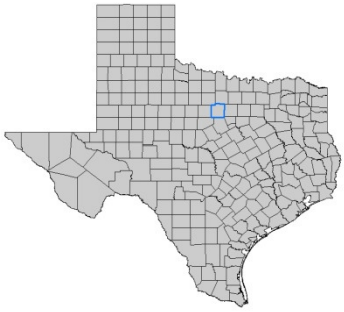
FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 2 OF 3



PALO PINTO COUNTY, TX

AND INCORPORATED AREAS

COMMUNITY NAME	NUMBER
GORDON, CITY OF	480963
GRAFORD, CITY OF	480964
MINERAL WELLS, CITY OF	480517
MINGUS, CITY OF	480518
PALO PINTO COUNTY, UNINCORPORATED AREAS	480516
STRAWN, CITY OF	480965

FEMA

REVISED

FLOOD INSURANCE STUDY NUMBER
48363CV002B

Version Number 2.3.3.2

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Published Separately

Flood Insurance Rate Map (FIRM)

SECTION 5.0 – ENGINEERING METHODS

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2% annual chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

In addition to these flood events, the "1-percent-plus", or "1%+", annual chance flood elevation has been modeled and included on the flood profile for certain flooding sources in this FIS Report. While not used for regulatory or insurance purposes, this flood event has been calculated to help illustrate the variability range that exits between the regulatory 1% annual chance flood elevation and a 1% annual chance elevation that has taken into account an additional amount of uncertainty in the flood discharges (thus, the 1% "plus"). For flooding sources whose discharges were estimated using regression equations, the 1%+ flood elevations are derived by taking the 1% annual chance flood discharges and increasing the modeled discharges by a percentage equal to the average predictive error for the regression equation. For flooding sources with gage- or rainfall-runoff-based discharge estimates, the upper 84-percent confidence limit of the discharges is used to compute the 1%+ flood elevations.

The engineering analyses described here incorporate the results of previously issued Letters of Map Change (LOMCs) listed in Table 27, "Incorporated Letters of Map Change", which include Letters of Map Revision (LOMRs). For more information about LOMRs, refer to Section 6.5, "FIRM Revisions."

5.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the hydrologic methods applied to develop the discharges used in the hydraulic analyses for each stream is provided in Table 13. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

A summary of the discharges is provided in Table 10. Frequency Discharge-Drainage Area Curves used to develop the hydrologic models may also be shown in Figure 7 for selected flooding sources. A summary of stillwater elevations developed for non-coastal flooding sources is provided in Table 11. (Coastal stillwater elevations are discussed in Section 5.3 and shown in Table 17.) Stream gage information is provided in Table 12.

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Brazos River	At FM 1189	25,360	53,507	79,230	101,411	126,063	193,443
Brazos River	Approximately 1,000 feet upstream of US Highway 281	24,426	49,147	72,727	93,004	115,488	176,647
Brazos River	Approximately seven miles downstream of Palo Pinto Highway	24,320	44,233	65,398	83,530	103,570	157,718
Brazos River	Approximately ten miles upstream of Palo Pinto Highway	23,979	41,274	60,985	77,825	96,394	146,321
Brazos River	At FM 4	23,936	39,700	58,636	74,789	92,575	140,256
Brazos River	Approximately 11.3 miles upstream of FM 4	23,747	37,744	55,720	71,019	87,833	132,724
Brazos River	At Morris Sheppard Dam on Possum Kingdom Lake	23,720	35,729	47,740	57,413	67,631	93,572
Brazos River	Approximately 7.2 miles upstream of Morris Sheppard Dam	23,687	35,345	47,264	56,838	66,924	92,425
Brazos River	Approximately 13.4 miles upstream of Morris Sheppard Dam	23,565	35,055	46,906	56,404	66,391	91,560

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Brazos River	Approximately 15.1 miles upstream of Morris Sheppard Dam	23,363	34,975	46,808	56,284	66,244	91,322
Brazos River	Approximately 25.3 miles upstream of Morris Sheppard Dam	23,209	34,460	46,172	55,514	65,298	89,787
Brazos River	Approximately 2,000 feet upstream of FM 1287	22,847	33,111	44,505	53,495	62,818	85,763
Crystal Creek	At confluence with Brazos River	0.10	44.8	66.0	88.5	111.7	183.5
Crystal Creek	Above Crystal Creek Tributary 6	0.82	412.0	578.9	750.9	925.6	1,456.1
Crystal Creek	Above Lime Creek	0.57	107.7	153.0	750.9	925.6	1,456.1
Crystal Creek	Approximately 1,000 feet downstream of SW 5th Avenue	1.20	369.0	510.8	656.5	804.0	1,251.7
Crystal Creek	Above Crystal Creek Tributary 1	0.55	201.5	279.3	358.9	439.7	684.9
Crystal Creek	At confluence with Crystal Creek	0.54	414.7	557.1	700.6	844.5	1,274.7
Crystal Creek	Above Crystal Creek Tributary 3	0.56	534.7	698.2	861.4	1,024.0	1,507.8
Crystal Creek	At NW 9th Street	0.08	98.3	132.6	167.1	201.8	305.3
Crystal Creek	Above Crystal Creek Tributary 5	0.30	193.0	262.1	322.5	403.0	615.9

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Crystal Creek Tributary 1	Above Whatley Creek	0.54	244.0	330.8	419.0	507.9	774.9
Crystal Creek Tributary 1	At SE 25th Street	0.33	209.3	276.8	344.6	412.3	614.2
Crystal Creek Tributary 1.1	Above Crystal Creek Tributary 1-2	1.23	326.0	454.0	586.1	720.3	1,128.8
Crystal Creek Tributary 1.1	At Old Millsap Road	0.51	175.3	243.2	313.0	384.0	598.9
Crystal Creek Tributary 1.1	At confluence with Crystal Creek Tributary 1	0.22	69.3	96.3	124.0	152.1	237.5
Crystal Creek Tributary 1.2	At confluence with Crystal Creek Tributary 1.1	0.38	315.2	422.8	531.2	639.7	964.2
Crystal Creek Tributary 2	At confluence with Crystal Creek	0.13	125.9	166.2	206.6	247.0	367.2
Crystal Creek Tributary 2	At southwest corner of SE 4th Avenue and SE 15th Street	0.045	71.7	95.2	118.8	142.4	212.7
Crystal Creek Tributary 2	At southwest corner of SE 2nd Ave and SE 15th St	0.02	43.5	57.4	71.3	85.2	126.6
Crystal Creek Tributary 2	At northwest Corner of SE 15th St and SE 9th Ave	0.012	21.2	27.9	34.5	41.2	60.9
Crystal Creek Tributary 2	At northeast corner of SE 15th Street and SE 9th Avenue	0.011	20.9	27.3	33.7	40.0	58.9
Crystal Creek Tributary 2	At northwest corner of SE 2nd Ave and SE 15th St	0.01	27.2	35.7	44.3	52.8	78.0

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Crystal Creek Tributary 2	At southwest Corner of SE 16th St and SE 7th Ave	0.008	19.0	24.8	30.7	36.5	53.7
Crystal Creek Tributary 2	South of SE 16th St approximately 150 feet east of SE 6th Ave	0.008	9.1	11.9	14.7	17.5	25.8
Crystal Creek Tributary 2	At northeast Corner of SE 16th St and SE 9th Ave	0.006	9.1	11.9	14.7	17.5	25.7
Crystal Creek Tributary 2	At southeast Corner of SE 16th St and SE 7th Ave	0.005	10.6	13.8	17.0	20.2	29.6
Crystal Creek Tributary 2	North of SE 16th St approximately 150 feet east of SE 6th Ave	0.005	10.2	13.3	16.4	19.5	28.6
Crystal Creek Tributary 2	At northeast Corner of SE 16th St and SE 9th Ave	0.002	3.7	4.9	6.0	7.1	10.5
Crystal Creek Tributary 2	At northwest Corner of SE 16th St and SE 9th Ave	0.001	1.7	2.2	2.8	3.3	4.8
Crystal Creek Tributary 3	At confluence with Crystal Creek	0.60	654.1	859.5	1,065.0	1,269.8	1,879.7
Crystal Creek Tributary 3	Approximately 900 feet downstream of Martin Luther King Jr Street	0.29	256.4	338.9	421.5	504.0	749.8
Crystal Creek Tributary 3	Above Crystal Creek Tributary 3-1	0.17	184.6	234.4	283.8	333.1	479.7
Crystal Creek Tributary 3.1	At confluence with Crystal Creek Tributary 3	0.45	9.1	11.9	14.7	17.5	25.7

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Crystal Creek Tributary 5	At private pond approximately 700 feet upstream of Northeast 16th Street	0.11	118.7	166.9	216.4	266.6	418.6
Crystal Creek Tributary 5	At confluence with Crystal Creek	0.04	67.0	91.6	116.5	141.6	216.7
Crystal Creek Tributary 6	At confluence with Crystal Creek	1.17	322.8	452.7	587.3	724.4	1,142.1
Lime Creek	Above Lime Creek Tributary 2	1.94	461.8	645.0	834.4	1,027.1	1,614.8
Lime Creek	Approximately 1,000 feet downstream of F.M. 2256	0.96	401.7	561.5	725.9	893.4	1,401.9
Lime Creek	Above Lime Creek Tributary 1	0.39	189.9	271.0	355.2	441.6	705.8
Lime Creek	At confluence with Crystal Creek	0.04	189.9	271.0	355.2	441.6	705.8
Lime Creek Tributary 1	Above Lime Creek Tributary 1-1	0.43	162.1	222.6	284.3	346.6	534.9
Lime Creek Tributary 1	At confluence with Lime Creek	0.26	161.1	230.3	302.2	375.6	599.6
Lime Creek Tributary 2	At confluence with Lime Creek	0.78	297.3	411.2	528.2	646.7	1,005.4
Pollard Creek	At confluence with Brazos River	1.23	465.1	657.8	857.6	1,061.2	1,681.8
Pollard Creek	Approximately 6500 feet above confluence with Brazos River	0.74	199.6	281.8	366.8	453.8	719.5

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Pollard Creek	Above Pollard Creek Tributary 1	1.31	395.7	568.8	749.3	934.5	1,504.7
Pollard Creek	Above Pollard Creek Tributary 2	0.22	102.7	154.9	210.5	268.2	449.2
Pollard Creek	At NRCS Site No. 1A Reservoir	1.06	374.2	520.2	670.1	1,061.2	1,681.8
Pollard Creek	Above Pollard Creek Tributary 6-1	0.36	283.4	393.2	505.5	619.0	961.6
Pollard Creek	At private dam approximately 1,600 feet upstream of U.S. Highway 281	0.78	468.8	675.6	865.9	1,059.6	1,640.5
Pollard Creek Tributary 1	At confluence with Pollard Creek	0.12	36.5	54.3	73.2	92.8	154.0
Pollard Creek Tributary 1	Approximately 1,300 feet below SW 10th Street	0.69	416.2	569.9	726.8	885.1	1,361.1
Pollard Creek Tributary 1	At Holly Hill Road	0.44	312.5	427.2	543.8	661.2	1,013.8
Pollard Creek Tributary 1	At Palo Pinto Highway	0.61	392.8	539.4	688.8	839.6	1,295.5
Pollard Creek Tributary 2	At confluence with Pollard Creek	0.20	109.7	166.6	227.2	290.2	486.8
Pollard Creek Tributary 2	At NRCS Site No. 2 Reservoir	0.15	117.2	165.3	215.0	265.3	418.5
Pollard Creek Tributary 2	At Pollard Creek Tributary 2 Private Dam	0.33	522.1	712.4	905.6	1,098.9	1,679.6

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Pollard Creek Tributary 3	At NRCS Site No. 1A Reservoir	0.63	369.9	516.0	666.0	818.0	1,277.8
Pollard Creek Tributary 4	Approximately 1,700 feet downstream of NE 23rd Street	0.15	93.3	129.3	166.2	203.5	316.0
Pollard Creek Tributary 5	Approximately 2,100 feet downstream of NE 23rd Street	0.10	90.5	124.3	158.8	193.6	298.2
Pollard Creek Tributary 6	Above Pollard Creek Tributary 6-1	1.24	423.1	580.5	741.3	903.7	1,394.7
Private Reservoir 3	At private dam approximately 100 feet upstream of Withers Road	0.22	182.7	245.7	309.4	373.1	563.8
Rock Creek Tributary 1	At Union Pacific Railroad	0.75	179.4	254.0	331.4	410.6	653.3
Rock Creek Tributary 1	Above Rock Tributary 2	0.65	639.5	804.9	969.4	1,133.3	1,622.2
Rock Creek Tributary 1	Approximately 750 feet upstream of State Highway 180	0.33	402.8	526.9	650.8	774.2	1,141.4
Rock Creek Tributary 1	Below Garrett Morris Parkway	0.27	243.2	526.9	650.8	774.2	1,141.4
Rock Creek Tributary 1-1	Approximately 600 feet downstream of Union Pacific Railroad	0.93	356.7	498.8	645.0	794.0	1,246.6
Rock Creek Tributary 2	Approximately 2,000 feet upstream of F.M. 1195	1.60	444.1	606.0	771.6	938.7	1,443.8

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Rock Creek Tributary 2	Above Rock Creek Tributary 2-1	0.59	430.8	550.4	669.4	787.7	1,140.8
Rock Creek Tributary 2	At confluence with Rock Creek Tributary 1	0.04	21.8	31.4	41.5	51.8	83.5
Tributary 1 to Crystal Creek Tributary 3	At confluence with Crystal Creek Tributary 3	0.45	250.5	344.0	439.3	535.4	824.9
Tributary to Pollard Creek Tributary 2	At NRCS Site No. 2 Reservoir	0.76	559.4	775.1	996.8	1,221.6	1,900.4
Tributary 1 to Crystal Creek Tributary 1.1	At confluence with Crystal Creek Tributary 1-1	0.09	83.8	111.9	140.2	168.5	253.0
Tributary to Lime Creek Tributary 1	At confluence with Lime Creek Tributary 1	0.54	177.8	247.1	318.3	390.6	610.4
Tributary to Rock Creek Tributary 1	At confluence with Rock Creek Tributary 1	0.13	159.4	217.9	277.3	337.0	516.2
Tributary to Rock Creek Tributary 2	At confluence with Rock Creek Tributary 2	1.18	296.7	413.5	534.1	656.7	1,030.1
Unnamed Tributary to Pollard Creek	At confluence with Pollard Creek Tributary 6	1.24	335.9	468.7	605.5	744.6	1,168.5

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Unnamed Tributary to Pollard Creek	At confluence with Pollard Creek	0.03	12.4	19.8	27.9	36.4	63.5
Whatley Creek	At Withers Road	1.44	325.2	449.6	577.5	707.3	1,101.9
Whatley Creek	At confluence with Crystal Creek Tributary 1	0.27	141.1	192.6	245.0	297.8	456.5

Figure 7: Frequency Discharge-Drainage Area Curves

[Not Applicable to this FIS Project]

Table 11: Summary of Non-Coastal Stillwater Elevations

[Not Applicable to this FIS Project]

Table 12: Stream Gage Information used to Determine Discharges

[Not Applicable to this FIS Project]

5.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

For streams for which hydraulic analyses were based on cross sections, locations of selected cross sections are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 6.3), selected cross sections are also listed on Table 24, "Floodway Data."

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 13. Roughness coefficients are provided in Table 14. Roughness coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Table 13: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Ainsworth Creek	At the confluence with Possum Kingdom Tributary 8	Approximately 1.4 miles upstream of confluence with Brazos River	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Barton Creek	At the confluence with Palo Pinto Creek	At the border of Palo Pinto and Erath Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Barton Creek Tributary 1	At the confluence with Barton Creek	Approximately 2.7 miles upstream of the confluence with Barton Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Barton Creek Tributary 2	At the confluence with Barton Creek	Approximately 2.8 miles upstream of the confluence with Barton Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Bear Canyon	At the confluence with Lake Creek	Approximately 1.8 miles upstream of the confluence with Lake Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Bear Creek	At the confluence with Big Sunday Cr R6	Approximately 7.6 miles upstream of the confluence with Big Sunday Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Big Sunday Creek	At the confluence with Palo Pinto Creek	At border of Palo Pinto and Erath Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Big Sunday Creek Tributary	At the confluence with Big Sunday Creek	Approximately 1.5 miles upstream of the confluence with Big Sunday Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Big Sunday Creek Tributary 2	At the confluence with Big Sunday Creek	Approximately 4.1 miles upstream of the confluence with Big Sunday Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Big Sunday Creek Tributary 3	At the confluence with Big Sunday Creek	Approximately 1.1 miles upstream of the confluence with Big Sunday Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Bills Creek	At the confluence with Palo Pinto Creek	At border of Palo Pinto and Stephens Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Bills Creek Tributary 1	At the confluence with Bills Creek	Approximately 1.0 mile upstream of the confluence with Bills Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Bills Creek Tributary 2	At the confluence with Bills Creek	Approximately 1.1 miles upstream of the confluence with Bills Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Bills Creek Tributary 3	At the confluence with Bills Creek	Approximately 1.0 mile upstream of the confluence with Bills Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Brazos River	At border of Palo Pinto and Parker Counties	At the Morris Sheppard Dam	PkFQ Version 5.2.0	HEC-RAS 4.1.0	4/29/2016	A	
Brazos River	At the Morris Sheppard Dam	At border of Palo Pinto and Young Counties	Flood Flow Frequency	HEC 2	12/1981	AE	
Brazos River	At border of Palo Pinto and Parker Counties	At border of Palo Pinto and Parker Counties	Flood Flow Frequency	HEC 2	12/1981	AE w/ Floodway	
Bridges Branch	At the confluence with Little Sunday Creek	At border of Palo Pinto and Erath Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Bridges Branch Tributary	At the confluence with Bridges Branch	At border of Palo Pinto and Erath Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Brushy Hollow	At the confluence with Lake Creek	Approximately 2.3 miles upstream of the confluence of Brushy Hollow Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Brushy Hollow Tributary 1	At the confluence with Brushy Hollow	Approximately 0.8 miles upstream of the confluence with Brushy Hollow	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Buck Creek	At the confluence of Palo Pinto Creek	At border of Palo Pinto and Erath Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Buck Creek Tributary 1	At the confluence of Buck Creek	Approximately 0.7 miles upstream of the confluence of Buck Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Buck Creek Tributary 2	At the confluence with Buck Creek	At border of Palo Pinto and Erath Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Buck Creek Tributary 3	At the confluence with Buck Creek Tributary 2	Approximately 2.4 miles upstream of the confluence with Buck Creek Tributary 2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Buck Creek Tributary 4	At the confluence of Buck Creek	Approximately 4.2 miles upstream of the confluence of Buck Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Buck Creek Tributary 5	At the confluence of Buck Creek	At border of Palo Pinto and Erath Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Caddo Creek	Approximately 4.6 miles upstream of confluence with Brazos River	At boarder of Palo Pinto and Stephens Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Caddo Creek	At the confluence with the Brazos River	Approximately 4.6 miles upstream of confluence with Brazos River	Regression Equations	HEC-RAS 4.1.0	4/29/2016	AE	
Carter Branch	At the confluence with Palo Pinto Creek	Approximately 10.2 miles upstream of the confluence with Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Cedar Creek	At the confluence with the Brazos River	At border of Palo Pinto and Stephens Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	AE	
Coffee Creek	At the confluence with Brazos River	Approximately 2.0 miles upstream of confluence with Coffee Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Coffee Creek Tributary 1	At the confluence with Coffee Creek	Approximately 0.67 miles upstream of confluence with Coffee Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Coffee Creek Tributary 2	At the confluence with Coffee Creek	Approximately 1.9 miles upstream of confluence with Coffee Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Coffee Creek Tributary 3	At the confluence with Coffee Creek	Approximately 0.33 miles upstream of confluence with Coffee Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Crystal Creek	Approximately 0.2 miles upstream of Eaton Road	Approximately 0.6 mi upstream of the confluence of Crystal Creek Tributary 5	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	AE w/ Floodway	
Crystal Creek	At the confluence with Brazos River	Approximately 0.2 miles upstream of Eaton Road	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	A	
Crystal Creek Tributary 1	Approximately 0.4 miles upstream of the confluence of Whatley Creek	Approximately 0.3 miles upstream of the confluence of Unnamed Tributary to Crystal Creek	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	A	
Crystal Creek Tributary 1	At the confluence with Crystal Creek	Approximately 0.4 miles upstream of the confluence of Whatley Creek	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	AE	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Crystal Creek Tributary 1.1	At the confluence of Crystal Creek Tributary 1	Approximately 2.3 miles upstream of the confluence of Crystal Creek Tributary 1.2	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	A	
Crystal Creek Tributary 1.2	At the confluence with Crystal Creek Tributary 1.1	Approximately 0.3 miles upstream of the confluence with Crystal Creek Tributary 1.1	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	A	
Crystal Creek Tributary 2	At the confluence with Crystal Creek	At SE 13th Avenue	HEC-HMS version 3.5	XP-SWMM Version 2014	4/29/2016	AE	
Crystal Creek Tributary 3	At the confluence with Crystal Creek	Approximately 0.6 miles upstream of the confluence of Crystal Creek Tributary 3.1	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	AE w/ Floodway	
Crystal Creek Tributary 3.1	At the confluence with Crystal Creek Tributary 3	Approximately 0.5 miles upstream of the confluence with Crystal Creek Tributary 3	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	A	
Crystal Creek Tributary 5	At the confluence with Crystal Creek	Approximately 0.6 miles upstream of the confluence with Crystal Creek	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	AE w/ Floodway	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Crystal Creek Tributary 6	At the confluence with Crystal Creek	Approximately 0.6 miles upstream of the confluence with Crystal Creek	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	A	
Deep Elm Creek	At the confluence with Brazos River	Approximately 1.8 miles upstream of confluence with Possum Kingdom Tributary 11	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Dry Branch	At the confluence with Palo Pinto Creek	Approximately 2.9 miles upstream of the confluence with Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Eagle Creek	At the confluence with Brazos River	Approximately 1.9 miles upstream of the confluence with Eagle Creek Tributary 5	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Eagle Creek Tributary 1	At the confluence with Eagle Creek	Approximately 1.9 miles upstream of the confluence with Eagle Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Eagle Creek Tributary 2	At the confluence with Eagle Creek	Approximately 0.1 miles upstream of the confluence with Eagle Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Eagle Creek Tributary 3	At the confluence with Eagle Creek	Approximately 2.4 miles upstream of the confluence with Eagle Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Eagle Creek Tributary 4	At the confluence with Eagle Creek	Approximately 1.1 miles upstream of the confluence of Eagle Creek Tributary 4.1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Eagle Creek Tributary 4.1	At the confluence with Eagle Creek Tributary 4	Approximately 0.5 miles upstream of the confluence with Eagle Creek Tributary 4	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Eagle Creek Tributary 5	At the confluence with Eagle Creek	Approximately 3.1 miles upstream of the confluence of Eagle Creek Tributary 5.1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Eagle Creek Tributary 5.1	At the confluence with Eagle Creek Tributary 5	Approximately 0.1 miles upstream of the confluence with Eagle Creek Tributary 5	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
East Fork Keechi Creek	At the confluence with Keechi Creek	At border of Palo Pinto and Jack Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
East Fork Keechi Creek Tributary 1	At the confluence with East Fork Keechi Creek	Approximately 1.3 miles upstream of the confluence with East Fork Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
East Fork Keechi Creek Tributary 2	At the confluence with East Fork Keechi Creek	Approximately 1.2 miles upstream of the confluence with East Fork Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
East Fork Keechi Creek Tributary 3	At the confluence with East Fork Keechi Creek	Approximately 7.7 miles upstream of the confluence with East Fork Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
East Fork Keechi Creek Tributary 4	At the confluence with East Fork Keechi Creek	Approximately 1.6 miles upstream of the confluence with East Fork Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
East Fork Keechi Creek Tributary 5	At the confluence with East Fork Keechi Creek	Approximately 0.8 miles upstream of the confluence with East Fork Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
East Fork Keechi Creek Tributary 6	At border of Palo Pinto and Jack Counties	Approximately 3.4 miles upstream of the confluence with East Fork Keechi Creek Tributary 6.1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
East Fork Keechi Creek Tributary 6.1	At the confluence with East Fork Keechi Creek Tributary 6	Approximately 1.8 miles upstream of the confluence with East Fork Keechi Creek Tributary 6	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Edwards Branch	At the confluence with South Fork Palo Pinto Creek	At border of Palo Pinto and Eastland Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Elm Creek	At the confluence with Brazos River	Approximately 2.6 miles upstream of confluence with Possum Kingdom Tributary 8	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Flat Rock Branch	At the confluence with West Fork Keechi Creek	Approximately 3.4 miles upstream of the confluence with West Fork Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Fog Branch	At the confluence with the Brazos River	Approximately 3.5 miles upstream of confluence with the Brazos River	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Fox Hollow Creek	At the confluence with Cedar Creek	Approximately 1.6 miles upstream of confluence with Possum Kingdom Tributary 6	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Gibson Creek	At the confluence with Palo Pinto Creek	At border of Palo Pinto and Erath Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Gibson Creek Tributary 1	At the confluence with Gibson Creek	Approximately 4.3 miles upstream of the confluence with Gibson Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Gibson Creek Tributary 2	At the confluence with Gibson Creek	Approximately 2.7 miles upstream of the confluence with Gibson Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Gibson Creek Tributary 3	At the confluence with Gibson Creek	Approximately 4.3 miles upstream of the confluence with Gibson Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Gibson Creek Tributary 4	At the confluence with Gibson Creek	Approximately 1.5 miles upstream of the confluence with Gibson Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Gilmore Creek	At the confluence with Edwards Branch	Approximately 2.8 miles upstream of the confluence with Edwards Branch	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Grindstone Creek	At the confluence with East Fork Keechi Creek	Approximately 4.6 miles upstream of the confluence with Salt Branch	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Hamilton Hollow	At the confluence with Bluff Creek	Approximately 3.5 miles upstream of confluence with Possum Kingdom Tributary 3_BE	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Hill Creek	At border of Palo Pinto and Parker Counties	Approximately 0.2 miles upstream of the border of Palo Pinto and Parker Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Hill Creek	At border of Palo Pinto and Parker Counties	Approximately 0.3 miles upstream of the border of Palo Pinto and Parker Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Honey Creek	At the confluence with Lake Creek	Approximately 6.9 miles upstream of the confluence with Lake Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Indian Creek	At the confluence with Brazos River	Approximately 3.2 miles upstream of confluence with Brazos River	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Joes Creek	At the confluence with Palo Pinto Creek	Approximately 2.3 miles upstream of the confluence with Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Keechi Creek	At the confluence with Brazos River	At the confluence of West Fork Keechi Creek and East Fork Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Keechi Creek Tributary 1	At the confluence with Keechi Creek	Approximately 0.5 miles upstream of the confluence with Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Keechi Creek Tributary 2	At the confluence with Keechi Creek	Approximately 2.0 miles upstream of the confluence with Keechi Creek Tributary 2.1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Keechi Creek Tributary 2.1	At the confluence with Keechi Creek Tributary 2	Approximately 0.5 miles upstream of the confluence with Keechi Creek Tributary 2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Keechi Creek Tributary 3	At the confluence with Keechi Creek	Approximately 2.1 miles upstream of the confluence with Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Keechi Creek Tributary 4	At the confluence with Keechi Creek	Approximately 1.2 miles upstream of the confluence with Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Keechi Creek Tributary 5	At the confluence with Keechi Creek	Approximately 1.8 miles upstream of the confluence with Keechi Creek Tributary 5.2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Keechi Creek Tributary 5.1	At the confluence with Keechi Creek Tributary 5	Approximately 0.6 miles upstream of the confluence with Keechi Creek Tributary 5.1.1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Keechi Creek Tributary 5.1.1	At the confluence of Keechi Creek Tributary 5.1	Approximately 1.1 miles upstream of the confluence with Keechi Creek Tributary 5.1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Keechi Creek Tributary 5.2	At the confluence with Keechi Creek Tributary 5	Approximately 2.3 miles upstream of the confluence with Keechi Creek Tributary 5	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Keechi Creek Tributary 6	At the confluence with Keechi Creek	Approximately 0.9 miles upstream of the confluence with Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Kettle Hollow	At the confluence with Lake Creek	Approximately 2.9 miles upstream of the confluence with Lake Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Lake Creek	At the confluence with Palo Pinto Creek	Approximately 2.5 miles upstream of the confluence of Lake Creek Tributary 8	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lake Creek Tributary 1	At the confluence with Lake Creek	Approximately 0.4 miles upstream of the confluence with Lake Creek Tributary 1.1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lake Creek Tributary 1.1	At the confluence with Lake Creek Tributary 1	Approximately 0.4 miles upstream of the confluence with Lake Creek Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lake Creek Tributary 3	At the confluence with Lake Creek	Approximately 0.6 miles upstream of the confluence of Lake Creek Tributary 3.1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lake Creek Tributary 3.1	At the confluence with Lake Creek Tributary 3	Approximately 0.3 miles upstream of the confluence with Lake Creek Tributary 3	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Lake Creek Tributary 4	At the confluence with Lake Creek	Approximately 0.4 miles upstream of the confluence of Lake Creek Tributary 4.1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lake Creek Tributary 4.1	At the confluence with Lake Creek Tributary 4	Approximately 0.4 miles upstream of the confluence with Lake Creek Tributary 4	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lake Creek Tributary 5	At the confluence with Lake Creek	Approximately 5.1 miles upstream of the confluence of Lake Creek Tributary 5.1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lake Creek Tributary 5.1	At the confluence with Lake Creek Tributary 5	Approximately 0.4 miles upstream of the confluence with Lake Creek Tributary 5	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lake Creek Tributary 6	At the confluence with Lake Creek	Approximately 1.1 miles upstream of the confluence of Lake Creek Tributary 6.3	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Lake Creek Tributary 6.1	At the confluence with Lake Creek Tributary 6	Approximately 1.0 mile upstream of the confluence with Lake Creek Tributary 6	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lake Creek Tributary 6.2	At the confluence with Lake Creek Tributary 6	Approximately 1.1 miles upstream of the confluence with Lake Creek Tributary 6	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lake Creek Tributary 6.3	At the confluence with Lake Creek Tributary 6	Approximately 0.5 miles upstream of the confluence with Lake Creek Tributary 6	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lake Creek Tributary 7	At the confluence with Lake Creek	Approximately 2.3 miles upstream of the confluence with Lake Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lake Creek Tributary 8	At the confluence with Lake Creek	Approximately 1.3 miles upstream of the confluence with Lake Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Lake Creek Tributary 9	At the confluence with Lake Creek	Approximately 2.0 miles upstream of the confluence with Lake Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lime Creek	At the confluence with Crystal Creek	Approximately 0.7 miles upstream of the confluence of Lime Creek Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	AE	
Lime Creek	Approximately 0.7 miles upstream of the confluence of Lime Creek Tributary 1	Approximately 2.6 miles upstream of the confluence of Lime Creek Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lime Creek Tributary 1	At the confluence with Lime Creek	Approximately 0.4 miles upstream of the confluence with Lime Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	AE	
Lime Creek Tributary 1	Approximately 0.4 miles upstream of the confluence with Lime Creek	Approximately 1.9 miles upstream of the confluence with Lime Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Little Sunday Creek	At the confluence with Big Sunday Creek	At border of Palo Pinto and Erath Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Little Sunday Creek Tributary 1	At the confluence with Little Sunday Creek	Approximately 2.7 miles upstream of the confluence of Little Sunday Creek Tributary 2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Little Sunday Creek Tributary 2	At the confluence with Little Sunday Creek Tributary 1	Approximately 0.6 miles upstream of the confluence with Little Sunday Creek Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Lost Creek	At the confluence with Big Sunday Creek	At border of Palo Pinto and Erath Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Loving Creek	At the confluence with Brazos River	Approximately 3.6 miles upstream of the confluence with Loving Creek Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Loving Creek Tributary 1	At the confluence with Loving Creek	Approximately 1.2 miles upstream of confluence with Loving Creek Tributary 2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Loving Creek Tributary 2	At the confluence with Loving Creek Tributary 1	Approximately 1.2 miles upstream of confluence with Loving Creek Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Maloney Creek	At the confluence with Cedar Creek	Approximately 5.0 miles upstream of confluence with Cedar Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Middle Creek	At the confluence with Walnut Creek	Approximately 3.3 miles upstream of the confluence of Middle Creek Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Middle Creek Tributary 1	At the confluence with Middle Creek	Approximately 2.0 miles upstream of the confluence with Middle Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Mill Branch	At the confluence with Eagle Creek	Approximately 0.4 miles upstream of the confluence of Mill Branch Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Mill Branch Tributary 1	At the confluence with Mill Branch	Approximately 1.2 miles upstream of the confluence with Mill Branch	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Moore Creek	Approximately 463 feet upstream of the border of Palo Pinto and Jack Counties	Approximately 2.2 miles upstream of the border of Palo Pinto and Jack Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Palo Pinto Creek	At the confluence with Brazos River	At border of Palo Pinto and Stephens Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Palo Pinto Creek Tributary	At the confluence with Palo Pinto Creek	Approximately 1.1 miles upstream of the confluence with Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Palo Pinto Creek Tributary 1	At the confluence with Palo Pinto Creek	Approximately 0.5 miles upstream of the confluence with Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Palo Pinto Creek Tributary 1	At the confluence with Palo Pinto Creek	Approximately 1.8 miles upstream of the confluence with Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Palo Pinto Creek Tributary 2	At the confluence with Palo Pinto Creek	Approximately 6.6 miles upstream of the confluence with Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Palo Pinto Creek Tributary 2	At the confluence with Palo Pinto Creek	Approximately 1.8 miles upstream of the confluence with Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Palo Pinto Creek Tributary 3	At the confluence of Lake Creek	Approximately 1.5 miles upstream of the confluence with Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Palo Pinto Creek Tributary 5	At the confluence with Palo Pinto Creek	Approximately 2.5 miles upstream of the confluence of Palo Pinto Creek Tributary 5.2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Palo Pinto Creek Tributary 5.1	At the confluence with Palo Pinto Creek Tributary 5	Approximately 1.7 miles upstream of the confluence of Palo Pinto Creek Tributary 5.1.1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Palo Pinto Creek Tributary 5.1.1	At the confluence with Palo Pinto Creek Tributary 5.1	Approximately 1.2 miles upstream of the confluence with Palo Pinto Creek Tributary 5.1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Palo Pinto Creek Tributary 5.2	At the confluence with Palo Pinto Creek Tributary 5	Approximately 1.7 miles upstream of the confluence with Palo Pinto Creek Tributary 5	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Palo Pinto Creek Tributary 6	At the confluence with Palo Pinto Creek	Approximately 2.6 miles upstream of the confluence with Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Palo Pinto Creek Tributary 7	At the confluence with Palo Pinto Creek	Approximately 0.8 miles upstream of the confluence with Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Palo Pinto Creek Tributary 8	At the confluence with Palo Pinto Creek	Approximately 2.2 miles upstream of the confluence with Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Panther Creek	At the confluence with Palo Pinto Creek	Approximately 0.6 miles upstream of the confluence of Panther Creek Tributary 2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Panther Creek Tributary 1	At the confluence with Panther Creek	Approximately 1.1 miles upstream of the confluence with Panther Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Panther Creek Tributary 2	At the confluence with Panther Creek	Approximately 1.3 miles upstream of the confluence with Panther Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Pecan Branch	At the confluence with Keechi Creek	Approximately 4.0 miles upstream of the confluence with Pecan Branch Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Pecan Branch Tributary 1	At the confluence with Pecan Branch	Approximately 1.2 miles upstream of the confluence with Pecan Branch	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Pickard Creek	At border of Palo Pinto and Young Counties	Approximately 0.45 miles upstream of confluence with Possum Kingdom Tributary 7	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Pollard Creek	At the confluence with Brazos River	Approximately 1.3 miles upstream of the confluence with Brazos River	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	A	
Pollard Creek	Approximately 1.3 miles upstream of the confluence with Brazos River	At the confluence of Pollard Creek Tributaries 4 and 5	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	AE w/ Floodway	
Pollard Creek Tributary 1	Approximately 2.1 miles upstream of the confluence with Pollard Creek	Approximately 2.7 miles upstream of the confluence with Pollard Creek	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	A	
Pollard Creek Tributary 1	At the confluence with Pollard Creek	Approximately 2.1 miles upstream of the confluence with Pollard Creek	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	AE w/ Floodway	
Pollard Creek Tributary 2	At the confluence with Pollard Creek	Approximately 1.2 miles upstream of the confluence with Pollard Creek	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	AE w/ Floodway	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Pollard Creek Tributary 4	At the confluence with Pollard Creek	Approximately 0.6 miles upstream of the confluence with Pollard Creek	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	AE	
Pollard Creek Tributary 5	At the confluence with Pollard Creek	Approximately 0.4 miles upstream of the confluence with Pollard Creek	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	AE	
Pollard Creek Tributary 6	At the confluence of Unnamed Tributary to Pollard Creek	Approximately 1.2 miles upstream of the confluence of Unnamed Tributary to Pollard Creek	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	A	
Pollard Creek Tributary 7	At the confluence with Pollard Creek	Approximately 0.9 miles upstream of the confluence with Pollard Creek	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	AE	
Possum Kingdom Tributary 1	At the confluence with Brazos River	Approximately 5.0 miles upstream of confluence with Brazos River	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 2	At the confluence with Brazos River	Approximately 1.0 miles upstream of confluence with Brazos River	Regression Equations	HEC-RAS 4.1.0	4/29/2016	AE	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Possum Kingdom Tributary 2	Approximately 1.0 mile upstream of confluence with Brazos River	Approximately 1.1 miles upstream of the confluence of Possum Kingdom Tributary 2_5	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 2_1	At the confluence with Possum Kingdom Tributary 2	Approximately 1.6 miles upstream of confluence with Possum Kingdom Tributary 2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 2_2	At the confluence with Possum Kingdom Tributary 2	Approximately 1.4 miles upstream of confluence with Possum Kingdom Tributary 2_3	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 2_3	At the confluence with Possum Kingdom Tributary 2_2	Approximately 1.4 miles upstream of confluence with Possum Kingdom Tributary 2_2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 2_4	At the confluence with Possum Kingdom Tributary 2	Approximately 1.3 miles upstream of confluence with Possum Kingdom Tributary 2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Possum Kingdom Tributary 2_5	At the confluence with Possum Kingdom Tributary 2	Approximately 1.2 miles upstream of confluence with Possum Kingdom Tributary 2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 3	At the confluence with Brazos River	Approximately 1.3 miles upstream of confluence with Brazos River	Regression Equations	HEC-RAS 4.1.0	4/29/2016	AE	
Possum Kingdom Tributary 3	Approximately 1.3 miles upstream of confluence with Brazos River	Approximately 1.5 miles upstream of the confluence with Possum Kingdom Tributary 3_W2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	a	
Possum Kingdom Tributary 3_BE	At the confluence with Hamilton Hollow	Approximately 0.82 miles upstream of confluence with Hamilton Hollow	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 3_E	At the confluence with Possum Kingdom Tributary 3	Approximately 1.1 miles upstream of confluence with Possum Kingdom Tributary 3_EE	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Possum Kingdom Tributary 3_EE	At the confluence with Possum Kingdom Tributary 3_E	Approximately 0.82 miles upstream of confluence with Possum Kingdom Tributary 3_EEE	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 3_EEE	At the confluence with Possum Kingdom Tributary 3_EE	Approximately 0.26 miles upstream of confluence with Possum Kingdom Tributary 3_EE	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 3_W1	At the confluence with Possum Kingdom Tributary 3	Approximately 0.23 miles upstream of confluence with Possum Kingdom Tributary 3	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 4	At the confluence with Caddo Creek	Approximately 0.85 miles upstream of confluence with Possum Kingdom Tributary 4_C1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 4_B	At the confluence with Sam Bass Hollow	Approximately 1.0 miles upstream of confluence with Possum Kingdom Tributary 4_B1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Possum Kingdom Tributary 4_B1	At the confluence with Possum Kingdom Tributary 4_B	Approximately 0.52 miles upstream of confluence with Possum Kingdom Tributary 4_B2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 4_B2	At the confluence with Possum Kingdom Tributary 4_B1	Approximately 0.52 miles upstream of confluence with Possum Kingdom Tributary 4_B1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 4_C1	At the confluence with Possum Kingdom Tributary 4	Approximately 0.54 miles upstream of confluence with Possum Kingdom Tributary 4	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 4_C3	At the confluence with Caddo Creek	Approximately 0.72 miles upstream of confluence with Caddo Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 4_C4	At the confluence with Caddo Creek	Approximately 0.45 miles upstream of confluence with Caddo Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Possum Kingdom Tributary 4_D	At the confluence with Caddo Creek	Approximately 0.65 miles upstream of confluence with Possum Kingdom Tributary 4_D1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 4_D1	At the confluence with Possum Kingdom Tributary 4_D	Approximately 0.38 miles upstream of confluence with Possum Kingdom Tributary 4_D	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 4_E	At the confluence with Caddo Creek	At border of Palo Pinto and Stephens Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 4_F	At the confluence with Caddo Creek	At border of Palo Pinto and Stephens Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 6	At the confluence with Fox Hollow Creek	Approximately 0.15 miles upstream of confluence with Possum Kingdom Tributary 6_1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 6_1	At the confluence with Possum Kingdom Tributary 6	Approximately 0.82 miles upstream of confluence with Possum Kingdom Tributary 6	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Possum Kingdom Tributary 6_2	At the confluence with Possum Kingdom Tributary 6	Approximately 0.73 miles upstream of confluence with Possum Kingdom Tributary 6	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 6_4	At the confluence with Fox Hollow Creek	Approximately 0.36 miles upstream of confluence with Fox Hollow Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 6_5	At the confluence with Fox Hollow Creek	Approximately 1.5 miles upstream of confluence with Fox Hollow Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 7	At the confluence with Pickard Creek	Approximately 0.63 miles upstream of confluence with Pickard Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 7_2	At the confluence with Pickard Creek	Approximately 1.7 miles upstream of confluence with Pickard Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 7_3	At the confluence with Pickard Creek	Approximately 0.84 miles upstream of confluence with Pickard Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Possum Kingdom Tributary 11	At the confluence with Deep Elm Creek	Approximately 1.3 miles upstream of confluence with Possum Kingdom Tributary 11_1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 11_1	At the confluence with Possum Kingdom Tributary 11	Approximately 1.0 miles upstream of confluence with Possum Kingdom Tributary 11	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 11_3	At the confluence with Deep Elm Creek	Approximately 2.4 miles upstream of confluence with Possum Kingdom Tributary 11_4	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 11_4	At the confluence with Possum Kingdom Tributary 11_3	Approximately 1.2 miles upstream of confluence with Possum Kingdom Tributary 11_5	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 11_5	At the confluence with Possum Kingdom Tributary 11_4	Approximately 0.26 miles upstream of confluence with Possum Kingdom Tributary 11_4	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Possum Kingdom Tributary 12	At the confluence with Brazos River	Approximately 3.0 miles upstream of confluence with the Brazos River	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Possum Kingdom Tributary 12_1	At the confluence with Possum Kingdom Tributary 12	Approximately 0.86 miles upstream of confluence with Possum Kingdom Tributary 12	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Ramsey Creek	At the confluence with Brazos River	Approximately 4.5 miles upstream of confluence with Brazos River	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Rock Creek	Approximately 2.5 miles upstream of the confluence with the Brazos River	At border of Palo Pinto and Jack Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Rock Creek	At the confluence with the Brazos River	Approximately 2.5 miles upstream of the confluence with the Brazos River	Regression Equations	HEC-RAS 4.1.0	4/29/2016	AE	
Rock Creek Tributary 1	At border of Palo Pinto and Parker Counties	Approximately 0.47 miles upstream of the border of Palo Pinto and Parker Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Rock Creek Tributary 1	Approximately 0.47 miles upstream of the border of Palo Pinto and Parker Counties	Approximately 2.6 miles upstream of the confluence of Rock Creek Tributary 2	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	AE w/ Floodway	
Rock Creek Tributary 1	At the confluence with Rock Creek	Approximately 5.6 miles upstream of confluence with the Rock Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Rock Creek Tributary 2	At the confluence with Rock Creek Tributary 1	Approximately 1.8 miles upstream of the confluence with Rock Creek Tributary 1	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	AE w/ Floodway	
Rock Creek Tributary 3	At border of Palo Pinto and Parker Counties	Approximately 4.0 miles upstream of Palo Pinto and Parker Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Rock Creek Tributary 4	At border of Palo Pinto and Parker Counties	Approximately 0.8 miles upstream of Palo Pinto and Parker Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Rock Creek Tributary 7	At the confluence with Rock Creek	Approximately 3.6 miles upstream of confluence with Rock Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Rocky Bluff Creek	At the confluence of Buck Creek	Approximately 0.4 miles upstream of the confluence of Rocky Bluff Creek Tributary 2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Rocky Bluff Creek Tributary 1	At the confluence with Rocky Bluff Creek	Approximately 1.3 miles upstream of the confluence with Rocky Bluff Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Rocky Bluff Creek Tributary 2	At the confluence of Rocky Bluff Creek	Approximately 0.9 miles upstream of the confluence of Rocky Bluff Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Rocky Creek	At the confluence with Palo Pinto Creek	Approximately 3.8 miles upstream of the confluence of Rocky Creek Tributary 2	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Rocky Creek Tributary 1	At the confluence with Rocky Creek	Approximately 1.8 miles upstream of the confluence with Rocky Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Rocky Creek Tributary 2	At the confluence with Rocky Creek	Approximately 4.0 miles upstream of the confluence with Rocky Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Russell Creek	At the confluence with Palo Pinto Creek	At border of Palo Pinto and Stephens Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Saline Creek	At the confluence with Big Sunday Creek	Approximately 4.1 miles upstream of the confluence with Big Sunday Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Salt Branch	At the confluence with Grindstone Creek	Approximately 7.6 miles upstream of the confluence with Grindstone Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Sam Bass Hollow	At the confluence with Caddo Creek	Approximately 1.5 miles upstream of confluence with Possum Kingdom Tributary 4_B	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Snider Branch	At the confluence with Palo Pinto Creek	Approximately 6.3 miles upstream of the confluence with Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Soda Springs Creek	At the confluence with Keechi Creek	Approximately 2.9 miles upstream of the confluence with Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
South Bills Creek	At the confluence with Bills Creek	Approximately 4.1 miles upstream of the confluence with Bills Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
South Fork Palo Pinto Creek	At the confluence with Palo Pinto Creek	At border of Palo Pinto and Eastland Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
South Fork Palo Pinto Creek Tributary 1	At the confluence with South Fork Palo Pinto Creek	Approximately 1.5 miles upstream of the confluence with South Fork Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
South Fork Palo Pinto Creek Tributary 2	At the confluence with South Fork Palo Pinto Creek	Approximately 3.9 miles upstream of the confluence with South Fork Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Town Branch	At the confluence with Eagle Creek	Approximately 3.2 miles upstream of the confluence of Town Branch Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Town Branch Tributary 1	At the confluence with Town Branch	Approximately 1.8 miles upstream of the confluence of Town Branch Tributary 1.1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Town Branch Tributary 1.1	At the confluence with Town Branch Tributary 1	Approximately 2.7 miles upstream of the confluence with Town Branch Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Tributary 5	At the confluence with Brazos River	Approximately 0.47 miles upstream of confluence with Brazos River	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Tributary 6a	At the confluence with Tributary 6d	Approximately 0.38 miles upstream of confluence with Tributary 6e	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Tributary 6b	At the confluence with Tributary 6d	Approximately 0.29 miles upstream of confluence with Tributary 6c	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Tributary 6c	At the confluence with Tributary 6b	Approximately 0.14 miles upstream of confluence with Tributary 6b	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Tributary 6d	At the confluence with Brazos River	Approximately 2.9 miles upstream of confluence with Tributary 6b	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Tributary 6e	At the confluence with Tributary 6a	Approximately 0.27 miles upstream of confluence with Tributary 6a	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Tributary 10	At the confluence with Brazos River	Approximately 0.85 miles upstream of confluence with Tributary 10b	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Tributary 10b	At the confluence with Tributary 10	Approximately 0.64 miles upstream of confluence with Tributary 10	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Tributary 11	At the confluence with Brazos River	Approximately 3.0 miles upstream of confluence with Brazos River	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Turkey Creek	At the confluence with South Fork Palo Pinto Creek	At border of Palo Pinto and Erath Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Turkey Creek Tributary 1	At the confluence with Turkey Creek	At border of Palo Pinto and Erath Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Unnamed Tributary 1	At border of Palo Pinto and Jack Counties	Approximately 0.6 miles upstream of the confluence with Unnamed Tributary 1.1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Unnamed Tributary 1.1	At the confluence with Unnamed Tributary 1	Approximately 1.0 mile upstream of the confluence with Unnamed Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Unnamed Tributary to Pollard Creek	At the confluence with Pollard Creek	Approximately 1.2 miles upstream of the confluence with Pollard Creek Tributary 6	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	A	
Vaughn Branch	At the confluence with West Fork Keechi Creek	Approximately 4.8 miles upstream of the confluence with West Fork Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Walnut Creek	At the confluence with Palo Pinto Creek	Approximately 0.5 miles upstream of the confluence with Walnut Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Walnut Creek Tributary 1	At the confluence with Walnut Creek	Approximately 0.8 miles upstream of the confluence with Walnut Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Walnut Creek Tributary 2	At the confluence with Walnut Creek	Approximately 1.0 miles upstream of the confluence with Walnut Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Walnut Creek Tributary 3	At the confluence of Walnut Creek	Approximately 0.8 miles upstream of the confluence of Walnut Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Ward Branch	At the confluence with Brazos River	Approximately 2.0 miles upstream of confluence with Ward Branch Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Ward Branch Tributary 1	At the confluence with Ward Branch	Approximately 1.7 miles upstream of confluence with Ward Branch	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Ward Branch Tributary 2	At the confluence with Ward Branch	Approximately 0.16 miles upstream of confluence with Ward Branch	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
West Fork Keechi Creek	At the confluence with Keechi Creek	At border of Palo Pinto and Jack Counties	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
West Fork Keechi Creek Tributary 1	At the confluence with West Fork Keechi Creek	Approximately 5.0 miles upstream of the confluence with West Fork Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
West Fork Keechi Creek Tributary 2	At the confluence with West Fork Keechi Creek	Approximately 1.9 miles upstream of the confluence with West Fork Keechi Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Whatley Creek	At the confluence with Crystal Creek Tributary 1	Approximately 0.6 miles upstream of the confluence with Crystal Creek Tributary 1	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	AE	
Whatley Creek	Approximately 0.6 miles upstream of the confluence with Crystal Creek Tributary 1	Approximately 2.0 miles upstream of the confluence with Crystal Creek Tributary 1	HEC-HMS version 3.5	HEC-RAS 4.1.0	4/29/2016	A	
Wilson Hollow	At the confluence with Lake Creek	Approximately 4.1 miles upstream of the confluence with Lake Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Wolf Branch	At the confluence with Eagle Creek	Approximately 1.5 miles upstream of the confluence of Wolf Branch Tributary 1	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Wolf Branch Tributary 1	At the confluence with Wolf Branch	Approximately 0.4 miles upstream of the confluence with Wolf Branch	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	
Worser Creek	At the confluence of Palo Pinto Creek	Approximately 8.6 miles upstream of the confluence of Palo Pinto Creek	Regression Equations	HEC-RAS 4.1.0	4/29/2016	A	

Table 14: Roughness Coefficients

Flooding Source	Channel "n"	Overbank "n"
Brazos River	0.025-0.030	0.060-0.080
Caddo Creek	0.030	0.060-0.080
Cedar Creek	0.030	0.060-0.080
Crystal Creek	0.015-0.065	0.020-0.070
Crystal Creek Tributary 1	0.050-0.060	0.045-0.080
Crystal Creek Tributary 3	0.020-0.045	0.015-0.065
Crystal Creek Tributary 5	0.020-0.065	0.030-0.100
Lime Creek	0.065	0.045-0.100
Lime Creek Tributary 1	0.060-0.070	0.045-0.070
Pollard Creek	0.020-0.065	0.015-0.100
Pollard Creek Tributary 1	0.020-0.065	0.015-0.100
Pollard Creek Tributary 2	0.030-0.080	0.015-0.100
Pollard Creek Tributary 4	0.055	0.045-0.070
Pollard Creek Tributary 5	0.055 - 0.070	0.030-0.070
Pollard Creek Tributary 7	0.060	0.035-0.100
Possum Kingdom Lake	0.025-0.030	0.060-0.080
Rock Creek	0.030	0.060-0.080
Rock Creek Tributary 1	0.035-0.065	0.020-0.100
Rock Creek Tributary 2	0.045-0.070	0.035-0.100
Whatley Creek	0.060	0.045-0.100
All revised A zone streams	0.030-0.050	0.060-0.095

5.3 Coastal Analyses

This section is not applicable to this FIS Project

Table 15: Summary of Coastal Analyses

[Not Applicable to this FIS Project]

5.3.1 Total Stillwater Elevations

This section is not applicable to this FIS Project

Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas

[Not Applicable to this FIS Project]

Table 16: Tide Gage Analysis Specifics

[Not Applicable to this FIS Project]

5.3.2 Waves

This section is not applicable to this FIS Project

5.3.3 Coastal Erosion

This section is not applicable to this FIS Project

5.3.4 Wave Hazard Analyses

This section is not applicable to this FIS Project

Table 17: Coastal Transect Parameters

[Not Applicable to this FIS Project]

Figure 9: Transect Location Map

[Not Applicable to this FIS Project]

5.4 Alluvial Fan Analyses

This section is not applicable to this FIS Project

Table 18: Summary of Alluvial Fan Analyses

[Not Applicable to this FIS Project]

Table 19: Results of Alluvial Fan Analyses

[Not Applicable to this FIS Project]

SECTION 6.0 – MAPPING METHODS

6.1 Vertical and Horizontal Control

All FIS Reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS Reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS Reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS Report and on the FIRMs are referenced to NAVD 88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey (NGS) at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the archived project documentation associated with the FIS Report and the FIRMs for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks in the area, please contact information services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

The datum conversion factor from NGVD 29 to NAVD 88 for Palo Pinto County is +0.29 feet.

Table 20: Countywide Vertical Datum Conversion

[Not Applicable to this FIS Project]

Table 21: Stream-by-Stream Vertical Datum Conversion

[Not Applicable to this FIS Project]

6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood

hazard information was converted to a Geographic Information System (GIS) format that meets FEMA's FIRM database specifications and geographic information standards. This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features. For example, the information contained in the Floodway Data table and Flood Profiles can be linked to the cross sections that are shown on the FIRMs. Additional information about the FIRM Database and its contents can be found in FEMA's Guidelines and Standards for Flood Risk Analysis and Mapping, https://www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping. Base map information shown on the FIRM was derived from the sources described in Table 22.

Table 22: Base Map Sources

Data Type	Data Provider	Data Date	Data Scale	Data Description
Palo Pinto County FIRM Database	FEMA	2012	N/A	Spatial and attribute information for transportation features, political boundaries, water area, water line, flood hazard area, flood hazard line, and FIRM panels.

6.3 Floodplain and Floodway Delineation

The FIRM shows tints, screens, and symbols to indicate floodplains and floodways as well as the locations of selected cross sections used in the hydraulic analyses and floodway computations.

For riverine flooding sources, the mapped floodplain boundaries shown on the FIRM have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 23.

In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

The floodway widths presented in this FIS Report and on the FIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. Table 24 indicates the flooding sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 24, "Floodway Data."

Certain flooding sources may have been studied that do not have published BFEs on the FIRMs, or for which there is a need to report the 1% annual chance flood elevations at selected cross

sections because a published Flood Profile does not exist in this FIS Report. These streams may have also been studied using methods to determine non-encroachment zones rather than floodways. For these flooding sources, the 1% annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 23. All topographic data used for modeling or mapping has been converted as necessary to NAVD88.

Table 23: Summary of Topographic Elevation Data used in Mapping

Community	Flooding Source	Source for Topographic Elevation Data					
		Description	Scale	Contour Interval	$RMSE_Z$	$Accuracy_z$	Citation
Palo Pinto County and Incorporated Areas	All within Palo Pinto County and Incorporated Areas	Light Detection and Ranging data (LiDAR)	N/A	N/A	0.109 m	0.213 m	FEMA 2013

BFEs shown at cross sections on the FIRM represent the 1% annual chance water surface elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations.

Table 24: Floodway Data

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET / SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	5,938	417	2,900	6.3	822.8	822.8	823.4	0.6
B	6,938	581	3,557	5.1	825.5	825.5	826.1	0.6
C	8,801	341	2,313	5.3	828.7	828.7	829.5	0.8
D	11,387	185	1,585	7.7	833.9	833.9	834.5	0.6
E	13,576	294	3,079	4.0	840.5	840.5	841.1	0.6
F	15,500	247	2,654	4.6	843.9	843.9	844.3	0.4
G	18,393	864	4,188	3.8	845.9	845.9	846.5	0.6
H	21,506	650	2,683	2.8	849.3	849.3	850.2	0.9
I	21,806	267	1,854	4.1	849.9	849.9	850.9	1.0
J	23,973	589	2,369	3.2	858.9	858.9	859.7	0.8
K	24,793	617	3,016	2.5	860.4	860.4	861.3	0.9
L	26,803	341	983	3.0	865.2	865.2	865.9	0.7
M	27,075	637	1,564	1.9	867.4	867.4	868.4	1.0
N	27,453	610	1,477	2.0	868.4	868.4	869.3	0.9
O	27,885	674	917	3.2	870.4	870.4	871.2	0.8
P	28,168	311	698	4.3	873.2	873.2	874.2	1.0

[1]Feet above confluence with Brazos River

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

PALO PINTO COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CRYSTAL CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET / SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Q	28,441	258	834	3.5	875.7	875.7	876.3	0.6
R	28,969	400	1,037	2.8	878.6	878.6	879.0	0.4
S	29,229	349	1,100	2.7	880.9	880.9	881.9	1.0
T	29,490	243	725	4.1	882.4	882.4	882.7	0.3
U	29,767	301	1,041	2.8	884.8	884.8	885.7	0.9
V	30,024	470	1,701	1.7	886.9	886.9	887.8	0.9
W	30,392	280	782	3.8	889.2	889.2	889.5	0.3
X	30,650	340	1,307	2.3	892.0	892.0	893.0	1.0
Y	30,911	330	1,302	2.3	894.0	894.0	894.6	0.6
Z	31,170	77	344	8.6	895.8	895.8	896.0	0.2
AA	31,419	217	676	4.4	897.9	897.9	898.2	0.3
AB	31,501	217	570	5.2	898.2	898.2	898.3	0.1
AC	31,588	172	589	5.0	898.9	898.9	899.4	0.5
AD	31,810	182	1,116	6.0	900.0	900.0	900.0	0.0
AE	32,342	330	1,005	1.1	902.4	902.4	903.2	0.8

[1]Feet above confluence with Brazos River

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

PALO PINTO COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CRYSTAL CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET / SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
AF	32,521	240	492	2.3	902.5	902.5	903.2	0.7
AG	32,819	90	161	7.1	905.0	905.0	905.2	0.2
AH	33,721	109	190	6.0	913.3	913.3	913.6	0.3
AI	34,199	20	92	10.0	916.5	916.5	916.9	0.4
AJ	34,448	28	104	8.8	919.2	919.2	919.6	0.4
AK	34,984	109	159	5.8	927.1	927.1	927.4	0.3
AL	35,358	227	405	2.3	930.3	930.3	931.2	0.9
AM	35,624	164	181	5.1	935.7	935.7	936.1	0.4
AN	35,995	27	90	10.2	943.8	943.8	944.7	0.9
AO	36,269	27	90	10.2	949.6	949.6	949.9	0.3
AP	36,631	29	125	7.3	961.5	961.5	962.1	0.6
AQ	36,841	43	115	8.0	962.2	962.2	967.4	0.2

[1]Feet above confluence with Brazos River

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

PALO PINTO COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CRYSTAL CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET / SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	305	160	916	5.2	863.5	863.5	864.1	0.6
B	996	230	1,137	4.2	865.7	865.7	866.5	0.8
C	1,540	263	1,145	4.2	867.2	867.2	867.4	0.2
D	2,336	194	709	6.8	867.9	867.9	868.4	0.5
E	2,865	321	1,337	3.6	870.2	870.2	870.6	0.4
F	3,292	640	2,658	1.8	871.7	871.7	872.2	0.5
G	4,031	361	1,330	3.6	872.3	872.3	873.2	0.9
H	5,268	600	1,425	2.7	875.2	875.2	875.5	0.3
I	6,706	255	765	1.0	880.7	880.7	881.4	0.7
J	7,500	77	294	2.7	883.5	883.5	884.4	0.9
K	7,714	159	394	2.0	885.2	885.2	885.8	0.6
L	8,445	87	332	2.3	886.2	886.2	887.0	0.8
M	8,975	57	201	3.9	886.5	886.5	887.4	0.9
N	9,275	73	127	6.1	886.7	886.7	887.5	0.8
O	9,498	68	128	6.1	888.1	888.1	888.7	0.6

[1]Feet above confluence with Crystal Creek

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

PALO PINTO COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CRYSTAL CREEK TRIBUTARY 3

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET / SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	74	39	126	1.8	915.6	915.6	916.6	1.0
B	295	13	52	4.1	918.3	918.3	918.8	0.5
C	595	13	52	4.1	921.5	921.5	921.7	0.2
D	990	83	141	2.9	930.4	930.4	931.3	0.9
E	1,451	63	64	3.4	938.3	938.3	938.3	0.0
F	1,739	312	1,931	0.0	954.2	954.2	954.2	0.0
G	2,785	93	88	4.6	964.5	964.5	964.5	0.0
H	3,156	44	64	6.3	977.4	977.4	977.4	0.0
I	3,247	40	64	6.3	981.7	981.7	981.7	0.0

[1]Feet above confluence with Crystal Creek

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

PALO PINTO COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CRYSTAL CREEK TRIBUTARY 5

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET / SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	6,976	194	1,621	3.2	816.7	816.7	817.6	0.9
B	8,253	110	1,082	4.8	821.1	821.1	822.1	1.0
C	9,923	135	973	5.3	825.5	825.5	826.3	0.8
D	11,806	119	790	6.5	832.9	832.9	833.6	0.7
E	11,893	119	908	5.7	833.8	833.8	834.6	0.8
F	12,392	45	466	11.0	837.0	837.0	837.9	0.9
G	12,710	234	1,840	2.8	839.9	839.9	840.9	1.0
H	15,076	431	1,833	1.6	843.5	843.5	844.3	0.8
I	15,131	398	1,139	2.6	843.6	843.6	844.4	0.8
J	15,416	460	1,031	2.9	844.3	844.3	845.0	0.7
K	16,157	152	675	4.4	846.8	846.8	847.7	0.9
L	16,507	205	849	3.5	848.3	848.3	849.2	0.9
M	17,803	90	495	6.0	850.5	850.5	851.3	0.8
N	18,582	522	2,225	1.3	854.2	854.2	855.1	0.9
O	20,098	180	592	5.0	856.7	856.7	857.4	0.7

[1]Feet above confluence with Brazos River

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

PALO PINTO COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: POLLARD CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET / SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
P	20,595	435	1,114	2.6	859.4	859.4	860.4	1.0
Q	20,631	449	1,533	1.9	860.2	860.2	861.2	1.0
R	20,800	167	514	5.7	860.8	860.8	861.7	0.9
S	21,095	231	780	3.8	862.7	862.7	863.5	0.8
T	22,101	140	657	4.5	866.5	866.5	867.3	0.8
U	23,284	69	413	7.1	867.9	867.9	868.6	0.7
V	23,334	79	529	5.6	869.4	869.4	869.7	0.3
W	23,434	57	406	7.3	869.9	869.9	870.1	0.2
X	23,555	72	589	5.0	871.3	871.3	871.4	0.1
Y	23,599	72	617	4.8	871.6	871.6	871.7	0.1
Z	23,853	38	258	2.2	872.2	872.2	872.3	0.1
AA	24,567	48	170	3.3	872.4	872.4	872.6	0.2
AB	24,601	48	136	4.1	872.8	872.8	873.5	0.7
AC	25,103	27	136	4.1	874.4	874.4	874.9	0.5
AD	26,128	41	103	5.4	880.0	880.0	880.5	0.5

[1]Feet above confluence with Brazos River

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

PALO PINTO COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: POLLARD CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET / SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
AE	26,628	53	127	4.4	883.3	883.3	883.3	0.0
AF	26,776	100	303	1.8	883.6	883.6	883.6	0.0
AG	27,096	118	104	5.4	902.9	902.9	902.9	0.0
AH	27,273	625	12,078	0.0	916.9	916.9	916.9	0.0
AI	29,451	514	8,944	0.7	916.9	916.9	916.9	0.0
AJ	29,488	514	8,649	0.7	917.0	917.0	917.0	0.0
AK	32,203	316	2,423	2.5	917.1	917.1	917.1	0.0
AL	33,849	290	1,274	4.7	918.9	918.9	919.9	1.0
AM	34,265	218	1,147	5.2	921.5	921.5	922.3	0.8
AN	34,287	218	1,310	4.6	921.9	921.9	922.8	0.9
AO	34,415	207	1,328	4.5	922.6	922.6	923.6	1.0
AP	35,648	380	2,302	2.6	926.6	926.6	927.3	0.7
AQ	36,163	72	667	9.5	926.4	926.4	927.4	1.0
AR	36,193	72	769	8.3	928.5	928.5	928.8	0.3
AS	36,319	350	2,481	2.4	930.0	930.0	930.4	0.4

[1]Feet above confluence with Brazos River

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

PALO PINTO COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: POLLARD CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET / SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
AT	37,473	47	264	6.6	931.3	931.3	931.8	0.5
AU	37,538	43	379	4.6	935.2	935.2	935.2	0.0
AV	38,114	37	296	5.9	938.2	938.2	939.2	1.0
AW	38,821	97	374	4.6	946.9	946.9	947.9	1.0
AX	38,955	29	140	12.4	956.7	956.7	957.6	0.9
AY	39,140	303	2,860	0.6	963.6	963.6	964.5	0.9
AZ	40,370	72	273	6.5	963.6	963.6	964.5	0.9
BA	41,186	75	246	7.2	974.6	974.6	975.3	0.7
BB	41,988	109	296	6.0	981.8	981.8	982.4	0.6
BC	42,619	61	191	9.3	993.2	993.2	993.2	0.0
BD[2]	42,764	180	907	2.0	999.6	999.6	1,000.5	0.9

[1]Feet above confluence with Brazos River

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

PALO PINTO COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: POLLARD CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET / SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A - B[2]	-	-	-	-	-	-	-	-
C	5,645	205	820	3.6	864.0	864.0	864.8	0.8
D	6,880	340	1,485	3.1	872.1	872.1	873.0	0.9
E	8,290	301	979	3.0	875.9	875.9	876.4	0.5
F	9,939	94	393	5.3	884.8	884.8	885.5	0.7
G - H[2]	-	-	-	-	-	-	-	-

[1]Feet above confluence with Pollard Creek
[2] Floodway not shown for this cross section

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

PALO PINTO COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: POLLARD CREEK TRIBUTARY 1

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET / SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	385	37	152	3.9	872.9	872.9	873.8	0.9
B	1,181	49	149	4.0	877.5	877.5	877.6	0.1
C	1,555	30	151	3.9	878.6	878.6	878.8	0.2
D	1,587	47	229	2.6	878.8	878.8	879.1	0.3
E	2,822	76	521	1.1	883.9	883.9	884.2	0.3
F	3,079	869	9,514	0.0	910.1	910.1	910.1	0.0
G	4,645	88	429	3.0	910.1	910.1	910.1	0.0
H	5,106	276	1,233	0.7	925.0	925.0	925.0	0.0

[1]Feet above confluence with Pollard Creek

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

PALO PINTO COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: POLLARD CREEK TRIBUTARY 2

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET / SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A - H[2]	-	-	-	-	-	-	-	-
I	15,089	85	142	7.7	854.2	854.2	854.4	0.2
J	16,044	200	350	2.9	859.4	859.4	860.3	0.9
K	16,758	45	142	6.5	864.8	864.8	865.5	0.7
L	18,137	400	555	1.7	872.0	872.0	872.1	0.1
M	23,087	135	115	3.7	917.6	917.6	918.2	0.6
N	23,337	39	227	2.5	926.3	926.3	926.3	0.0
O	23,877	26	57	7.6	928.8	928.8	929.1	0.3
P	24,394	57	109	3.9	942.5	942.5	942.8	0.3
Q	24,699	35	59	7.3	953.3	953.3	953.3	0.0
R	24,801	214	1,625	0.3	961.0	961.0	961.4	0.4
S	25,253	69	76	5.6	963.7	963.7	963.9	0.2
T	25,500	95	131	3.3	969.6	969.6	970.2	0.6

[1]Feet above confluence with Rock Creek
[2]Floodway not shown for this cross section

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

PALO PINTO COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: ROCK CREEK TRIBUTARY 1

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET / SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A - F[2]	-	-	-	-	-	-	-	-
G	6,004	185	528	3.6	857.2	857.2	857.7	0.5
H	8,496	160	534	3.6	867.9	867.9	868.5	0.6
I	9,095	102	369	5.2	869.7	869.7	870.2	0.5
J	9,262	58	261	7.4	870.9	870.9	871.3	0.4
K	9,366	382	1,327	1.4	874.5	874.5	875.1	0.6
L	9,663	375	1,291	1.5	874.6	874.6	875.2	0.6

[1]Feet above confluence with Rock Creek Tributary 1
[2]Floodway not shown for this cross section

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

PALO PINTO COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: ROCK CREEK TRIBUTARY 2

Table 25: Flood Hazard and Non-Encroachment Data for Selected Streams

[Not Applicable to this FIS Project]

6.4 Coastal Flood Hazard Mapping

This section is not applicable to this FIS Project

Table 26: Summary of Coastal Transect Mapping Considerations

[Not Applicable to this FIS Project]

6.5 FIRM Revisions

This FIS Report and the FIRM are based on the most up-to-date information available to FEMA at the time of its publication; however, flood hazard conditions change over time. Communities or private parties may request flood map revisions at any time. Certain types of requests require submission of supporting data. FEMA may also initiate a revision. Revisions to FIS projects may take several forms, including Letters of Map Amendment (LOMAs), Letters of Map Revision Based on Fill (LOMR-Fs), Letters of Map Revision (LOMRs) (referred to collectively as Letters of Map Change (LOMCs)), Physical Map Revisions (PMRs), and FEMA-contracted restudies. These types of revisions are further described below. Some of these types of revisions do not result in the republishing of the FIS Report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood-hazard data (shown in Table 31, "Map Repositories").

6.5.1 Letters of Map Amendment

A LOMA is an official revision by letter to an effective NFIP map. A LOMA results from an administrative process that involves the review of scientific or technical data submitted by the owner or lessee of property who believes the property has incorrectly been included in a designated SFHA. A LOMA amends the currently effective FEMA map and establishes that a specific property is not located in a SFHA.

To obtain an application for a LOMA, visit http://www.fema.gov/floodplain-management/letter-map-amendment-loma and download the form "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill". Visit the "Flood Map-Related Fees" section to determine the cost, if any, of applying for a LOMA.

FEMA offers a tutorial on how to apply for a LOMA. The LOMA Tutorial Series can be accessed at www.fema.gov/online-tutorials.

For more information about how to apply for a LOMA, call the FEMA Map Information eXchange; tool free, at 1-877-FEMA MAP (1877-336-2627).

6.5.2 Letters of Map Revision Based on Fill

A LOMR-F is an official revision by letter to an effective NFIP map. A LOMR-F states FEMA's determination concerning whether a structure or parcel has been elevated on fill above the base flood elevation and is, therefore, excluded from the SFHA.

Information about obtaining an application for a LOMR-F can be obtained in the same manner as that for a LOMA, by visiting https://www.fema.gov/floodplain-management/letter-map-amendment-loma for the "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill" or by calling the FEMA Map Information eXchange, toll free, at 1-877-FEMA MAP (1-877-336-2627). Fees for applying for a LOMR-F, if any, are listed in the "Flood Map-Related Fees" section.

A tutorial for LOMR-F is available at www.fema.gov/online-tutorials.

6.5.3 Letters of Map Revision

A LOMR is an official revision to the currently effective FEMA map. It is used to change flood zones, floodplain and floodway delineations, flood elevations and planimetric features. All requests for LOMRs should be made to FEMA through the chief executive officer of the community, since it is the community that must adopt any changes and revisions to the map. If the request for a LOMR is not submitted through the chief executive officer of the community, evidence must be submitted that the community has been notified of the request.

To obtain an application for a LOMR, visit www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/mt-2-application-forms-and-instructions and download the form "MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision". Visit the "Flood Map-Related Fees" section to determine the cost of applying for a LOMR. For more information about how to apply for a LOMR, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627) to speak to a Map Specialist.

Previously issued mappable LOMCs (including LOMRs) that have been incorporated into the Palo Pinto County FIRM are listed in Table 27.

Table 27: Incorporated Letters of Map Change

Case Number	Effective Date	Flooding Source	FIRM Panel(s)
07-06-0680P	10-25-2007	Rock Creek Tributary No. 1	48363C0340F
08-06-2504P	1-7-2009	Rock Creek Tributary No. 1	48363C0330F, 48363C0340F

6.5.4 Physical Map Revisions

PMRs are an official republication of a community's NFIP map to effect changes to base flood elevations, floodplain boundary delineations, regulatory floodways and planimetric features. These changes typically occur as a result of structural works or improvements, annexations resulting in additional flood hazard areas or correction to base flood elevations or SFHAs.

The community's chief executive officer must submit scientific and technical data to FEMA to support the request for a PMR. The data will be analyzed and the map will be revised if warranted. The community is provided with copies of the revised information and is afforded a review period. When the base flood elevations are changed, a 90-day appeal period is provided. A 6-month adoption period for formal approval of the revised map(s) is also provided.

For more information about the PMR process, please visit www.fema.gov and visit the "Flood Map Revision Processes" section.

6.5.5 Contracted Restudies

The NFIP provides for a periodic review and restudy of flood hazards within a given community. FEMA accomplishes this through a national watershed-based mapping needs assessment strategy, known as the Coordinated Needs Management Strategy (CNMS). The CNMS is used by FEMA to assign priorities and allocate funding for new flood hazard analyses used to update the FIS Report and FIRM. The goal of CNMS is to define the validity of the engineering study data within a mapped inventory. The CNMS is used to track the assessment process, document engineering gaps and their resolution, and aid in prioritization for using flood risk as a key factor for areas identified for flood map updates. Visit www.fema.gov to learn more about the CNMS or contact the FEMA Regional Office listed in Section 8 of this FIS Report.

6.5.6 Community Map History

The current FIRM presents flooding information for the entire geographic area of Palo Pinto County. Previously, separate FIRMs, Flood Hazard Boundary Maps (FHBMs) and/or Flood Boundary and Floodway Maps (FBFMs) may have been prepared for the incorporated communities and the unincorporated areas in the county that had identified SFHAs. Current and historical data relating to the maps prepared for the project area are presented in Table 28, "Community Map History." A description of each of the column headings and the source of the date is also listed below.

- *Community Name* includes communities falling within the geographic area shown on the FIRM, including those that fall on the boundary line, nonparticipating communities, and communities with maps that have been rescinded. Communities with No Special Flood Hazards are indicated by a footnote. If all maps (FHBM, FBFM, and FIRM) were rescinded for a community, it is not listed in this table unless SFHAs have been identified in this community.

- *Initial Identification Date (First NFIP Map Published)* is the date of the first NFIP map that identified flood hazards in the community. If the FHBM has been converted to a FIRM, the initial FHBM date is shown. If the community has never been mapped, the upcoming effective date or "pending" (for Preliminary FIS Reports) is shown. If the community is listed in Table 28 but not identified on the map, the community is treated as if it were unmapped.

- *Initial FHBM Effective Date* is the effective date of the first Flood Hazard Boundary Map (FHBM). This date may be the same date as the Initial NFIP Map Date.

- *FHBM Revision Date(s)* is the date(s) that the FHBM was revised, if applicable.

- *Initial FIRM Effective Date* is the date of the first effective FIRM for the community. This is the first effective date that is shown on the FIRM panel.

- *FIRM Revision Date(s)* is the date(s) the FIRM was revised, if applicable. This is the revised date that is shown on the FIRM panel, if applicable. As countywide studies are completed or revised, each community listed should have its FIRM dates updated accordingly to reflect the date of the countywide study. Once the FIRMs exist in countywide format, as Physical Map Revisions (PMR) of FIRM panels within the county are completed, the FIRM Revision Dates in the table for each community affected by the PMR are updated with the date of the PMR, even if the PMR did not revise all the panels within that community.

The initial effective date for the Palo Pinto County FIRMs in countywide format was August 2, 2012.

Table 28: Community Map History

Community Name	Initial Identification Date (First NFIP Map Published)	Initial FHBM Effective Date	FHBM Revision Date(s)	Initial FIRM Effective Date	FIRM Revision Date(s)
Gordon, Town of	8/2/2012	N/A	N/A	8/2/2012	
Graford, City of	7/11/1975	7/11/1975	N/A	4/1/2010	8/2/2012
Mineral Wells, City of	5/3/1974	5/3/1974	7/23/1976	12/1/1977	8/2/2012 6/2/1995 5/17/1990
Mingus, City of	5/2/1975	5/2/1975	N/A	9/1/2004	8/2/2012
Palo Pinto County, Unincorporated Areas	8/2/1990	N/A	N/A	8/2/1990	8/2/2012 8/18/1992
Strawn, City of	7/16/1976	7/16/1976	N/A	11/1/1989	8/2/2012