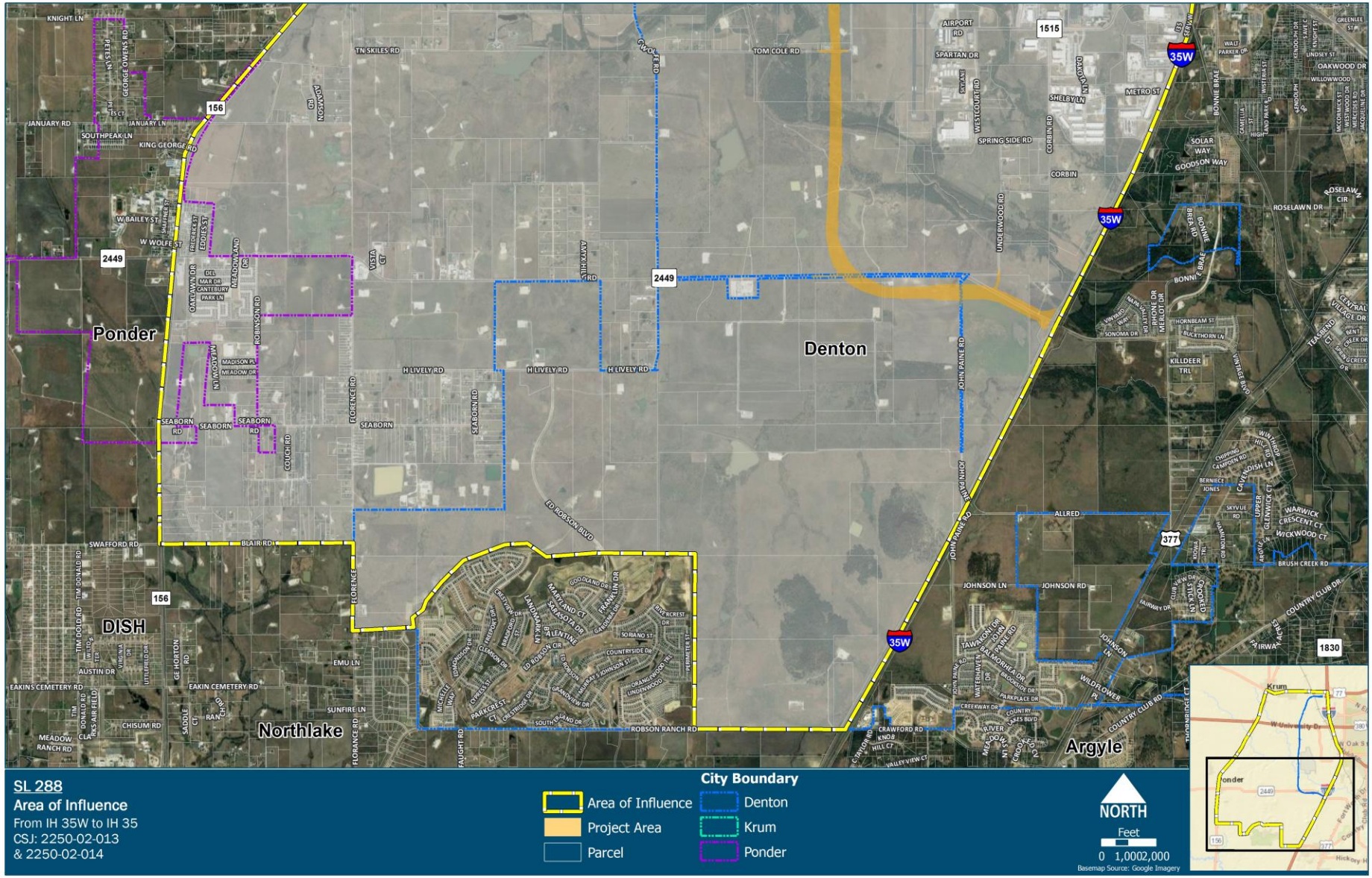
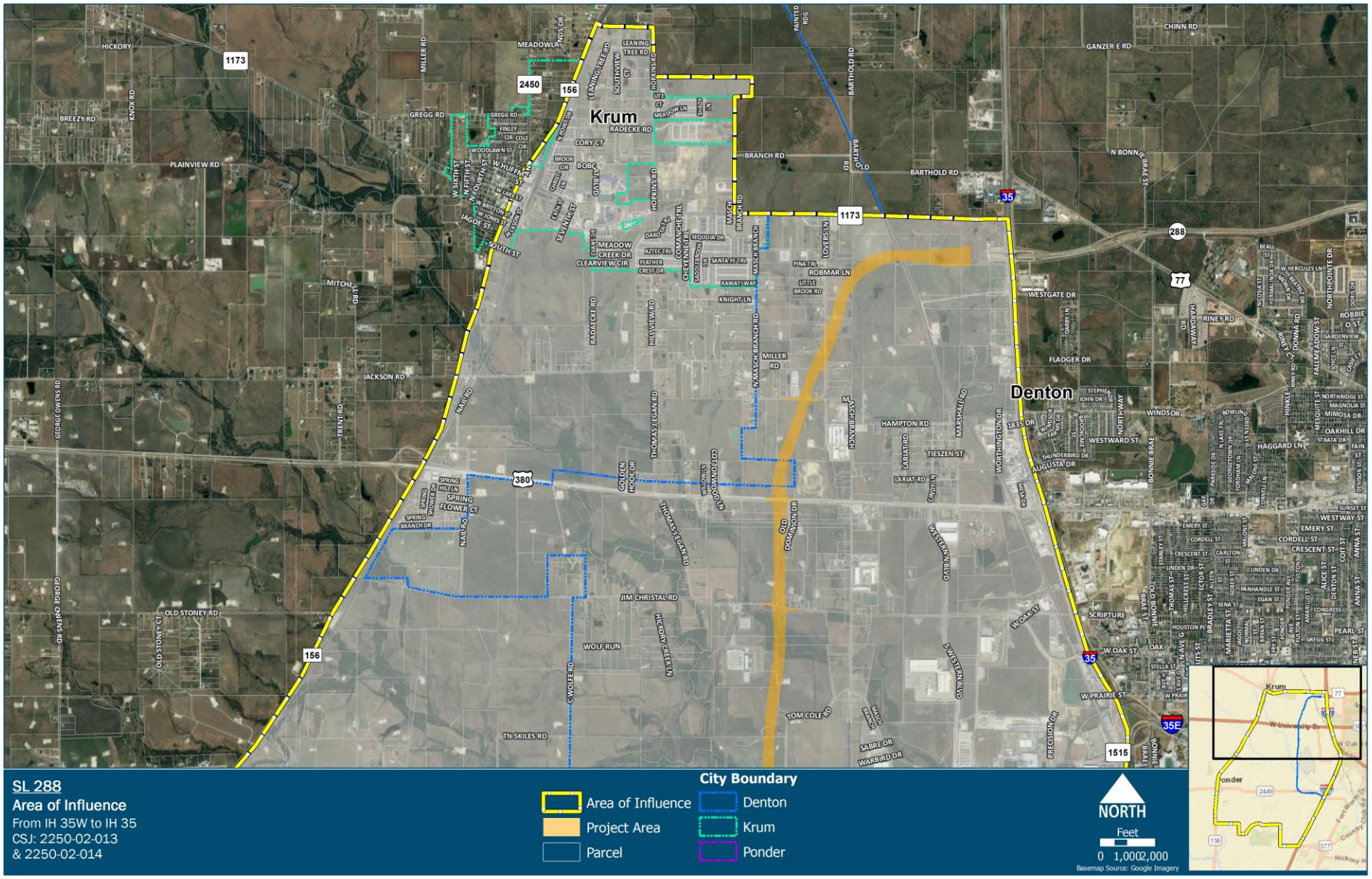


Figure 1: Area of Influence (Cont.)



2.3 Step 3 – Identify Areas Subject to Induced Growth in the AOI

2.3.1 Quantification of Developable Land

Changes in land use could occur within the AOI if undeveloped areas are developed as a result of enhanced access to this land. To identify areas where project-influenced development might occur in the AOI, data on existing and planned developments were analyzed to determine areas of vacant land that could be developed in the future. Land within the AOI was classified as developed or undeveloped based on existing land use data and tax code information. Undeveloped land was then broken into undevelopable land (such as floodplains, water bodies, parklands/recreation, and cemeteries), planned development (land on which projects are planned/platted or under construction), and developable land (land that is available for development). **Figure 2** shows developable land within the AOI.

Within the approximately 28,775 total acres (45 square miles) of land within the AOI, approximately 9,102 acres (31.6 percent) are already developed (see **Table 1**). Approximately 3,910 acres (13.6 percent) are undevelopable, including floodplains, water bodies, and parks. The planning professionals, engineers, and elected officials located within the AOI identified several projects in various stages of development, ranging from under review to under construction. These planned developments, which also include Master Planned Communities (MPCs) from the Denton Plan 2030, total approximately 5,163 acres, which makes up 17.9 percent of the AOI. Removing these planned projects from land suitable for development yields approximately 10,157 acres of developable land within the AOI (35.3 percent of the AOI). **Table 1** shows these land use categories and the amount of land available for development (mapped in **Figure 2**).

Table 1: Acres of Land Available for Development within the AOI

Existing Land Use	Acres	Percentage of Total
Developed Land	9,102	31.6%
Undevelopable Land (100-year Floodplains, Water Bodies, Parks, Cemeteries)	3,910	13.6%
Planned Developments (Including areas of potential project-induced development)	5,163	18.0%
Developable Land	10,157	35.3%
Project Area	443	1.5%
Total AOI	28,775	100.0%

Source: Denton Central Appraisal District, Denton Plan 2030, City of Krum.

Figure 2: Developable Land in the AOI

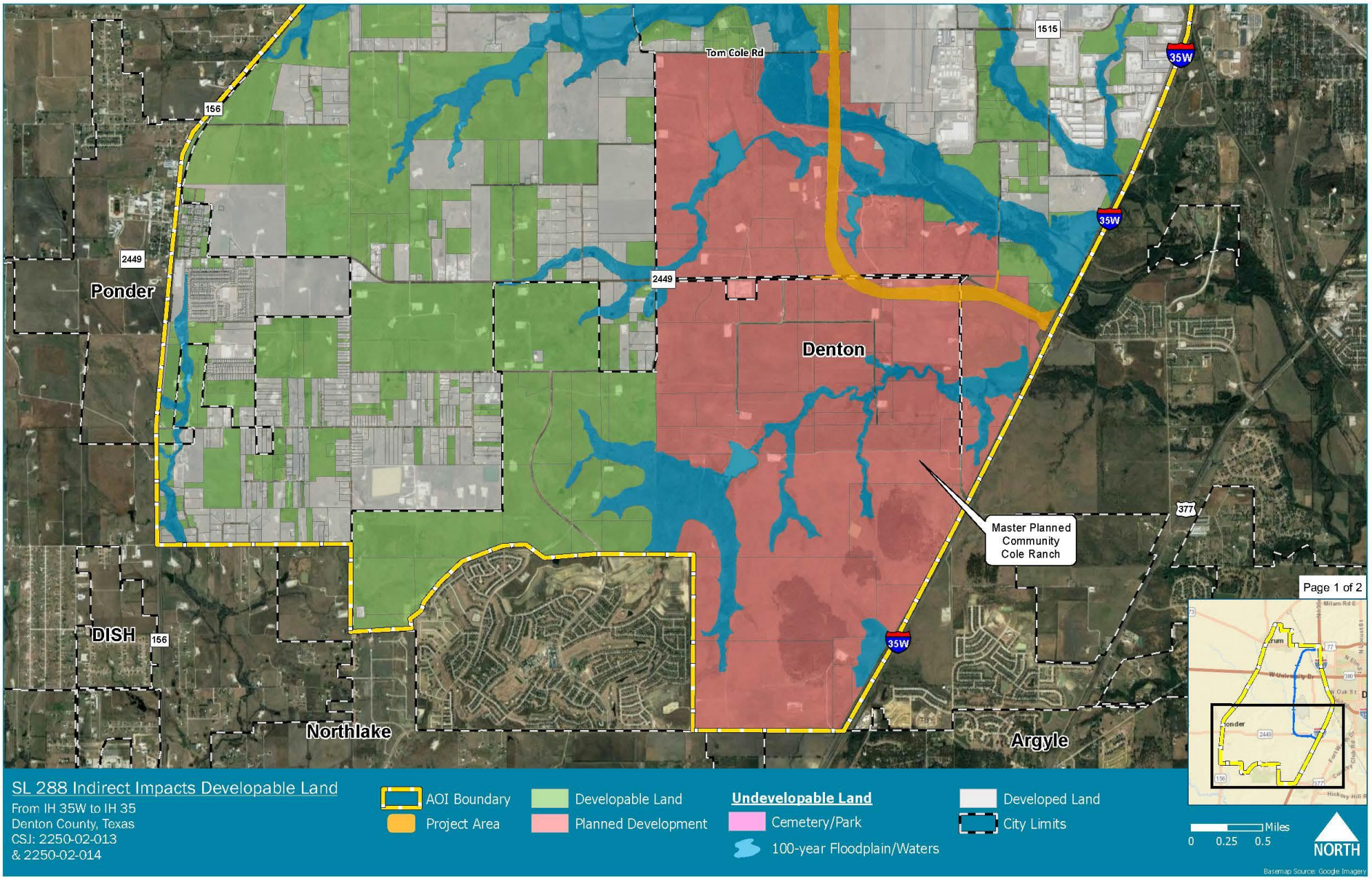
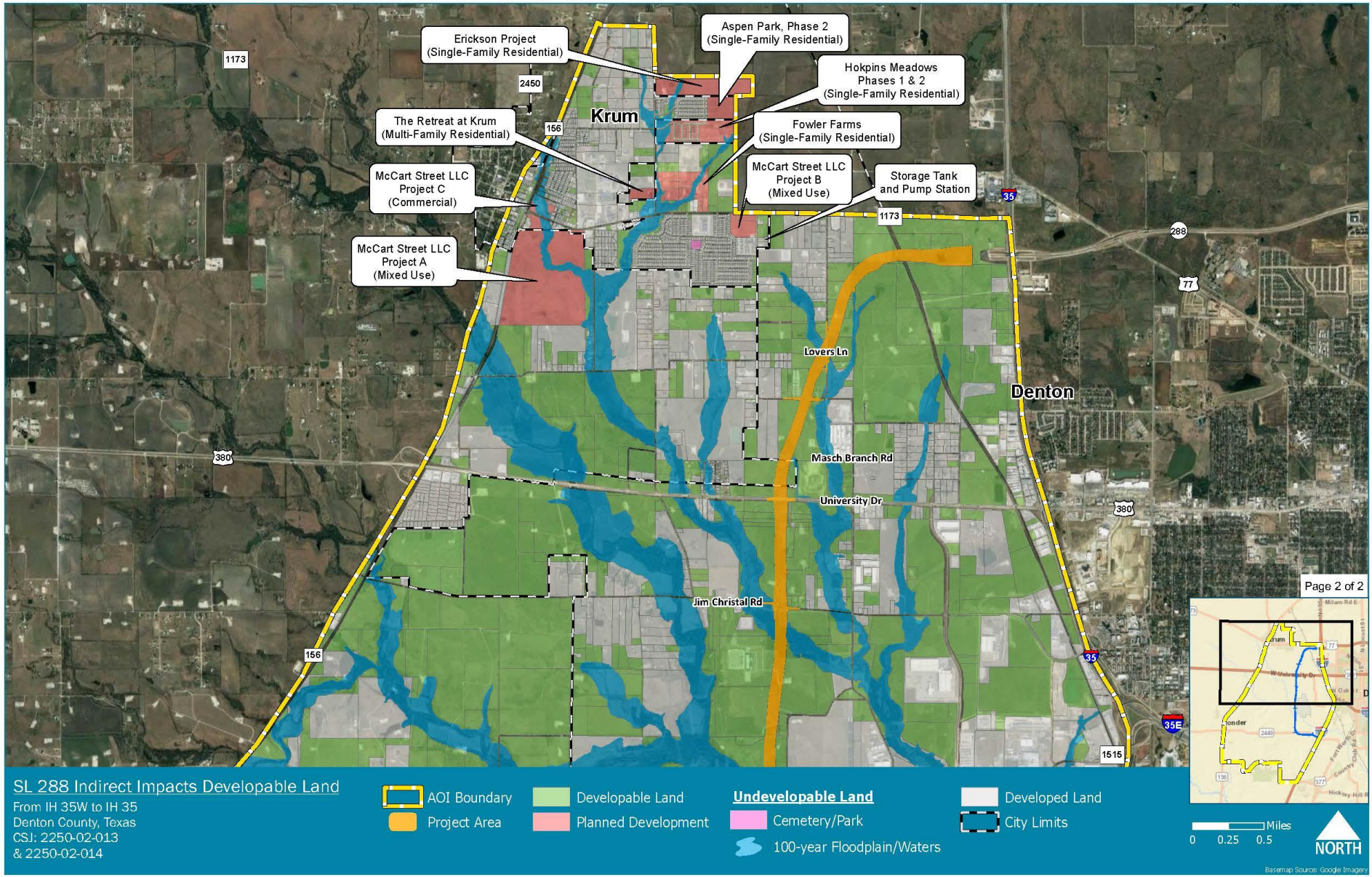


Figure 2: Developable Land in the AOI (Cont.)



2.3.2 Planning Expert Questionnaire and Responses

Questionnaires were sent to planning and engineering professionals, and elected officials within the project's AOI (see **Table 2**). The questionnaire and AOI map (**Appendix A**) were e-mailed to each organization listed in **Table 2** on June 26, 2019. The questionnaire and map were forwarded to an additional official by recipients in the City of Denton that was better able to respond to the request. Follow up emails to the City of Denton, Town of Ponder, and Denton County were sent July 12, 2019, and an additional follow up email was sent to the City of Denton on July 22, 2019.

The questions were designed to identify available resources and solicit input concerning how the project might affect growth and development within the AOI. In addition to identifying available information and data, the questionnaire specifically focused on how each agency or organization viewed the potential impacts of the project. See **Appendix A** for the contact e-mail correspondence form.

Table 2: Indirect Effects Questionnaire Recipients

Organization	Primary Point of Contact	Response Received
Denton County	Fred Ehler, Director of Public Works	No response
Denton County	Terri Crabtree, Planning Manager	No response
Denton County	Dianne Edmondson, Commissioner Precinct 4	No response
City of Denton	Scott McDonald, Director of Development Services	Undeliverable
City of Denton	Todd Hileman, City Manager	No response
City of Denton	Todd Estes, City Engineer	No response
City of Denton	Chris Watts, Mayor	No response
City of Denton	Jesse Davis, City Council District 3	No response
City of Denton	Deb Armintor, City Council at Large Place 5	No response
City of Denton	Paul Meltzer, City Council at Large Place 6	No response
City of Denton*	Richard Cannone, Deputy Director/Planning Director	No response
City of Krum	Devon Kennedy, Public Works Director	No response
City of Krum	Tom Elgin, City Planner (Dept. Of Development Services)	June 26, 2019
City of Krum	Ronald G. Harris, Jr., Mayor	No response
Town of Ponder	John Bassler, Mayor	No response
Town of Ponder	Gary Morris, Director of Public Works	July 15, 2019

*Recipient was forwarded questionnaire by original recipient

As of July 25, 2019, two recipients have submitted responses answering the questions (see **Appendix B**). One respondent, the City of Krum, said that "Because of the extent of the projects currently under construction or in negotiation, and due to Krum's limited area for development…" the proposed expansion/extension of SL 288 would not likely induce development in Krum. However, the city indicated that the proposed project would affect the rate of development in Krum but not the intensity because the city does not have a vast array of retail and service businesses. SL 288 would provide easier access to employment centers in Denton, which would make Krum more attractive as a residential community. Krum anticipates being fully developed but wants to retain open space and low-density development of a rural community. The AOI was modified in response to Krum's questionnaire response that stated that the AOI should include the northeast quadrant of the city (north of FM 1173 and east of FM 156) which includes six planned developments. "This section of town currently accesses IH 35 via FM 1173, which experiences congestion during peak hours." The SL 288 expansion would help alleviate that congestion, "thereby increasing the attractiveness and viability of northeast Krum for residential development."

The Town of Ponder also responded that there would be no areas that would likely be developed as a result of the construction of the proposed project, nor would it affect the rate or intensity of land development within the town. The majority of the AOI lies within the Denton City Limits, however, a response was not received from this jurisdiction.

2.4 Step 4 – Determine if Growth is Likely to Occur in the Induced Growth Areas

2.4.1 Population Trends

This section includes information about trends that characterize the AOI over time. In general, the area encompassed by the AOI has grown considerably over the past decades as shown in terms of population change, housing starts and predominant construction periods.

As shown in **Table 3**, the cities of Denton, Krum, and Ponder, Denton County, and the census block groups in the AOI have grown since the 1990s with a marked increase in land development between 2000 and 2009. Home construction during this period accounts for over 40 percent of the total housing stock within the AOI, with nearly 55 percent in Ponder, nearly 50 percent in Krum, and approximately 30 percent in Denton and Denton County. Home construction slowed between 2010 and 2017, with the percentage of housing stock from this time accounting for 11.3 percent in the AOI. The housing stock from this period accounts for around 10.5 percent or less of the total in all cities and counties except for Krum, where just over 15 percent of the housing was built during this period.

Table 3: Year Structure Built/Percent Built by Decade for Jurisdictions in the AOI, 1990–2017

Geography	Total Homes	Year Structure Built/Percent Built within Decade					
		1990–1999		2000–2009		2010–2017	
		#	%	#	%	#	%
AOI*	12,843	2,025	15.8%	5,367	41.8%	1,448	11.3%
Denton County	290,621	64,257	22.1%	90,830	31.3%	30,685	10.6%
Denton	49,560	8,198	16.5%	14,411	29.1%	3,336	6.7%
Krum	1,537	139	9.0%	737	48.0%	237	15.4%
Ponder	540	96	17.8%	296	54.8%	14	2.6%

*Includes census block groups encompassing the AOI
Source: American Community Survey, Five-Year Estimates, 2017, Table B25034 ("Year Structure Built").

As shown in **Table 4**, the population in the AOI grew by nearly 50 percent over the period from 2000 to 2017. Between 1990 and 2017, the population of the Town of Ponder grew by over 350 percent, Denton County and the City of Krum both grew by over 200 percent, and Denton's population grew by over 100 percent.

Table 4: Current and Historic Population Growth in the AOI, 1990–2017

Geography	Total Population by Year					
	1990	2000	2010	2015	2017	% Change from 1990–2017
AOI*	N/A**	17,941	29,216	31,875	26,633	48.4%
Denton County	273,525	432,976	662,614	779,572	836,210	205.7%
Denton	66,270	80,537	113,383	131,276	136,268	105.6%
Krum	1,542	1,979	4,157	4,998	5,020	225.6%
Ponder	432	507	1,395	1,533	1,949	351.2%

*Includes census block groups encompassing the AOI
**Data for AOI block groups not available for 1990; therefore, the % population change shown for the AOI is for 2000–2017
Source: U.S. Census Bureau, Decennial Census Total Population, 2000 (Table P001), 2010 (Table P1); American Community Survey 5-year estimates 2011-2015 (Table B01003), 2013-2017 (Table B01003); 1990 Census data sourced from Texas State Library and Archives Commission https://www.tsl.texas.gov/ref/abouttx/popcity1.html and https://www.tsl.texas.gov/ref/abouttx/popcnty1.html.

The jurisdictions that intersect the AOI are expected to continue to grow into 2050 (see **Table 5**). This trend is seen at the city and county level: Denton County and the City of Krum are expected to grow by 139.1 percent and 128 percent respectively, while the City of Denton's population is projected to nearly double at 184.4 percent. The Town of Ponder is projected to experience the largest population growth within the AOI at 424.1 percent. NCTCOG has forecasted population and job growth in the region through 2045. The region (made up of Wise, Denton, Collin, Hunt, Parker,

Tarrant, Dallas Kaufman, Hood, Johnson, and Ellis counties) is expected to experience a population growth of 51 percent and employment is expected to increase by 47 percent.

Table 5: Projected Population Growth in the AOI, 2010–2050

Geography*	Total Population by Year (Projected 2020-2050)					
	2010 Census	2020	2030	2040	2050	% Change from 2010–2050
Denton County	662,614	891,063	1,115,119	1,329,551	1,584,015	139.1%
Denton	113,383	145,000	186,773	233,749	322,472	184.4%
Krum	4,157	5,110	6,347	7,827	9,479	128.0%
Ponder	1,395	3,117	4,305	5,725	7,311	424.1%

Source: Texas Water Development Board, 2021 Regional Water Plan Population Projections 2020-2070, March 2019.
*Data not available for census blocks/tracts that encompass the AOI

2.4.2 Likelihood of Induced Growth on Developable Land

Cities and unincorporated areas along the proposed new location SL 288 are currently experiencing high population growth and are expecting additional growth in the future. The City of Denton future land use plan shows that the city expects development to expand around the proposed project area and throughout the AOI. Much of the area would be industrial, which would be a continuation west from the industrial area that exists along IH 35. The land use along the southern portion of the project would be a mix of community and neighborhood mixed-use with business innovation, as well as some single-family residential. The northern portion of the AOI within Denton City limits would be reserved for business innovation and rural areas.

The Denton Plan 2030 includes the proposed SL 288 in its growth scenario, which includes commercial and residential development along the northern and southern sections of the proposed roadway as well as an employment center expanding from the industrial area between the IH 35/IH 35W corridor and the airport. The plan includes information about MPCs, of which Cole Ranch is located along both sides of the southwestern portion of the proposed project within the AOI, as shown in **Figure 2.** It is recommended in the Denton Plan 2030 that the MPCs be flexible in their exact planning and to include mixed-use. The majority of the MPCs, including Cole Ranch, have experienced little or no development as of yet and have an excess of capacity. The plan for Cole Ranch – as well as Hunter Ranch, which is adjacent to Cole Ranch - as presented by development representatives in December 2018, includes nearly 15,720 single-family homes, over 5,000 multifamily units, 424 acres for commercial, and 101 acres for industrial development.

Among the City of Krum's $24 million Capital Improvement projects includes a water storage tank and pump station along Masch Branch Road just south of FM 1173, which indicates growth is expected in this area. The city also responded to the questionnaire that there are eight planned developments within the AOI: Hopkins Meadows Phases 1 & 2, Fowler Farms, The Retreat at Krum,

Aspen Park Phase 2, McCart Street LLC – Projects A, B & C, and Erickson Project. (See **Figure 2**). The Hopkins Meadows Phase 1, Fowler Farms, and the Erickson Project are currently being constructed, while Hopkins Meadows Phase 2 is anticipated to begin in September 2019. These developments are all located north of FM 1173. The other planned developments are anticipated to begin between early 2020 and 2023. In total, these developments would include approximately 1,390 lots and single-family homes, approximately 630 multifamily units, and nearly 95,000 square feet of retail, commercial, and office space. Based on the questionnaire response from the City of Krum, there are no substantial projects that would be developed as a result of the proposed expansion/extension of SL 288. The proposed project could increase the rate of development, but likely not the intensity because the city does not have a vast array of retail and service businesses; the largest employer in Krum is the Krum Independent School District. SL 288 would provide easier access to employment centers in Denton, which would make Krum more attractive as a residential community. Krum anticipates to be fully developed but wants to retain the open space and low-density development of a rural community.

The Town of Ponder's response to the questionnaire stated that there are no planned developments within the AOI and that there are no areas within the AOI and the town that would develop as a result of the proposed project. Ponder's future land use map includes single-family residential, commercial, and industrial uses along FM 2449 within the AOI. The Town of Ponder responded that FM 2449 is part of their capital improvement plan, which could increase mobility to and from IH 35W and Ponder and would connect to the proposed SL 288 project. This could lead to development along FM 2449 and in the southern portion of the AOI.

Although the City of Denton and Denton County did not respond to the questionnaire, it is expected that the proposed improvements and associated benefits could induce development or accelerate already planned developments, particularly commercial developments in the City of Denton and Denton County, adjacent to the proposed roadway. The addition of the proposed frontage roads and sidewalks would also increase safety, access, and mobility to the remaining undeveloped areas in the AOI for other modes of transportation. Encouraging these other modes of transportation could attract businesses and residents who otherwise would not relocate to or develop in the area. Sidewalks are especially important for children, senior citizens, people with disabilities, low-income, residents, and those who prefer or need to use alternative modes of transportation. Another possible scenario would be that the residential development that has been underway and continuing to increase in the majority of the area could encourage commercial development along the proposed SL 288 frontage roads and drive land values up, which could induce the sale of large parcels of developable land to residential and commercial developers.

Based on the questionnaire responses from the City of Krum and Town of Ponder as well as information provided in the Denton 2030 Plan, the proposed project would induce development in the AOI. The rate of development would likely increase in both Krum and Denton and the intensity of development would likely increase in the AOI within Denton city limits. The City of Krum plans to

retain open spaces and low-density residential developments in its growth. The proposed project is expected to make the city more attractive as a predominantly residential community for those working in Denton. This induced development would result from increased access within the AOI from the surrounding region and additional modes of transportation included in the proposed project.

2.5 Step 5 – Identify Resources Subject to Induced Growth Impacts

The proposed project does not cross any impaired waterbody segments that are on the Texas Commission on Environmental Quality (TCEQ) Section 303(d) list, and there are no waterbodies in the project area that are upstream within five stream miles of an impaired waterbody segment. All waterbody segments drain, eventually, within the Trinity River Basin. There are approximately 150 mapped stream miles and 669.4 acres of National Wetlands Inventory (NWI)-mapped wetlands within the AOI. Approximately 62 of those stream miles and 300 acres of NWI wetlands intersect developable land. Direct impacts to water resources that intersect developable land within the AOI associated with induced development may include the placement of fill material in waters of the U.S., including wetlands. The resulting fill may increase the potential for erosion and sedimentation within waterways during future construction activities. However, induced growth impacts to water resources would be considered unsubstantial as impacts to any waters of the U.S., including wetlands, would follow environmental sequencing (avoidance, minimization, or mitigation) in coordination with the U.S. Army Corps of Engineers (USACE) Clean Water Act Section 404 permitting process. Additionally, Section 401 Water Quality Certification would be required by the TCEQ for permitted impacts to waters of the U.S., including wetlands, associated with future construction activities.

According to Texas Parks and Wildlife Department (TPWD) Ecological Mapping System of Texas (EMST), undeveloped areas in the AOI are comprised primarily of tallgrass prairie/grassland (5,596.1 acres) and agriculture fields (1,465.8 acres). Currently, 2,469.7 acres of land are classified by the EMST as urban (i.e., developed) land use within the AOI, including 383.5 acres within what is considered developable. EMST data is a tool, so vegetation should be field verified to ensure accuracy; however, it would not be feasible to field verify all vegetation within the developable land within the AOI. Based on current aerials, there is some acreage considered urban that appears to be undeveloped. As such, actual vegetation types may vary from the EMST data. **Table 6** depicts the mapped EMST Memorandum of Understanding (MOU) vegetation types located within the AOI.

Table 6. EMST Vegetation Types within the AOI

MOU Vegetation Type	AOI Acreage	Developable Land Vegetation Acreage
Agriculture	3,387	1,465.8
Tallgrass Prairie, Grassland	14,094.2	5,596.1
Riparian	2,890.6	432.5
Crosstimbers Woodland and Forest	2,600.2	867.2
Edwards Plateau Savannah, Woodland, and Shrubland	1,964	842.4
Disturbed Prairie	1,220.5	533.7
Open Water	149.1	35.8
Urban	2,469.7	383.5
Total AOI	**28,775.3**	**10,157**

Source: TPWD EMST, 2019.

Potential indirect impacts to vegetation and wildlife habitat within the undeveloped areas could occur as a result of project induced development throughout the AOI. These impacts would include removal of vegetation and conversion of vegetated areas into developed/urban land uses. Such future conversion of vegetated areas would have direct impacts on wildlife habitat. Based on the results of the TPWD's Natural Diversity Database (NDD), there is habitat for the Mollisol Blackland Prairie, a tracked species, east of the proposed project along Hampton Road and the BNSF railroad. Two Species of Greatest Conservation Need (SGCN) were observed during field investigation: the American Bumblebee and Alligator Gar. Potential habitat for three state-listed species (Timber rattlesnake, Louisiana pigtoe, and Texas heelsplitter) and 27 other SGCN were also observed during field investigations. These species may be directly impacted by the proposed project and therefore indirect impacts may also result from induced development within the area. However, these impacts could be minimized/mitigated using BMPs. Therefore, induced growth impacts to these resources is considered unsubstantial.

2.6 Step 6 - Identify Mitigation

There is a potential for induced growth impacts on vegetation/wildlife habitat and water resources. Indirect impacts that may occur to vegetation/wildlife habitat, water resources, and land use as a result of induced development within the study area would be addressed by the entity impacting the resource. Private, government, and/or municipal actions that may result in property acquisition and/or impacts to waters of the U.S. would be mitigated, for example, by that entity in accordance with their own policies and procedures plus any federal, state, or local laws, statutes, guidelines, etc.

Impacts to waters of the U.S., including wetlands, would be documented, coordinated, and permitted through the USACE as needed. The USACE would require consideration of compensatory mitigation in some instances. Additionally, the conversion of undeveloped land to residential, commercial, or industrial uses may require vegetation removal and result in increased erosion and water quality issues. Private, government, and/or municipal entities may be required to coordinate with the TCEQ for impacts associated with water quality (i.e., construction general permit, storm water pollution prevention plans, etc.). Best Management Practices (BMPs) to be implemented for the proposed project would be described in the Storm Water Pollution Prevention Plan.

Impacts to vegetation and wildlife habitat would consist of converting undeveloped areas into developed land uses including commercial and residential development. Impacts to vegetation and wildlife habitat for federally and state-threatened and endangered species would be assessed and addressed for each individual project in the AOI for all public projects. Species specific BMPs (e.g. Bird BMPs, Bat BMPs) would need to be implemented for impacts to SGCNs according to the MOU between TxDOT and TPWD. SGCNs that do not fall under the MOU guidance may need to be individually coordinated with the TPWD if habitat or species are identified or encountered. Table 7 lists the SGCNs that have habitat present and may be impacted within the AOI.

Privately funded land development projects would not be expected to prepare publicly available environmental documentation. The only exception would be developments that were obligated to meet federal requirements such as Section 404 permitting through the USACE and adherence to the Endangered Species Act. The SGCNs within the developable land and the AOI that do not have federal status would not require environmental documentation or mitigation under privately funded projects. Continued development is expected and would likely result in the conversion of undeveloped land to residential, commercial, and light industrial uses.

Table 7: SGCNs within Developable Land in AOI

Impacted SGCN	BMPs
Western Burrowing Owl	Bird BMPs
Strecker's chorus frog	Not included In Best Management Practices 2017 Revision
Woodhouse's toad	Not included In Best Management Practices 2017 Revision
Alligator gar	Not included In Best Management Practices 2017 Revision
Chub shiner	Not included In Best Management Practices 2017 Revision
American Bumblebee	Not included In Best Management Practices 2017 Revision
Arethaea ambulator (no common name)	Not included In Best Management Practices 2017 Revision

Impacted SGCN	BMPs
American badger	Not included In Best Management Practices 2017 Revision
Big brown bat	Not included In Best Management Practices 2017 Revision
Big free-tailed bat	Bat BMPs
Eastern red bat	Not included In Best Management Practices 2017 Revision
Hoary bat	Not included In Best Management Practices 2017 Revision
Long-tailed weasel	Not included In Best Management Practices 2017 Revision
Mexican free-tailed bat	Not included In Best Management Practices 2017 Revision
Mink	Not included In Best Management Practices 2017 Revision
Mountain lion	Not included In Best Management Practices 2017 Revision
Southern short-tailed shrew	Not included In Best Management Practices 2017 Revision
Thirteen-lined ground squirrel	Not included In Best Management Practices 2017 Revision
Tricolored bat	Not included In Best Management Practices 2017 Revision
Western hog-nosed skunk	Not included In Best Management Practices 2017 Revision
Woodland Vole	Not included In Best Management Practices 2017 Revision
Eastern box turtle	Not included In Best Management Practices 2017 Revision
Slender glass lizard	Not included In Best Management Practices 2017 Revision
Smooth softshell	Not included In Best Management Practices 2017 Revision
Texas garter snake	Terrestrial Reptile BMPs
Timber (canebrake) rattlesnake*	Terrestrial Reptile BMPs
Western box turtle	Not included In Best Management Practices 2017 Revision
Western hognose snake	Not included In Best Management Practices 2017 Revision
Western rattlesnake	Not included In Best Management Practices 2017 Revision
Louisiana pigtoe*	Mussel BMPs
Texas heelsplitter*	Mussel BMPs
Topeka purple-coneflower	Not included In Best Management Practices 2017 Revision

Source: Texas Parks and Wildlife 2013 MOU: Best Management Practices 2017 Revision and 2019 Biological Evaluation Form
*State-listed threatened species

3.0 Encroachment-Alteration Effects

Encroachment-alteration effects are impacts that are caused by the project but separated from it by time and/or space. In addition to indirect effects from project induced development, indirect effects may occur to water resources as a result of encroachment-alteration effects. During construction, degradation of water quality could occur due to sedimentation of both surface water and groundwater. Construction has the highest likelihood of creating pollutants and sediment that could impact waters if storm water runoff enters surface water features prior to being treated. The potential for project-related encroachment-alteration effects on wetlands and waters of the U.S. would be mitigated through permanent (post-construction) BMPs. Wetlands and waters of the U.S. could receive an increased amount of sediment if storm water were released from the project area despite the use of BMPs. To minimize the potential for adverse impacts, BMPs would be regularly inspected and proactively maintained.

The potential for project-related encroachment-alteration effects on floodplains would be mitigated through temporary (construction phase) and permanent (post-construction) BMPs. Floodplains could receive an increased amount of sediment if storm water were released from the project area despite the use of BMPs. Build-up of sediment, in turn, could reduce the water storage capacity of the floodplain. To minimize the potential for adverse impacts, erosion and sedimentation BMPs would be effectively installed, regularly inspected and proactively maintained.

No Section 303(d) impaired waters cross the project area or are located within five stream miles downstream of the project area in the AOI. Therefore, there would be no encroachment-alteration effects to Section 303(d) impaired waters.

Encroachment-alteration effects may occur to groundwater resources as a result of the proposed project. During construction, degradation of groundwater quality could occur due to fugitive sedimentation from the construction site entering area streams, creeks, and other recharge features. Temporary construction phase water quality BMPs would be in place, regularly inspected, and proactively maintained throughout the duration of construction to minimize the potential for water quality impacts. Post-construction operation of the proposed project has the potential to result in encroachment-alteration effects to groundwater quality if roadway contaminants or increased sediments in runoff were to enter recharge features. The potential for these impacts (both construction phase and post-construction) would be minimized by the development and implementation of water quality BMPs. The utilization of temporary and permanent BMPs would serve to minimize sediments and roadway pollutants arising from normal roadway usage and accidental spills.

Potential encroachment alteration effects may also occur to vegetation and wildlife habitats in undeveloped areas, as tree and grassland removal may result in habitat fragmentation, which could change the behavior of wildlife within or adjacent to those areas. This construction would result in an encroachment impact which would create the fragmentation of existing vegetation and/or wildlife

habitat in those undeveloped areas. Such impacts may change the behavior of wildlife, including carrying capacity, within or adjacent to the project limits.

4.0 Conclusion

The AOI for the proposed project encompasses approximately 45 square miles (28,775 acres) in Denton County and intersects three municipalities, Denton, Krum, and Ponder. Based on the preceding analysis of existing and future land use, historic and projected population, and access, the proposed project could induce growth in the AOI. Roughly 35 percent of the AOI is developable (**Table 1** and **Figure 2**). It is anticipated that future development will be driven by increased population growth and aided by the proposed project increasing access and mobility to the area within the AOI. The questionnaire respondents from Krum and Ponder did not expect the proposed project to induce development in their jurisdictions; however, Krum's questionnaire response stated that the proposed project would likely increase the rate of development within the city. The project would also likely increase the rate and intensity of development within the city limits of Denton, particularly in areas adjacent to the proposed roadway and around interchanges.

The proposed project would provide travelers with more direct access to areas west of Denton with interchanges proposed at IH 35W, John Paine, FM 2449, Tom Cole/FM 1515, Jim Christal Road, US 380, Masch Branch Road, and IH 35. Access and mobility would improve throughout the study area as a result of the proposed project because there would be more direct travel between the southern and northern portions of the study area. Travelers would no longer need to travel east to IH 35 or west to FM 156 to travel north or south. Sidewalks and shared outside lanes are also proposed as part of the project and would allow pedestrians and bicyclists safe routes along the corridor and to other parts of the community. Induced growth impacts to vegetation/wildlife habitat and water resources would be experienced, however, these impacts could be minimized/mitigated using BMPs, where applicable. Therefore, induced growth impacts to these resources is considered unsubstantial.

Encroachment-alteration effects may occur to vegetation/wildlife habitat and water resources, including floodplains and waters of the U.S. as a result of the proposed project. Potential encroachment alteration effects to vegetation and wildlife habitats may occur in the undeveloped areas needed for the proposed roadway, as tree and grassland removal may result in habitat fragmentation, which could change the behavior of wildlife within or adjacent to those areas. The potential for project-related encroachment-alteration effects on waters of the U.S. and water quality could occur during construction, which has the highest likelihood of creating pollutants and sediment if storm water runoff enters surface water features prior to being treated. Build-up of sediment could also reduce the water storage capacity of the floodplain. Temporary (construction phase) and permanent (post-construction) BMPs, would minimize the potential for encroachment-alteration effects to vegetation/wildlife habitat and water resources.

5.0 References

AASHTO. 2011. Practitioner's Handbook #12 Assessing Indirect Effects and Cumulative Impacts under NEPA. http://www.environment.transportation.org/pdf/programs/practitioners_handbook_12.pdf

American Community Survey. 2017. Five-Year Estimates, Table B25034 ("Year Structure Built").

City of Denton

- 2015a. Denton Plan 2030
- 2015b. Mobility Plan
- 2016a. Existing Land Use Map
- 2016b. Zoning Map
- 2017. Future Land Use Map
- 2018. Informal Staff Report (Report No. 2019-190) to mayor and City Council: Cole Ranch and Hunter Ranch master-planned communities in southwest Denton.

City of Krum

- 2005. Comprehensive Plan Map
- 2018. Parks and Open Space Master Plan
- 2019a. CIP Costs
- 2019b. CIP Mapping
- 2019c. Zoning Map

Denton County

- 2017. Thoroughfare Plan

National Cooperative Highway Research Program, National Research Council, Transportation Research Board (NCHRP). 2002. The National Cooperative Highway Research Program (NCHRP) Report 466: Desk Reference for Estimating Indirect Effects of Proposed Transportation Projects. The Louis Berger Group, Inc., National Academy Press, Washington D.C.

North Central Texas Council of Governments (NCTCOG). 2018. Mobility 2045 – 2045 Metropolitan Transportation Plan.

Texas Department of Transportation (TxDOT).

- 2014a. Risk Assessment for Indirect Impacts
- 2014b. Induced Growth Indirect Impacts Decision Tree
- 2015. Scope Development Tool
- 2019. Guidance: Indirect Impacts Analysis

Texas State Library and Archives Commission. 2017. 1990 Census Data. Accessed May 2019. https://www.tsl.texas.gov/ref/abouttx/popcity1.html, https://www.tsl.texas.gov/ref/abouttx/popcnty1.html.

Texas Water Development Board. 2021 Regional Water Plan Population Projections 2020-2070.

Town of Ponder

- 2000. Zoning District Map

United States Census Bureau.

- 2000. Decennial Census, Table P001.
- 2010. Decennial Census, Table P1.

Appendix A: Indirect Effects Questionnaire

The Texas Department of Transportation (TxDOT) is proposing the construction of State Loop (SL) 288 from Interstate Highway (IH) 35W south of Denton to IH 35 north of Denton in Denton County, Texas. The proposed project includes an approximately 9-mile long new location frontage road system with four lanes in each direction, with bicycle and pedestrian accommodations. The project length is approximately 9.0 miles. The proposed project right-of-way would include a wide median that would accommodate the future construction of an ultimate mainlane facility. Construction of the ultimate mainlane facility would be based on projected traffic and the availability of funding.

As part of the environmental process, CP&Y, the TxDOT consultant on the project, is analyzing the indirect impacts that would occur as a result of the proposed project. We have attached a map showing the proposed project area along with the indirect impacts Area of Influence (AOI). The AOI includes areas in the vicinity of the project alignment most likely to experience development as a result of the proposed project. We are seeking to identify any areas where potential development could occur (whether or not it is currently planned) that could be attributed to the proposed project.

We recognize that those who are most knowledgeable about how a project might affect a community are the local experts. With that in mind, we appreciate your time and input in this process. Please complete the attached questionnaire to the best of your knowledge; if you are not the best person to answer the questions, please forward this to the appropriate person or persons within your organization. **Please submit your answers to the address below (electronic responses are welcomed with legible marked up maps) by July 10, 2019. If you have any questions, you may call Leigh Raderschadt at 512.492.6813.**

CP&Y, Inc.
Attn: Leigh Raderschadt
13809 Research Boulevard, Suite 300
Austin, TX 78750
lraderschadt@cpyi.com

Texas Department of Transportation

P.O. Box 15426, AUSTIN, TEXAS 78761-5426 | 512.832.7000 | WWW.TXDOT.GOV

SL 288: IH 35W to IH 35 Indirect Effects Questionnaire

1. Are you aware of any substantial proposed land developments within your jurisdiction or area? If so, please mark the general areas on the provided (or equivalent) map and provide the location, type, and size (e.g., acres, density, number of units) of any planned developments.

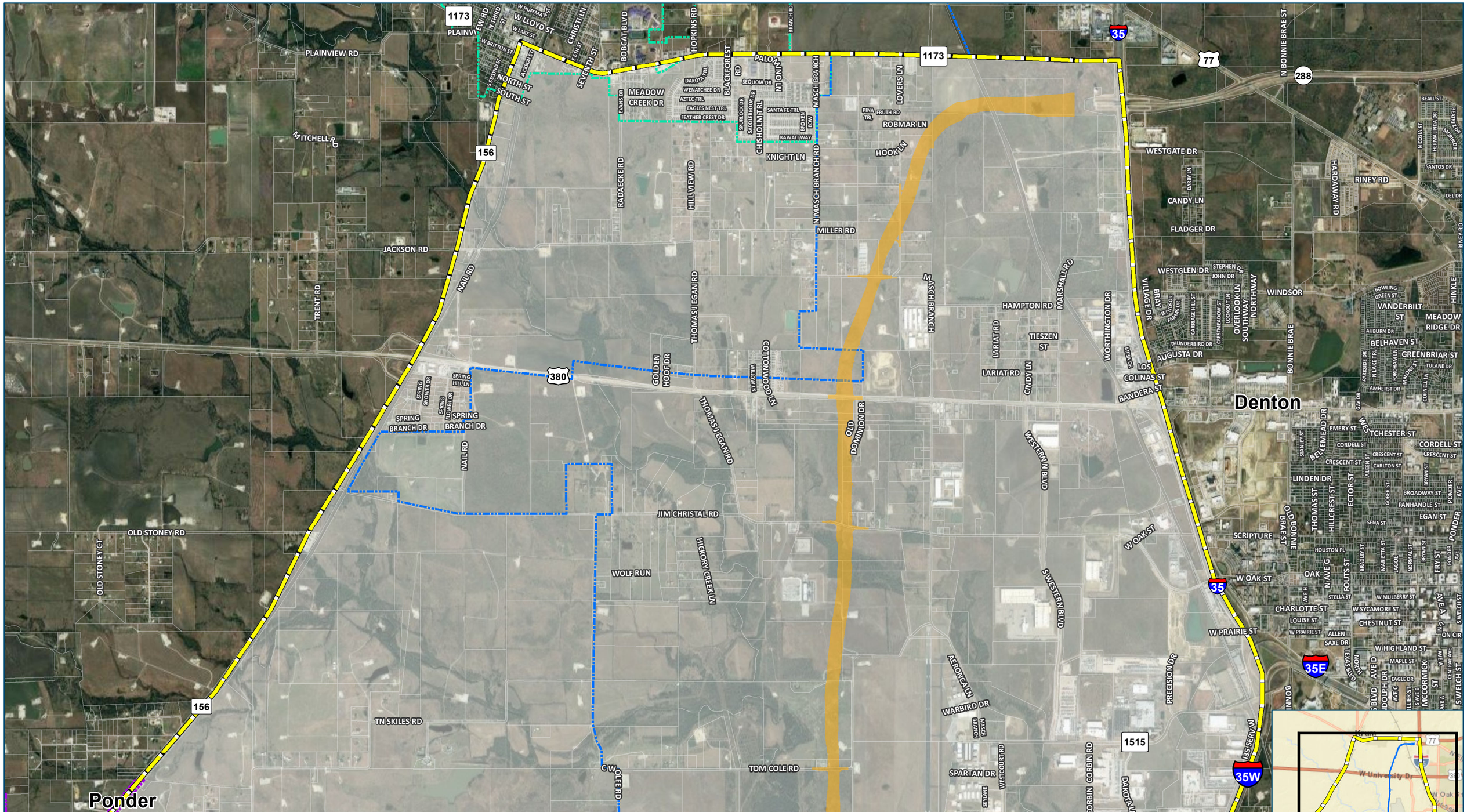
2. On the map provided, please identify areas (if any) that you think would likely be developed as a result of the construction of the proposed project that would not otherwise be developed (please distinguish from developments identified in question 1).

3. Would the proposed project affect the rate or intensity of land development in your jurisdiction? If so, please describe.

4. Are there other capital improvement projects – such as water or sewer infrastructure, school or hospital construction, or roadway improvements – that are planned for the area which might affect development in the project vicinity?

5. Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc.?

6. In your opinion, are there areas not encompassed by the Area of Influence shown on the map that would be indirectly impacted by the project and should be included in the Area of Influence?

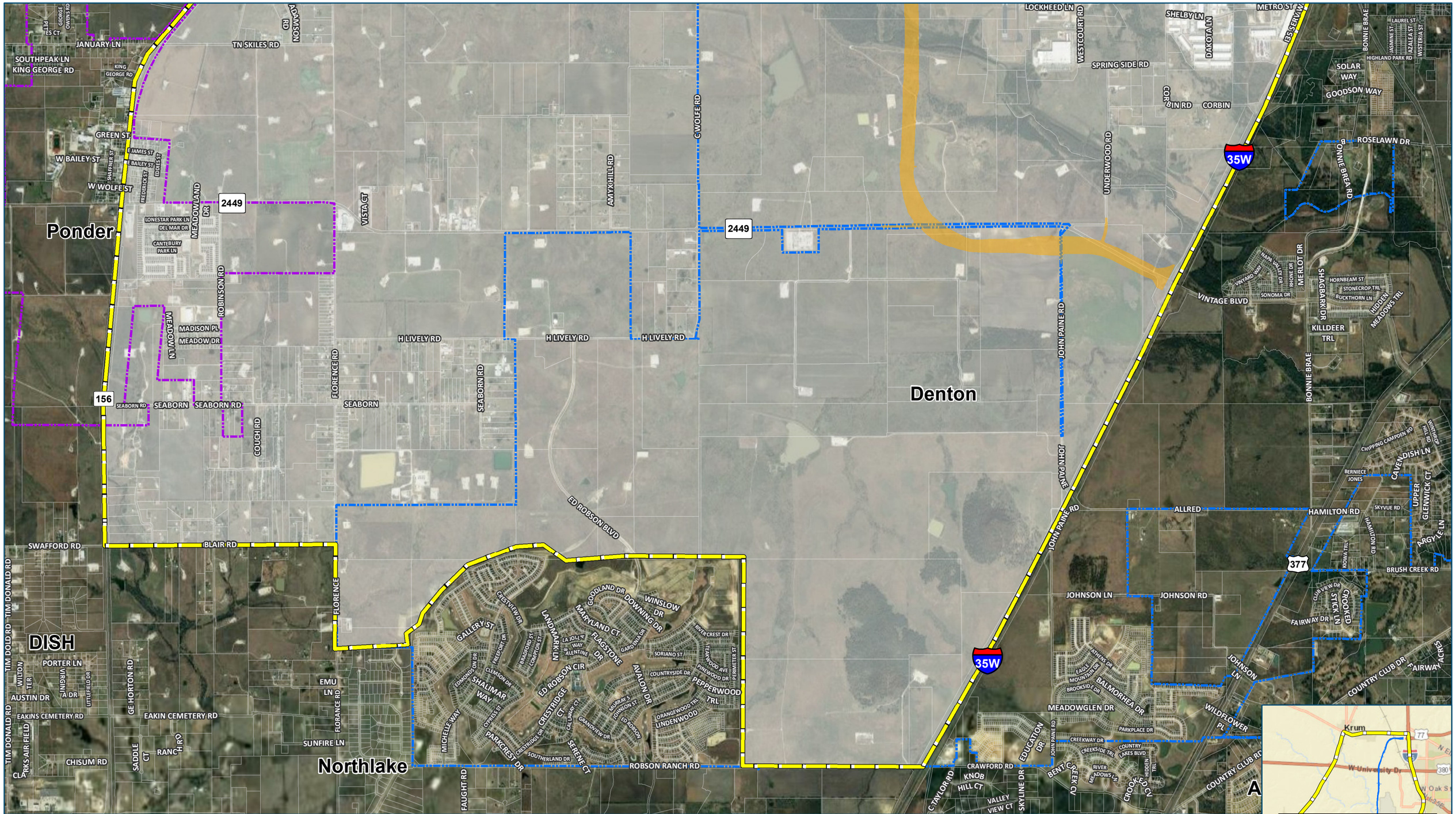


SL 288
Area of Influence
From IH 35W to IH 35
CSJ: 2250-02-013
& 2250-02-014

Area of Influence
Project Area
Parcel

City Boundary
Denton
Krum
Ponder

NORTH
Feet
0 1,000 2,000
Basemap Source: Google Imagery



SL 288
Area of Influence
From IH 35W to IH 35
CSJ: 2250-02-013
& 2250-02-014

Area of Influence
Project Area
Parcel

City Boundary
Denton
Krum
Ponder

NORTH
Feet
0 1,000 2,000
Basemap Source: Google Imagery

Appendix B: Indirect Effects Questionnaire Responses

Tom Elgin, AICP
City of Krum Development Services Director

Texas Department of Transportation

4777 E. HIGHWAY 80, MESQUITE, TEXAS 75150-6643 | 214.320.4480 | WWW.TXDOT.GOV

SL 288: IH 35W to IH 35 Indirect Effects Questionnaire

1. Are you aware of any substantial proposed land developments within your jurisdiction or area? If so, please mark the general areas on the provided (or equivalent) map and provide the location, type, and size (e.g., acres, density, number of units) of any planned developments.

   There are eight substantial development projects in process within the City of Krum and City of Krum extraterritorial jurisdiction (ETJ).

   Two of the eight development projects are within the Area of Influence (AOI). I have shown these two developments on the attached AOI map. Details about these developments may be found in the attached document "City of Krum – active and projected development projects – project descriptions" file.

   The other six developments projects are outside of the AOI. These are indicated on the map in the attached document "City of Krum – active and projected development projects – map" file. Please see the attached City of Krum – active and projected development projects – project descriptions" file for details on these six developments.

2. On the map provided, please identify areas (if any) that you think would likely be developed as a result of the construction of the proposed project that would not otherwise be developed (please distinguish from developments identified in question 1).

   Because of the extent of the projects currently under construction or in negotiation, and due to Krum's limited area for development, I do not foresee any substantial projects to be developed as a result of the proposed expansion/extension of Loop 288.

3. Would the proposed project affect the rate or intensity of land development in your jurisdiction? If so, please describe.

   Yes, the expansion/extension of Loop 288 will affect the rate of development; however, I do not feel the project will affect the intensity of development.

   Krum does not have any major employers other than the Krum Independent School District. Krum also does not have a vast array of retail and service businesses. Loop 288 construction will provide easier access to employment centers and businesses in Denton and beyond, and this effect will make Krum more attractive as a residential community.

I do not think the Loop 288 project will affect the intensity of development. Krum anticipates to be fully developed but wants to retain the open space and lower development intensity characteristics of a rural community.

4. Are there other capital improvement projects – such as water or sewer infrastructure, school or hospital construction, or roadway improvements – that are planned for the area which might affect development in the project vicinity?

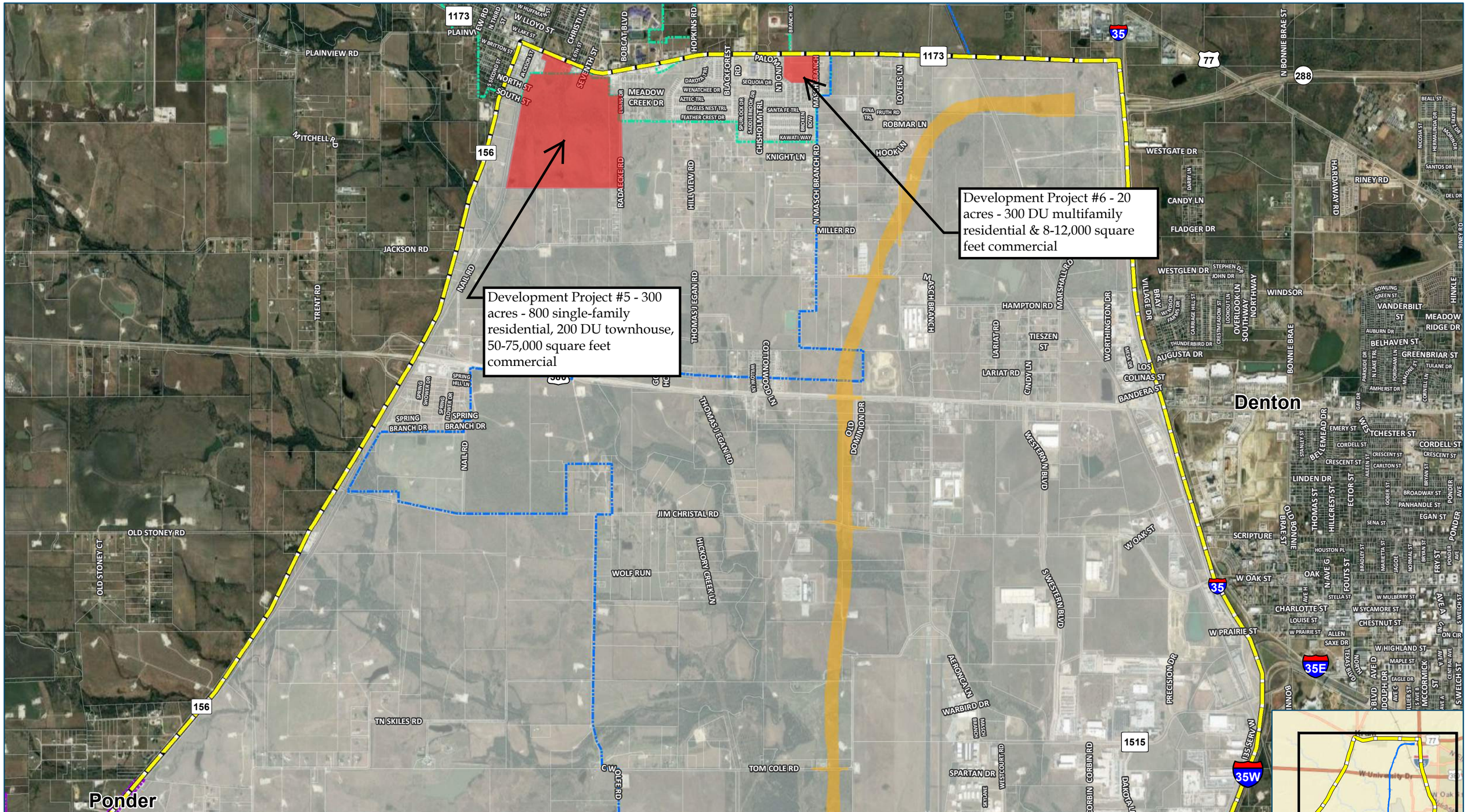
   The City of Krum has approximately $24 million of planned water, sewer, and roadway capital improvements projects. Several of these are within the AOI. Please see the attached "CIP_Costs" and "CIP_mapping" files for more information.

5. Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc.?

   Within the AOI, there are significant floodplain and riparian areas in the City of Krum and Krum's ETJ that will affect the intensity of development. These areas are planned to be maintained as natural open space and linear hike and bike trail parks in conformance with Krum's Land Use and Parks & Open Space Master Plans and Denton County Greenbelt Plan.

6. In your opinion, are there areas not encompassed by the Area of Influence shown on the map that would be indirectly impacted by the project and should be included in the Area of Influence?

   Yes, I feel that the AOI should include the northeast quadrant of the City of Krum (north of FM 1173 and east of FM 156) and particularly the six development projects not within the AOI. This section of town currently access I-35 via FM 1173. The FM 1173 corridor experiences congestion during peak hours. The Loop 288 expansion/extension will help alleviate FM 1173 peak hour congestion, thereby increasing the attractiveness and viability of northeast Krum for residential development.

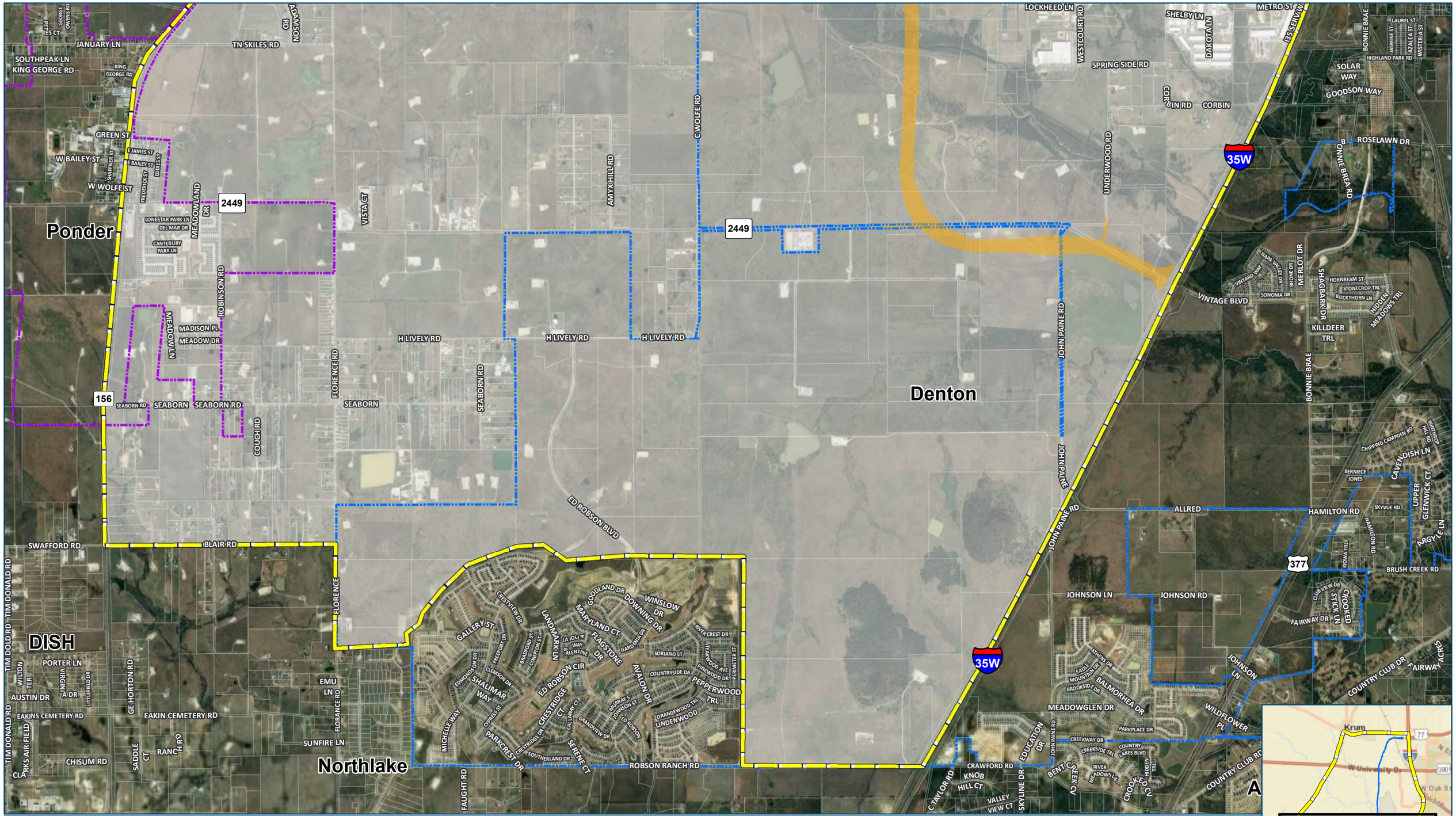


SL 288
Area of Influence
From IH 35W to IH 35
CSJ: 2250-02-013
& 2250-02-014

Area of Influence
Project Area
Parcel

City Boundary
Denton
Krum
Ponder

NORTH
Feet
0 1,000 2,000
Basemap Source: Google Imagery



SL 288

Area of Influence

From IH 35W to IH 35

CSJ: 2250-02-013

& 2250-02-014

Area of Influence

Project Area

Parcel

City Boundary

Denton

Krum

Ponder

NORTH

Feet

0 1,000 2,000

Basemap Source: Google Imagery

City of Krum

Active and Projected Development Projects

#1. **Hopkins Meadows Phases, 1 & 2**

- 153 Single-Family Residential Homes
- Home Sizes: 1,800 to 3,200 square feet
- Home Sale Prices: $250,000 to $375,000
- Phase 1
    - Subdivision construction (77 lots) is complete
    - 36 residential permits issued
        - Anticipate 4-5 permits per month
- Phase 2
    - Final plat is approved (76 lots)
    - Subdivision construction plans in review
        - Construction anticipated to begin September 2019
        - Construction anticipated to be complete March 2020
    - Residential permitting expected to begin April 2020
        - Anticipate 4-5 permits per month

#2 **Fowler Farms**

- 175 Single-Family Residential Homes
- Home Sizes: 1,800 to 3,000 square feet
- Anticipated Home Sale Prices: $250,000 to $350,000
- Subdivision construction is 95% complete
- 9 residential permits issued
    - Anticipate 10 permits per month thereafter

#3 **The Retreat at Krum**

- 132-unit, age restricted, market rent, multifamily development on 10 acres
- Zoning, site plan, preliminary plat, civil engineering & final plat approved by City of Krum
- Anticipate construction in 2021-2022

#4 **Aspen Park, Phase 2**

- Zoning and preliminary plat approved by City of Krum (60 lots)
- No timetable for subdivision construction
- Anticipate subdivision construction in 2022-23

#5 **McCart Street LLC – Project A**

- 300 acres of land purchased with City of Krum, Krum extraterritorial jurisdiction & City of Denton extraterritorial jurisdiction
- Preliminary land planning and civil engineering has been complete
    - Mixed use development with single-family, townhouse, and retail, commercial & office nonresidential uses
    - 800 single-family residential homes
    - 200 townhouse dwelling units
    - 50,000 to 75,000 square feet of retail and commercial development
- Currently negotiating pre-annexation developer agreement and public improvement district
- Anticipate Phase 1 to contain 200-250 single-family residential lots
    - Anticipate subdivision construction to begin April 2020
    - Anticipate residential construction to begin November 2020
        - Anticipate 20 permits per month

#6 McCart Street LLC – Project B

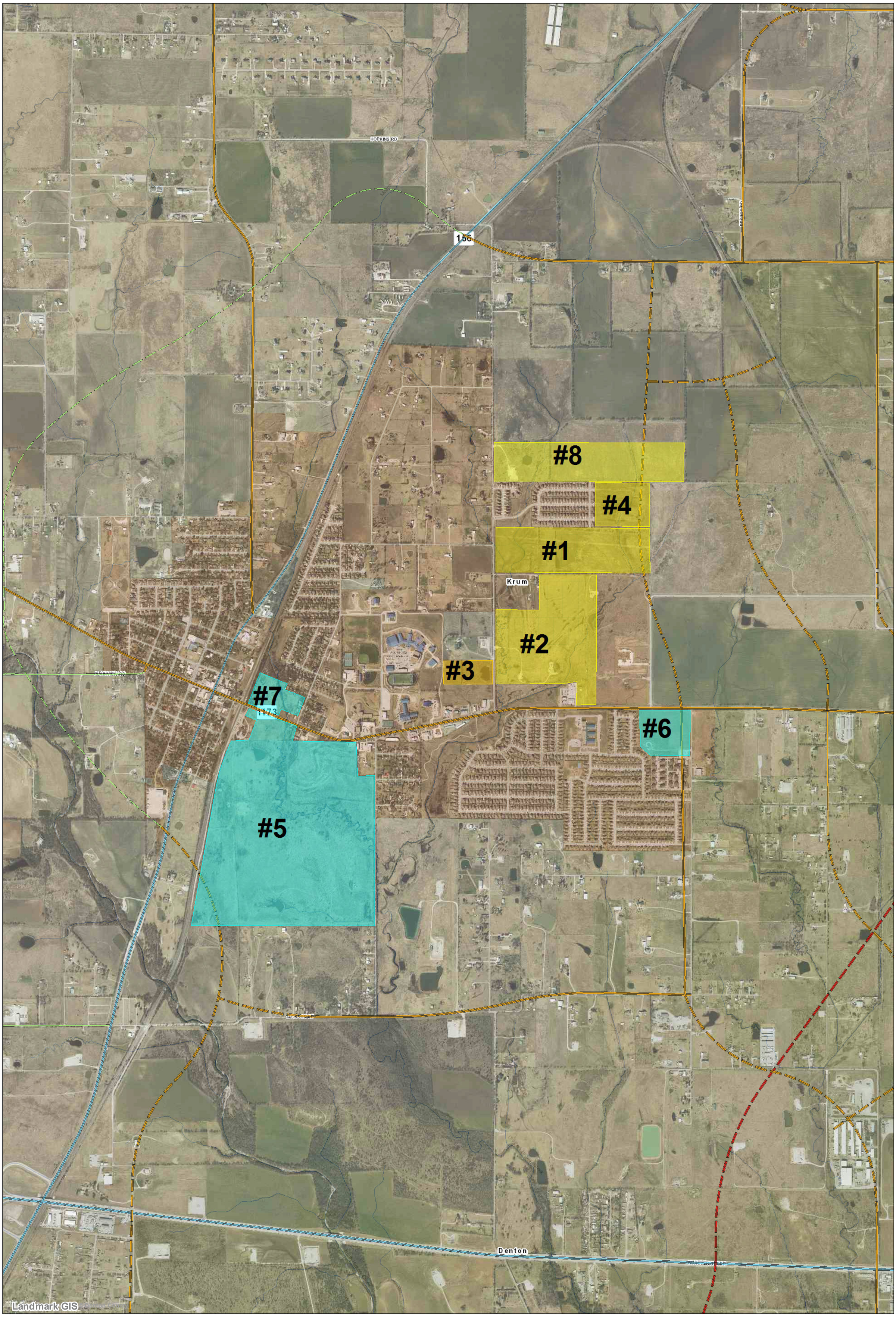
- 20 acres, mixed use multifamily residential and retail, commercial & office nonresidential uses
    - 300 multifamily dwelling units
        - Anticipate construction in 2021
    - 8,000 to 12,000 square feet of retail, commercial & office nonresidential uses
        - Anticipate construction in 2022

#7 McCart Street LLC – Project C

- 10 acres, retail, commercial & office nonresidential uses
    - 4,000 to 6,000 square feet of retail, commercial & office nonresidential uses
        - Anticipate construction in 2022-23

#8 Erickson Project

- 70 acres
- Applications for annexation, zoning & preliminary plat expected July-August 2019
- 180-200 single-family residential lots
    - Anticipate subdivision construction to begin in November 2019 with completion in March 2019
    - Anticipate residential construction to begin in March/April 2019



City of Krum - New Developments

N

0 1,100 2,200 4,400 Feet

http://dentoncounty.com

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

Denton County does not guarantee the correctness or accuracy of any features on this product and assumes no responsibility in connection therewith. This product may be revised at any time without notification to any user.

City of Krum
Wastewater/Water/Roadway
CIP Cost Summary

Project Number	Project Name	Cost
Wastewater Projects		
S-1	24-inch Southeast Wastewater Treatment Plant Gravity Line	$ 1,613,300
S-2	Southeast Lift Station and 12-inch Force Main	$ 3,375,600
S-3	15-inch Hopkins Road Interceptor	$ 1,914,200
S-4	21-inch Dry Fork Hickory Creek Interceptor	$ 684,800
	Wastewater Projects Total	**$ 7,587,900**
Water Projects		
W-1	12-inch McCart Street Water Line Replacement Phase 1	$ 1,399,400
W-2	12-inch McCart Street Water Line Replacement Phase 2	$ 1,946,900
W-3	12-inch 6th Street Water Line Replacement	$ 912,600
W-4	Elevated Storage Tank Projects	$ 3,664,500
W-5	1.0 MG Ground Storage Tank	$ 3,120,000
W-6	16-inch McCart Street Water Line Replacement and Mash Branch PS Expansion	$ 3,444,800
	Water Projects Total	**$ 14,488,200**
Roadway Projects		
R-1	E. 6th Street and E. Huffman Street	$ 1,800,300
	Roadway Projects Total	**$ 1,800,300**
	Projects Total	**$ 23,876,400**

DRAFT City of Krum

Capital Improvement Cost Estimate **May 2019**

Construction Project Number: **S-1**

Project Name: **24-inch Southeast Wastewater Treatment Plant Gravity Line**

Project Description:

This project consists of the construction of an 24-inch wastewater gravity main in the southern portion of the ETJ from east of the BNSF Railroad to the southeast corner of the Wastewater Treatment Plant.

Project Drivers:

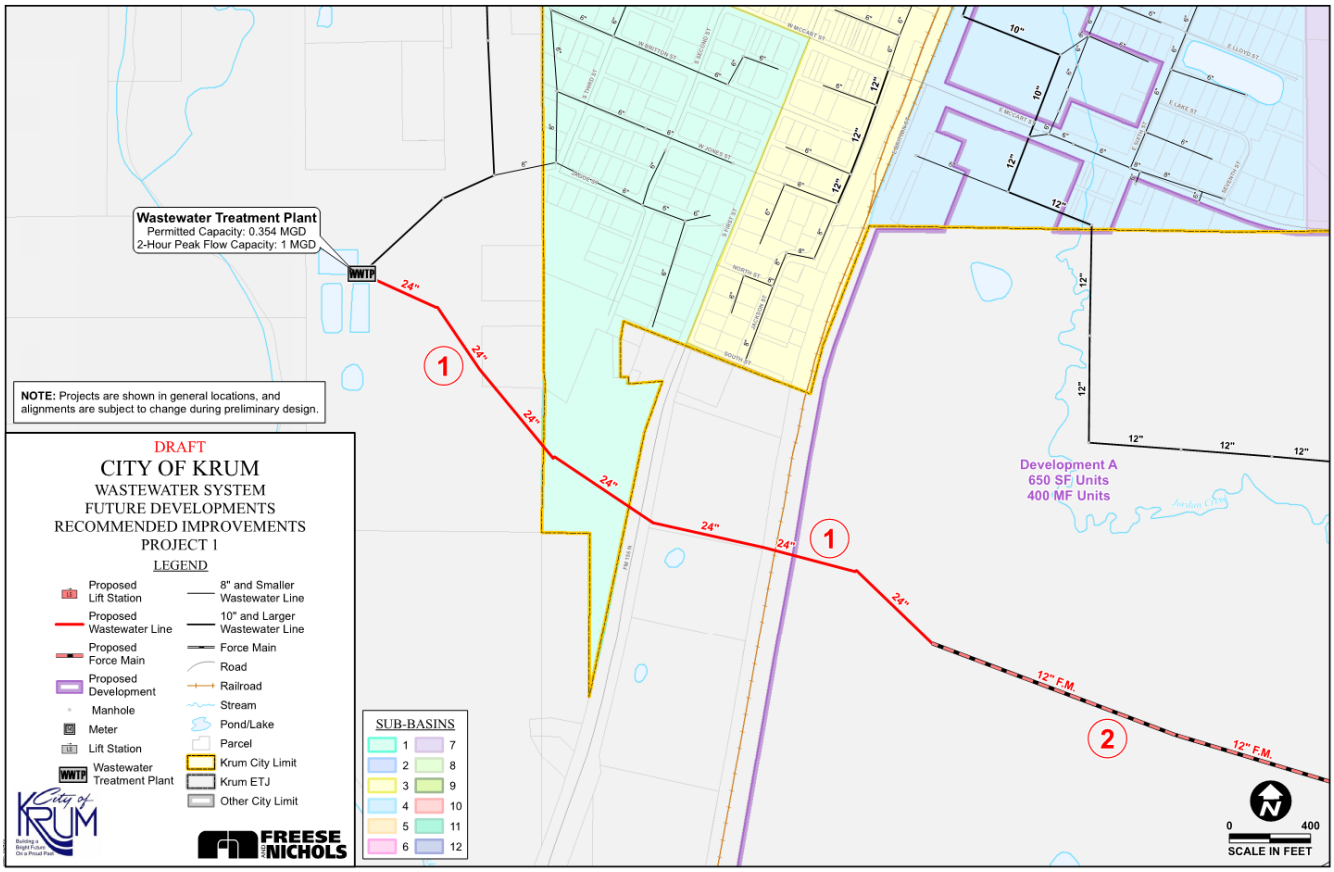
The proposed improvements will provide capacity to convey flow from existing development in the eastern portion of the city limits and projected development in the southern portion of the ETJ to the Wastewater Treatment Plant.

Comments

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" Gravity Main	4,300	LF	$ 192	$ 825,600
2	60" Diameter Manhole	10	EA	$ 7,500	$ 75,000
3	48" Boring and Casing	150	LF	$ 840	$ 126,000
4	Pavement Repair	100	LF	$ 75	$ 7,500
				SUBTOTAL:	**$ 1,034,100**
		CONTINGENCY		30%	$ 310,300
				SUBTOTAL:	**$ 1,344,400**
		ENG/SURVEY		20%	$ 268,900
				SUBTOTAL:	**$ 1,613,300**
				Estimated Project Total:	**$ 1,613,300**

Costs do not include contract administration or land and easement acquisition.



DRAFT City of Krum

Capital Improvement Cost Estimate	**May 2019**
Construction Project Number:	**S-2**
Project Name:	**Southeast Lift Station and 12-inch Force Main**

Project Description:

This project consists of the construction of a lift station adjacent to the City of Denton meter station with a first-phase firm capacity of 1.25 MGD and a 12-inch force main from the lift station to the proposed 24-inch wastewater interceptor near the BNSF Railroad.

Project Drivers:

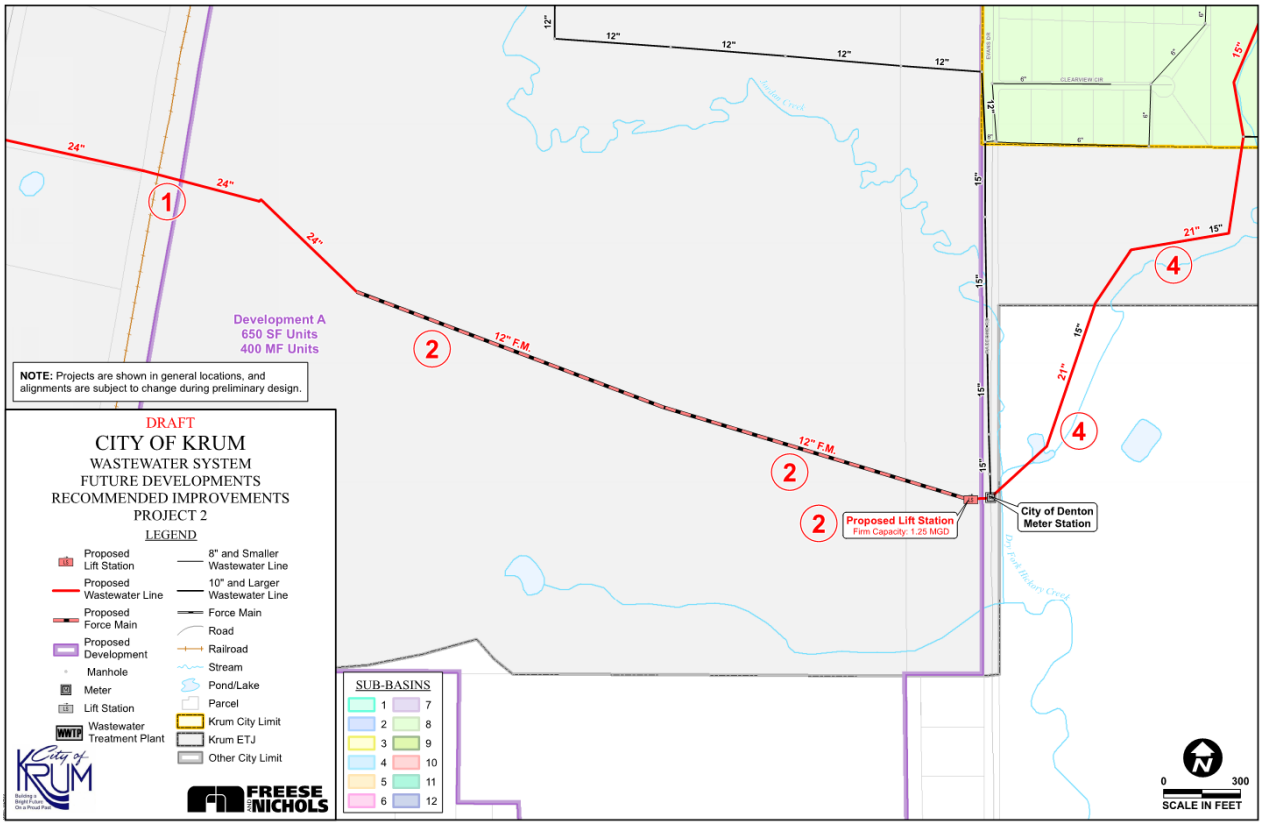
The proposed improvements will provide capacity to convey flow from existing development in the eastern portion of the city limits and projected development in the southern portion of the ETJ to utilize existing capacity at the Wastewater Treatment Plant.

Comments

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	1.25 MGD Lift Station	1	EA	$ 1,875,000	$ 1,875,000
2	12" Force Main	2,800	LF	$ 96	$ 268,800
3	Actuated Sluice Gate	1	LS	$ 20,000	$ 20,000
				SUBTOTAL:	**$ 2,163,800**
		CONTINGENCY		30%	$ 649,200
				SUBTOTAL:	**$ 2,813,000**
		ENG/SURVEY		20%	$ 562,600
				SUBTOTAL:	**$ 3,375,600**
				Estimated Project Total:	**$ 3,375,600**

Costs do not include contract administration or land and easement acquisition.



DRAFT City of Krum

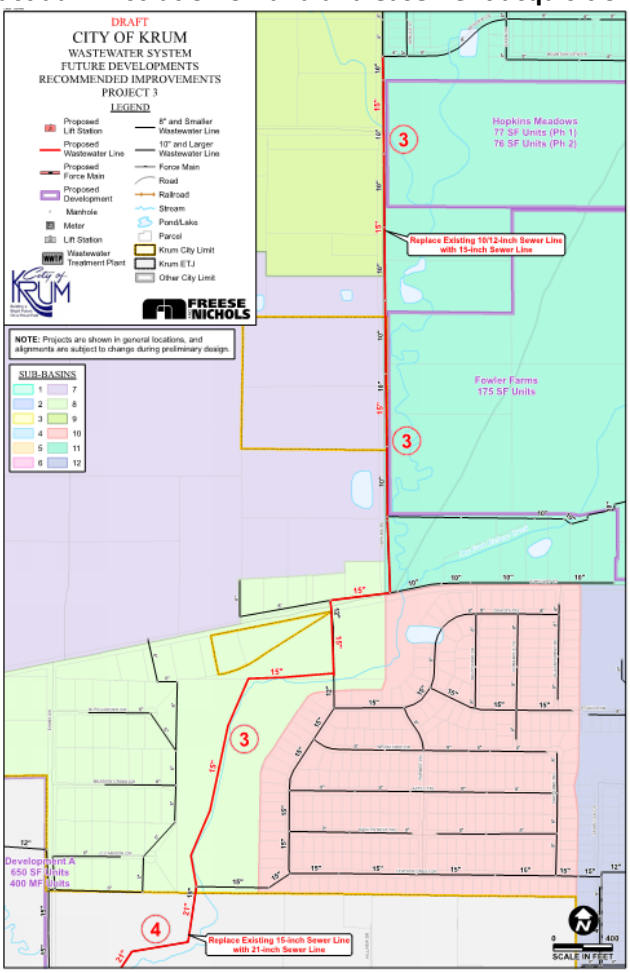
Capital Improvement Cost Estimate	**May 2019**
Construction Project Number:	**S-3**
Project Name:	**15-inch Hopkins Road Interceptor**

Project Description:	**Comments**
This project consists of the construction of a 15-inch wastewater interceptor replacing the existing 10/12-inch wastewater interceptor from Hopkins Road and Meadow Lane to the Dry Fork Hickory Creek.	
Project Drivers:	
The proposed improvements will provide capacity to convey flow from projected development in the northeast corner of the city limits.	

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Gravity Main	8,400	LF	$ 120	$ 1,008,000
2	60" Diameter Manhole	18	EA	$ 7,500	$ 135,000
3	24" Boring and Casing	200	LF	$ 420	$ 84,000
				SUBTOTAL:	**$ 1,227,000**
		CONTINGENCY		30%	$ 368,100
				SUBTOTAL:	**$ 1,595,100**
		ENG/SURVEY		20%	$ 319,100
				SUBTOTAL:	**$ 1,914,200**
				Estimated Project Total:	**$ 1,914,200**

Costs do not include contract administration or land and easement acquisition.



DRAFT City of Krum

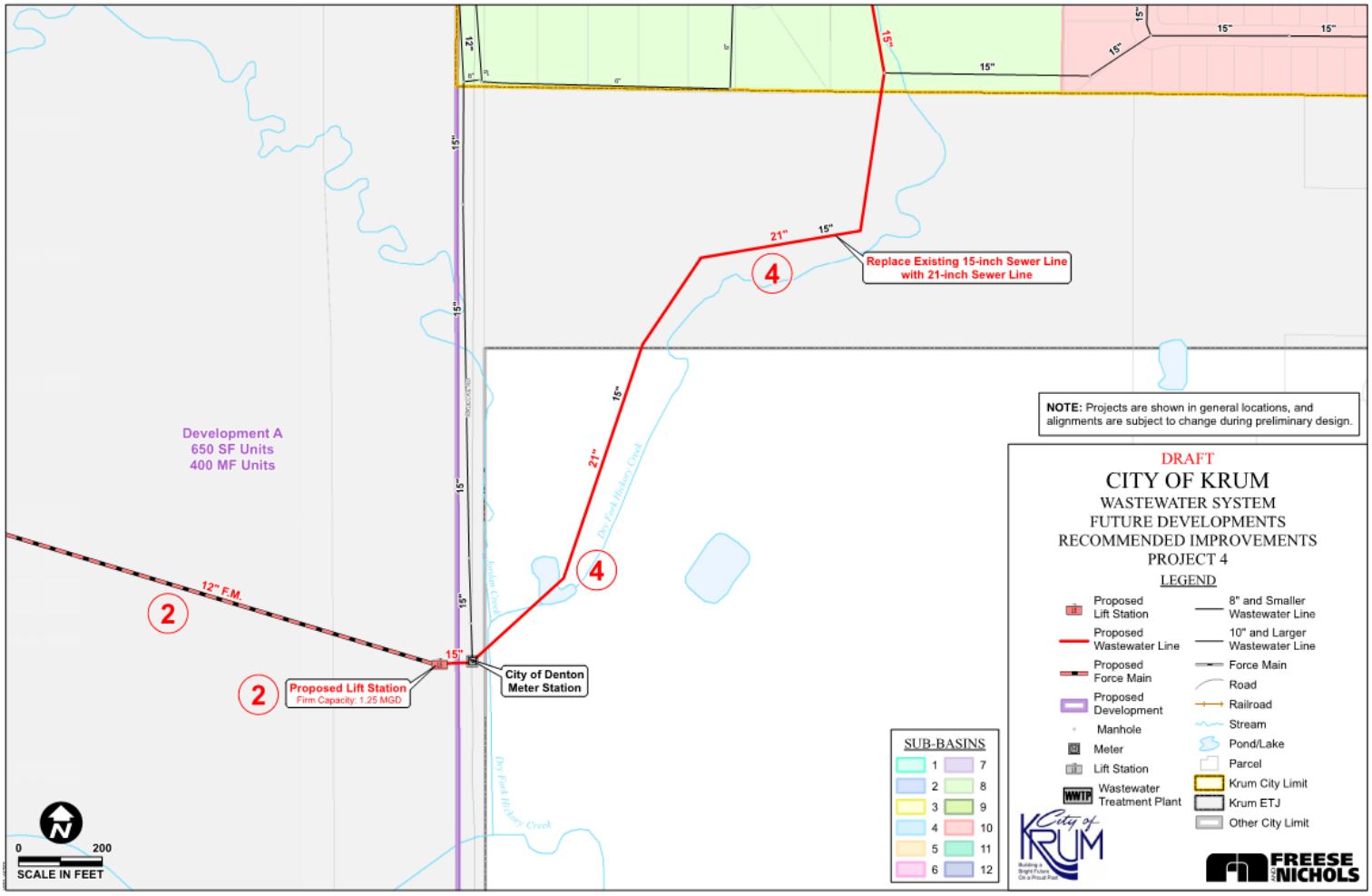
Capital Improvement Cost Estimate	**May 2019**
Construction Project Number:	**S-4**
Project Name:	**21-inch Dry Fork Hickory Creek Interceptor**

Project Description:	**Comments**
This project consists of the construction of a 21-inch wastewater interceptor replacing the existing 15-inch wastewater interceptor from the city limits to the City of Denton meter station.	
Project Drivers:	
The proposed improvements will provide capacity to convey flow from projected development in the northeast corner of the city limits.	

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	21" Gravity Main	2,300	LF	$ 168	$ 386,400
2	60" Diameter Manhole	7	EA	$ 7,500	$ 52,500
				SUBTOTAL:	**$ 438,900**
		CONTINGENCY		30%	$ 131,700
				SUBTOTAL:	**$ 570,600**
		ENG/SURVEY		20%	$ 114,200
				SUBTOTAL:	**$ 684,800**
				Estimated Project Total:	**$ 684,800**

Costs do not include contract administration or land and easement acquisition.



DRAFT City of Krum

Capital Improvement Cost Estimate — **May 2019**

Construction Project Number: W-1

Project Name: 12-inch McCart Street Water Line Replacement Phase 1

Project Description:

This project consists of the construction of a 12-inch water line replacing the existing 6-inch water line along McCart Street from Hopkins Road to 6th Street.

Project Drivers:

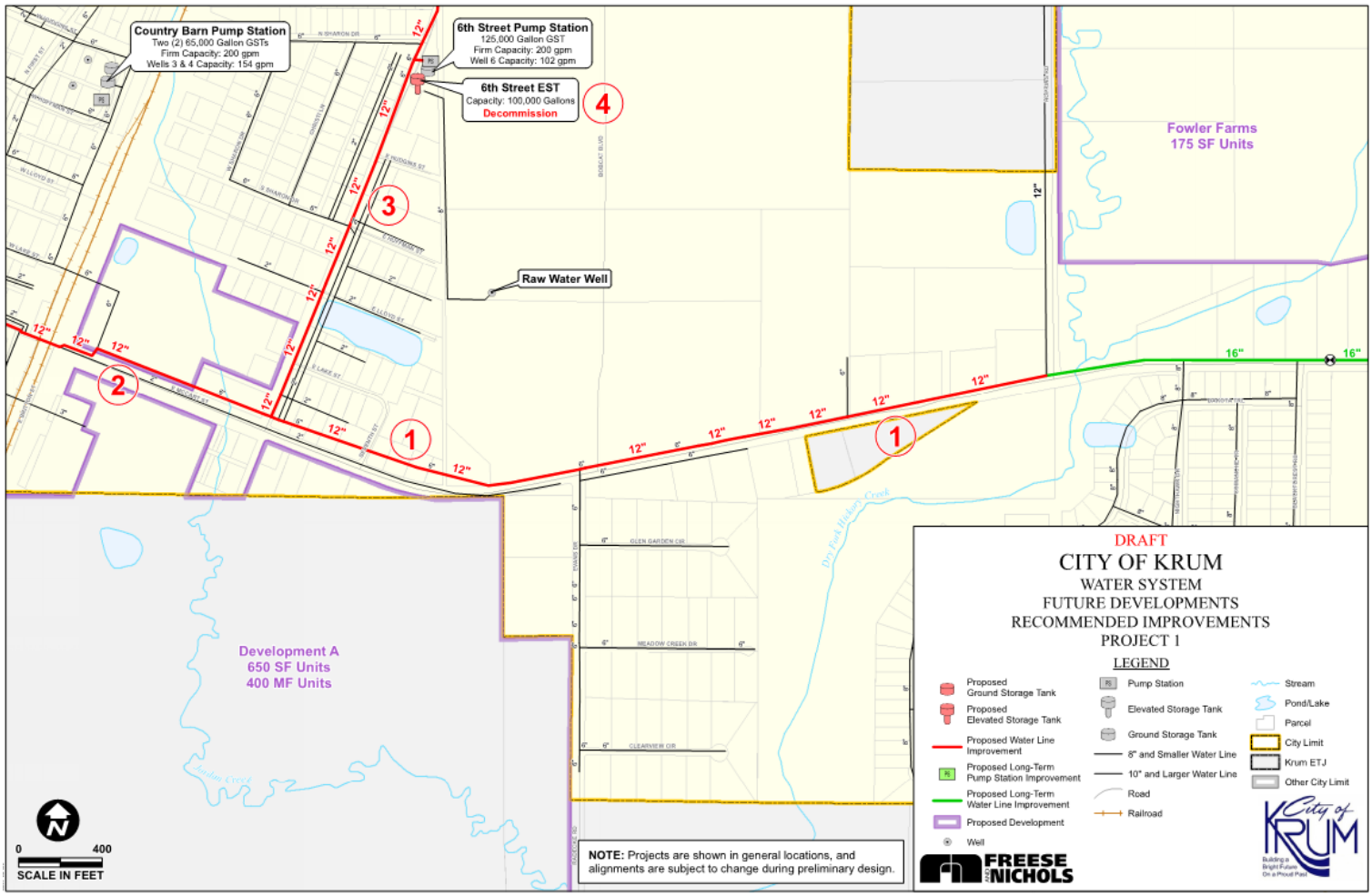
This project will provide increased transmission capacity from the Masch Branch Pump Station to the western half of the City.

Comments

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	4,600	LF	$ 120	$ 552,000
2	Pavement Repair	4,600	LF	$ 75	$ 345,000
				SUBTOTAL:	**$ 897,000**
		CONTINGENCY		30%	$ 269,100
				SUBTOTAL:	**$ 1,166,100**
		ENG/SURVEY		20%	$ 233,300
				SUBTOTAL:	**$ 1,399,400**
				Estimated Project Total:	**$ 1,399,400**

Costs do not include contract administration or land and easement acquisition.



DRAFT City of Krum

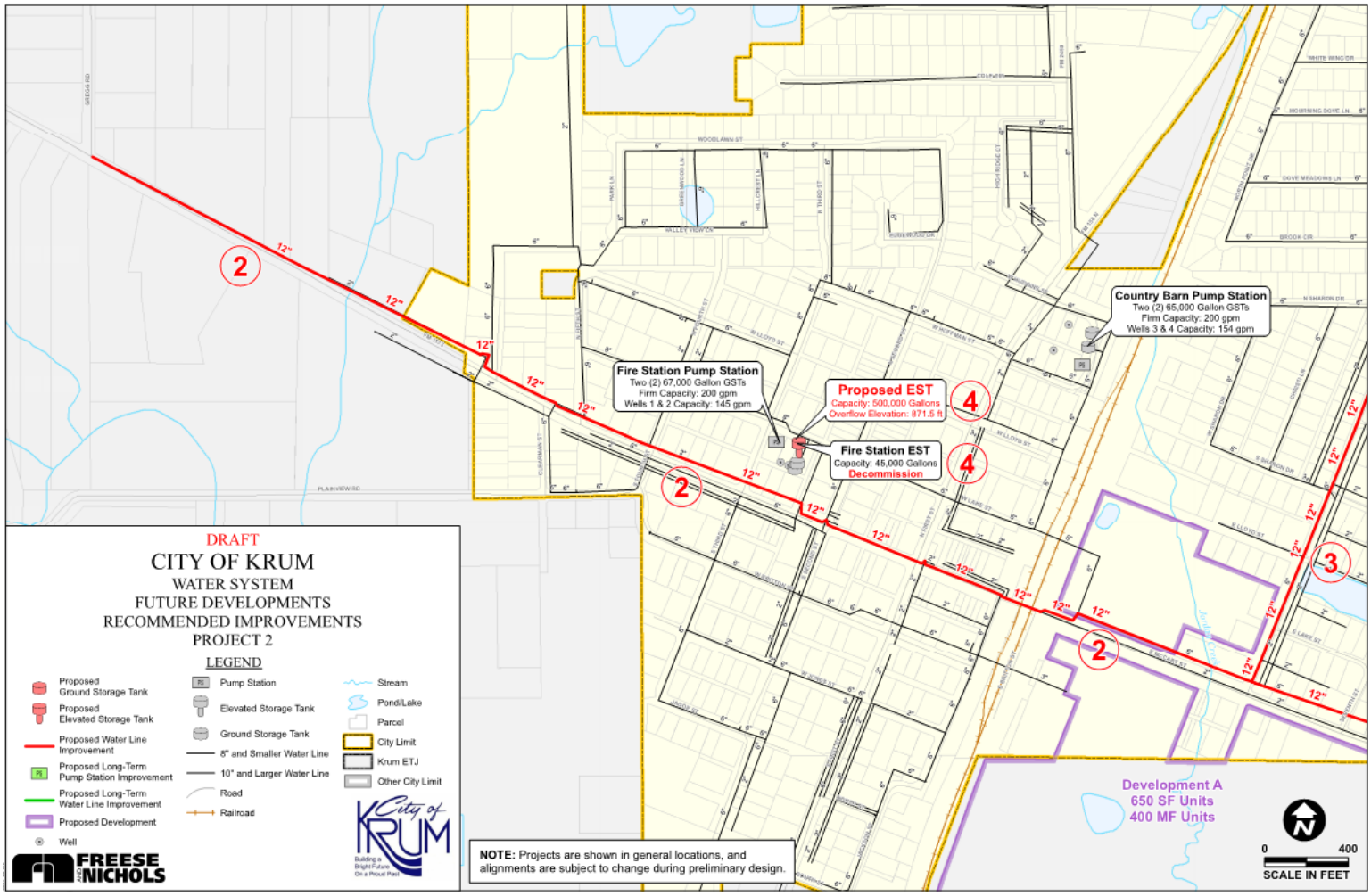
Capital Improvement Cost Estimate	**May 2019**
Construction Project Number:	**W-2**
Project Name:	**12-inch McCart Street Water Line Replacement Phase 2**

Project Description:	**Comments**
This project consists of the construction of a 12-inch water line replacing the existing 2-inch and 6-inch water lines along McCart Street from 6th Street to just west of the city limits.	
Project Drivers:	
This project will provide increased transmission capacity from the Masch Branch Pump Station to the western half of the City.	

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	6,200	LF	$ 120	$ 744,000
2	Pavement Repair	4,200	LF	$ 75	$ 315,000
3	24" Boring and Casing	450	LF	$ 420	$ 189,000
				SUBTOTAL:	**$ 1,248,000**
		CONTINGENCY		30%	$ 374,400
				SUBTOTAL:	**$ 1,622,400**
		ENG/SURVEY		20%	$ 324,500
				SUBTOTAL:	**$ 1,946,900**
				Estimated Project Total:	**$ 1,946,900**

Costs do not include contract administration or land and easement acquisition.



DRAFT City of Krum

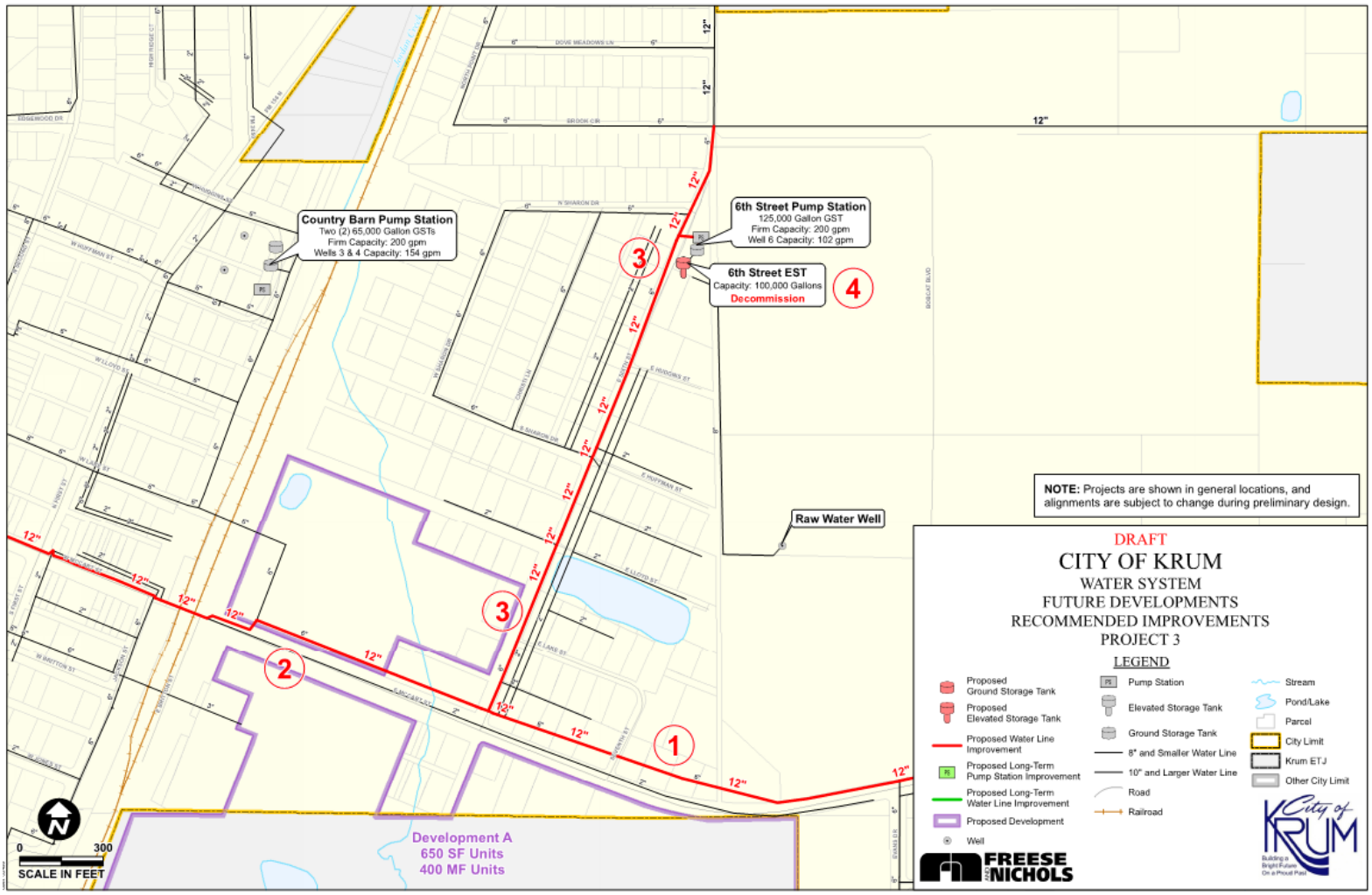
Capital Improvement Cost Estimate	**May 2019**
Construction Project Number:	**W-3**
Project Name:	**12-inch 6th Street Water Line Replacement**

Project Description:	**Comments**
This project consists of the construction of a 12-inch water line replacing the existing 6-inch water line along 6th Street from McCart Street to Brook Circle.	
Project Drivers:	
This project will provide increased transmission capacity from the Masch Branch Pump Station to the northern half of the City.	

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	3,000	LF	$ 120	$ 360,000
2	Pavement Repair	3,000	LF	$ 75	$ 225,000
				SUBTOTAL:	**$ 585,000**
		CONTINGENCY		30%	$ 175,500
				SUBTOTAL:	**$ 760,500**
		ENG/SURVEY		20%	$ 152,100
				SUBTOTAL:	**$ 912,600**
				Estimated Project Total:	**$ 912,600**

Costs do not include contract administration or land and easement acquisition.



DRAFT City of Krum

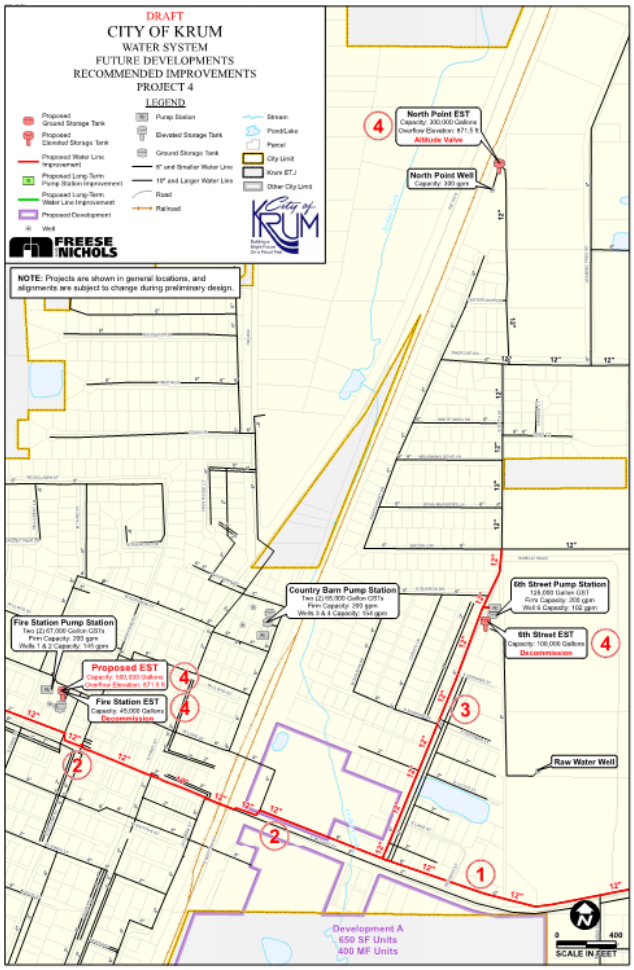
Capital Improvement Cost Estimate	**May 2019**
Construction Project Number:	**W-4**
Project Name:	**Elevated Storage Tank Projects**

Project Description:	**Comments**
This project consists of decommissioning the Fire Station and 6th Street EST, the construction of a 500,000 gallon elevated storage tank near the Fire Station EST, and an altitude valve at the North Point EST.	
Project Drivers:	
This project will provide additional elevated storage capacity for future growth and demands.	

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Decommission of Existing Elevated Tank	2	LS	$ 200,000	$ 400,000
2	500,000 Gallon Elevated Storage Tank	1	LS	$ 1,875,000	$ 1,875,000
3	Altitude Valve	1	EA	$ 50,000	$ 50,000
4	12" WL & Appurtenances	200	LF	$ 120	$ 24,000
				SUBTOTAL:	**$ 2,349,000**
		CONTINGENCY		30%	$ 704,700
				SUBTOTAL:	**$ 3,053,700**
		ENG/SURVEY		20%	$ 610,800
				SUBTOTAL:	**$ 3,664,500**
				Estimated Project Total:	**$ 3,664,500**

Costs do not include contract administration or land and easement acquisition.



DRAFT City of Krum

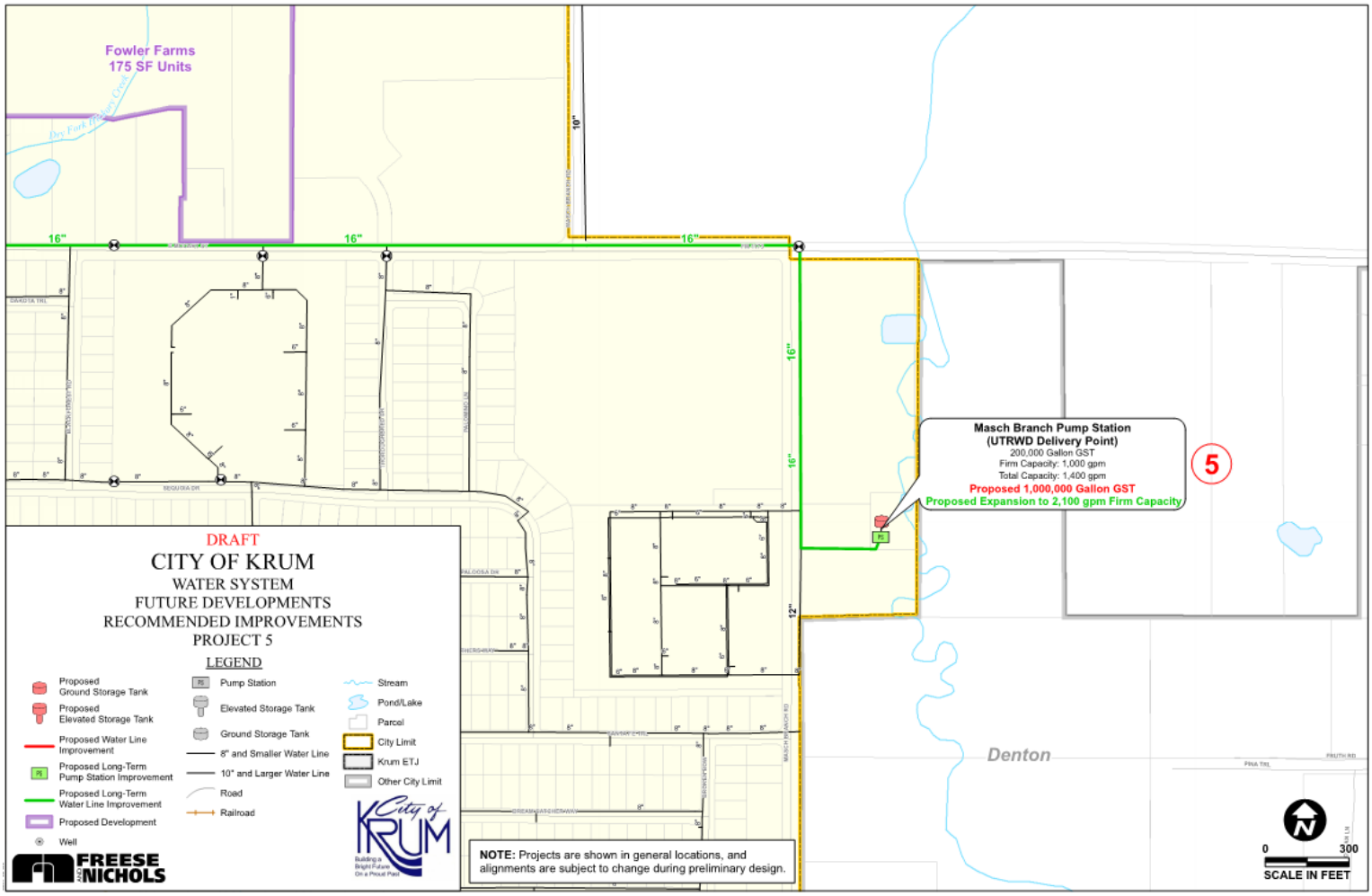
Capital Improvement Cost Estimate	**May 2019**
Construction Project Number:	**W-5**
Project Name:	**1.0 MG Ground Storage Tank**

Project Description:	**Comments**
This project consists of the construction of a 1 MG ground storage tank at the Masch Branch Pump Station	
Project Drivers:	
This project will provide storage capacity for 10 hours of maximum day demand based on projected system demands.	

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	1.0 MG Ground Storage Tank	1	LS	$ 2,000,000	$ 2,000,000
				SUBTOTAL:	**$ 2,000,000**
		CONTINGENCY		30%	$ 600,000
				SUBTOTAL:	**$ 2,600,000**
		ENG/SURVEY		20%	$ 520,000
				SUBTOTAL:	**$ 3,120,000**
				Estimated Project Total:	**$ 3,120,000**

Costs do not include contract administration or land and easement acquisition.



DRAFT City of Krum

Capital Improvement Cost Estimate	**May 2019**
Construction Project Number:	**W-6**
Project Name:	**16-inch McCart Street Water Line Replacement and Mash Branch PS Expansion**

Project Description:

This project consists of the construction of a 16-inch water line replacing the existing 12-inch water line along McCart Street and Masch Branch Road from the Mash Branch Pump Station to Hopkins Road, and the expansion of the Masch Branch Pump Station to a firm capacity of 2,100 gpm.

Project Drivers:

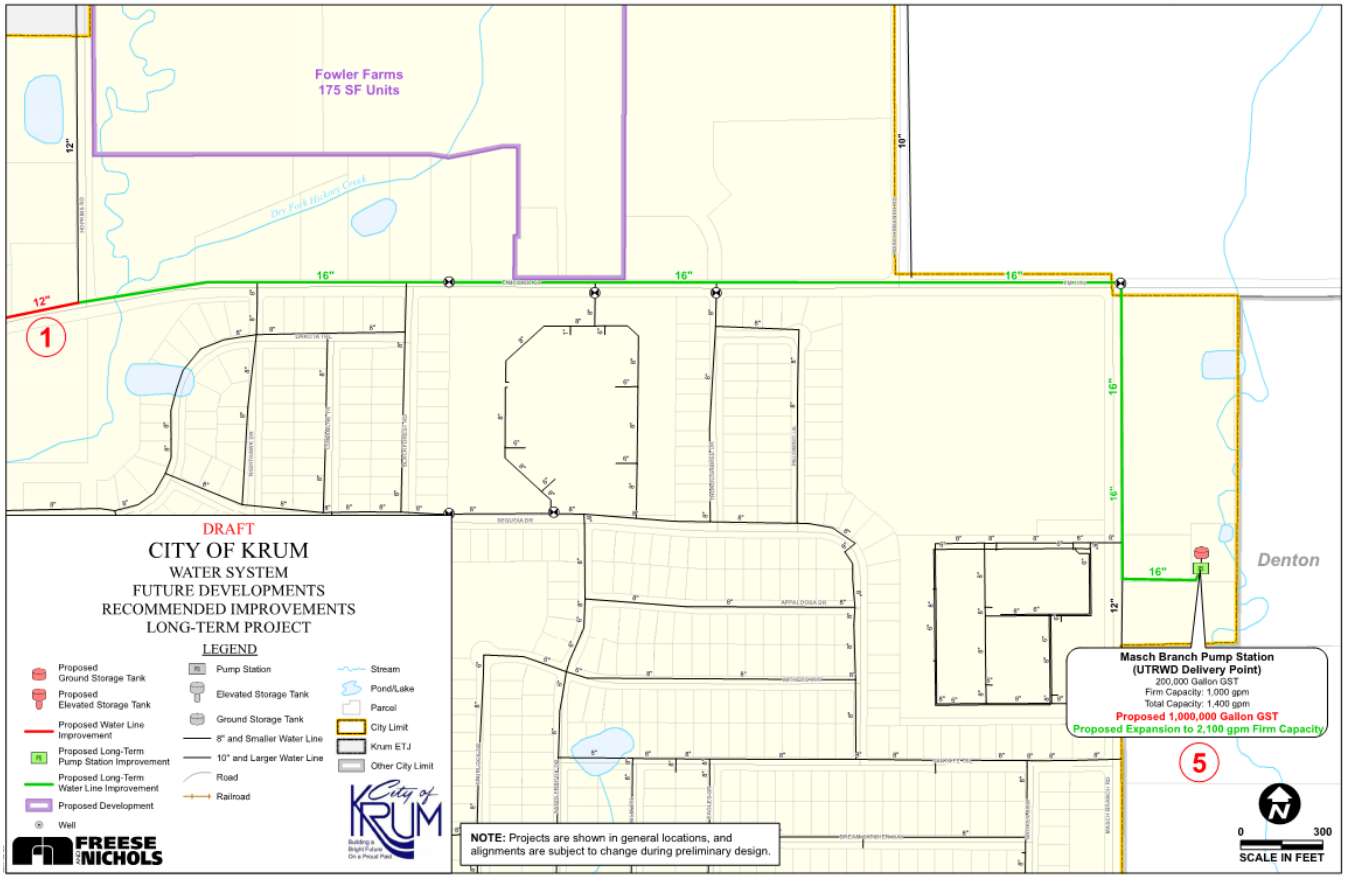
This project will provide increased transmission capacity from the Masch Branch Pump Station to the western half of the City, and provide additional firm pumping capacity to meet future demands.

Comments

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	16" WL & Appurtenances	6,700	LF	$ 160	$ 1,072,000
2	Pavement Repair	6,700	LF	$ 75	$ 502,500
3	Pump Station - Expand 1,100 gpm	1	LS	$ 633,600	$ 633,600
				SUBTOTAL:	**$ 2,208,100**
		CONTINGENCY		30%	$ 662,500
				SUBTOTAL:	**$ 2,870,600**
		ENG/SURVEY		20%	$ 574,200
				SUBTOTAL:	**$ 3,444,800**
				Estimated Project Total:	**$ 3,444,800**

Costs do not include contract administration or land and easement acquisition.



DRAFT City of Krum

Capital Improvement Cost Estimate — **June 2019**

Construction Project Number: R-1

Project Name: E. 6th Street and E. Huffman Street

Project Description:

This project consists of the reconstruction of E. 6th Street from FM 1173 to Radecke Rd and E. Huffman St. from E. 6th St. to the ISD property, including a 5' sidewalk on one side of both streets.

Project Drivers:

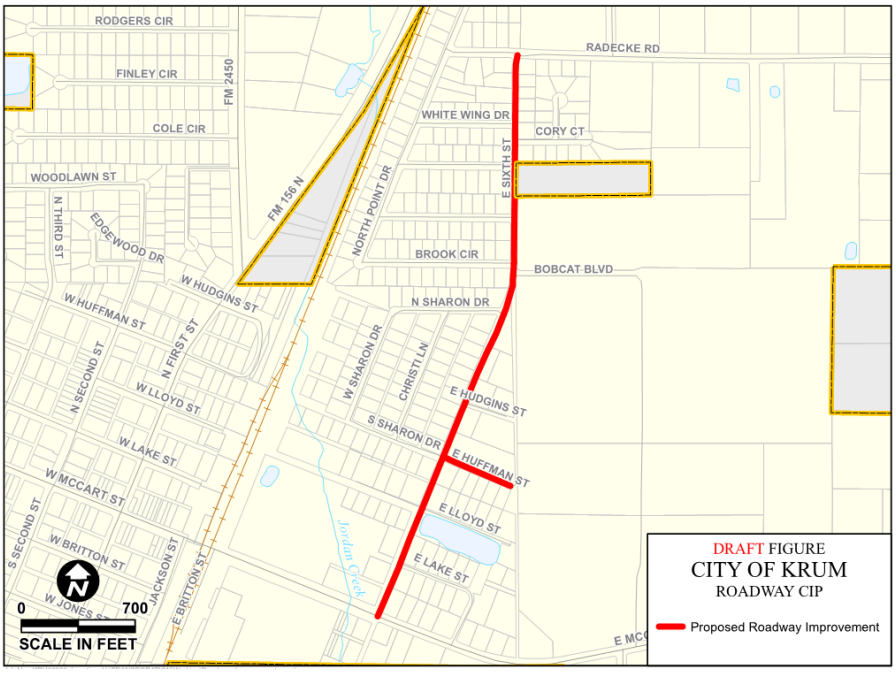
The proposed improvements will provide improved pavement for school bus traffic and a sidewalk for pedestrians.

Comments

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Roadway Excavation	3,500	CY	$ 10	$ 35,000
2	Subgrade Lime Treatment	11,340	SY	$ 12	$ 137,000
3	6" Flexible Base and Prime Coat	9,910	SY	$ 18	$ 179,000
4	3" Hot Mix Asphalt Surface Course	11,150	SY	$ 22	$ 246,000
5	9" Concrete Intersection Paving	180	SY	$ 80	$ 15,000
6	Concrete Ribbon Curb	7,980	LF	$ 24	$ 192,000
7	4" Concrete Sidewalk	2,300	SY	$ 50	$ 115,000
8	Topsoil and Sodding	3,700	SY	$ 12	$ 45,000
9	Traffic Control, Erosion Control	1	LS	$ 40,000	$ 40,000
10	Drainage Improvements	1	LS	$ 50,000	$ 50,000
11	Utility Improvements	1	LS	$ 100,000	$ 100,000
				SUBTOTAL:	**$ 1,154,000**
		CONTINGENCY		30%	$ 346,200
				SUBTOTAL:	**$ 1,500,200**
		ENG/SURVEY		20%	$ 300,100
				SUBTOTAL:	**$ 1,800,300**
				Estimated Project Total:	**$ 1,800,300**

Costs do not include contract administration or land and easement acquisition.



DRAFT

CITY OF KRUM

WASTEWATER SYSTEM FUTURE DEVELOPMENTS RECOMMENDED IMPROVEMENTS

NOTE: Projects are shown in general locations, and alignments are subject to change during preliminary design.

LEGEND

- Proposed Lift Station
- Proposed Wastewater Line
- Proposed Force Main
- Proposed Development
- Manhole
- Meter
- Lift Station
- Wastewater Treatment Plant
- 8" and Smaller Wastewater Line
- 10" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Pond/Lake
- Parcel
- Krum City Limit
- Krum ETJ
- Other City Limit

City of KRUM — Building a Bright Future On a Proud Past

FREESE AND NICHOLS

SUB-BASINS

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Wastewater Treatment Plant
Permitted Capacity: 0.354 MGD
2-Hour Peak Flow Capacity: 1 MGD

Development A
650 SF Units
400 MF Units

70 ac. tract
200 SF Units

Aspen Parks
60 SF Units

Hopkins Meadows
77 SF Units (Ph 1)
76 SF Units (Ph 2)

Fowler Farms
175 SF Units

LS #1

LS #2

LS #4

Private - Veterinary Clinic LS

Private - LS #3

Replace Existing 10/12-inch Sewer Line with 15-inch Sewer Line

Replace Existing 15-inch Sewer Line with 21-inch Sewer Line

Proposed Lift Station
Firm Capacity: 1.25 MGD

City of Denton Meter Station

Denton

0 900 1,800
SCALE IN FEET

Created By Freese and Nichols, Inc.
Job No.: KRU16628
Location: H:\W_WW_PLANNING\01_DELIVERABLES\13_Client_Relations_Developments\Wastewater_Future_Developments.mxd
Updated: Wednesday, May 29, 2019 10:25:31 AM
User: 02499

DRAFT

CITY OF KRUM

WASTEWATER SYSTEM
FUTURE DEVELOPMENTS
RECOMMENDED IMPROVEMENTS
PROJECT 1

Wastewater Treatment Plant
Permitted Capacity: 0.354 MGD
2-Hour Peak Flow Capacity: 1 MGD

WWTP

NOTE: Projects are shown in general locations, and alignments are subject to change during preliminary design.

LEGEND

- Proposed Lift Station
- Proposed Wastewater Line
- Proposed Force Main
- Proposed Development
- Manhole
- Meter
- Lift Station
- Wastewater Treatment Plant
- 8" and Smaller Wastewater Line
- 10" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Pond/Lake
- Parcel
- Krum City Limit
- Krum ETJ
- Other City Limit

SUB-BASINS

1	7
2	8
3	9
4	10
5	11
6	12

Development A
650 SF Units
400 MF Units

24" 24" 24" 24" 24" 24" 24" 24"

1

2

12" F.M. 12" F.M.

W BRITTON ST
S SECOND ST
S THIRD ST
W JONES ST
S GROVE ST
S FIRST ST
W MCCART ST
E BRIMPSON ST
NORTH ST
JACKSON ST
SOUTH ST
FM 156 N
E MCCART ST
E LLOYD ST
E LAKE ST
E SIXTH ST
SEVENTH ST
Jordan Creek

0 400
SCALE IN FEET

City of KRUM
Building a Bright Future On a Proud Past

FREESE AND NICHOLS

Created By Freese and Nichols, Inc.
Job No.: KRU16928
Location: H:\W_WW_PLANNING\01_DELIVERABLES\13_Client_Relations_Developments\Project_Zoom-Ins\WW_Future_Dev_Project_1.mxd
Updated: Wednesday, May 29, 2019 10:36:52 AM
User: 07249

DRAFT

CITY OF KRUM

WASTEWATER SYSTEM
FUTURE DEVELOPMENTS
RECOMMENDED IMPROVEMENTS
PROJECT 2

NOTE: Projects are shown in general locations, and alignments are subject to change during preliminary design.

LEGEND

- Proposed Lift Station
- Proposed Wastewater Line
- Proposed Force Main
- Proposed Development
- Manhole
- Meter
- Lift Station
- Wastewater Treatment Plant
- 8" and Smaller Wastewater Line
- 10" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Pond/Lake
- Parcel
- Krum City Limit
- Krum ETJ
- Other City Limit

SUB-BASINS

1	7
2	8
3	9
4	10
5	11
6	12

Development A
650 SF Units
400 MF Units

Proposed Lift Station
Firm Capacity: 1.25 MGD

City of Denton Meter Station

Jordan Creek

Dry Fork Hickory Creek

EVANS DR

CLEARVIEW CIR

0 300
SCALE IN FEET

City of KRUM
Building a Bright Future On a Proud Past

FREESE AND NICHOLS

Created By: Freese and Nichols, Inc.
Job No.: KRU16628
Location: H:\W_WW_PLANNING\01_DELIVERABLES\13_Client_Relations_Developments\Project_Zoom-Ins\Wastewater\WW_Future_Dev_Project_2.mxd
Updated: Wednesday, May 29, 2019 11:31:26 AM
User: 72489

Created By Freese and Nichols, Inc.
Job No.: KRU16628
Location: H:\W_WW_PLANNING\01_DELIVERABLES\13_Client_Relations_Developments\Project_Zoom-Ins\WW_Future_Dev_Project_3.mxd
Updated: Wednesday, May 29, 2019 10:47:31 AM
User: 02499

DRAFT

CITY OF KRUM

WASTEWATER SYSTEM
FUTURE DEVELOPMENTS
RECOMMENDED IMPROVEMENTS
PROJECT 3

LEGEND

- Proposed Lift Station
- Proposed Wastewater Line
- Proposed Force Main
- Proposed Development
- Manhole
- Meter
- Lift Station
- Wastewater Treatment Plant
- 8" and Smaller Wastewater Line
- 10" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Pond/Lake
- Parcel
- Krum City Limit
- Krum ETJ
- Other City Limit

City of KRUM
Building a Bright Future On a Proud Past

FREESE AND NICHOLS

NOTE: Projects are shown in general locations, and alignments are subject to change during preliminary design.

SUB-BASINS
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Hopkins Meadows
77 SF Units (Ph 1)
76 SF Units (Ph 2)

Fowler Farms
175 SF Units

Development A
650 SF Units
400 MF Units

Replace Existing 10/12-inch Sewer Line with 15-inch Sewer Line

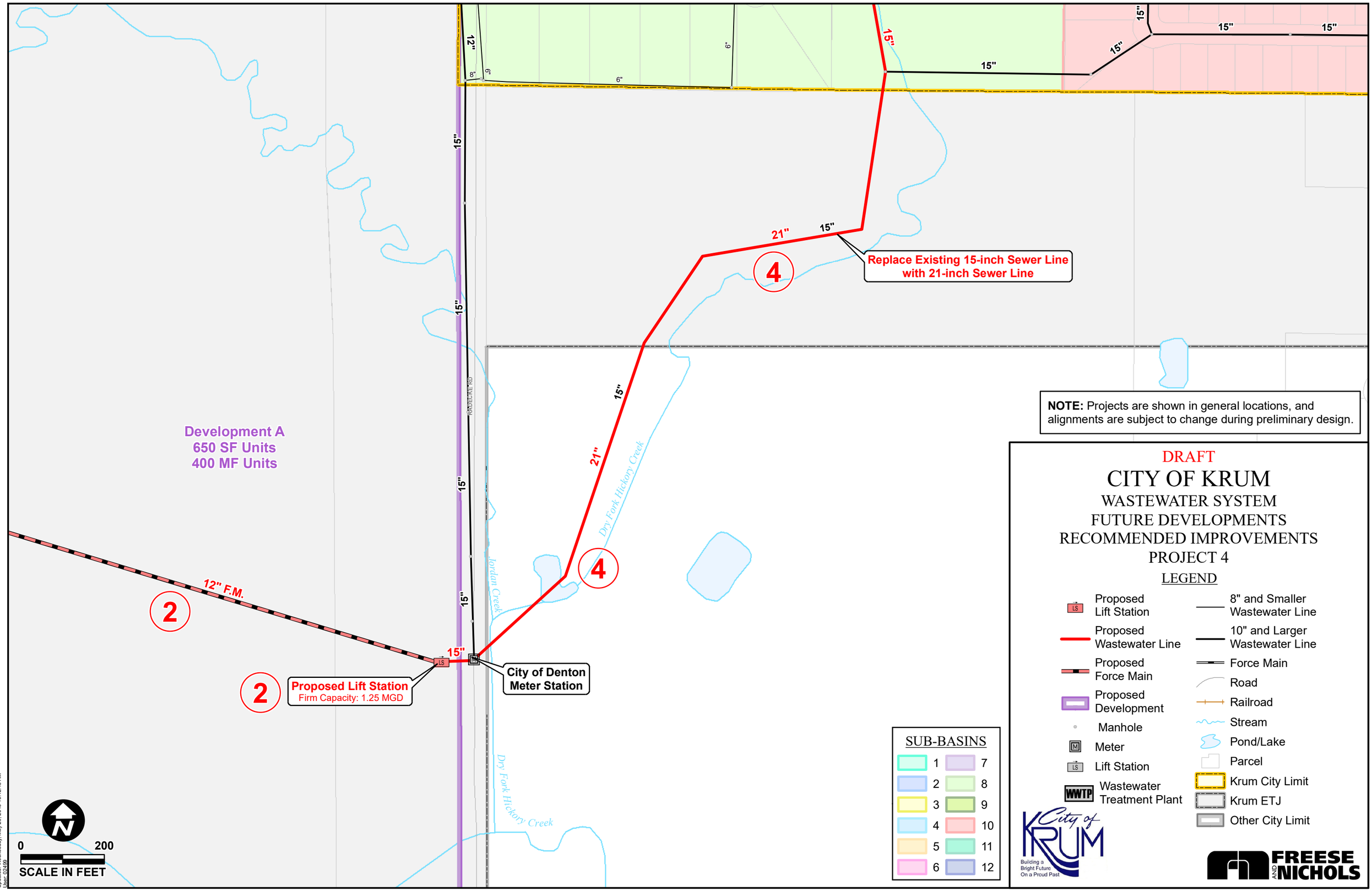
Replace Existing 15-inch Sewer Line with 21-inch Sewer Line

3

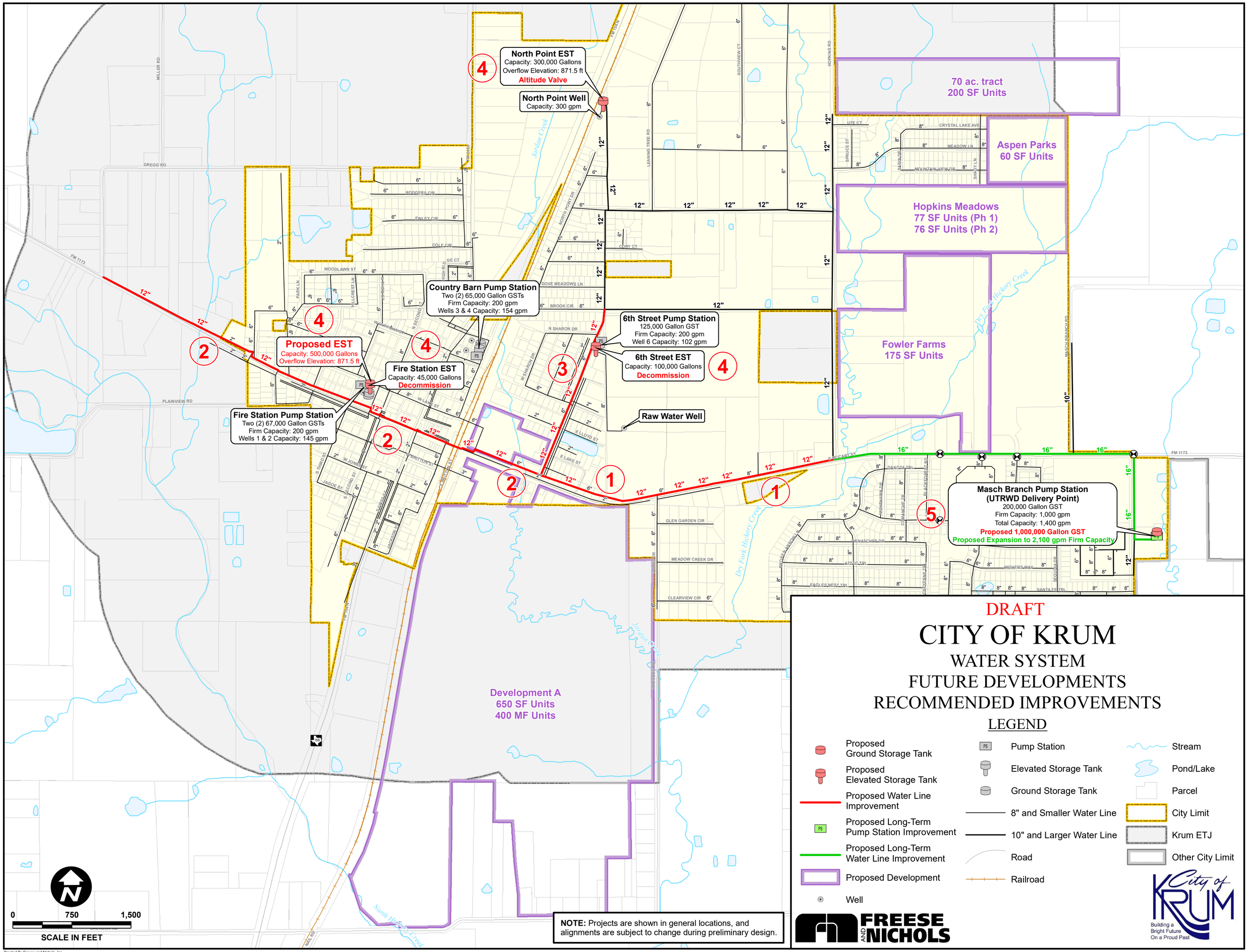
4

MEADOW LN
SPRUCE ST
SABINE DR
MOUNTAIN VIEW DR
HOPKINS RD
Dry Fork Hickory Creek
E MCCART ST
DAKOTA TRL
NIGHTHAWK DR
COMANCHE TR
BLACKFOREST RD
SEQUOIA DR
WENATCHEE DR
PAWNEE TRL
AZTEC TRL
CHEYENNE TRL
EAGLES NEST TRL
FEATHER CREST DR
SPURLOCK DR
EVANS DR
GLEN GARDEN CIR
MEADOW CREEK DR
CLEARVIEW CIR
HILLVIEW DR

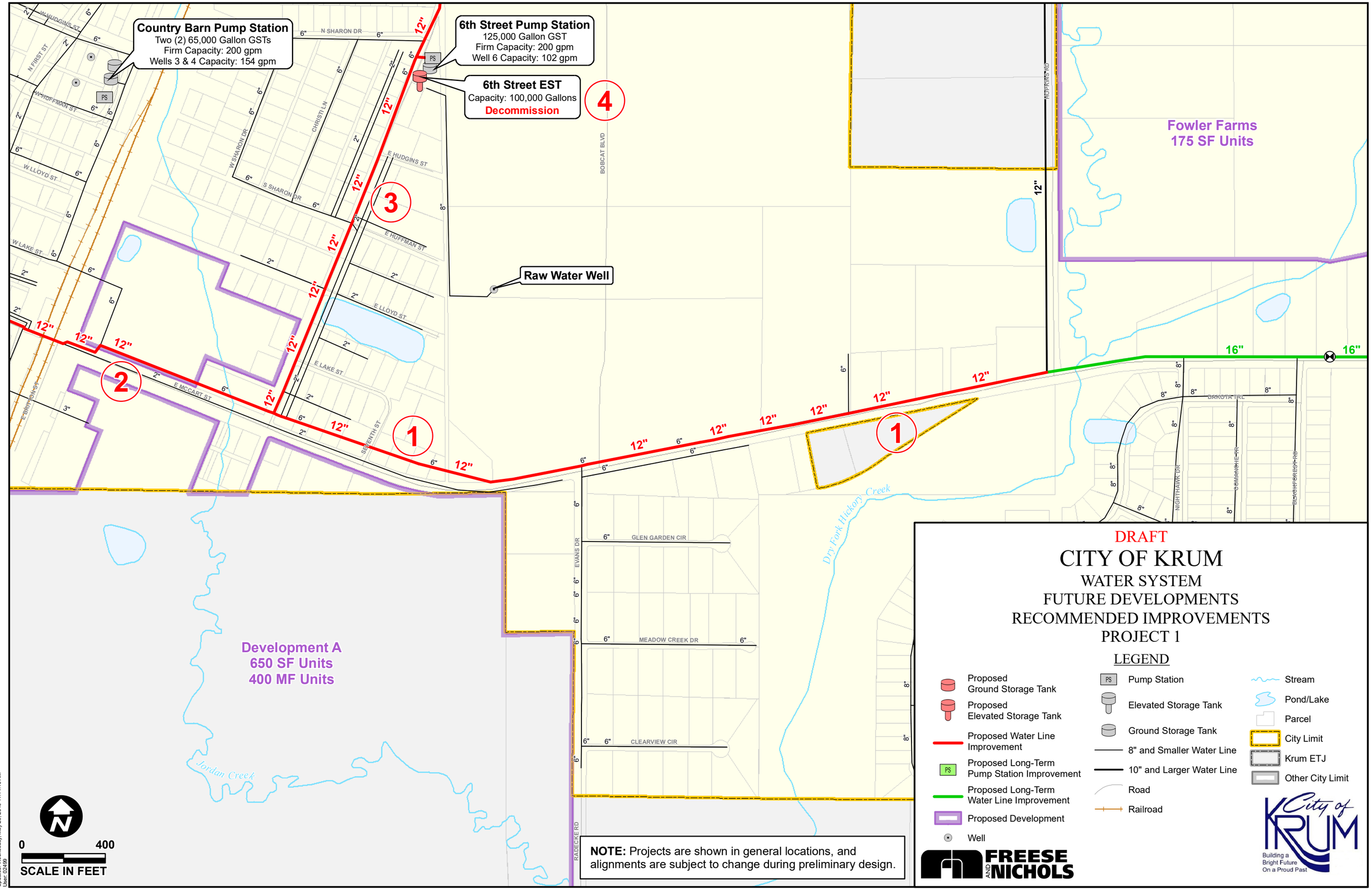
0 400
SCALE IN FEET



Created By:Freese and Nichols, Inc.
Job No.: KRU16628
Location: H:\W_WW_PLANNING\01_DELIVERABLES\13_Client_Relations_Developments\Project_Zoom-Ins\WW_Future_Dev_Project_4.mxd
Updated: Wednesday, May 29, 2019 10:42:13 AM
User: 07499



Created By Freese and Nichols, Inc.
Job No.: KRU16628
Location: H:\W_WW_PLANNING\01_DELIVERABLES\13_Client_Relations_Developments_(01-16-2019)\Water_Future_Developments.mxd
Updated: Tuesday, May 28, 2019 10:20:16 AM
User: 02499



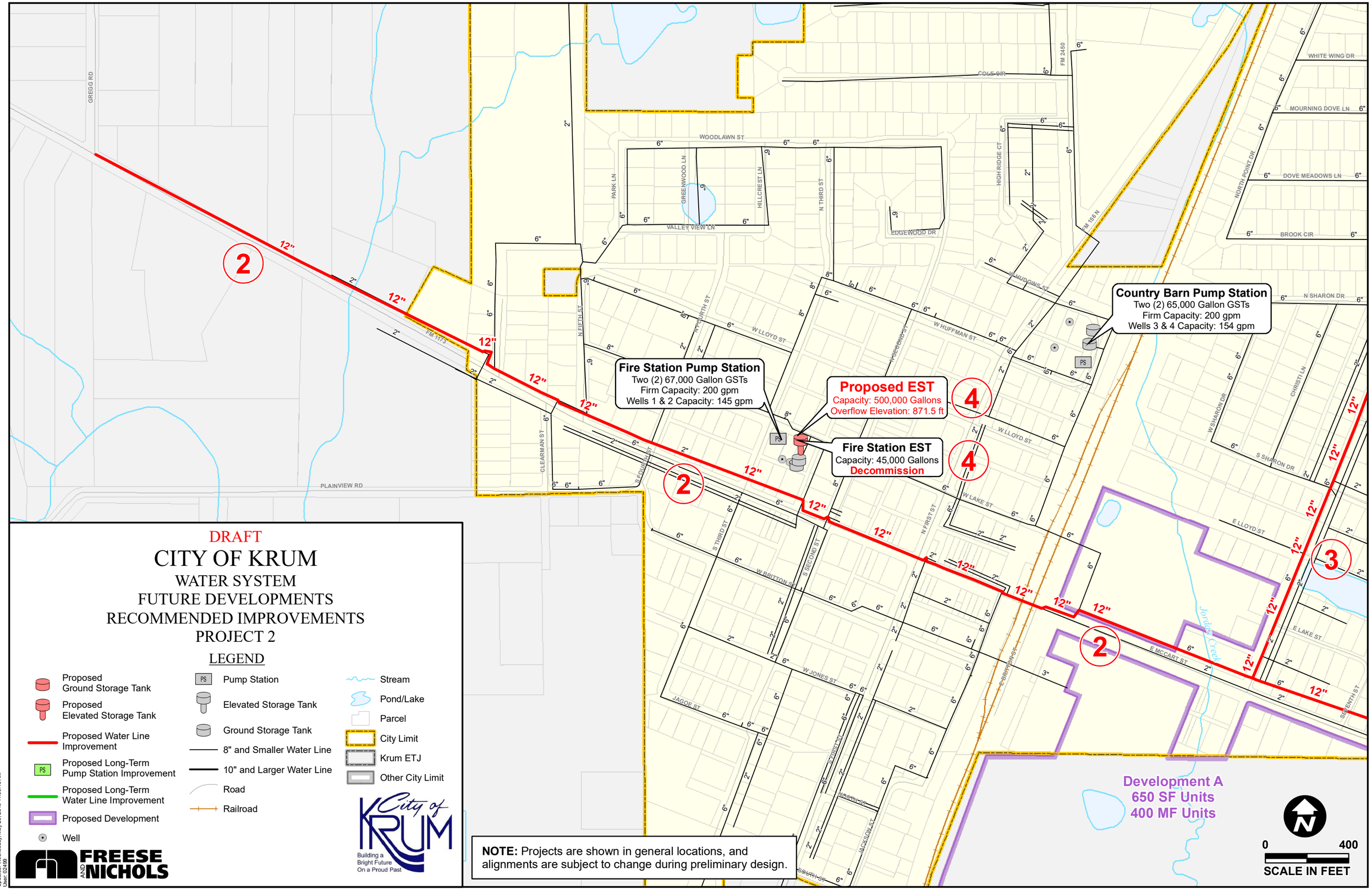
NOTE: Projects are shown in general locations, and alignments are subject to change during preliminary design.

Created By Freese and Nichols, Inc.
Job No.: KRU16828
Location: H:\W_WW_PLANNING\01_DELIVERABLES\13_Client_Relations_Developments\Project_Zoom-Ins\Water\Water_Future_Dev_Project_1.mxd
Updated: Wednesday, May 29, 2019 11:14:10 AM
User: 12469

DRAFT

CITY OF KRUM

WATER SYSTEM
FUTURE DEVELOPMENTS
RECOMMENDED IMPROVEMENTS
PROJECT 2



LEGEND

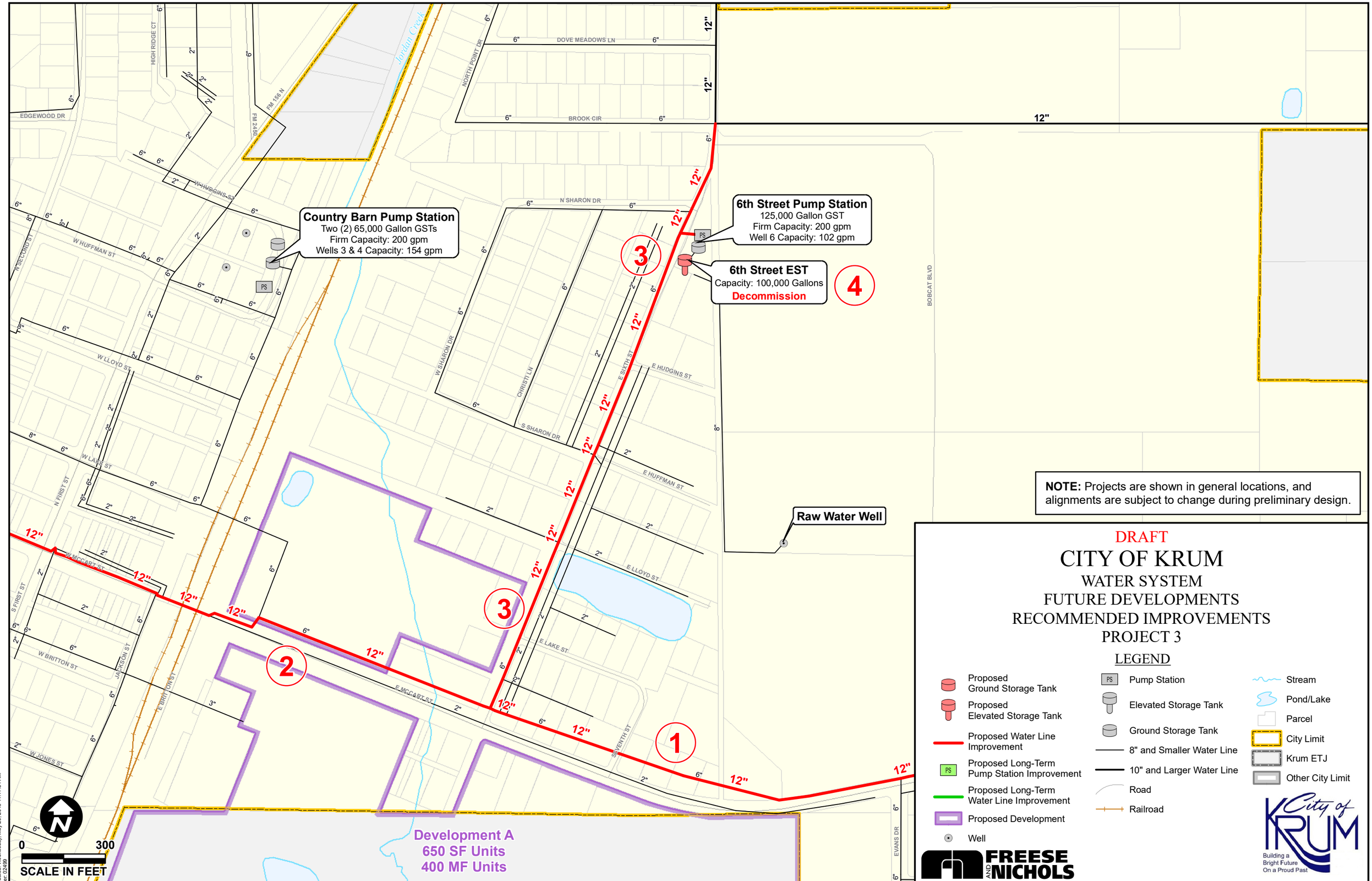
- Proposed Ground Storage Tank
- Proposed Elevated Storage Tank
- Proposed Water Line Improvement
- Proposed Long-Term Pump Station Improvement
- Proposed Long-Term Water Line Improvement
- Proposed Development
- Well
- Pump Station
- Elevated Storage Tank
- Ground Storage Tank
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Pond/Lake
- Parcel
- City Limit
- Krum ETJ
- Other City Limit

FREESE AND NICHOLS

City of KRUM
Building a Bright Future On a Proud Past

NOTE: Projects are shown in general locations, and alignments are subject to change during preliminary design.

Created By Freese and Nichols, Inc.
Job No.: KRU16628
Location: H:\W_WW_PLANNING\01_DELIVERABLES\13_Client_Relations_Developments\Project_Zoom-Ins\Water\Water_Future_Dev_Project_2.mxd
Updated: Wednesday, May 29, 2019 11:00:46 AM
User: 02489



Created By Freese and Nichols, Inc.
Job No.: KRU16628
Location: H:\W_WW_PLANNING\01_DELIVERABLES\13_Client_Relations_Developments\Project_Zoom-Ins\Water\Water_Future_Dev_Project_3.mxd
Updated: Wednesday, May 29, 2019 11:17:51 AM
User: 02489

Created By Freese and Nichols, Inc.
Job No.: KRU16628
Location: H:\W_WW_PLANNING\01_DELIVERABLES\13_Client_Relations_Developments\Project_Zoom-Ins\Water\Water_Future_Dev_Project_4.mxd
Updated: Wednesday, May 29, 2019 11:22:29 AM
User: 02499

DRAFT

CITY OF KRUM

WATER SYSTEM
FUTURE DEVELOPMENTS
RECOMMENDED IMPROVEMENTS
PROJECT 4

LEGEND

- Proposed Ground Storage Tank
- Proposed Elevated Storage Tank
- Proposed Water Line Improvement
- Proposed Long-Term Pump Station Improvement
- Proposed Long-Term Water Line Improvement
- Proposed Development
- Well
- Pump Station
- Elevated Storage Tank
- Ground Storage Tank
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Pond/Lake
- Parcel
- City Limit
- Krum ETJ
- Other City Limit

FREESE AND NICHOLS

City of KRUM
Building a Bright Future On a Proud Past

NOTE: Projects are shown in general locations, and alignments are subject to change during preliminary design.

North Point EST
Capacity: 300,000 Gallons
Overflow Elevation: 871.5 ft
Altitude Valve

North Point Well
Capacity: 300 gpm

Country Barn Pump Station
Two (2) 65,000 Gallon GSTs
Firm Capacity: 200 gpm
Wells 3 & 4 Capacity: 154 gpm

6th Street Pump Station
125,000 Gallon GST
Firm Capacity: 200 gpm
Well 6 Capacity: 102 gpm

6th Street EST
Capacity: 100,000 Gallons
Decommission

Fire Station Pump Station
Two (2) 67,000 Gallon GSTs
Firm Capacity: 200 gpm
Wells 1 & 2 Capacity: 145 gpm

Proposed EST
Capacity: 500,000 Gallons
Overflow Elevation: 871.5 ft

Fire Station EST
Capacity: 45,000 Gallons
Decommission

Raw Water Well

Development A
650 SF Units
400 MF Units

Jordan Creek

FM 156 N
FM 2450
LEANING TREE RD
RADECKE RD
WHITE WING DR
MOURNING DOVE LN
DOVE MEADOWS LN
BROOK CIR
NORTH POINT DR
E SIXTH ST
CARISSA CT
CORY CT
BOBCAT BLVD
N SHARON DR
S SHARON DR
W SHARON DR
CHRISTI LN
E HUDGINS ST
W HUDGINS ST
E HUFFMAN ST
W HUFFMAN ST
E LLOYD ST
W LLOYD ST
E LAKE ST
W LAKE ST
E MCCART ST
SEVENTH ST
E BRITTON ST
W BRITTON ST
JACKSON ST
W JONES ST
N FIRST ST
S FIRST ST
S SECOND ST
S THIRD ST
N THIRD ST
HIGH RIDGE CT
EDGEWOOD DR
WOODLAWN ST
HILLCREST LN
VALLEY VIEW LN
RODGERS CIR
FINLEY CIR
COLE CIR
TURTLEDOVE LN
VANS DR

0 400
SCALE IN FEET

DRAFT

CITY OF KRUM

WATER SYSTEM
FUTURE DEVELOPMENTS
RECOMMENDED IMPROVEMENTS
PROJECT 5

LEGEND

- Proposed Ground Storage Tank
- Proposed Elevated Storage Tank
- Proposed Water Line Improvement
- Proposed Long-Term Pump Station Improvement
- Proposed Long-Term Water Line Improvement
- Proposed Development
- Well
- Pump Station
- Elevated Storage Tank
- Ground Storage Tank
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Pond/Lake
- Parcel
- City Limit
- Krum ETJ
- Other City Limit

FREESE AND NICHOLS

City of KRUM
Building a Bright Future On a Proud Past

NOTE: Projects are shown in general locations, and alignments are subject to change during preliminary design.

Fowler Farms
175 SF Units

Dry Fork Hickory Creek

16"
16"
16"
16"
16"
12"
10"

FM 1173
MASCH BRANCH RD
DAKOTA TRL
BLACKFOREST TRL
SEQUOIA DR
THOROUGHBRED DR
PALOMINO LN
PALOOSA DR
SANTA FE TRL
BREAM CATCHER WAY
BROKEN BOW
MASCH BRANCH RD

Masch Branch Pump Station
(UTRWD Delivery Point)
200,000 Gallon GST
Firm Capacity: 1,000 gpm
Total Capacity: 1,400 gpm
Proposed 1,000,000 Gallon GST
Proposed Expansion to 2,100 gpm Firm Capacity

5

Denton

PINA TRL
FRUTH RD

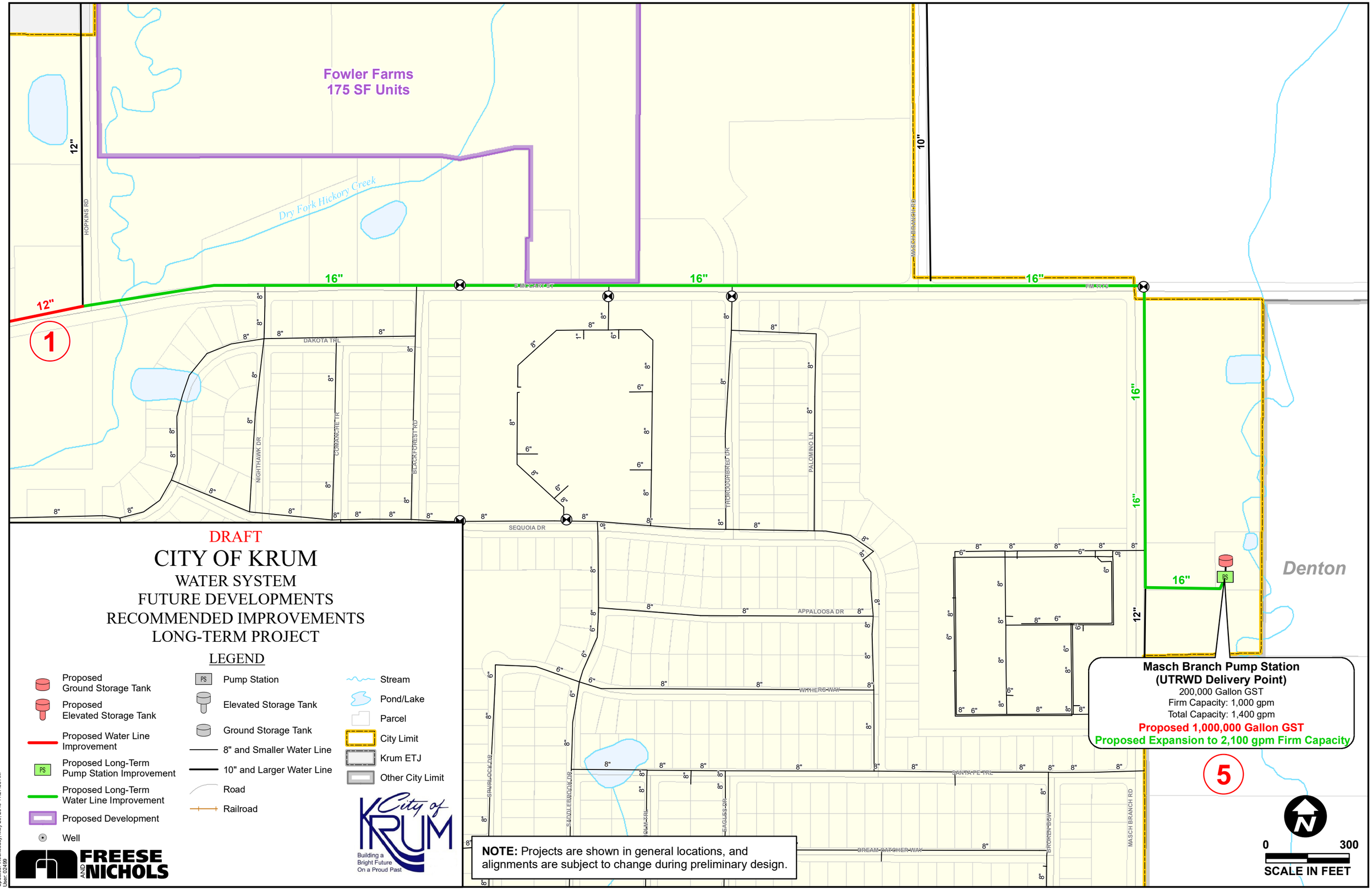
0 300
SCALE IN FEET

Created By Freese and Nichols, Inc.
Job No.: KRU16628
Location: H:\W_WW_PLANNING\01_DELIVERABLES\13_Client_Relations_Developments\Project_Zoom-Ins\Water\Water_Future_Dev_Project_5.mxd
Updated: Wednesday, May 29, 2019 11:24:47 AM
User: DZ489

DRAFT

CITY OF KRUM

WATER SYSTEM
FUTURE DEVELOPMENTS
RECOMMENDED IMPROVEMENTS
LONG-TERM PROJECT



LEGEND

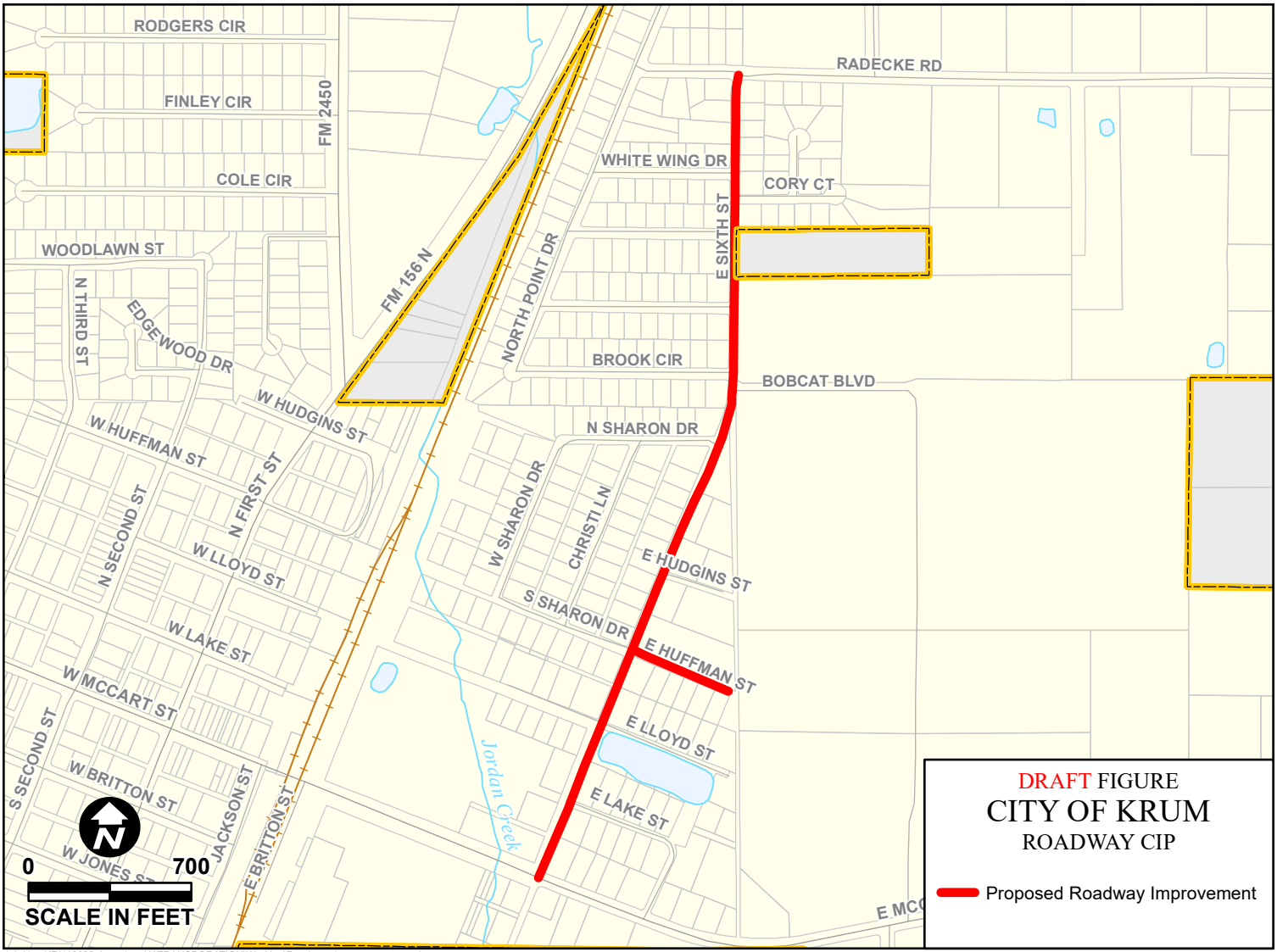
- Proposed Ground Storage Tank
- Proposed Elevated Storage Tank
- Proposed Water Line Improvement
- Proposed Long-Term Pump Station Improvement
- Proposed Long-Term Water Line Improvement
- Proposed Development
- Well
- Pump Station
- Elevated Storage Tank
- Ground Storage Tank
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Pond/Lake
- Parcel
- City Limit
- Krum ETJ
- Other City Limit

FREESE AND NICHOLS

City of KRUM
Building a Bright Future On a Proud Past

NOTE: Projects are shown in general locations, and alignments are subject to change during preliminary design.

Created By Freese and Nichols, Inc.
Job No.: KRU16628
Location: H:\W_WW_PLANNING\01_DELIVERABLES\13_Client_Relations_Developments\Project_Zoom-Ins\Water\Water_Future_Dev_Project_LongTerm.mxd
Updated: Wednesday, May 29, 2019 11:27:59 AM
User: CDB9



Job No.: KRU16628 Location: H:\TRANSPORATION\Working\Roadway_Improvements.mxd

Gary Morris
Town of Ponder Director of Public Works

Texas Department of Transportation

4777 E. HIGHWAY 80, MESQUITE, TEXAS 75150-6643 | 214.320.4480 | WWW.TXDOT.GOV

SL 288: IH 35W to IH 35 Indirect Effects Questionnaire

1. Are you aware of any substantial proposed land developments within your jurisdiction or area? If so, please mark the general areas on the provided (or equivalent) map and provide the location, type, and size (e.g., acres, density, number of units) of any planned developments.

   None

2. On the map provided, please identify areas (if any) that you think would likely be developed as a result of the construction of the proposed project that would not otherwise be developed (please distinguish from developments identified in question 1).

   None with respect to Ponder

3. Would the proposed project affect the rate or intensity of land development in your jurisdiction? If so, please describe.

   Probably not for Ponder

4. Are there other capital improvement projects – such as water or sewer infrastructure, school or hospital construction, or roadway improvements – that are planned for the area which might affect development in the project vicinity?

   FM 2449

5. Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc.?

   No known significant limitations with respect to Ponder

6. In your opinion, are there areas not encompassed by the Area of Influence shown on the map that would be indirectly impacted by the project and should be included in the Area of Influence?

   None with respect to Ponder