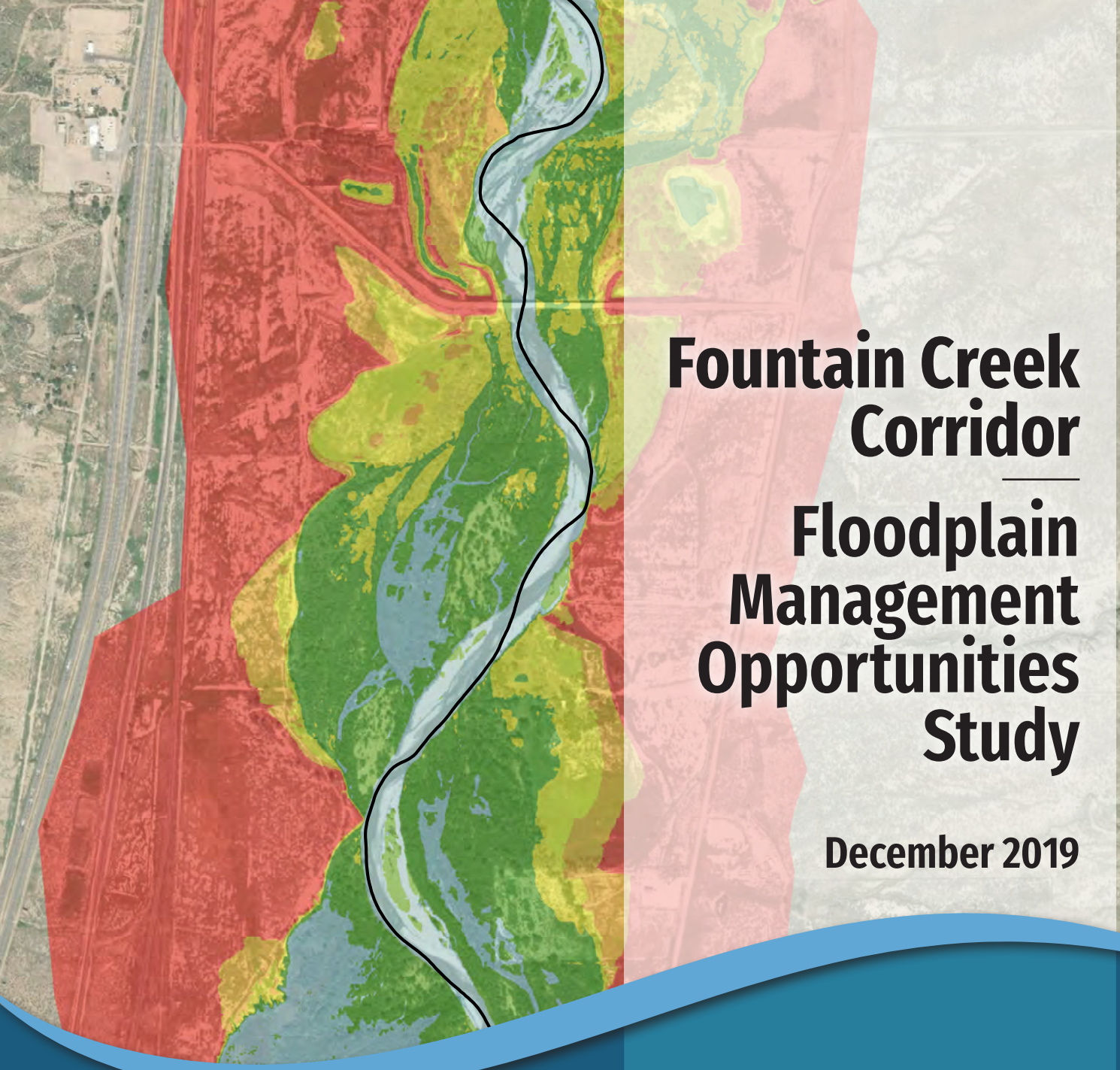

Fountain Creek Corridor

Floodplain Management Opportunities Study

December 2019

Fountain Creek Watershed Flood Control & Greenway District

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Matrix

THK associates, inc.

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Acknowledgements

This study was made possible through a grant by the Colorado Water Conservation Board (CWCB) and matching funds by the Fountain Creek Watershed Flood Control and Greenway District.

The project team wishes to acknowledge Larry Small, Executive Director of the Fountain Creek Watershed Flood Control and Greenway District, who initiated and assisted in the preparation of this study.

The project team also wishes to thank members of the stakeholder group for their review of this study.

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1 Executive Summary

The purpose of this Floodplain Management Opportunities Study was to consolidate and build upon the recommendations from previous studies to organize and reevaluate prior projects, identify new projects, establish cost estimates, and prioritize potential floodplain management projects for Fountain Creek. The major accomplishments from this Fountain Creek Corridor Floodplain Management Opportunities (FMO) Study were that it:

1. Provided a repeatable framework for identifying and prioritizing floodplain management projects along the entire stretch of the mainstem of the Fountain Creek Corridor (Corridor).
    - Used the latest Geographic Information System (GIS) technologies to gather data from authoritative sources and generated a data repository of all analyses and results for future comparison.
    - Identified 221 total projects grouped into 18 focus areas.
    - Developed a decision matrix tool to rank focus areas, highlighting six that are of the highest need as depicted in Table 1-1.

Table 1-1 High Priority Projects

Focus Area ID	Focus Area
PC-6	Hancock-Greenview Trust
PC-7	Greenview Trust South
EPC-1	Pinello Ranch
EPC-6	Hanna Ranches
PC-1	Wood Valley Ditch
PC-10	Pueblo Levee System

2. Assigned conceptual cost estimates to the projects within and outside of the focus areas.
3. Developed a high-resolution plan and profile for the entire Corridor.
4. Updated the geomorphic assessment, last completed in 2003, and performed a departure analysis to help inform project needs.
5. Created a relative elevation model for the entire Corridor to identify potential areas for reconnecting Fountain Creek to the floodplain.

2 Introduction

2.1 Authorization

Matrix Design Group, Inc. (Matrix) was retained by the Fountain Creek Watershed Flood Control and Greenway District to complete the FMO Study. The agreement regarding the FMO Study was executed on January 1, 2019 (Fountain Creek Project Grant Services Task Order 2019-3 Under Amendment 7 to Professional Services Agreement – Matrix Design Group, Inc.).

2.2 Purpose and Scope

Several previous studies have been conducted on the health of the Fountain Creek watershed.

The Fountain Creek Corridor Restoration Master Plan (2011) identified as one of its goals to improve watershed health by reducing erosion, sedimentation, and flooding. The *Fountain Creek Flood Control Study* (2018) stakeholder group and technical team approved the following recommendation:

"The Floodplain Management Alternative is the recommended flood management alternative for Fountain Creek upstream of Pueblo as it provides multiple benefits in addition to flood management, has general stakeholder support, and could attract outside funding for certain components. When combined with localized floodplain development methods in Pueblo at currently flood-prone locations it could address the key flood control objectives along Fountain Creek in Pueblo."

The study identified several key conservation techniques, like acquiring land, establishing conservation easements, reconnecting the channel to the floodplain, preserving and restoring wetlands, and maximizing floodplain benefits through excavating side detention areas. The *Fountain Creek Flood Control Study* also advocated for various techniques, from *The Fountain Creek Corridor Restoration Master Plan* and the *Fountain Creek Corridor Watershed Assessment of River Stability & Sediment Supply Study* (WARSSS) (2017), focused on addressing sediment transport and flooding concerns, like increasing creek sinuosity, installing grade control structures, stabilizing eroding banks, and diverting flood flows into wetlands and side detention areas.

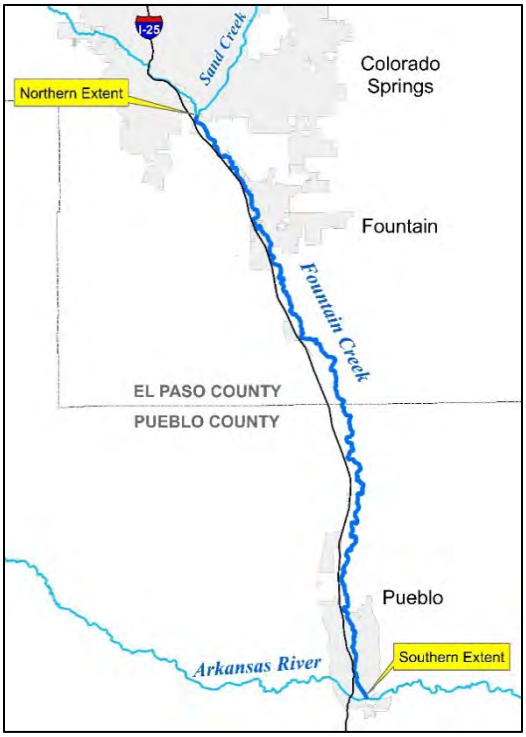
The FMO study expanded on the previous studies by identifying new projects, organizing and reevaluating prior projects which match the proposed techniques, establishing cost estimates, and prioritizing potential floodplain management projects for Fountain Creek.

3 Study Area

The mainstem of Fountain Creek was evaluated for approximately 50 miles stretching between the cities of Colorado Springs and Pueblo in the counties of El Paso and Pueblo, respectively. The northern study

area extent, just south of the City of Colorado Springs, is the confluence of Fountain Creek and Sand Creek. The southern study area extent is the confluence of Fountain Creek and the Arkansas River. Figure 3-1 depicts the study area.

Figure 3-1 Study Area Map



4 Fountain Creek Corridor Floodplain Management Opportunities Study

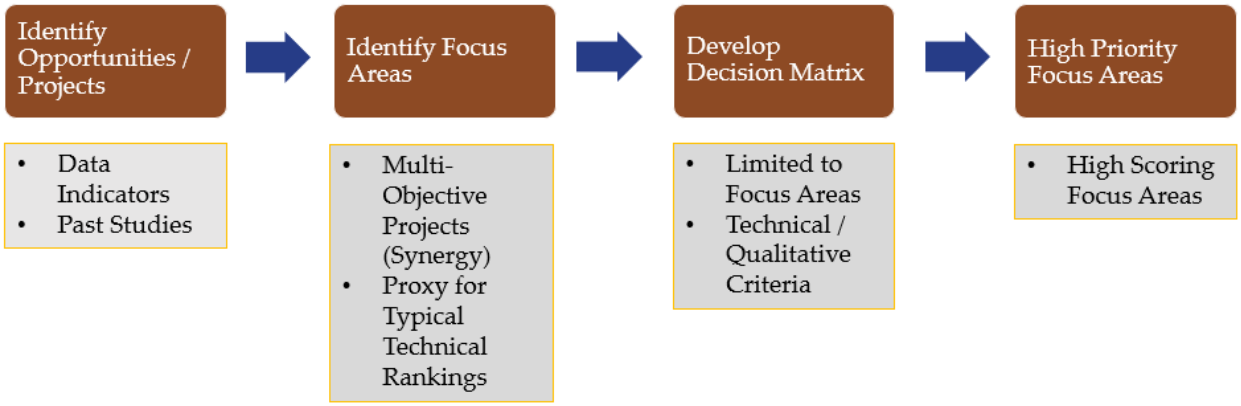
This study aimed to identify potential project locations for restoring the natural function of Fountain Creek through the techniques outlined by the Floodplain Management Alternative from the *Fountain Creek Flood Control Study*. There were six primary tasks, from data collection and analysis to project prioritizing and reporting. Before projects were identified, GIS data were processed and analyzed to provide indicators that would inform opportunities and projects.

Figure 4-1 is a process flow diagram which illustrates the employed strategy to move from data to prioritized projects.

1. Identify Opportunities / Projects: GIS data were collected and created to function as indicators to help inform opportunities. Recommendations from past studies were reviewed and compared against the indicators.

2. Focus areas were developed in locations where multi-objective projects were naturally grouped and offered opportunities for synergy from an implementation standpoint. Typically, projects are rated from a technical standpoint to develop a ranking; however, geospatial proximity served as an excellent proxy to this process as it was a natural filtering device. Consequently, this study did not have to develop a methodology for ranking disparate types of projects against each other. Instead, the implementation strategy was on the focus area level.
3. A decision matrix was developed to rank the focus areas from a technical and qualitative standpoint.
4. High priority focus areas were identified.

Figure 4-1 Process Flow Diagram



4.1 Data Collection

During the summer of 2016, Matrix gathered the best available data for the *Fountain Creek Corridor Watershed Assessment of River Stability & Sediment Supply Study* and stored it in a GIS database. Because most of the datasets did not change significantly since that time, this study did not entail a large data collection effort. Matrix evaluated all the existing data and only requested updated information as appropriate. Table 4-1 summarizes the GIS data obtained and utilized as part of this analysis.

Additional key datasets gathered include 2016 aerial photography and Light Detection and Ranging (LiDAR) data flown in late 2016 for Pueblo County. El Paso County flew new aerial photography in 2018. The CWCB provided 2018 digital elevation models (DEMs), which were processed to generate 1-foot contours for the Corridor in El Paso County. Matrix requested utility datasets for the Corridor from various providers and received some of that information. Compiling a comprehensive utility database is suggested for the future. Matrix also created GIS data of the proposed improvements from *The Fountain Creek*

Corridor Restoration Master Plan and the *Fountain Creek Flood Control Study*. See Appendix A for the Task 1 Data Collection Technical Memo.

Table 4-1 Data Sources and Vintage

Data Description	Source	Date
Electric and Gas Transmission Lines	Black Hills Energy, Colorado Springs Utilities	October, 2019
City of Fountain Planning	City of Fountain	July, 2016
City of Fountain Utilities	City of Fountain	September, 2019
City of Fountain Zoning	City of Fountain	July, 2016
City of Pueblo Boundary	City of Pueblo GIS	March, 2019
City of Pueblo Roads	City of Pueblo GIS	March, 2019
City of Pueblo Zoning	City of Pueblo GIS	March, 2019
Pueblo County Trails	City of Pueblo GIS	March, 2019
Diversion Structures	Colorado Division of Water Resources (CDWR)	March, 2019
Riparian Areas	Colorado Division of Wildlife	August, 2012
El Paso County Digital Elevation Models (DEMs)	Colorado Water Conservation Board	January, 2019
El Paso County 911 Roads	El Paso - Teller 911 Authority	July, 2016
2018 Aerial Photography (1 foot resolution)	El Paso County Information Technologies	2018
El Paso County Boundary	El Paso County Information Technologies	March, 2019
El Paso County Building Footprints	El Paso County Information Technologies	April, 2019
El Paso County Existing Land Use	El Paso County Information Technologies	April, 2019
El Paso County Parcels	El Paso County Information Technologies	March , 2019
El Paso County Parks	El Paso County Information Technologies	March , 2019
El Paso County Railroads	El Paso County Information Technologies	March , 2019
El Paso County Trails	El Paso County Information Technologies	March , 2019
El Paso County Zoning	El Paso County Information Technologies	March , 2019
El Paso Incorporated Cities	El Paso County Information Technologies	March , 2019
100-Year Effective Floodplain	Federal Emergency Management Agency (FEMA)	March , 2019
100-Year Preliminary Floodplain	Federal Emergency Management Agency (FEMA)	2016
Proposed Improvments	Fountain Creek Corridor Restoration Master Plan	2011
Bank Stablization Projects	Fountain Creek Corridor WARSSS Study	February, 2018
Side Detention	Fountain Creek Flood Control Study	February, 2018
Conservation Easements	National Conservation Easements Database	March, 2019
2016 Aerial Photography (6 inch resolution)	Pueblo County GIS	2016
Pueblo County Boundary	Pueblo County GIS	March, 2019
Pueblo County Building Footprints	Pueblo County GIS	June, 2016
Pueblo County Electric Transmission Lines	Pueblo County GIS	September, 2019
Pueblo County LiDAR	Pueblo County GIS	2016
Pueblo County Municipal Boundary	Pueblo County GIS	March, 2019
Pueblo County Parcels	Pueblo County GIS	March, 2019
Pueblo County Parks	Pueblo County GIS	March, 2019
Pueblo County Railroads	Pueblo County GIS	March, 2019
Pueblo County Roads	Pueblo County GIS	June, 2016
Pueblo County Zoning	Pueblo County GIS	March, 2019
Pueblo and El Paso Counties LiDAR	State of Colorado	2018
Geomorphology of Fountain Creek	US Army Corps of Engineers (USACE)	2007

4.2 Fountain Creek Channel Plan and Profile

Matrix created a profile to assess major deviations from the average 0.33% grade of Fountain Creek and establish possible grade control locations. The profile was created from the thalweg, which was generated from a Triangular Irregular Network (TIN) surface based on the latest LiDAR data. For profile changes that occurred after the LiDAR was collected, Matrix incorporated as-built and conceptual design contours from

recent plans, including Masciantonio, Barr Farm Phase 1, Piñon Bridge, Highway 47, and 13th Street. Though the water surface obscured some portions of the true thalweg, the approximation was refined in AutoCAD. The thalweg and stationing were added to four 1:400 scale interactive GIS work maps.

Analyzing the plan and profile, slope inflection points were identified. Only locations that had the largest change in slope and were suitable for grade control, based on the surrounding geophysical context and other proposed projects, were recommended as projects. See Appendix B to view the work maps and profiles.

4.3 Geomorphometric Delineation of Floodplains and Terraces

To delineate floodplain and terrace features along Fountain Creek, Matrix researched several 3rd party tools to identify the most effective method.

4.3.1 Tool Research

The first tool reviewed was from the University of Edinburgh Land Surface Dynamics' Topographic Tools package. While the tool provided floodplain and terrace delineations, it was unclear exactly how these features were delineated and obtaining relative elevation differences proved difficult. In addition, the model output was discrete features as opposed to a more continuous representation, which helps aid in visualization. The tool also had file size constraints, limiting its usefulness at the large extent of this study.

Matrix next explored the Hydrologic Engineering Center's River Analysis System (HEC-RAS), a software package created by the US Army Corps of Engineers (USACE). Using several existing models combined with newer topography, Matrix delineated approximate floodplains based on flows from the *Hydrology Report for Fountain Creek* (2010). Much like filling up a bathtub and subtracting each flow regime (bankfull, two-times bankfull, and 10-year), the goal was to be left with a continuous dataset that identified discrete elevation differences. However, given the discrepancy between the model and topography vintages, the outputs tended to show extraneous results with the water surface elevation falling below the ground elevation.

Matrix also investigated TerEx, a semi-automated fluvial feature selection tool developed by the Belmont Hydrology and Fine Sediment Lab through the Utah State University S.J. & Jessie E. Quinney College of Natural Resources. Unlike other tools, TerEx operates through a custom GIS Esri ArcToolbox, providing a better user experience. Issues arose with TerEx's integration of outdated HEC-RAS cross section elevations and assigning absolute elevation, rather than relative elevations, to the output.

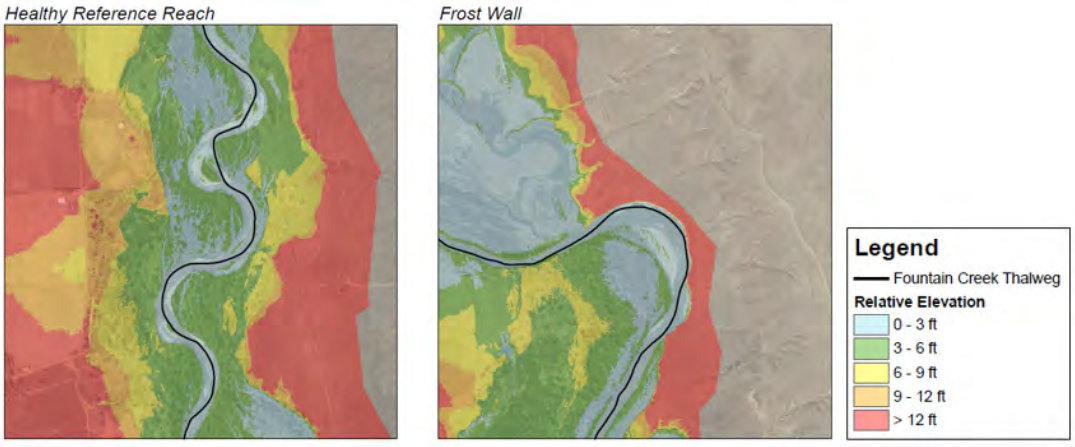
4.3.2 Methodology

The most effective floodplain and terrace delineation tool was provided by the CWCB. The Relative Elevation Model (REM) tool was developed for the Fluvial Hazard Zone (FHZ) initiative, a component of the Colorado Hazard Mapping Program (CHAMP). Typical river corridor regulation relies on FEMA Flood Insurance Rate Maps (FIRMs), which do not include stream movement, erosion, or sediment and debris deposition when determining floodplain boundaries. The FHZ concept intends to incorporate those factors to more comprehensively capture flood risk.

The REM tool incorporated HEC-RAS cross sections, in this case from the USACE model, and located the lowest elevation within 30 feet of the intersection of the cross section and centerline. The output was a continuous surface of elevations relative to the defined channel elevation at that cross section, which allowed for visual isolation of floodplains and terraces. Matrix grouped the relative elevation values into 3-foot subsets to better visualize topography. The first two groupings, 0-3 feet and 3-6 feet, represented the approximate bankfull and twice bankfull flood prone areas for Fountain Creek, based on historic flows. Three-foot intervals were continued up to 12 feet to delineate the next two terraces. The tool output, grouped in this fashion, was used to identify zones where terraces could be regraded to expand the floodplain to mitigate downstream flooding.

Figure 4-2 demonstrates the REM tool output and presents a comparison between the healthiest, reference reach on Fountain Creek, in southern El Paso County, and an area where the Creek was severely incised. On the healthy stretch, relative elevation gradually increased on either side of the Creek; the zones move from blue (0-3 feet) and green (3-6 feet) to warmer colors (>6 feet). There were no areas of constriction and there was evidence of an old oxbow and low-lying wetlands off the main channel. The Creek had a wide corridor with which to meander, creating a thriving habitat and an area of low sediment erosion. This area should be conserved and was a prime candidate for a conservation easement. On the Frost Wall section, however, there was a distinct lack of balance with small and abrupt changes in relative elevation. During a flood, there was little corridor for the water to spread out and velocities to decrease. This was a highly erodible area due to increased velocities and the general landform the Creek was incising. Due to the high velocities and lack of terrace features, the habitat was poor and vegetation struggled to establish.

Figure 4-2 CWCB REM Tool Output



4.4 Departure Analysis

The departure analysis helped inform degree of impairment, potential causes of instability, and project opportunities in the study area. The departure analysis evaluated geomorphological changes in the Creek's planform based on bankfull width, belt width, meander wavelength, and radius of curvature.

The USACE's *Fountain Creek Watershed Study: Watershed Management Plan* (2009) calculated previous values for 1955, 1983, and 2003; this departure analysis compared historical data points with newly-generated 2016/2018 values. Because the spatial data points for the departure analysis were generated based on aerial imagery, each county's data had a different imagery vintage. El Paso County had imagery from 2018, while Pueblo County's was from 2016. Methodologies employed to calculate the historic data were carried over to maintain a level of consistency. However, the process can be somewhat subjective depending on how the feature was delineated in GIS. Therefore, large trends over the years were noted. Data were grouped by segment as defined in *The Fountain Creek Corridor Restoration Master Plan*. The full departure analysis technical memo can be viewed in Appendix C .

4.5 Opportunity Identification

After data collection and generation, a GIS review harnessed various datasets and identified potential project opportunities throughout the study area. Historic and recent aerial photography were analyzed along with new contour information. This study considered projects from *The Fountain Creek Corridor Restoration Master Plan*, the *Fountain Creek Corridor Watershed Assessment of River Stability & Sediment Supply Study*, and the *Fountain Creek Flood Control Study*. Additionally, Matrix utilized "indicator datasets", like infrastructure crossings, vegetation cover, stream velocity, slope breaks, and the relative elevation model. See Appendix D for the indicator maps.

Based on these datasets, 221 projects were identified. The projects fell into specific opportunities based on the indicator datasets. These categories included:

- Areas to restore and preserve wetland/riparian zones, evaluated using current vegetation types through the latest aerial photography, regional vegetation GIS datasets, previous studies, and expert analysis from THK Associates.
- Areas to realign the channel based on the current thalweg and profile from section 4.2, delineated floodplain and terrace features from section 4.3, the departure analysis from section 4.4, areas of high-water velocity, changes in slope inflection, and banks evaluated during the *Fountain Creek Corridor Watershed Assessment of River Stability & Sediment Supply Study*.
- Areas in need of grade control based on the profile and the largest identified slope breaks in section 4.2 and the departure analysis from section 4.4.
- Areas to reconnect the channel to the floodplain as informed by the floodplain and terrace features delineated in section 4.3 and the departure analysis from section 4.4.
- Areas requiring infrastructure protection as evaluated during the *Fountain Creek Corridor Watershed Assessment of River Stability & Sediment Supply Study* and supplemented with utility crossings data.
- Areas where side detention could be implemented. While this study considered the general location provided in the *Fountain Creek Flood Control Study*, a level of detail was added to address ownership considerations and coordination with side detention identified in *The Fountain Creek Corridor Restoration Master Plan*. Sizing and design considerations were not evaluated as part of this study, with the focus being on practical siting of the side detention. However, recommendations from the USGS report, *Remediation Scenarios for Attenuating Peak Flows and Reducing Sediment Transport in Fountain Creek, Colorado* (2013), were considered.
- Areas to acquire land or establish conservation easements, were often identified in conjunction with other project types such as side detention and wetlands.

4.6 Implementation Strategy

Generally, there were two strategies for implementing the identified projects. A systematic approach would involve executing projects in a downstream to upstream fashion throughout the Corridor. This would ensure the capacity and resiliency of the Creek by helping to mitigate any unintended downstream consequences. However, given the high costs associated with the Floodplain Management Alternative identified projects and the relative limited funding available, a more opportunistic approach was desired.

Projects were identified and grouped into focus areas. A decision making process flowchart was developed with stakeholder input and a decision matrix was created to efficiently and fairly evaluate focus areas against each other. This geographic grouping approach had the benefit of identifying areas of high synergy and great need, where multiple identified projects could be implemented in a holistic approach that met the core values of the stakeholders and addressed critical issues. This strategy allocated the limited financial resources to the areas of greatest need. During the design phase, attention should be given to the downstream impacts and action taken to reduce unintended consequences.

While this study was focused on identifying channel and near-channel opportunities, Fountain Creek functions as the backbone of a larger drainage system. There are high sediment producing tributaries and watersheds that will not be addressed by any of the identified projects. Sand Creek and Kettle Creek are known significant contributors of sediment in Fountain Creek. Jimmy Camp Creek, with the increased development being seen in this watershed, will continue to provide a greater influx of sediment. Also, upstream watersheds with recent burn scars, as seen from the Waldo Canyon and Black Forest fires, can be significant contributors of sediment and other debris.

4.6.1 Focus Areas

Most of the 221 projects identified were grouped into 18 focus areas. These focus areas were created based on the proximity and synergy of the projects within them. Furthermore, the focus area strategy allowed for similarly sized zones to be compared more fairly. Some projects did not fall into focus areas and were assigned Non-Focus Area IDs.

Each project was assigned a unique 3- to 4-digit ID for identification. The first digit indicated the project's location in El Paso (1) or Pueblo County (2), while the second digit referred to the focus area ID. The third digit was a unique project number within that county and focus area. See Table 4-2 for a guide. The 18 focus area maps can be found in Appendix E .

Table 4-2 Unique ID Key

County	County ID	Focus Area	Focus Area ID
El Paso	1	Pinello Ranch	1
		Venetucci Farm	2
		Fountain North	3
		Fountain South	4
		Clear Spring Ranch	5
		Hanna Ranches	6
		Frost	7
		BJ Ranches	8
		Non-Focus Area	X
Pueblo	2	Wood Valley Ditch	1
		T Cross Properties	2
		Lower Masciantonio Trust North	3
		Lower Masciantonio Trust South	4
		Upstream of Piñon Bridge	5
		Hancock-Greenview Trust	6
		Greenview Trust South	7
		Sandoval Property	8
		Eagleridge	9
		Pueblo Levee System	10
		Non-Focus Area	X

4.6.2 Decision Matrix

In order to develop an actionable plan with stakeholder involvement integrated into the focus area prioritization, the team developed a detailed

stakeholder decision making process to facilitate comparisons between numerous similarly sized focus areas. The decision making process defined the context of the restoration goals and objectives, the core values, critical issues, and evaluation criteria. This process was completed for the *Fountain Creek Flood Control Study* and modified slightly to be more in line with the focus area approach of this study. The decision making flowchart can be found in Appendix F with stakeholder meeting summaries located in Appendix I.

The decision matrix described and prioritized each of the focus areas based on evaluation criteria developed by the stakeholder group. The matrix can be used and adjusted for future re-evaluation of the focus area prioritization. The project team discussed the evaluation criteria and settled on 19 relevant questions to ask that reflect the core values of the study stakeholders: safety, resiliency, constructability/costs, environment, community, and schedule. These criteria were also informed by *The Fountain Creek Corridor Restoration Master Plan*, a primary precursor to this study. The 19 criteria were:

1. Reduce flood risk to the public and residents by providing long term solutions that increase resiliency?
2. Avoid transfer of risks that create impacts downstream to infrastructure, channel, and storm water systems?
3. Increase the number of people and amount of land protected?
4. Withstand flooding and minimize the level of effort to repair?
5. Make use of natural processes to improve resiliency?
6. Protect critical infrastructure that is at risk?
7. Create infrastructure investments that are reasonable to construct and provide the best value for their lifecycle, function, and purpose?
8. Minimize the effort required to maintain and repair?
9. Protect or improve the habitat, water quality, and geomorphology of Fountain Creek?
10. Incorporate locally available materials and environmentally friendly processes?
11. Reduce the quantity of sediment deposited in lower Fountain Creek and Arkansas River channels?
12. Meet CWCB's criteria for multi-objective program elements?
13. Impact wetlands?
14. Provide access, connectivity, and protects opportunities for enhancements to tourist destinations, community facilities, features, and neighborhoods?
15. Provide funding, partnering, and collaboration opportunities by meeting multiple stakeholder objectives?
16. Lend to being supported by current land use regulations or revised land use regulations?
17. Preserve existing water rights?

18. Preserve property rights and uses?
19. Has a reasonable timeframe required to achieve the benefit?

Based on a scoring system of one for fair, two for better, and three for best, the 18 focus areas were ranked according to how they addressed each of the criteria. Appendix G contains the scoring for each criterion and each focus area.

4.6.3 High Priority Focus Areas

While the focus areas are similarly sized, the extent and variety of projects within them varied. The decision matrix was used to identify high, moderate, and low priority focus areas and their associated projects. This prioritization provided the Fountain Creek Watershed Flood Control and Greenway District with a pathway towards planning, designing, and constructing projects that will best meet the objectives of the Floodplain Management Alternative.

The results of the decision matrix correlated with numerical scores assigned to each focus area. Those numerical scores were broken into the three prioritization categories (high, moderate, and low) using the Jenks method. The Jenks method was used to maintain consistency between this study and the *Fountain Creek Corridor Watershed Assessment of River Stability & Sediment Supply Study*. The priority score ranges are shown in Table 4-3.

Table 4-3 Priority by Score

Priority	Score Range
High	20 - 26
Moderate	16 - 19
Low	10 - 15

The Jenks method, also known as a natural breaks method, is a widely used data clustering method which aims to optimally place each value in a bin, or class, in an iterative process. The method seeks to minimize the class's average deviation from the class mean, while maximizing each class's deviation from the means of the other groups, until the optimal solution is achieved. This is commonly referred to as reducing the variance within classes and maximizing the variance between classes (Jenks, 1963).

After assigning prioritization categories to each focus area, the results were as follows: six high priority focus areas, seven moderate priority focus areas, and five low priority focus areas. Table 4-4 provides a summary of the number of focus areas, by county, assigned to each category. Table 4-5 lists each project with its total score and priority.

Table 4-4 Focus Areas by Priority and County

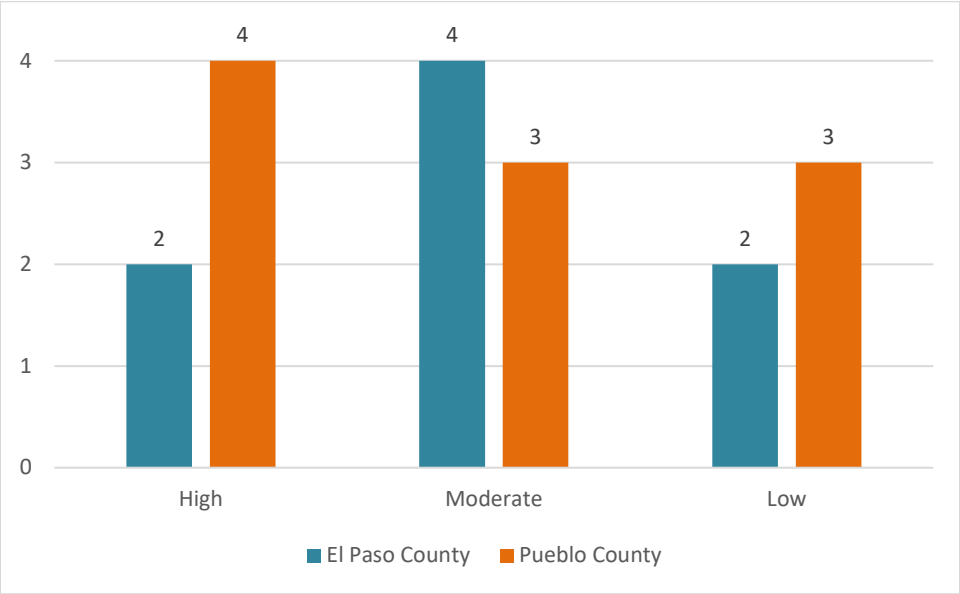


Table 4-5 Project Scores and Priority

Focus Area	Score	Priority
PC-6 Hancock-Greenview Trust	26	High
PC-7 Greenview Trust South	23	High
EPC-1 Pinello Ranch	21	High
EPC-6 Hanna Ranches	21	High
PC-1 Wood Valley Ditch	21	High
PC-10 Pueblo Levee System	20	High
EPC-4 Fountain South	19	Moderate
EPC-5 Clear Spring Ranch	18	Moderate
PC-2 T Cross	18	Moderate
EPC-3 Fountain North	17	Moderate
PC-8 Sandoval Property	17	Moderate
EPC-7 Frost	16	Moderate
PC-5 Upstream of Piñon Bridge	16	Moderate
PC-4 Masciantonio South	15	Low
EPC-2 Venetucci Farm	14	Low
PC-3 Masciantonio North	14	Low
PC-9 Eagleridge	13	Low
EPC-8 BJ Ranches	10	Low

4.6.4 Conceptual Cost Estimates

Conceptual cost estimates were prepared for all identified projects using a variety of sources. The project team leaned toward conservative values to avoid underestimates. These costs do not include realized construction efficiencies associated with adjacent, concurrent projects. This section breaks down conceptual cost by project type. The list of identified projects, by focus area, with associated cost estimates can be found in Appendix H.

4.6.4.1 Utility Crossing Monitoring

Points where utility lines intersected Fountain Creek were noted as utility crossings. Utilities evaluated included gas, hazardous liquid, electric, water, and wastewater. Each crossing was assessed through a desktop review of high-resolution imagery. If there was visible evidence that the utility was exposed, even if encased, the location was flagged to be monitored. Some utility infrastructure, like electric transmission towers, appeared to be in a precarious location along the Creek. These were also flagged for monitoring. A specific cost was not assigned to these monitoring activities as it was envisioned for the cost to be associated with labor hours and the need for monitoring frequency to be ascertained through future field work.

4.6.4.2 Grade Control

Grade control projects were assigned a cost of $4,000 per linear foot stretching the estimated bankfull width.

4.6.4.3 WARSSS Banks

Costs for WARSSS banks were estimated by assigning a restoration approach and respective unit costs to the length of each identified bank. These estimates are comparable to the Class 5 estimate outlined in the AACE Cost Estimate Classification System. The Class 5 estimate has an expected variation of up to +100% and -50%. The three restoration approaches included:

1. Localized bank reshaping and replanting, $250 per linear foot.
2. Localized bank reshaping and replanting including planform and section earthwork with bank hardening, $1,000 per linear foot.
3. Localized bank reshaping and replanting including planform and section earthwork with bank hardening and in-channel grade control, $2,000 per linear foot.

Slope, bank height, and current planform were considered in designating an approach to each bank.

4.6.4.4 Channel Realignment

Channel realignment cost was based on the type of WARSSS banks' priority that the channel realignment would alleviate. Priorities were developed for the *Fountain Creek Corridor Watershed Assessment of River Stability & Sediment Supply Study*. The cost of the channel realignment category reflects those of the WARSSS banks with the price doubled to account for two banks. Only the length of the outside bends of the proposed alignment were used to calculate the linear footage required.

If the realignment did not address medium-high or greater priority WARSSS banks, the realignment fell in the channel realignment reshaping and replanting restoration approach, with an estimated cost of $500 per linear foot. At the time of this report writing, there were no identified projects in this category as the project team only saw realignment as an economical option when banks were particularly deteriorated.

If medium-high or greater WARSSS banks were resolved by a channel realignment project, that project was assigned the channel realignment reshaping and replanting including planform and section earthwork with bank hardening restoration approach. This approach was assigned a cost of $2,000 per linear foot.

4.6.4.5 Detention

Side detention projects were assigned a construction cost of $24,500 per acre-foot. This cost was based on the Jimmy Camp Creek DBPS – FSD Costs Memo. Land acquisition was priced at $50,000 per acre based on the El Paso County Parks land value (2013).

4.6.4.6 Conservation Easement

To cost conservation easement components of projects, Matrix gathered information from THK Associates, via a real estate broker (October 2019) and stakeholder input from Westervelt (November 2019). The costs depended on whether the property was or could be irrigated, with irrigated property having a higher cost. Conservation easements generally cost between half and the full price of acquisition; if the property can continue to be farmed or irrigated, the cost is closer to half the price, while if farming is no longer possible or the property has development potential, a conservation easement would likely have the same cost as acquisition.

By applying a more conservative approach, Matrix assumed that established easements always took away farmable or developable land and thus cost nearly the same as acquiring the land. Because cases of non-irrigated land or possible land donations were not considered, the most conservative estimate led to conservation easement projects priced at $5,000 per acre.

4.6.4.7 Wetland Habitat

The wetland habitat category had two subtypes: restore wetland and conserve & enhance wetland. Restoring wetland applied to areas where functional wetland did not currently exist. Restoring wetlands had an estimated cost of $41,500 per acre, which assumed $1,500 for riparian seeding, $30,000 for willows, and $10,000 for erosion control blanket (coconut material at half an acre). These costs reflect the latest bid data received for Barr Farm Phases 1 and 2.

The conserve & enhance wetland type applied to areas where functional wetland exists but could be partially enhanced and placed under a conservation easement. Matrix estimated conserving & enhancing wetlands to cost $13,300 per acre, assuming $5,000 per acre for the conservation easement and an additional 20% of the per acre cost for restoring wetlands.

Neither of the costs in the wetland habitat category include securing water for the wetlands.

4.6.4.8 Earthwork

The earthwork cost category included two types of earthwork: reconnecting the floodplain and reconnecting the low terrace. Both types assumed 2 feet of excavation and cost $15 per cubic yard. Earthwork costs included a safety factor for hauling if required.

4.6.4.9 Removal

There were two specialized removal projects along the corridor: removing the approach to the old Piñon Bridge in the Upstream of Piñon Bridge focus area and removing the railroad abutments and bridge piers in the Pueblo Levee System focus area.

To estimate costs for these projects, Matrix employed the end area method, which involved finding the trapezoidal areas for both ends of a section of earth and computing the average between them. The volume was found by multiplying by the length of the section. These projects were costed at a higher earthwork rate of $28 per cubic yard to account for a higher hauling cost. Environmental considerations were not included in these costs.

5 Conclusions

The priority focus area maps, and corresponding decision matrix rankings, have accomplished the stated goals of identifying and ranking potential project locations for restoring the natural function of Fountain Creek through the techniques outlined by the Floodplain Management Alternative. This study provided the Fountain Creek Watershed Flood Control and Greenway District with a data-driven, defensible method of prioritizing a clear pathway forward to plan, design, and construct projects which will improve the water quality, channel stability, and flood conveyance of Fountain Creek. As projects are constructed and new

data becomes available, prioritization will update based on changing conditions. The decision matrix and cost portion of this report are dynamic and can be updated with minimal effort. Table 5-1 provides a summary of the estimated project costs for each focus area sorted by priority.

Table 5-1 Focus Area Project Costs by Priority

Focus Area	Score	Priority	Total Cost
PC-6 Hancock-Greenview Trust	26	High	$26,583,406
PC-7 Greenview Trust South	23	High	$23,206,024
EPC-1 Pinello Ranch	21	High	$37,330,606
EPC-6 Hanna Ranches	21	High	$8,483,993
PC-1 Wood Valley Ditch	21	High	$29,265,770
PC-10 Pueblo Levee System	20	High	$3,648,887
EPC-4 Fountain South	19	Moderate	$31,121,610
EPC-5 Clear Spring Ranch	18	Moderate	$32,057,448
PC-2 T Cross	18	Moderate	$14,383,459
EPC-3 Fountain North	17	Moderate	$31,389,823
PC-8 Sandoval Property	17	Moderate	$15,490,558
EPC-7 Frost	16	Moderate	$29,879,715
PC-5 Upstream of Piñon Bridge	16	Moderate	$24,526,475
PC-4 Masciantonio South	15	Low	$23,765,681
EPC-2 Venetucci Farm	14	Low	$27,124,625
PC-3 Masciantonio North	14	Low	$37,756,569
PC-9 Eagleridge	13	Low	$28,567,071
EPC-8 BJ Ranches	10	Low	$32,676,797

6 References

Fountain Creek Corridor Watershed Assessment of River Stability & Sediment Supply Study. Rep. Fountain Creek Watershed Flood Control and Greenway District, 2017.

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Appendices

Appendix A – Task 1 Data Collection Technical Memo

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MEMORANDUM

Date: April 25, 2019 (Updated 12/23/19)

To: Larry Small, Executive Director for Fountain Creek Watershed, Flood Control and Greenway District

From: Chris Martin, Director of GIS Services for Matrix Design Group

RE: Floodplain Management Opportunities Study – Task 1

Purpose

The purpose of this memorandum is to provide a summary of the datasets that were collected in association with project reach characteristics, property boundaries and associated project constraints, and geotechnical, soil and riparian and ecological conditions.

Background

To meet the overall objectives of the Floodplain Management Opportunities Study, a systematic GIS data collection effort was required. All data were obtained from authoritative sources and every attempt was made to use the best available data at the time of collection. Data sources varied from past studies to municipal stakeholders. Matrix gathered GIS data in the summer of 2016 to complete the WARSSS Study. It was our observation that the majority of these datasets have not changed significantly since that time and did not require updates. All data are organized in Esri compatible geodatabases.

Task 1 also required creating data from the Fountain Creek Corridor Restoration Master Plan. As the plan was not created in GIS, Matrix georeferenced and digitized the master plan maps to develop a database of proposed improvements. Captured information included the locations of creek realignments, side detention, wetland areas, conservation areas, bank stabilization, and oxbow plugs. The locations of six side detention ponds associated with the Floodplain Management Alternative from the Flood Control Study were also digitized.

Summary

Data collected for this study are summarized in Table 1.

Table 1 - Collected Data

Data Description	Source	Date
Electric and Gas Transmission Lines	Black Hills Energy, Colorado Springs Utilities	October, 2019
City of Fountain Planning	City of Fountain	July, 2016
City of Fountain Utilities	City of Fountain	September, 2019
City of Fountain Zoning	City of Fountain	July, 2016
City of Pueblo Boundary	City of Pueblo GIS	March, 2019
City of Pueblo Roads	City of Pueblo GIS	March, 2019
City of Pueblo Zoning	City of Pueblo GIS	March, 2019
Pueblo County Trails	City of Pueblo GIS	March, 2019
Diversion Structures	Colorado Division of Water Resources (CDWR)	March, 2019
Riparian Areas	Colorado Division of Wildlife	August, 2012
El Paso County Digital Elevation Models (DEMs)	Colorado Water Conservation Board	January, 2019
El Paso County 911 Roads	El Paso - Teller 911 Authority	July, 2016
2018 Aerial Photography (1 foot resolution)	El Paso County Information Technologies	2018
El Paso County Boundary	El Paso County Information Technologies	March, 2019
El Paso County Building Footprints	El Paso County Information Technologies	April, 2019
El Paso County Existing Land Use	El Paso County Information Technologies	April, 2019
El Paso County Parcels	El Paso County Information Technologies	March , 2019
El Paso County Parks	El Paso County Information Technologies	March , 2019
El Paso County Railroads	El Paso County Information Technologies	March , 2019
El Paso County Trails	El Paso County Information Technologies	March , 2019
El Paso County Zoning	El Paso County Information Technologies	March , 2019
El Paso Incorporated Cities	El Paso County Information Technologies	March , 2019
100-Year Effective Floodplain	Federal Emergency Management Agency (FEMA)	March , 2019
100-Year Preliminary Floodplain	Federal Emergency Management Agency (FEMA)	2016
Proposed Improvments	Fountain Creek Corridor Restoration Master Plan	2011
Bank Stablization Projects	Fountain Creek Corridor WARSSS Study	February, 2018
Side Detention	Fountain Creek Flood Control Study	February, 2018
Conservation Easements	National Conservation Easements Database	March, 2019
2016 Aerial Photography (6 inch resolution)	Pueblo County GIS	2016
Pueblo County Boundary	Pueblo County GIS	March, 2019
Pueblo County Building Footprints	Pueblo County GIS	June, 2016
Pueblo County Electric Transmission Lines	Pueblo County GIS	September, 2019
Pueblo County LiDAR	Pueblo County GIS	2016
Pueblo County Municipal Boundary	Pueblo County GIS	March, 2019
Pueblo County Parcels	Pueblo County GIS	March, 2019
Pueblo County Parks	Pueblo County GIS	March, 2019
Pueblo County Railroads	Pueblo County GIS	March, 2019
Pueblo County Roads	Pueblo County GIS	June, 2016
Pueblo County Zoning	Pueblo County GIS	March, 2019
Pueblo and El Paso Counties LiDAR	State of Colorado	2018
Geomorphology of Fountain Creek	US Army Corps of Engineers (USACE)	2007

Appendix B – Workmaps and Profiles


PUEBLO COUNTY LINE STA 1288+17.63
EPC TRAIL SYSTEM STA 1374+54.64
EPC TRAIL SYSTEM STA 1383+95.99
EPC TRAIL SYSTEM STA 1454+27.83
START JACKSON AND BURKE DITCH STA 1460+26.07
EPC TRAIL SYSTEM STA 1490+44.16
SEGMENT BREAK #2/COTTON SLOUGH DITCH STA 1541+38.90
EPC TRAIL SYSTEM STA 1546+53.48
EPC TRAIL SYSTEM STA 1599+37.84
EPC TRAIL SYSTEM STA 1621+94.50
EPC TRAIL SYSTEM STA 1631+08.32
EPC TRAIL SYSTEM STA 1659+29.05
WILLIAMS CREEK STA 1680+29.05
SEGMENT BREAK #7 STA 1680+96.58
EPC TRAIL SYSTEM STA 1747+05.87
EXISTING GRADE CONTROL STRUCTURE STA 1794+50.00
OLD PUEBLO RD ROADWAY BRIDGE STA 1796+23.70
BURLINGTON NORTHERN RAILROAD BRIDGE STA 1798+62.51
SEGMENT BREAK #6 STA 1799+78.30
END EPC PARK SYSTEM STA 1855+11.93
SLOPE BREAK UPSTREAM: 0.0045 FT/FT DOWNSTREAM: 0.0039 FT/FT % CHANGE: -13
SLOPE BREAK UPSTREAM: 0.0041 FT/FT DOWNSTREAM: 0.0045 FT/FT % CHANGE: 10
EPC TRAIL SYSTEM AND EXISTING GRADE CONTROL STRUCTURE STA 2021+42.54
EPC TRAIL SYSTEM STA 2090+63.21
EPC TRAIL SYSTEM STA 2090+63.21
SEGMENT BREAK #5 STA 2125+66.66
EPC TRAIL SYSTEM STA 2127+85.75
BURLINGTON NORTHERN RAILROAD BRIDGE STA 2142+45.75
E. SANTA FE AVE STA 2156+10.75
SLOPE BREAK UPSTREAM: 0.0044 FT/FT DOWNSTREAM: 0.0041 FT/FT % CHANGE: -7
SLOPE BREAK UPSTREAM: 0.0093 FT/FT DOWNSTREAM: 0.0044 FT/FT % CHANGE: -53
SLOPE BREAK UPSTREAM: 0.007 FT/FT DOWNSTREAM: 0.0093 FT/FT % CHANGE: 33
RETURN CHANSLER CANAL STA 2339+42.97
SLOPE BREAK UPSTREAM: 0.0039 FT/FT DOWNSTREAM: 0.007 FT/FT % CHANGE: 79
EXISTING GRADE CONTROL STRUCTURE STA 2353+74.13
DIVERT CHANSLER CANAL NO. 10 STA 2360+47.96
SEGMENT BREAK #4 STA 2375+57.02
START FOUNTAIN CREEK REGIONAL PARK STA 2405+96.94
MESA RIDGE PARKWAY ROADWAY CROSSING STA 2407+65.02
END CERESA PARK STA 2409+01.93
SLOPE BREAK UPSTREAM: 0.0034 FT/FT DOWNSTREAM: 0.0039 FT/FT % CHANGE: 15
START CERESA PARK STA 2422+20.02
AERIAL UTILITY CROSSING STA 2423+38.12
SLOPE BREAK UPSTREAM: 0.0044 FT/FT DOWNSTREAM: 0.0034 FT/FT % CHANGE: -23
SLOPE BREAK UPSTREAM: 0.0058 FT/FT DOWNSTREAM: 0.0044 FT/FT % CHANGE: -24
SLOPE BREAK UPSTREAM: 0.0047 FT/FT DOWNSTREAM: 0.0058 FT/FT % CHANGE: 23
SLOPE BREAK UPSTREAM: 0.0035 FT/FT DOWNSTREAM: 0.0047 FT/FT % CHANGE: 34
SLOPE BREAK UPSTREAM: 0.0058 FT/FT DOWNSTREAM: 0.0035 FT/FT % CHANGE: -40
SLOPE BREAK UPSTREAM: 0.0048 FT/FT DOWNSTREAM: 0.0058 FT/FT % CHANGE: 21
SLOPE BREAK UPSTREAM: 0.0057 FT/FT DOWNSTREAM: 0.0048 FT/FT % CHANGE: -16
SLOPE BREAK UPSTREAM: 0.005 FT/FT DOWNSTREAM: 0.0057 FT/FT % CHANGE: 14
S. ACADEMY BLVD. ROADWAY BRIDGE STA 2633+22.87
SLOPE BREAK UPSTREAM: 0.0021 FT/FT DOWNSTREAM: 0.005 FT/FT % CHANGE: 138
EXISTING GRADE CONTROL STRUCTURE STA 2663+82.87
SLOPE BREAK UPSTREAM: 0.0032 FT/FT DOWNSTREAM: 0.0021 FT/FT % CHANGE: -34
S. US 85, 87 ROADWAY CROSSING STA 2694+94.59
CLOVER DITCH OUTFALL STA 2694+25.40
CONFLUENCE WITH SAND CREEK STA 2721+27.13
EXISTING GRADE CONTROL STRUCTURE STA 2712+27.13
SEGMENT BREAK #3 STA 2719+85.45
END EPC THALWEG STA 2729+21.02
SLOPE BREAK UPSTREAM: 0.0066 FT/FT DOWNSTREAM: 0.0032 FT/FT % CHANGE: -52
SLOPE BREAK UPSTREAM: 0.003 FT/FT DOWNSTREAM: 0.0066 FT/FT % CHANGE: 120

Fountain Creek
Floodplain Management Opportunities Study
El Paso County - North Plan View

400 0 400 Feet
1 inch = 400 feet

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THK associates, inc.

Legend

Projects
- ■ Utility Crossing Monitoring
- Grade Control
- Channel Realignment

WARSSS Bank Score (Priority)
- 57 - 73 (High)
- 47 - 56 (Medium-High)
- 39 - 46 (Medium)
- 32 - 38 (Medium-Low)
- 20 - 31 (Low)
- 🟩 Reconnect Floodplain
- 🟨 Reconnect Low Terrace
- 🟪 Restore Wetland

- Focus Area

Active Point of Diversion
- ▲ Surface
- ▲ Other
- Creek Segment Break
- Trail
- Railroad
- 100-Year Effective Floodplain
- 🟩 Park
- ⬜ Parcel
- Municipal Boundary

FILE: G:\gis_projects\Fountain_Creek_FMO\active\apps\El_Paso_County_Project_Selection\Fountain_Creek_ElPaso_North_Plan_View.mxd, 12/23/2019, Rachel_Pierstorff

Fountain Creek
Floodplain Management Opportunities Study
El Paso County -
South Plan View

400 0 400 Feet
1 inch = 400 feet

Matrix
Excellence by Design
THK associates, inc.

Legend

Projects
- Grade Control
- Channel Realignment
- WARSSS Bank Score (Priority)
- 47 - 56 (Medium-High)
- 39 - 46 (Medium)
- 32 - 38 (Medium-Low)
- 20 - 31 (Low)
- Reconnect Floodplain
- Reconnect Low Terrace
- Conserve & Enhance Wetland
- Restore Wetland
- Side Detention

- Focus Area
- Active Point of Diversion
- ▲ Surface
- ▲ Other
- Creek Segment Break
- Trail
- Railroad
- 100-Year Effective Floodplain
- Park
- Parcel
- Municipal Boundary
- County Boundary

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CONFLUENCE WITH ARKANSAS RIVER STA 0+00.00
END FOUNTAIN RIVER TRAIL SYSTEM STA 4+54.78
RUNYON LAKE TRAIL STA 8+53.09
RAILROAD BRIDGE STA 38+22.29
EXISTING 102" SANITARY SEWER STA 53+71.29
FOURTH STREET BRIDGE STA 73+56.63
SLOPE BREAK
UPSTREAM: 0.0047 FT/FT
DOWNSTREAM: 0.004 FT/FT
% CHANGE: -15
EIGHTH STREET BRIDGE STA 87+04.09
FOUNTAIN CREEK TRAIL IN/OUT EGRESS, WEST SIDE STA 99+79.84
FOUNTAIN CREEK TRAIL IN/OUT EGRESS, EAST SIDE STA 101+37.47
E. US 50 BYPASS BRIDGE STA 140+04.08
SEGMENT BREAK #13 STA 168+77.43
SH 47 BRIDGE STA 214+38.09
PUEBLO MALL CONNECTOR TRAIL 215+55.72
START FOUNTAIN RIVER TRAIL SYSTEM STA 253+10.95
SLOPE BREAK
UPSTREAM: 0.0039 FT/FT
DOWNSTREAM: 0.0047 FT/FT
% CHANGE: 38
CITY OF PUEBLO JURISDICTIONAL BOUNDARY STA 313+68.12
CITY OF PUEBLO JURISDICTIONAL BOUNDARY STA 321+41.37
SEGMENT BREAK #12 STA 331+28.98
CITY OF PUEBLO JURISDICTIONAL BOUNDARY STA 334+42.09
PORTER DRAW STA 508+17.48
GREENVILLE DITCH DIVERSION STA 594+64.60
SEGMENT BREAK #11 STA 670+82.70
SEGMENT BREAK #10 STA 775+48.48
PINON ROAD BRIDGE STA 788+62.57
END SUTHERLAND DITCH STA 835+50.57
END BENESCH DITCH STA 898+40.91
SUTHERLAND DITCH DITCH CROSSES THALWEG STA 916+03.15
SUTHERLAND DITCH DITCH CROSSES THALWEG STA 939+52.26
START SUTHERLAND DITCH STA 968+56.94
END JACKSON AND BRUKE DITCH STA 1142+13.87
SEGMENT BREAK #9 STA 1141+72.92
START EDER BANNISTER DITCH STA 1217+68.05
PUEBLO/EL PASO COUNTY BOUNDARY STA 1288+17.63
4610 4620 4630 4640 4650 4660 4670 4680 4690 4700 4710 4720 4730 4740 4750 4760 4770 4780 4790 4800 4810 4820 4830 4840 4850 4860 4870 4880 4890 4900 4910 4920 4930 4940 4950 4960 4970 4980 4990 5000 5010 5020 5030 5040 5050 5060 5070 5080 5090 5100 5110 5120 5130 5140 5150 5160 5170 5180
10+00 20+00 30+00 40+00 50+00 60+00 70+00 80+00 90+00 100+00 110+00 120+00 130+00 140+00 150+00 160+00 170+00 180+00 190+00 200+00 210+00 220+00 230+00 240+00 250+00 260+00 270+00 280+00 290+00 300+00 310+00 320+00 330+00 340+00 350+00 360+00 370+00 380+00 390+00 400+00 410+00 420+00 430+00 440+00 450+00 460+00 470+00 480+00 490+00 500+00 510+00 520+00 530+00 540+00 550+00 560+00 570+00 580+00 590+00 600+00 610+00 620+00 630+00 640+00 650+00 660+00 670+00 680+00 690+00 700+00 710+00 720+00 730+00 740+00 750+00 760+00 770+00 780+00 790+00 800+00 810+00 820+00 830+00 840+00 850+00 860+00 870+00 880+00 890+00 900+00 910+00 920+00 930+00 940+00 950+00 960+00 970+00 980+00 990+00 1000+00 1010+00 1020+00 1030+00 1040+00 1050+00 1060+00 1070+00 1080+00 1090+00 1100+00 1110+00 1120+00 1130+00 1140+00 1150+00 1160+00 1170+00 1180+00 1190+00 1200+00 1210+00 1220+00 1230+00 1240+00 1250+00 1260+00 1270+00 1280+00 1290+00 1300+00

Fountain Creek
Floodplain Management Opportunities Study
Pueblo County - North Plan View

N
400 0 400 Feet
1 inch = 400 feet

Matrix
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Legend

Projects
- Utility Crossing Monitoring
- Channel Realignment

WARSSS Bank Score (Priority)
- 47 - 56 (Medium-High)
- 39 - 46 (Medium)
- 32 - 38 (Medium-Low)
- 20 - 31 (Low)
- Remove Old Approach
- Reconnect Floodplain
- Reconnect Low Terrace
- Conserve & Enhance Wetland
- Restore Wetland
- Side Detention

- Focus Area

Active Point of Diversion
- Surface
- Other

- Creek Segment Break
- Trail
- Railroad
- 100-Year Effective Floodplain
- 100-Year Preliminary Floodplain
- Conservation Easement
- Park
- Parcel
- Municipal Boundary
- County Boundary

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Fountain Creek
Floodplain Management Opportunities Study
Pueblo County - South Plan View

N
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1 inch = 400 feet

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Projects
- Utility Crossing Monitoring
- Grade Control
- Channel Realignment

WARSSS Bank Score (Priority)
- 47 - 56 (Medium-High)
- 39 - 46 (Medium)
- 32 - 38 (Medium-Low)
- 20 - 31 (Low)
- Remove Railroad Approach and Abutments
- Reconnect Floodplain
- Reconnect Low Terrace
- Conserve & Enhance Wetland
- Restore Wetland

Legend
- Focus Area

Active Point of Diversion
- Surface
- Other
- Creek Segment Break
- Trail
- Railroad
- 100-Year Effective Floodplain
- 100-Year Preliminary Floodplain
- Conservation Easement
- Park
- Parcel
- Municipal Boundary

Appendix C – Task 4 Departure Analysis Technical Memo

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MEMORANDUM

Date: December 24, 2019

To: Larry Small, Executive Director for Fountain Creek Watershed, Flood Control and Greenway District

From: Drew Phillips, GIS Analyst for Matrix Design Group

RE: Floodplain Management Opportunities Study –Task 1 Addendum

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Purpose

The purpose of this memorandum is to provide a summary of departure analysis and findings as an addendum to the memorandum from April 25, 2019, titled **Floodplain Management Opportunities Study – Task 1**.

Background

It is necessary to produce a departure analysis for the Floodplain Management Opportunities Study to determine the degree of impairment, potential causes of instability, and project opportunities in the Fountain Creek study area. Calculations of bankfull width, belt width, meander wavelength, and radius of curvature were used to quantify geomorphological changes in Fountain Creek's planform. Values for these features have been calculated for the years 1955, 1983, and 2003; trends in stream stability can be suggested by comparing the newly-generated 2016/2018 values to historic values.

Method

Spatial data for bankfull width, belt width, meander wavelength, and radius of curvature were developed by digitizing aerial imagery in ArcGIS Desktop 10.4.1 (*Esri, Redlands, CA*). The vintage of the imagery was 2018 for El Paso County and 2016 for Pueblo County. The same scale was used to digitize different fluvial features in order to maintain analytic consistency. Segment breaks were also held consistent across all time periods after confirming that there were no significant changes from the 2003 analysis. Valley length remained almost static, changing less than 1.5 percent in any segment from 1955 to 2018. Data developed in this task were reviewed internally by engineering and GIS staff.

Tabular data were exported to Microsoft Excel for calculations of sinuosity; maximum, average, and minimum meander wavelength; maximum, average, and minimum radii of curvature; and average bankfull width. These data were compared to calculations from previous years to suggest trends in Fountain Creek's geomorphology.

Summary

A summary of the changing geomorphology in Fountain Creek from the upstream terminus of segment three, at the confluence with Sand Creek, to the downstream terminus of segment thirteen, at the confluence with the Arkansas River, is as follows.

Segment 3: Upstream of Hwy 85/87 at Sand Creek Confluence to Downstream of Mesa Ridge Parkway

Sinuosity has remained constant between 1955 and 2016/2018. The average radius has increased, indicating a straightening of the river. The location of curves has remained similar at the upstream and downstream thirds of the segment, but the middle third of this segment has straightened. Meander wavelength has increased as this segment straightens somewhat and continues its vertical entrenchment.

3				
	1955	**1983**	**2003**	**2016/2018**
Stream Length (ft)	34,013	34,035	33,859	34,416
Valley Length (ft)	27,070	27,070	27,070	27,061
Sinuosity	1.3	1.3	1.3	1.3
Minimum Meander Wavelength (ft)	848	1,969	1,085	2,311
Maximum Meander Wavelength (ft)	6,695	4,229	4,638	7,352
Average Meander Wavelength (ft)	2,872	3,308	2,730	4,476
Minimum Radius (ft)	207	214	269	331
Maximum Radius (ft)	1,993	2,299	2,182	2,386
Average Radius (ft)	572	941	930	1,010

Segment 4: Downstream of Mesa Ridge Parkway to Downstream of Santa Fe Avenue at Jimmy Camp Creek Confluence

The measurements for segment 4, like segment 3, indicate vertical entrenchment and straightening. Although the average radius of curvature has fluctuated across time periods, it has decreased since 2003. Segment 4 has maintained its sinuosity of 1.3 across all time periods though meander wavelength is variable.

4				
	1955	**1983**	**2003**	**2016/2018**
Stream Length (ft)	23,859	23,920	24,963	24,982
Valley Length (ft)	18,633	18,633	18,633	18,626
Sinuosity	1.3	1.3	1.3	1.3
Minimum Meander Wavelength (ft)	675	1,266	1,368	1,346
Maximum Meander Wavelength (ft)	6,173	4,772	2,679	6,535
Average Meander Wavelength (ft)	2,707	2,996	2,083	2,920
Minimum Radius (ft)	297	317	399	332
Maximum Radius (ft)	1,332	1,556	1,489	1,206
Average Radius (ft)	795	804	892	755

Segment 5: Downstream of Santa Fe Avenue at Jimmy Camp Creek Confluence to Northeast of Pikes Peak International Raceway

Fountain Creek leaves the urbanized area surrounding Colorado Springs in segment 5. Sinuosity has decreased slightly since 2003, as has average radius and stream length. Average meander wavelength has increased, however. There is no clear trend for this segment.

5				
	1955	**1983**	**2003**	**2016/2018**
Stream Length (ft)	34,260	33,650	35,369	34,576
Valley Length (ft)	27,837	27,837	27,837	27,827
Sinuosity	1.2	1.2	1.3	1.2
Minimum Meander Wavelength (ft)	1,264	1,420	1,566	2,334
Maximum Meander Wavelength (ft)	4,683	5,649	5,781	7,322
Average Meander Wavelength (ft)	2,732	2,481	3,188	4,538
Minimum Radius (ft)	382	365	349	246
Maximum Radius (ft)	2,038	1,545	2,469	3,419
Average Radius (ft)	721	790	986	926

Segment 6: Northeast of Pikes Peak International Raceway to Southeast of Pikes Peak International Raceway

Sinuosity has decreased slightly since 2003, though it has fluctuated across the analysis periods. Average radius of curvature has increased from around 900 feet to over 1,200 feet, and average meander wavelength has modestly increased since 2003 as well. These values suggest that Segment 6 of Fountain Creek has straightened, though trends have been inconsistent in this segment. This segment is also the shortest of all those digitized, making this analysis more sensitive to small variations in measurements.

6				
	1955	**1983**	**2003**	**2016/2018**
Stream Length (ft)	9,835	8,763	10,037	9,878
Valley Length (ft)	7,397	7,397	7,397	7,394
Sinuosity	1.3	1.2	1.4	1.3
Minimum Meander Wavelength (ft)	4,256	1,367	1,738	2,219
Maximum Meander Wavelength (ft)	4,256	2,339	2,858	3,554
Average Meander Wavelength (ft)	4,256	1,753	2,442	2,886
Minimum Radius (ft)	657	460	349	358
Maximum Radius (ft)	978	1,667	1,326	1,824
Average Radius (ft)	804	910	915	1,211

Segment 7: Southeast of Pikes Peak International Raceway to East of El Huerta View at Williams Creek Confluence

Segment 7 is characterized by an unambiguous riffle-pool sequence, without the braiding or side channels that are present in other segments. Sinuosity has increased since 2003 as curvature has decreased. Despite these modest changes, stream planform and meander wavelength have remained largely consistent since 1955.

7				
	1955	**1983**	**2003**	**2016/2018**
Stream Length (ft)	12,993	12,448	13,078	13,953
Valley Length (ft)	10,582	10,582	10,582	10,578
Sinuosity	1.2	1.2	1.2	1.3
Minimum Meander Wavelength (ft)	1,935	1,791	1,204	968
Maximum Meander Wavelength (ft)	3,405	3,280	2,891	4,886
Average Meander Wavelength (ft)	2,747	2,539	2,092	2,371
Minimum Radius (ft)	408	326	306	252
Maximum Radius (ft)	1,212	1,378	1,430	1,531
Average Radius (ft)	755	956	829	640

Segment 8: East of El Huerta View at Williams Creek Confluence to Between CR-102 upstream and Young Hollow Road downstream at the Young Hollow Confluence

Average radius, meander wavelength, and sinuosity are close to values from 2003, indicating relative geomorphologic stability in this segment. Sinuosity measurements show an increase since 1955 but have remained stable since 2003. Planform changes are minor, with the largest departures from bankfull width occurring in the middle third of the segment.

8				
	1955	**1983**	**2003**	**2016/2018**
Stream Length (ft)	33,668	37,266	40,268	39,951
Valley Length (ft)	27,074	27,074	27,074	27,064
Sinuosity	1.2	1.4	1.5	1.5
Minimum Meander Wavelength (ft)	1,058	941	1,519	1,087
Maximum Meander Wavelength (ft)	5,940	4,541	4,304	5,173
Average Meander Wavelength (ft)	3,229	2,441	2,490	2,664
Minimum Radius (ft)	436	204	302	386
Maximum Radius (ft)	2,376	1,168	1,699	1,822
Average Radius (ft)	960	665	697	673

Segment 9: Between CR-102 upstream and Young Hollow Road downstream at the Young Hollow Confluence to Southeast of Pace Road

Segment 9 is characterized by increased stream length, increased sinuosity, increased meander wavelength, and a slight decrease in average radius of curvature. This segment has not exhibited consistent trends.

9				
	1955	**1983**	**2003**	**2016/2018**
Stream Length (ft)	29,183	29,350	32,439	36,610
Valley Length (ft)	23,173	23,173	23,173	23,164
Sinuosity	1.3	1.3	1.4	1.6
Minimum Meander Wavelength (ft)	2,941	2,730	1,756	1,161
Maximum Meander Wavelength (ft)	7,229	5,833	3,210	6,603
Average Meander Wavelength (ft)	5,234	4,456	2,264	3,084
Minimum Radius (ft)	473	518	306	280
Maximum Radius (ft)	1,768	1,231	1,858	1,512
Average Radius (ft)	1,022	802	704	654

Segment 10: Southeast of Pace Road to East of Gobatti Road at Steele Hollow Confluence

As in the upstream segment there are no consistent trends in this segment. The sinuosity and average radius have fluctuated throughout the time periods; sinuosity dropped from 1.4 to 1.2 compared to 2003, and average radius decreased in the same time period. The planform has changed since 2003 – Fountain Creek now bypasses a large oxbow-like curve on river right in the downstream reach of this segment. This change is reflected in the loss of about 2,000 feet of stream length.

10				
	1955	**1983**	**2003**	**2016/2018**
Stream Length (ft)	11,565	11,088	12,052	10,462
Valley Length (ft)	8,615	8,615	8,615	8,612
Sinuosity	1.3	1.3	1.4	1.2
Minimum Meander Wavelength (ft)	2,936	1,919	3,340	2,980
Maximum Meander Wavelength (ft)	3,586	4,821	5,066	3,646
Average Meander Wavelength (ft)	3,363	3,219	3,984	3,313
Minimum Radius (ft)	588	365	619	611
Maximum Radius (ft)	1,201	1,010	1,538	1,019
Average Radius (ft)	818	712	977	876

Segment 11: East of Gobatti Road at Steele Hollow Confluence to West of Randall Road

Sinuosity, stream length, and meander wavelength are similar to 2003 values, though the average radius has increased modestly. This segment exhibits significant departures from historical centerlines. The broad bankfull width in this segment indicates lateral migration, formation of braided channels, and suggests further bank erosion.

11				
	1955	**1983**	**2003**	**2016/2018**
Stream Length (ft)	29,618	30,034	33,802	33,941
Valley Length (ft)	25,664	25,664	25,664	25,653
Sinuosity	1.2	1.2	1.3	1.3
Minimum Meander Wavelength (ft)	3,845	1,496	1,939	237
Maximum Meander Wavelength (ft)	7,040	6,620	5,491	8,633
Average Meander Wavelength (ft)	5,088	3,643	3,624	3,695
Minimum Radius (ft)	1,098	481	347	279
Maximum Radius (ft)	2,472	1,252	1,272	1,449
Average Radius (ft)	1,616	780	652	756

Segment 12: West of Randall Road to Upstream of U.S. 50

Stream length and sinuosity have decreased since 2003. The average radius of curvature has increased since 2003, returning to 1983 values. The meander wavelength has also increased, again becoming similar to its 1983 values, indicating a straightening of this segment. A large average bankfull width in this segment implies that significant lateral migration will likely continue to occur.

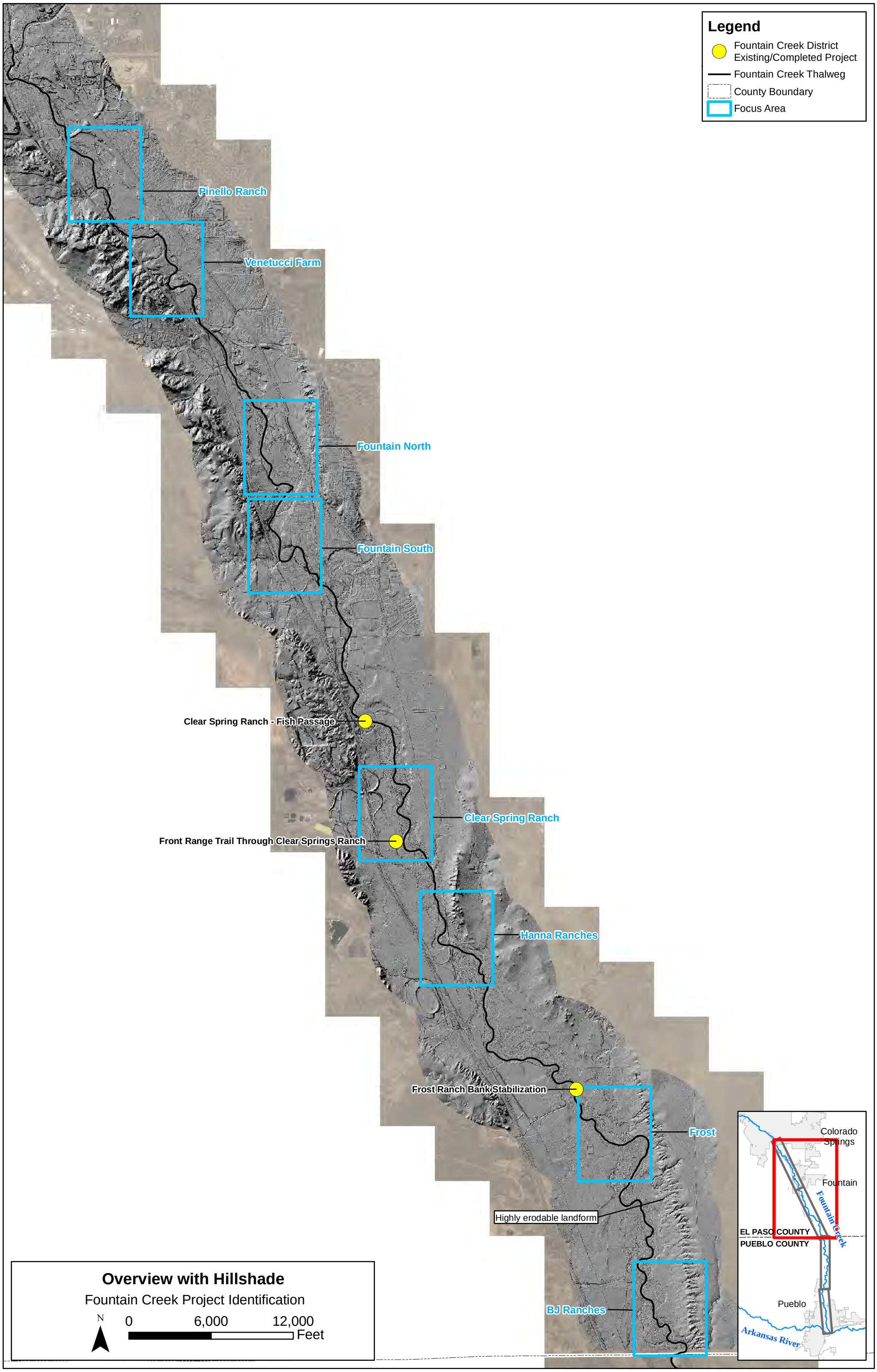
12				
	1955	**1983**	**2003**	**2016/2018**
Stream Length (ft)	15,871	16,601	17,295	16,244
Valley Length (ft)	14,490	14,490	14,490	14,484
Sinuosity	1.1	1.1	1.2	1.1
Minimum Meander Wavelength (ft)	1,316	2,046	1,114	1,239
Maximum Meander Wavelength (ft)	3,009	3,534	3,686	3,628
Average Meander Wavelength (ft)	1,866	2,773	2,455	2,959
Minimum Radius (ft)	429	518	267	399
Maximum Radius (ft)	1,293	1,830	936	1,837
Average Radius (ft)	710	1,004	642	1,102

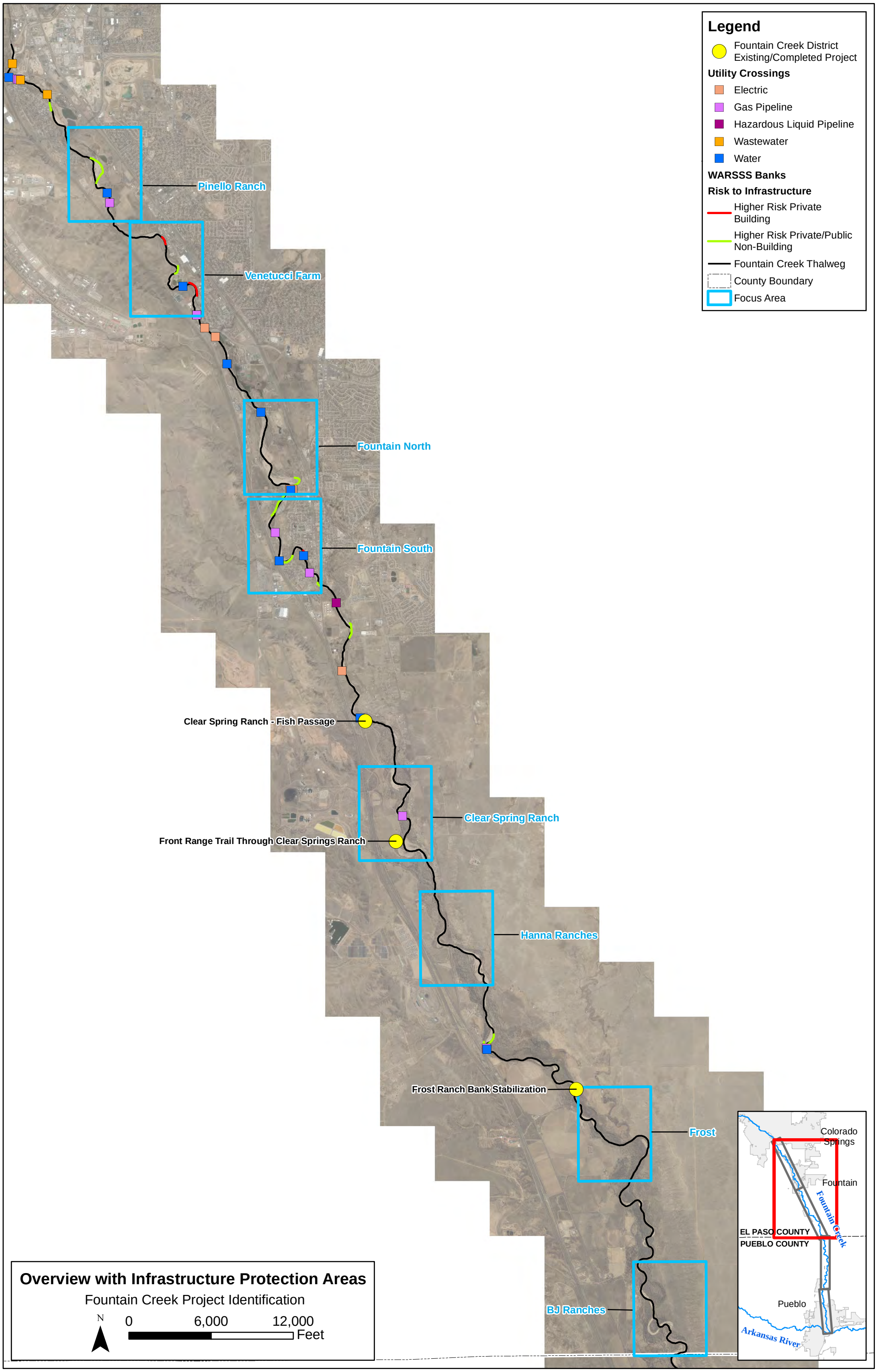
Segment 13: Upstream of U.S. 50 to Confluence with Arkansas River

Segment thirteen's low sinuosity and large average meander wavelength indicate a channelized, straight planform. Sinuosity remains unchanged though all 4 time periods. The average radius of curvature is variable but has increased since 2003, returning to values similar to those in 1983. The bankfull width and meander belt are narrow in this section perhaps due to lateral confinement by encroaching development and the levee system.

13				
	1955	**1983**	**2003**	**2016/2018**
Stream Length (ft)	16,889	16,943	17,674	16,872
Valley Length (ft)	15,812	15,927	16,035	16,029
Sinuosity	1.1	1.1	1.1	1.1
Minimum Meander Wavelength (ft)	2,148	1,313	985	4,744
Maximum Meander Wavelength (ft)	5,752	7,217	3,437	5,245
Average Meander Wavelength (ft)	4,117	3,357	2,049	4,995
Minimum Radius (ft)	989	853	411	572
Maximum Radius (ft)	2,926	2,323	1,380	2,393
Average Radius (ft)	1,873	1,291	896	1,331

Appendix D – Indicator Maps


Legend
Fountain Creek District Existing/Completed Project
Fountain Creek Thalweg
County Boundary
Focus Area
Pinello Ranch
Venetucci Farm
Fountain North
Fountain South
Clear Spring Ranch - Fish Passage
Clear Spring Ranch
Front Range Trail Through Clear Springs Ranch
Hanna Ranches
Frost Ranch Bank Stabilization
Frost
Highly erodable landform
BJ Ranches
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River
Overview with Hillshade
Fountain Creek Project Identification
N
0
6,000
12,000
Feet


Legend
Fountain Creek District Existing/Completed Project
Utility Crossings
Electric
Gas Pipeline
Hazardous Liquid Pipeline
Wastewater
Water
WARSSS Banks
Risk to Infrastructure
Higher Risk Private Building
Higher Risk Private/Public Non-Building
Fountain Creek Thalweg
County Boundary
Focus Area
Pinello Ranch
Venetucci Farm
Fountain North
Fountain South
Clear Spring Ranch - Fish Passage
Clear Spring Ranch
Front Range Trail Through Clear Springs Ranch
Hanna Ranches
Frost Ranch Bank Stabilization
Frost
BJ Ranches
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River
Overview with Infrastructure Protection Areas
Fountain Creek Project Identification
N
0
6,000
12,000
Feet

Legend

- Fountain Creek District Existing/Completed Project

Relative Elevation

- 0 - 3 ft
- 3 - 6 ft
- 6 - 9 ft
- 9 - 12 ft
- > 12 ft
- Fountain Creek Thalweg
- County Boundary
- Focus Area

Pinello Ranch

Venetucci Farm

Fountain North

Fountain South

Clear Spring Ranch - Fish Passage

Clear Spring Ranch

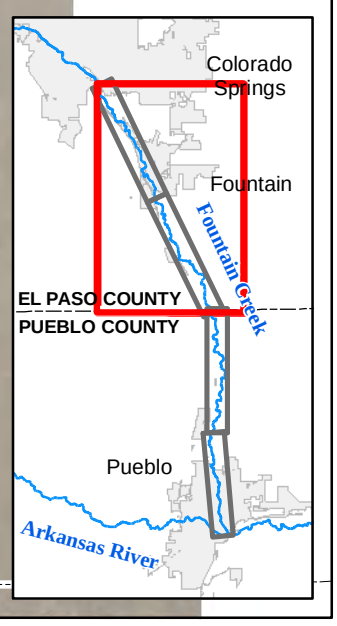
Front Range Trail Through Clear Springs Ranch

Hanna Ranches

Frost Ranch Bank Stabilization

Frost

BJ Ranches



Overview with Relative Elevation Model

Fountain Creek Project Identification

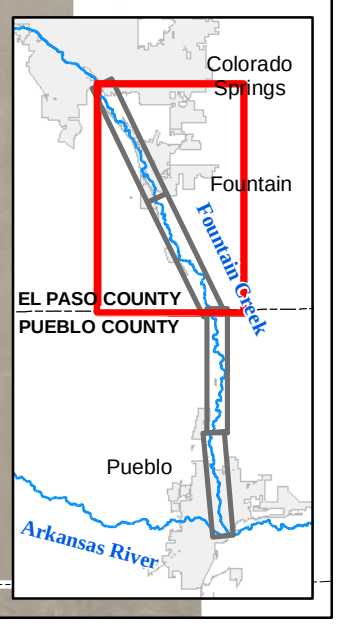
N

0 6,000 12,000 Feet

Legend

- Fountain Creek District Existing/Completed Project
- Potential Revegetation Area (Acres)
- Fountain Creek Thalweg
- County Boundary
- Focus Area

7 AC
9 AC
Pinello Ranch
Venetucci Farm
Fountain North
19 AC
3 AC
6 AC
10 AC
Fountain South
Clear Spring Ranch - Fish Passage
4 AC
2 AC
Clear Spring Ranch
Front Range Trail Through Clear Springs Ranch
16 AC
2 AC
Hanna Ranches
1 AC
6 AC
Frost Ranch Bank Stabilization
Frost
BJ Ranches
7 AC
9 AC
12 AC



Overview with Revegetation Areas

Fountain Creek Project Identification

N

0 6,000 12,000 Feet

US Slope: 0.003 ft/ft
DS Slope: 0.0066 ft/ft

100YR, 10YR, 2x Bankfull

US Slope: 0.0066 ft/ft
DS Slope: 0.0032 ft/ft

US Slope: 0.005 ft/ft
DS Slope: 0.0057 ft/ft

Pinello Ranch

US Slope: 0.0057 ft/ft
DS Slope: 0.0048 ft/ft

US Slope: 0.0048 ft/ft
DS Slope: 0.0058 ft/ft

Venetucci Farm

US Slope: 0.0047 ft/ft
DS Slope: 0.0058 ft/ft

US Slope: 0.0058 ft/ft
DS Slope: 0.0035 ft/ft

US Slope: 0.0044 ft/ft
DS Slope: 0.0034 ft/ft

US Slope: 0.0035 ft/ft
DS Slope: 0.0047 ft/ft

US Slope: 0.0034 ft/ft
DS Slope: 0.0039 ft/ft

US Slope: 0.0058 ft/ft
DS Slope: 0.0044 ft/ft

US Slope: 0.0039 ft/ft
DS Slope: 0.007 ft/ft

US Slope: 0.0093 ft/ft
DS Slope: 0.0044 ft/ft

Fountain North

US Slope: 0.007 ft/ft
DS Slope: 0.0093 ft/ft

US Slope: 0.0044 ft/ft
DS Slope: 0.0041 ft/ft

Fountain South

US Slope: 0.0041 ft/ft
DS Slope: 0.0045 ft/ft

Clear Spring Ranch - Fish Passage

US Slope: 0.0045 ft/ft
DS Slope: 0.0039 ft/ft

Clear Spring Ranch

Front Range Trail Through Clear Springs Ranch

Hanna Ranches

100YR

Frost Ranch Bank Stabilization

Frost

BJ Ranches

Legend

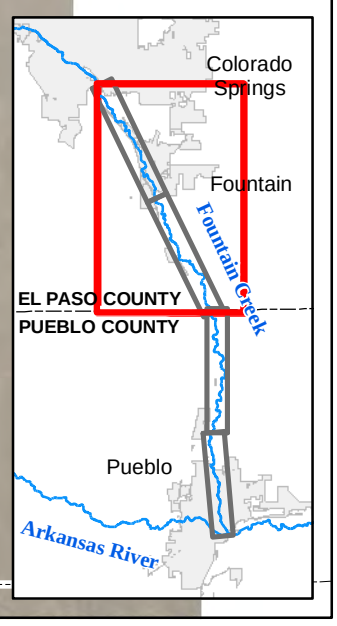
- Fountain Creek District Existing/Completed Project
- Velocity Peak
- Slope Break

HEC-RAS 100-YR Velocity (ft/s)

High : 25.996

Low : 0

- Fountain Creek Thalweg
- County Boundary
- Focus Area



Overview with Velocities and Slope Breaks

Fountain Creek Project Identification

N

0 6,000 12,000 Feet

Overview with Hillshade

Fountain Creek Project Identification

N

0 6,000 12,000 Feet

Legend

- Fountain Creek District Existing/Completed Project
- Fountain Creek Thalweg
- County Boundary
- Focus Area

Wood Valley Ditch

Highly erodable landform

T Cross Properties

Masciantonio Trust Bank Restoration

Lower Masciantonio Trust North

Lower Masciantonio Trust South

Overton Road Bank Restoration

Upstream of Piñon Bridge

Piñon Bridge Bank Stabilization

Barr Farm Channel Restoration Phase 2

Barr Farm Channel Restoration Phase 1

Hancock-Greenview Trust

Greenview Trust South

Sandoval Property

Eagleridge

Pueblo Side Detention

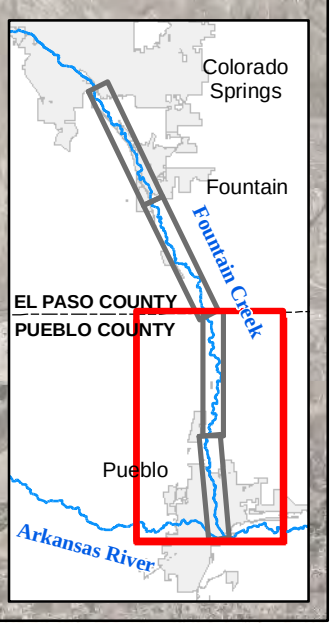
Highway 47 Bank Restoration

Fountain Creek Channel Restoration at 13th St in Pueblo

Pueblo Levee Dredging & Maintenance

Sediment Collector Pilot

Pueblo Levee System



Overview with Infrastructure Protection Areas

Fountain Creek Project Identification

N

0 6,000 12,000 Feet

Legend

- Fountain Creek District Existing/Completed Project

Utility Crossings

- Electric
- Gas Pipeline

WARSSS Banks

Risk to Infrastructure

- Higher Risk Private Building
- Higher Risk Private/Public Non-Building
- Fountain Creek Thalweg
- County Boundary
- Focus Area

Wood Valley Ditch

T Cross Properties

Masciantonio Trust Bank Restoration

Lower Masciantonio Trust North

Lower Masciantonio Trust South

Overton Road Bank Restoration

Upstream of Piñon Bridge

Piñon Bridge Bank Stabilization

Barr Farm Channel Restoration Phase 2

Barr Farm Channel Restoration Phase 1

Hancock Greenview Trust

Greenview Trust South

Sandoval Property

Eagleridge

Pueblo Side Detention

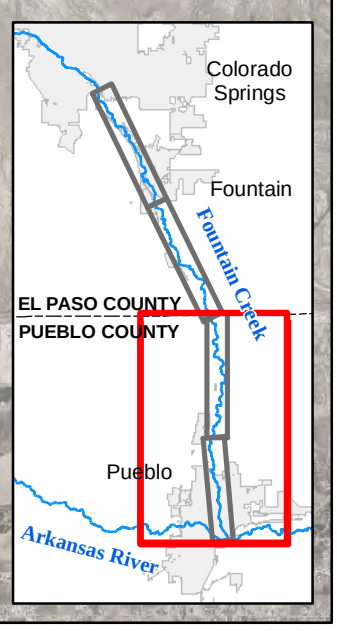
Highway 47 Bank Restoration

Fountain Creek Channel Restoration at 13th St in Pueblo

Pueblo Levee Dredging & Maintenance

Pueblo Levee System

Sediment Collector Pilot



Overview with Relative Elevation Model

Fountain Creek Project Identification

N

0 6,000 12,000 Feet

Legend

- Fountain Creek District Existing/Completed Project

Relative Elevation

- 0 - 3 ft
- 3 - 6 ft
- 6 - 9 ft
- 9 - 12 ft
- > 12 ft
- Fountain Creek Thalweg
- County Boundary
- Focus Area

Wood Valley Ditch

T Cross Properties

Masciantonio Trust Bank Restoration

Physical/Modeled Constriction

Lower Masciantonio Trust North

Lower Masciantonio Trust South

Overton Road Bank Restoration

Upstream of Piñon Bridge

Piñon Bridge Bank Stabilization

Barr Farm Channel Restoration Phase 2

Barr Farm Channel Restoration Phase 1

Hancock-Greenview Trust

Greenview Trust South

Physical/Modeled Constriction

Sandoval Property

Eagleridge

Physical/Modeled Constriction

Pueblo Side Detention

Highway 47 Bank Restoration

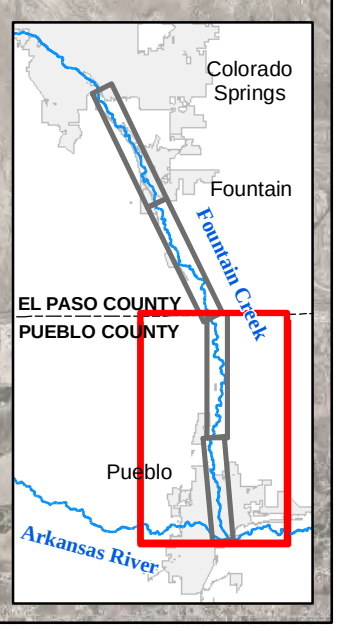
Physical/Modeled Constriction
(City Encroachment and Levee System)

Fountain Creek Channel
Restoration at 13th St in Pueblo

Pueblo Levee Dredging & Maintenance

Sediment Collector Pilot

Pueblo Levee System



Overview with Revegetation Areas

Fountain Creek Project Identification

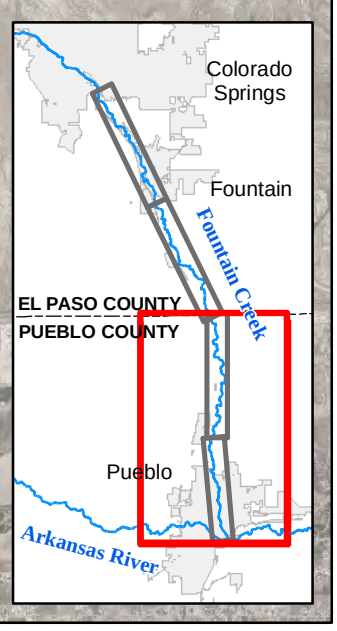
N

0 6,000 12,000 Feet

Legend

- Fountain Creek District Existing/Completed Project
- Potential Revegetation Area (Acres)
- Fountain Creek Thalweg
- County Boundary
- Focus Area

AC
9 AC
Wood Valley Ditch
T Cross Properties
Masciantonio Trust Bank Restoration
6 AC
Lower Masciantonio Trust North
33 AC
Lower Masciantonio Trust South
13 AC
Overton Road Bank Restoration
7 AC
Upstream of Piñon Bridge
Piñon Bridge Bank Stabilization
Barr Farm Channel Restoration Phase 2
34 AC
Barr Farm Channel Restoration Phase 1
Hancock Greenview Trust
3 AC
Greenview Trust South
Sandoval Property
9 AC
Eagleridge
Pueblo Side Detention
Highway 47 Bank Restoration
Fountain Creek Channel Restoration at 13th St in Pueblo
9 AC
Pueblo Levee Dredging & Maintenance
Sediment Collector Pilot
Pueblo Levee System



Overview with Velocities and Slope Breaks

Fountain Creek Project Identification

N

0 6,000 12,000 Feet

Legend

- Fountain Creek District Existing/Completed Project
- Velocity Peak
- Slope Break
- Fountain Creek Thalweg

HEC-RAS 100-YR Velocity (ft/s)

High : 25.996

Low : 0

- County Boundary
- Focus Area

Wood Valley Ditch

T Cross Properties

Masciantonio Trust Bank Restoration

Lower Masciantonio Trust North

Lower Masciantonio Trust South

Overton Road Bank Restoration

100YR

Upstream of Piñon Bridge

10YR, 2x Bankfull

Piñon Bridge Bank Stabilization

100YR

2x Bankfull

Barr Farm Channel Restoration Phase 2

Barr Farm Channel Restoration Phase 1

Hancock Greenview Trust

Bankfull

Greenview Trust South

100YR, 10YR, 2x Bankfull

Bankfull

10YR, 2x Bankfull, Bankfull

Sandoval Property

10YR, 2x Bankfull, Bankfull

100YR, 10YR, 2x Bankfull, Bankfull

Eagleridge

100YR

100YR

US Slope: 0.0039 ft/ft

DS Slope: 0.0047 ft/ft

Pueblo Side Detention

Highway 47 Bank Restoration

100YR, 10YR

2x Bankfull

100YR

Bankfull

10YR

Bankfull

US Slope: 0.0047 ft/ft

DS Slope: 0.004 ft/ft

Fountain Creek Channel Restoration at 13th St in Pueblo

Pueblo Levee Dredging & Maintenance

10YR

100YR, 10YR

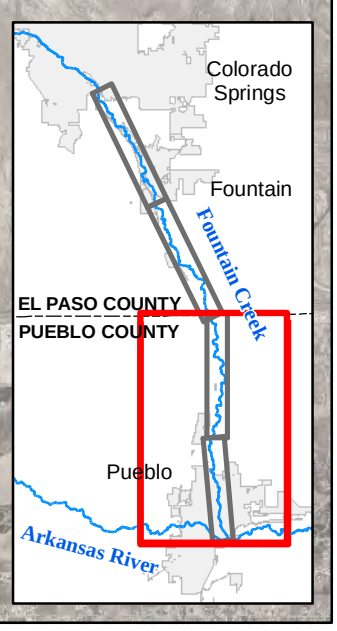
Pueblo Levee System

2x Bankfull, Bankfull

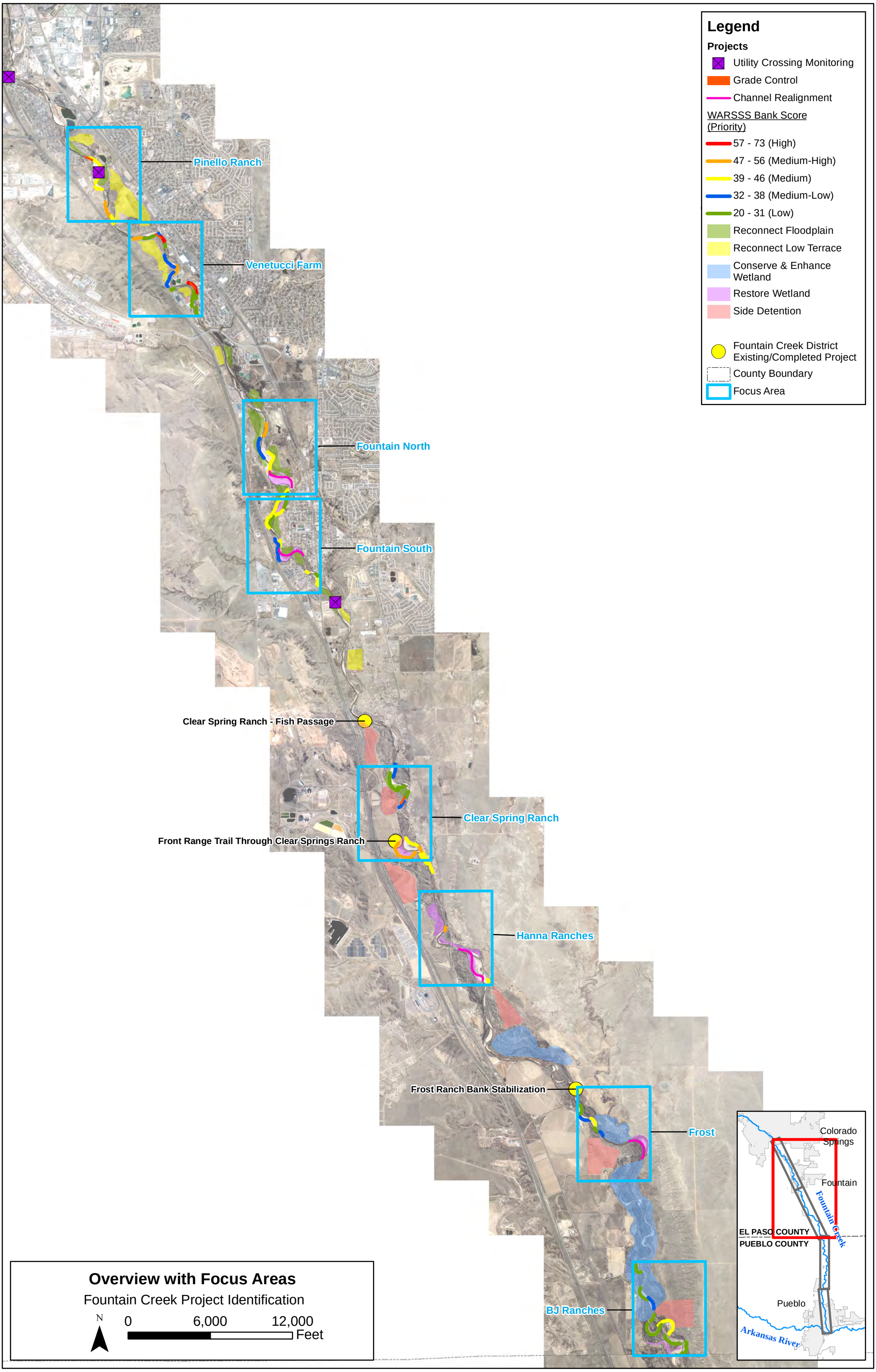
Bankfull

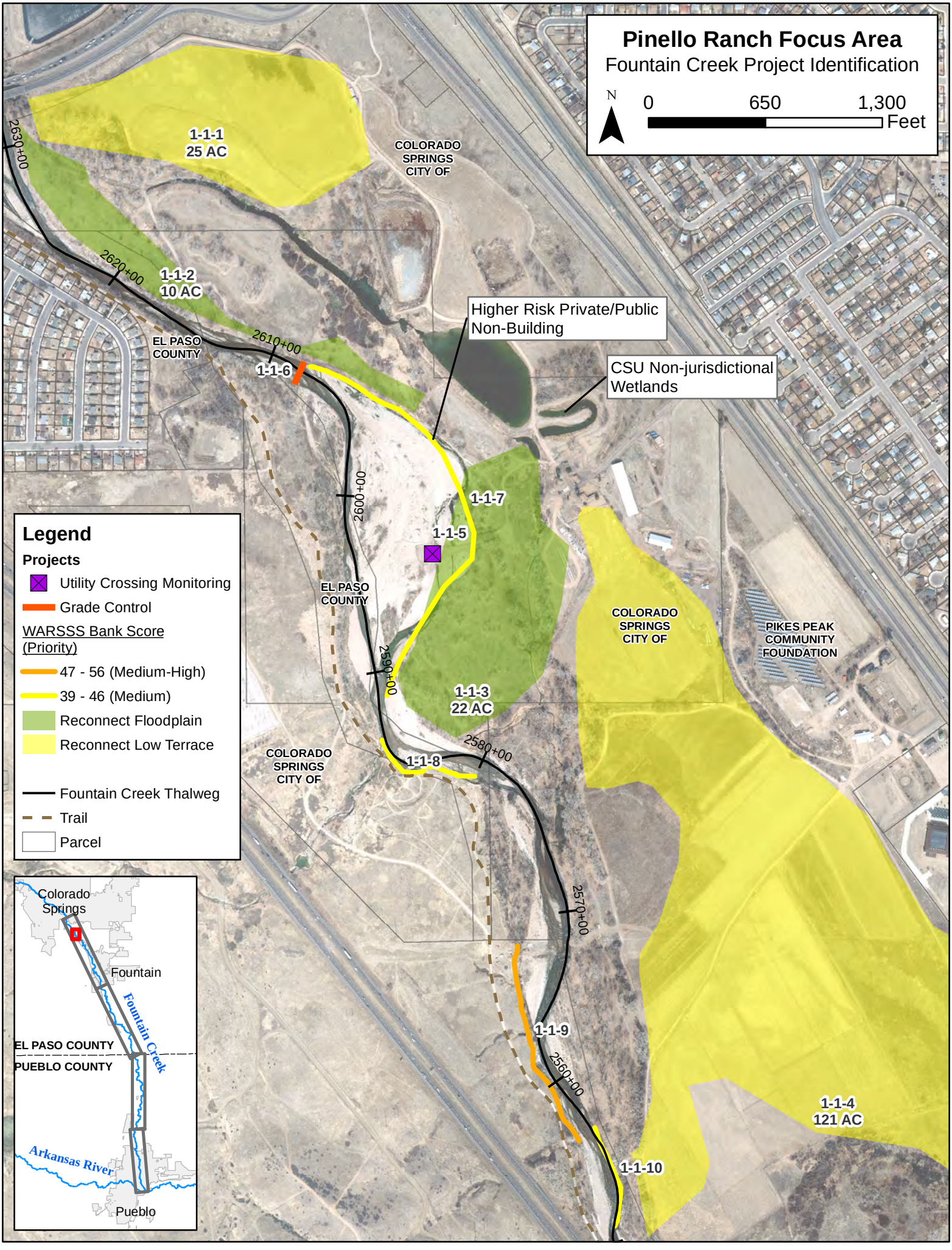
100YR

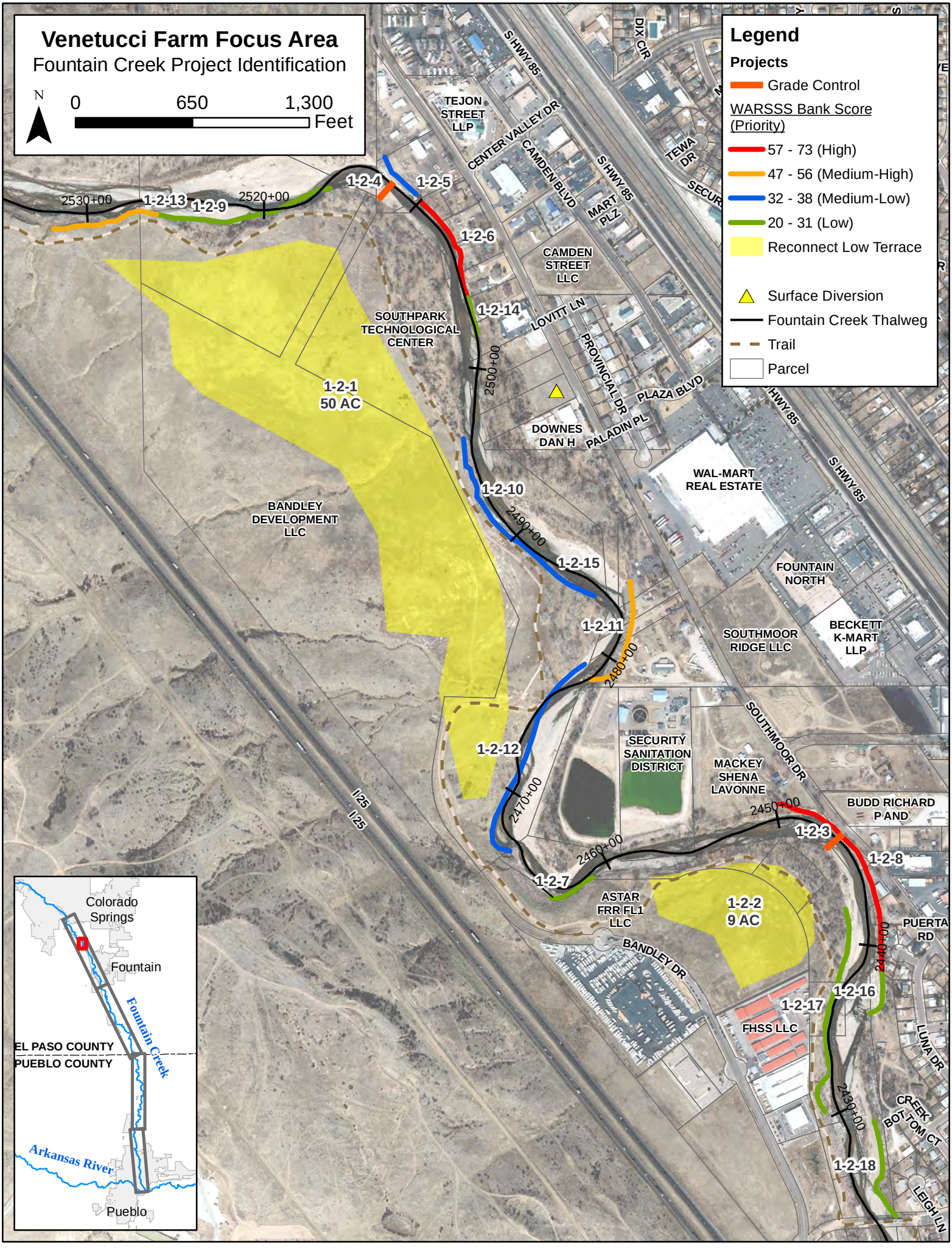
Sediment Collector Pilot

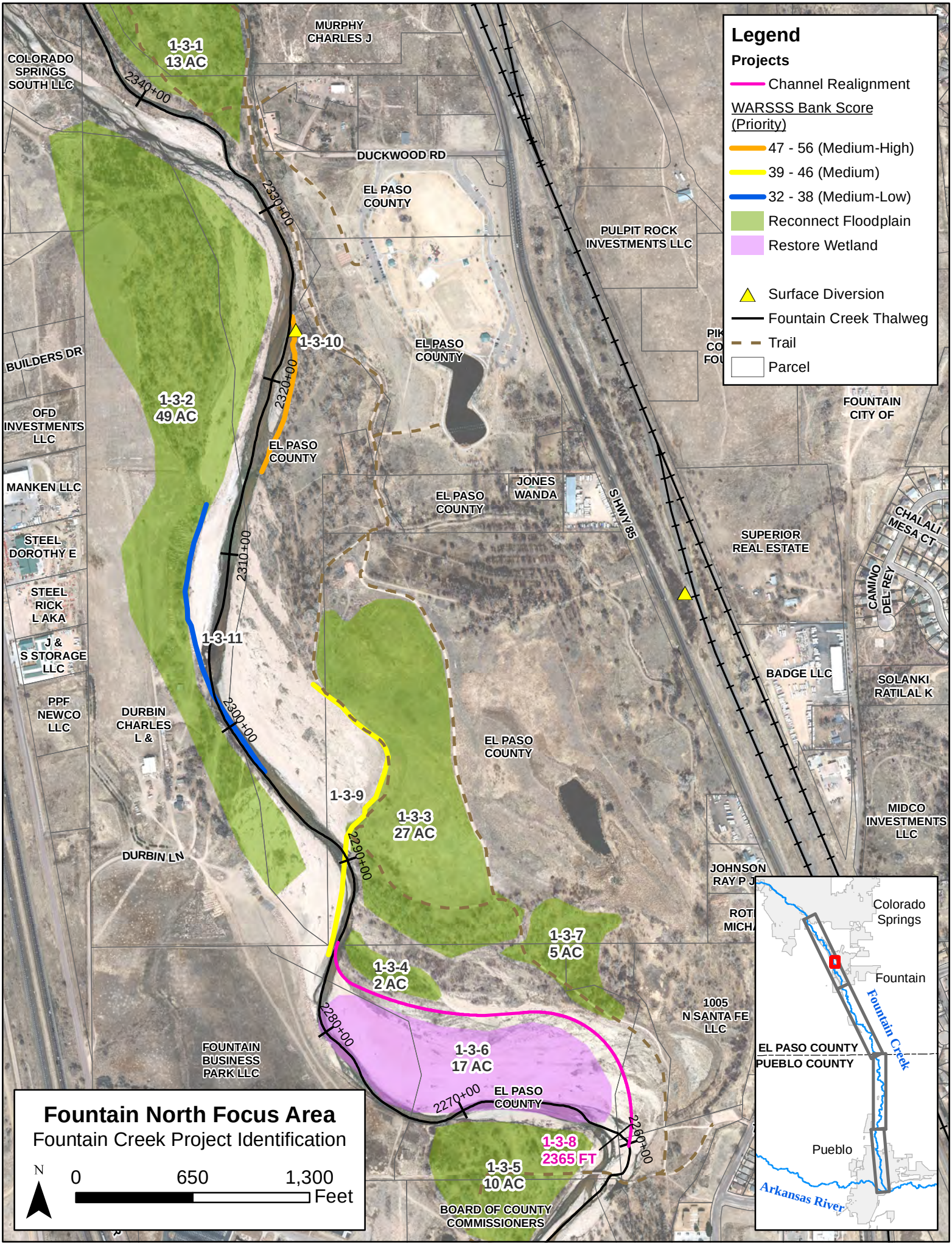


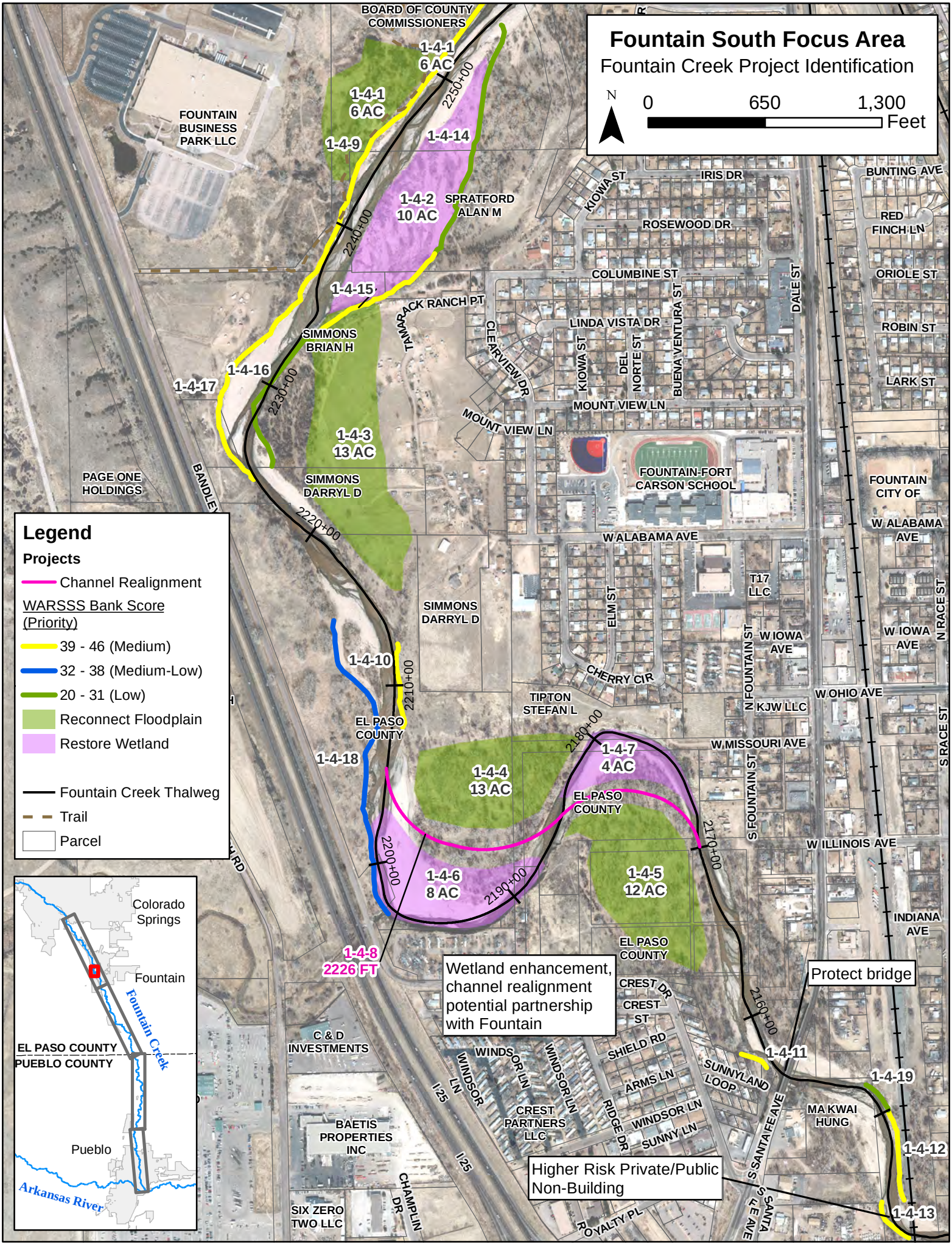
Appendix E – Focus Area Maps

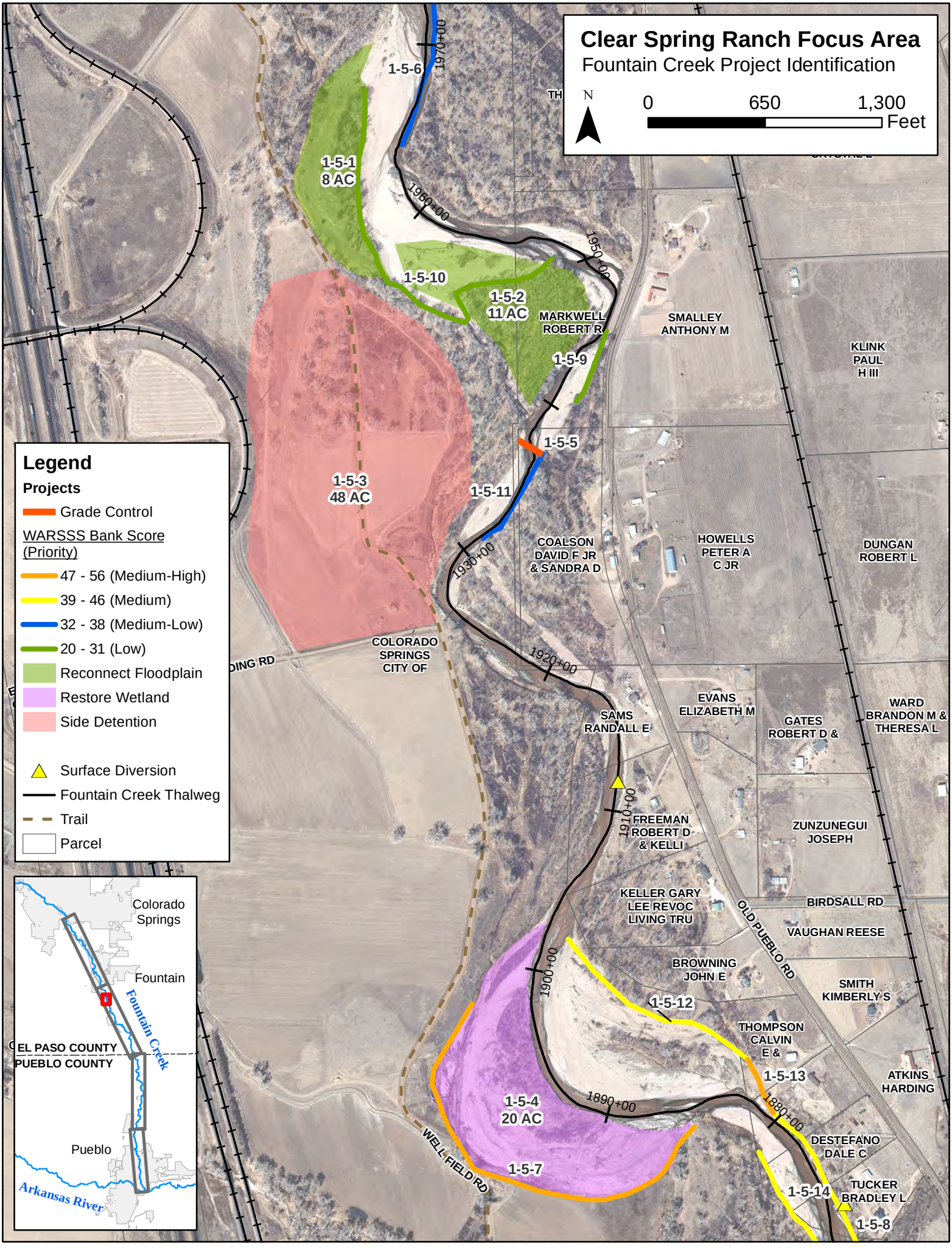

Legend
Projects
Utility Crossing Monitoring
Grade Control
Channel Realignment
WARSSS Bank Score (Priority)
57 - 73 (High)
47 - 56 (Medium-High)
39 - 46 (Medium)
32 - 38 (Medium-Low)
20 - 31 (Low)
Reconnect Floodplain
Reconnect Low Terrace
Conserve & Enhance Wetland
Restore Wetland
Side Detention
Fountain Creek District Existing/Completed Project
County Boundary
Focus Area
Pinello Ranch
Venetucci Farm
Fountain North
Fountain South
Clear Spring Ranch - Fish Passage
Clear Spring Ranch
Front Range Trail Through Clear Springs Ranch
Hanna Ranches
Frost Ranch Bank Stabilization
Frost
BJ Ranches
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River
Overview with Focus Areas
Fountain Creek Project Identification
N
0
6,000
12,000
Feet

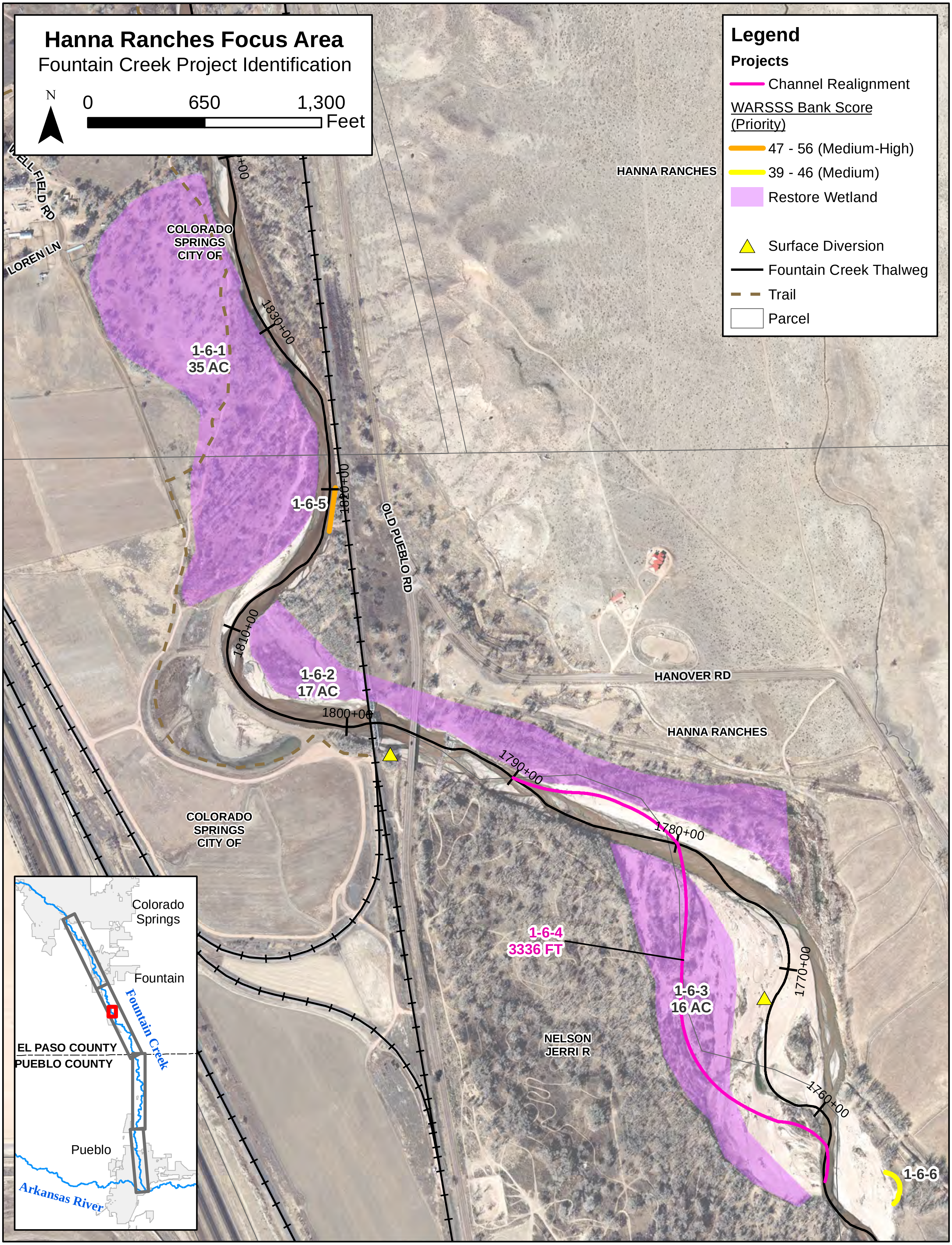

Pinello Ranch Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
1-1-1
25 AC
COLORADO SPRINGS CITY OF
2630+00
2620+00
1-1-2
10 AC
EL PASO COUNTY
2610+00
1-1-6
Higher Risk Private/Public Non-Building
CSU Non-jurisdictional Wetlands
2600+00
1-1-7
1-1-5
EL PASO COUNTY
COLORADO SPRINGS CITY OF
PIKES PEAK COMMUNITY FOUNDATION
2590+00
1-1-3
22 AC
2580+00
COLORADO SPRINGS CITY OF
1-1-8
2570+00
1-1-9
2560+00
1-1-4
121 AC
1-1-10
Legend
Projects
Utility Crossing Monitoring
Grade Control
WARSSS Bank Score (Priority)
47 - 56 (Medium-High)
39 - 46 (Medium)
Reconnect Floodplain
Reconnect Low Terrace
Fountain Creek Thalweg
Trail
Parcel
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Arkansas River
Pueblo

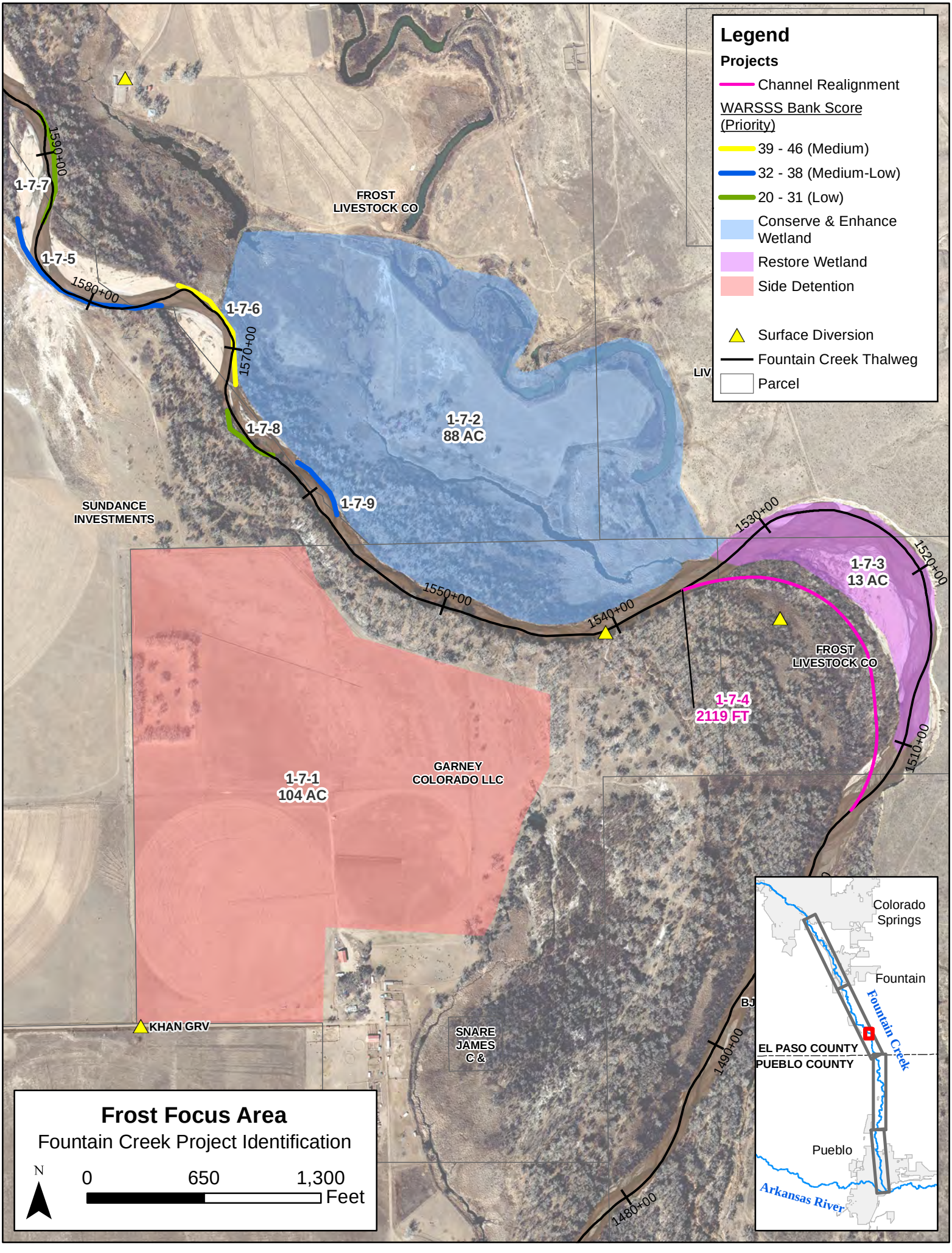

Venetucci Farm Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
Legend
Projects
Grade Control
WARSSS Bank Score (Priority)
57 - 73 (High)
47 - 56 (Medium-High)
32 - 38 (Medium-Low)
20 - 31 (Low)
Reconnect Low Terrace
Surface Diversion
Fountain Creek Thalweg
Trail
Parcel
1-2-1
50 AC
1-2-2
9 AC
1-2-3
1-2-4
1-2-5
1-2-6
1-2-7
1-2-8
1-2-9
1-2-10
1-2-11
1-2-12
1-2-13
1-2-14
1-2-15
1-2-16
1-2-17
1-2-18
2530+00
2520+00
2500+00
2490+00
2480+00
2470+00
2460+00
2450+00
2440+00
2439+00
S HWY 85
DIX CIR
TEJON STREET LLP
CENTER VALLEY DR
CAMDEN BLVD
MART PLZ
TEWA DR
CAMDEN STREET LLC
LOVITT LN
PROVINCIAL DR
PLAZA BLVD
PALADIN PL
DOWNES DAN H
SOUTHPARK TECHNOLOGICAL CENTER
BANDLEY DEVELOPMENT LLC
WAL-MART REAL ESTATE
FOUNTAIN NORTH
SOUTHMOOR RIDGE LLC
BECKETT K-MART LLP
SOUTHMOOR DR
SECURITY SANITATION DISTRICT
MACKEY SHENA LAVONNE
BUDD RICHARD P AND
ASTAR FRR FL1 LLC
BANDLEY DR
PUERTA RD
FHSS LLC
LUNA DR
CREEK BOTTOM CT
LEIGH LN
I-25
I-25
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Arkansas River
Pueblo

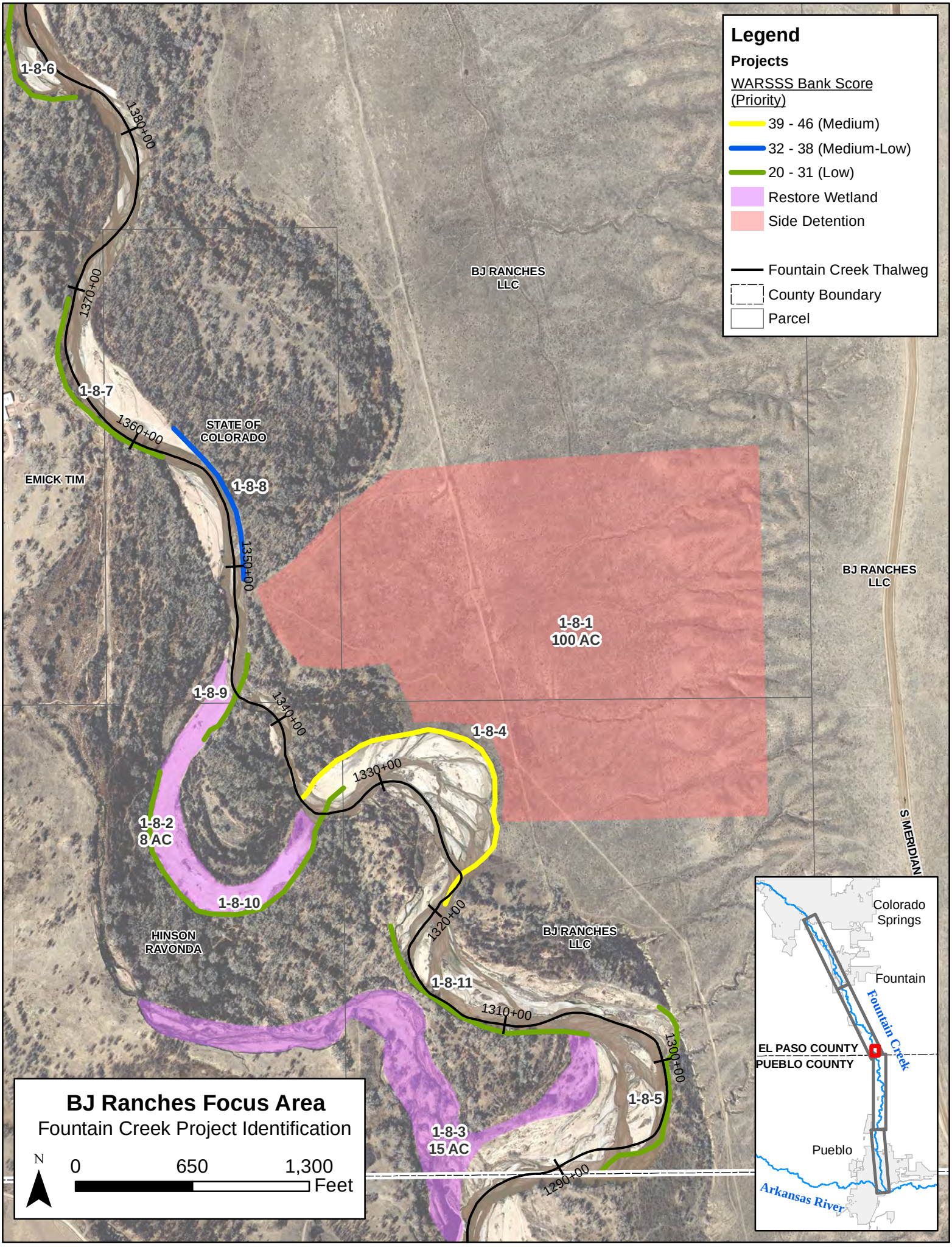

Legend
Projects
Channel Realignment
WARSSS Bank Score (Priority)
47 - 56 (Medium-High)
39 - 46 (Medium)
32 - 38 (Medium-Low)
Reconnect Floodplain
Restore Wetland
Surface Diversion
Fountain Creek Thalweg
Trail
Parcel
1-3-1 13 AC
1-3-2 49 AC
1-3-3 27 AC
1-3-4 2 AC
1-3-5 10 AC
1-3-6 17 AC
1-3-7 5 AC
1-3-8 2365 FT
1-3-9
1-3-10
1-3-11
2340+00
2330+00
2320+00
2310+00
2300+00
2290+00
2280+00
2270+00
2260+00
MURPHY CHARLES J
COLORADO SPRINGS SOUTH LLC
DUCKWOOD RD
EL PASO COUNTY
PULPIT ROCK INVESTMENTS LLC
BUILDERS DR
OFD INVESTMENTS LLC
MANKEN LLC
STEEL DOROTHY E
STEEL RICK L AKA
J & S STORAGE LLC
PPF NEWCO LLC
DURBIN CHARLES L &
DURBIN LN
JONES WANDA
S HWY 85
FOUNTAIN CITY OF
SUPERIOR REAL ESTATE
CHALALI MESA CT
CAMINO DEL REY
BADGE LLC
SOLANKI RATILAL K
MIDCO INVESTMENTS LLC
JOHNSON RAY P J
1005 N SANTA FE LLC
FOUNTAIN BUSINESS PARK LLC
BOARD OF COUNTY COMMISSIONERS
Fountain North Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River


Fountain South Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
Legend
Projects
Channel Realignment
WARSSS Bank Score (Priority)
39 - 46 (Medium)
32 - 38 (Medium-Low)
20 - 31 (Low)
Reconnect Floodplain
Restore Wetland
Fountain Creek Thalweg
Trail
Parcel
1-4-1 6 AC
1-4-9
1-4-14
1-4-2 10 AC
1-4-15
1-4-16
1-4-17
1-4-3 13 AC
1-4-10
1-4-18
1-4-4 13 AC
1-4-7 4 AC
1-4-5 12 AC
1-4-6 8 AC
1-4-8 2226 FT
1-4-11
1-4-19
1-4-12
1-4-13
2250+00
2240+00
2230+00
2220+00
2210+00
2200+00
2190+00
2180+00
2170+00
2160+00
BOARD OF COUNTY COMMISSIONERS
FOUNTAIN BUSINESS PARK LLC
SPRATFORD ALAN M
SIMMONS BRIAN H
SIMMONS DARRYL D
PAGE ONE HOLDINGS
EL PASO COUNTY
TIPTON STEFAN L
C & D INVESTMENTS
BAETIS PROPERTIES INC
SIX ZERO TWO LLC
CREST PARTNERS LLC
FOUNTAIN-FORT CARSON SCHOOL
FOUNTAIN CITY OF
T17 LLC
KJW LLC
MA KWAI HUNG
IRIS DR
ROSEWOOD DR
COLUMBINE ST
LINDA VISTA DR
MOUNT VIEW LN
W ALABAMA AVE
W IOWA AVE
CHERRY CIR
W OHIO AVE
W MISSOURI AVE
W ILLINOIS AVE
INDIANA AVE
CREST DR
CREST ST
SHIELD RD
ARMS LN
SUNNYLAND LOOP
WINDSOR LN
RIDGE DR
SUNNY LN
ROYALTY PL
CHAMPLIN DR
I-25
TAMARACK RANCH PT
CLEARVIEW DR
KIOWA ST
DEL NORTE ST
BUENA VENTURA ST
DALE ST
ELM ST
N FOUNTAIN ST
S FOUNTAIN ST
N RACE ST
S RACE ST
S SANTA FE AVE
BUNTING AVE
RED FINCH LN
ORIOLE ST
ROBIN ST
LARK ST
BANDLEY RD
Wetland enhancement, channel realignment potential partnership with Fountain
Protect bridge
Higher Risk Private/Public Non-Building
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River


Clear Spring Ranch Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
1-5-6
1970+00
1-5-1
8 AC
1960+00
1950+00
1-5-10
1-5-2
11 AC
MARKWELL
ROBERT R
SMALLEY
ANTHONY M
KLINK
PAUL
H III
1-5-9
1-5-5
1-5-3
48 AC
1-5-11
1930+00
COALSON
DAVID F JR
& SANDRA D
HOWELLS
PETER A
C JR
DUNGAN
ROBERT L
COLORADO
SPRINGS
CITY OF
1920+00
EVANS
ELIZABETH M
WARD
BRANDON M &
THERESA L
SAMS
RANDALL E
GATES
ROBERT D &
1910+00
FREEMAN
ROBERT D
& KELLI
ZUNZUNEGUI
JOSEPH
KELLER GARY
LEE REVOC
LIVING TRU
BIRDSALL RD
OLD PUEBLO RD
VAUGHAN REESE
1900+00
BROWNING
JOHN E
SMITH
KIMBERLY S
1-5-12
THOMPSON
CALVIN
E &
1-5-13
ATKINS
HARDING
1-5-4
20 AC
1890+00
1880+00
DESTEFANO
DALE C
WELL FIELD RD
1-5-7
1-5-14
TUCKER
BRADLEY L
1-5-8
Legend
Projects
Grade Control
WARSSS Bank Score (Priority)
47 - 56 (Medium-High)
39 - 46 (Medium)
32 - 38 (Medium-Low)
20 - 31 (Low)
Reconnect Floodplain
Restore Wetland
Side Detention
Surface Diversion
Fountain Creek Thalweg
Trail
Parcel
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River


Hanna Ranches Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
Legend
Projects
Channel Realignment
WARSSS Bank Score (Priority)
47 - 56 (Medium-High)
39 - 46 (Medium)
Restore Wetland
Surface Diversion
Fountain Creek Thalweg
Trail
Parcel
HANNA RANCHES
WELL FIELD RD
LOREN LN
COLORADO SPRINGS CITY OF
1-6-1
35 AC
1830+00
1-6-5
1820+00
OLD PUEBLO RD
1810+00
1-6-2
17 AC
1800+00
HANOVER RD
HANNA RANCHES
1790+00
1780+00
COLORADO SPRINGS CITY OF
1-6-4
3336 FT
1-6-3
16 AC
1770+00
NELSON JERRI R
1760+00
1-6-6
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River


Legend
Projects
Channel Realignment
WARSSS Bank Score (Priority)
39 - 46 (Medium)
32 - 38 (Medium-Low)
20 - 31 (Low)
Conserve & Enhance Wetland
Restore Wetland
Side Detention
Surface Diversion
Fountain Creek Thalweg
Parcel
1-7-7
1-7-5
1-7-6
1-7-8
1-7-9
1-7-2
88 AC
1-7-3
13 AC
1-7-4
2119 FT
1-7-1
104 AC
1590+00
1580+00
1570+00
1550+00
1540+00
1530+00
1520+00
1510+00
1490+00
1480+00
FROST LIVESTOCK CO
SUNDANCE INVESTMENTS
GARNEY COLORADO LLC
KHAN GRV
SNARE JAMES C &
Frost Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River


Legend
Projects
WARSSS Bank Score (Priority)
39 - 46 (Medium)
32 - 38 (Medium-Low)
20 - 31 (Low)
Restore Wetland
Side Detention
Fountain Creek Thalweg
County Boundary
Parcel
1-8-6
1380+00
1370+00
1-8-7
1360+00
STATE OF COLORADO
EMICK TIM
1-8-8
1350+00
BJ RANCHES LLC
1-8-1
100 AC
BJ RANCHES LLC
1-8-9
1340+00
1-8-4
1330+00
1-8-2
8 AC
1-8-10
HINSON RAVONDA
1320+00
BJ RANCHES LLC
1-8-11
1310+00
1300+00
1-8-5
1-8-3
15 AC
1290+00
S MERIDIAN
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River
BJ Ranches Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet

Overview with Focus Areas

Fountain Creek Project Identification

N

0 6,000 12,000 Feet

Wood Valley Ditch

T Cross Properties

Masciantonio Trust Bank Restoration

Lower Masciantonio Trust North

Lower Masciantonio Trust South

Overton Road Bank Restoration

Upstream of Piñon Bridge

Piñon Bridge Bank Stabilization

Barr Farm Channel Restoration Phase 2

Barr Farm Channel Restoration Phase 1

Hancock-Greenview Trust

Greenview Trust South

Sandoval Property

Eagleridge

Pueblo Side Detention

Highway 47 Bank Restoration

Fountain Creek Channel Restoration at 13th St in Pueblo

Pueblo Levee Dredging & Maintenance

Sediment Collector Pilot

Pueblo Levee System

Legend

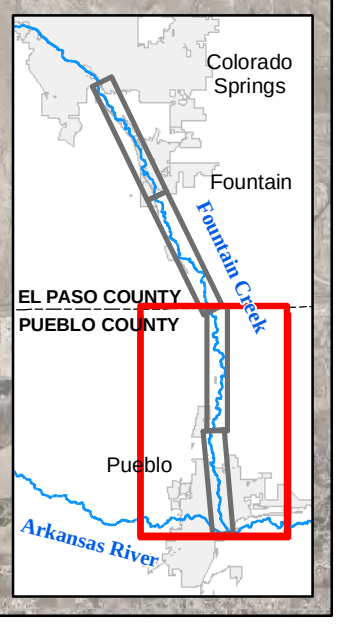
Projects

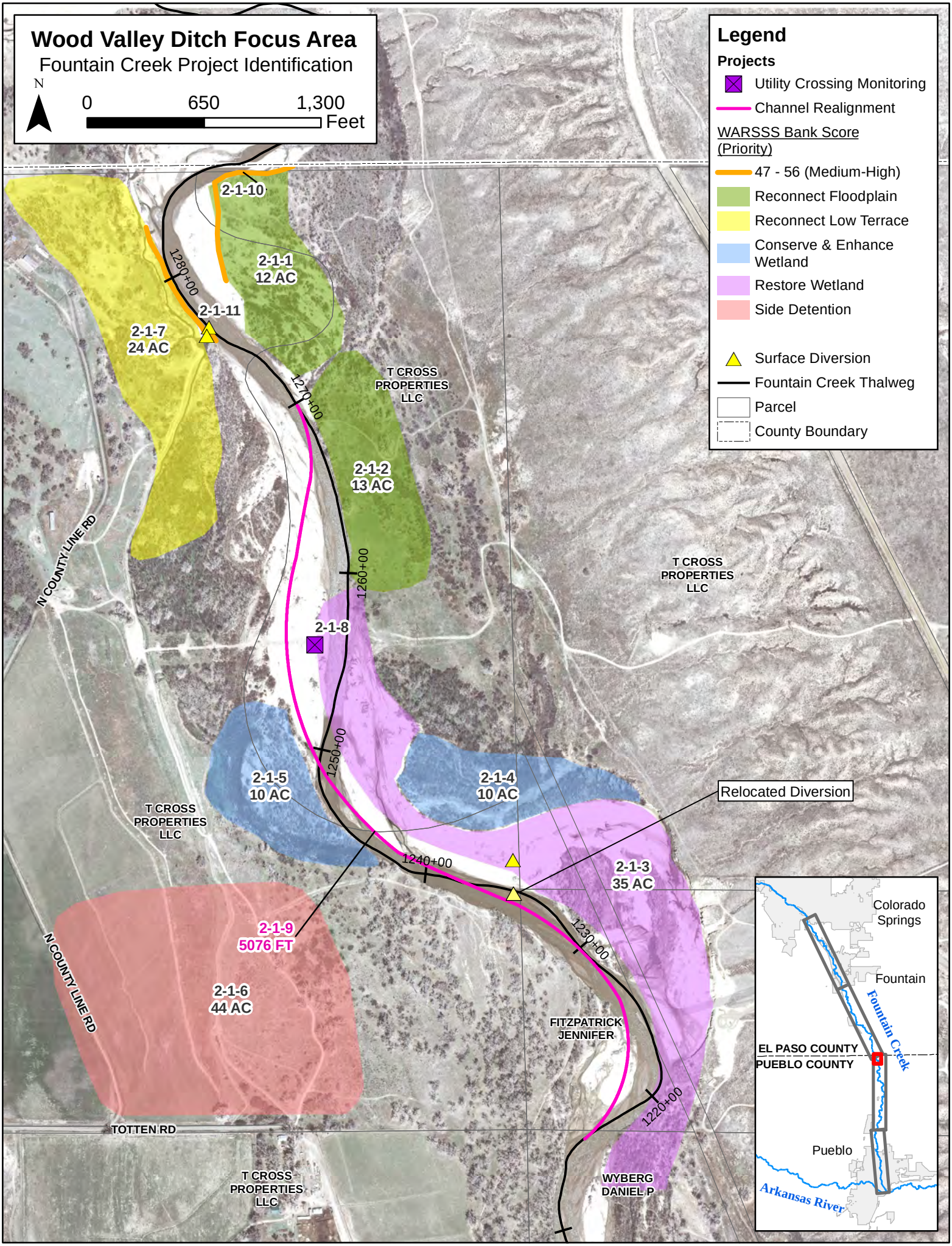
- Utility Crossing Monitoring
- Grade Control
- Channel Realignment

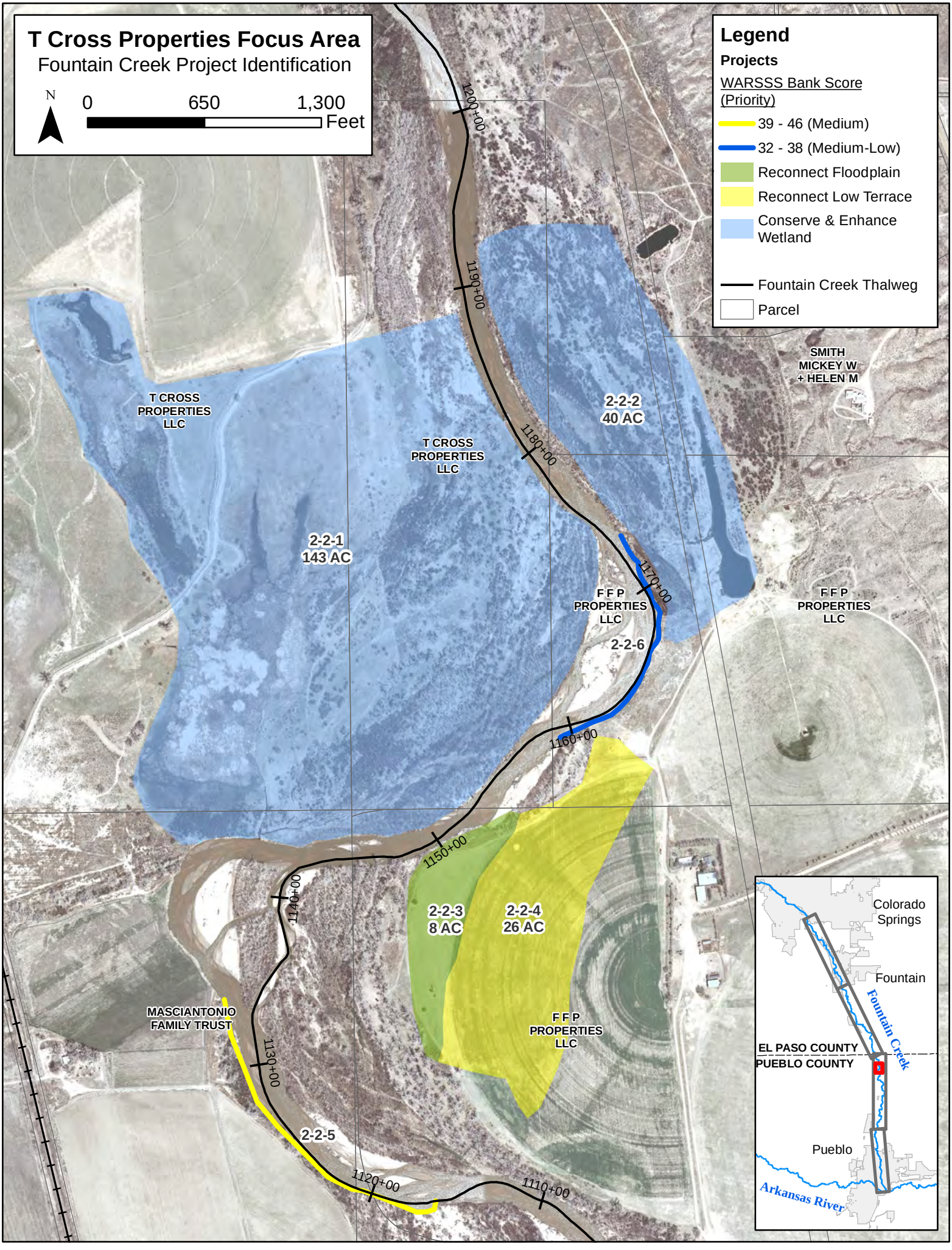
WARSSS Bank Score (Priority)

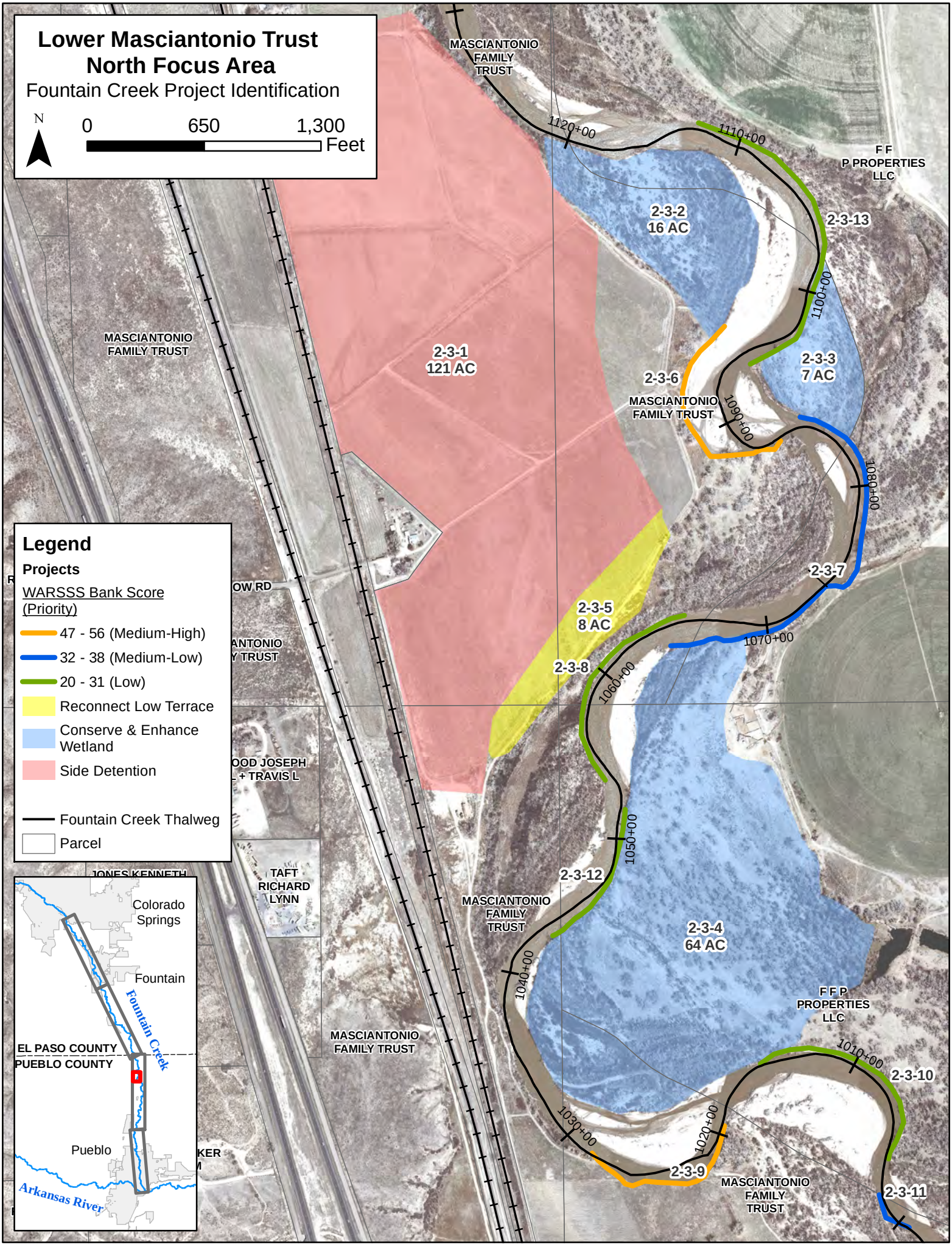
- 47 - 56 (Medium-High)
- 39 - 46 (Medium)
- 32 - 38 (Medium-Low)
- 20 - 31 (Low)
- Remove Old Approach
- Remove Railroad Approach and Abutments
- Reconnect Floodplain
- Reconnect Low Terrace
- Conserve & Enhance Wetland
- Restore Wetland
- Side Detention

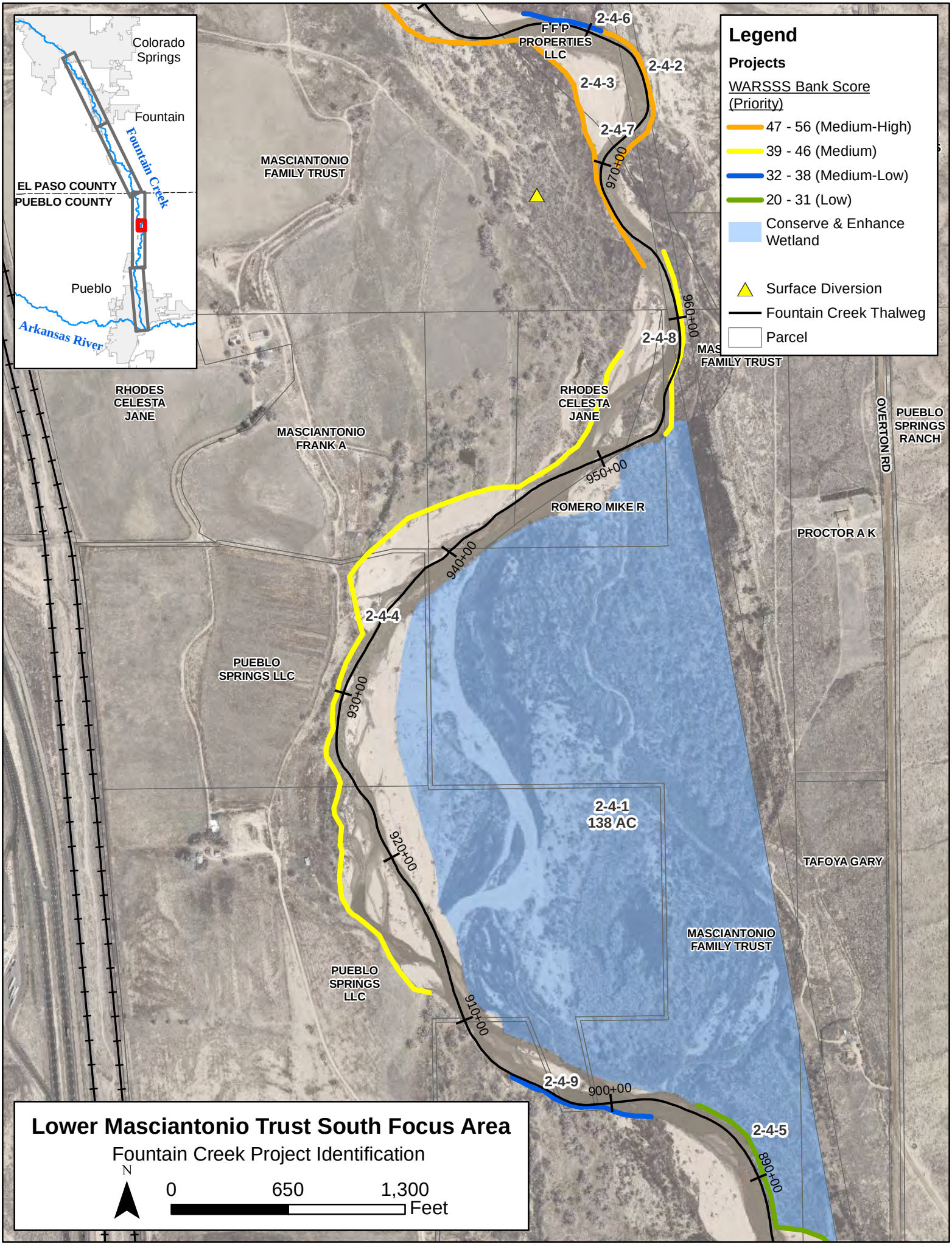
- Fountain Creek District Existing/Completed Project
- Fountain Creek Thalweg
- County Boundary
- Focus Area

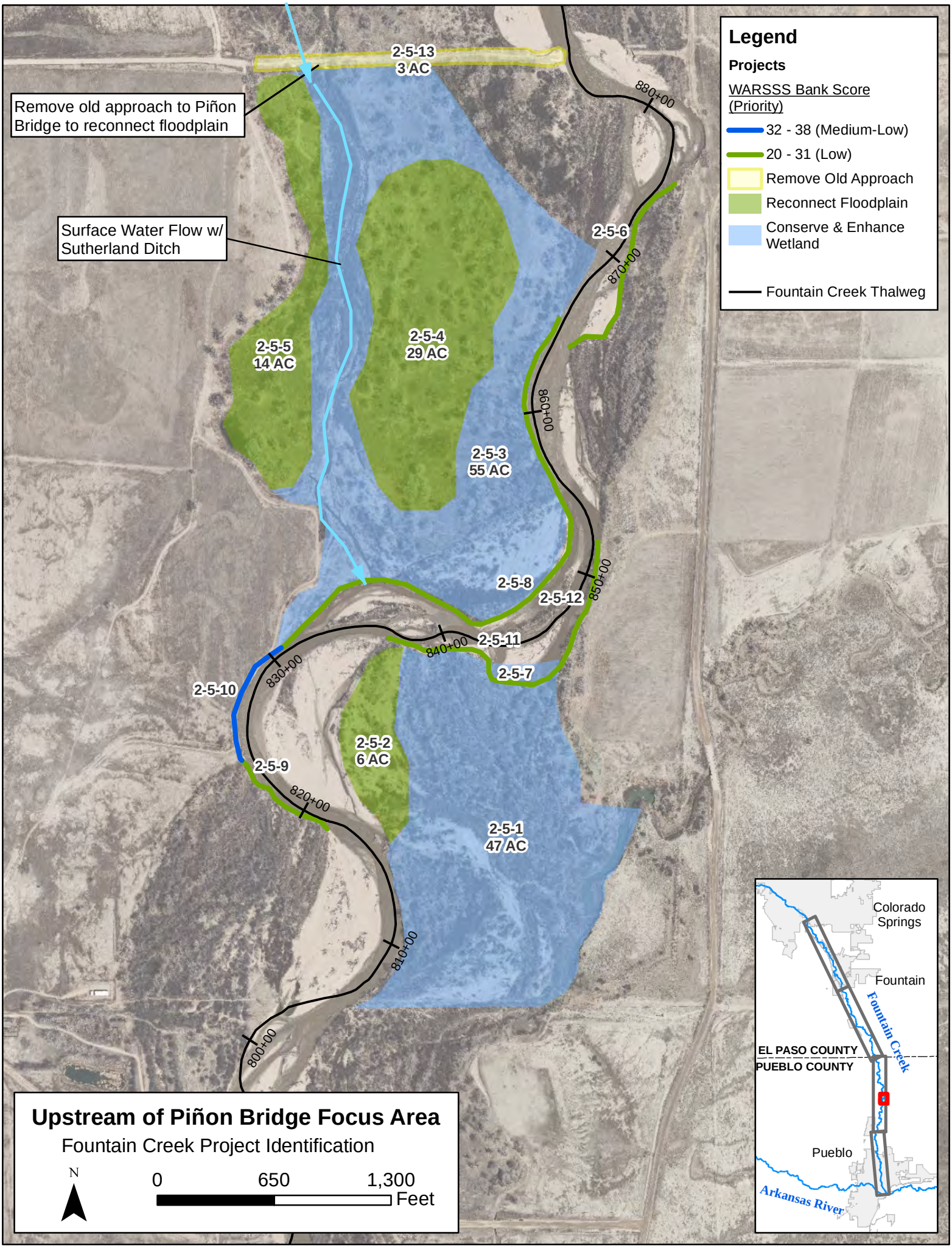


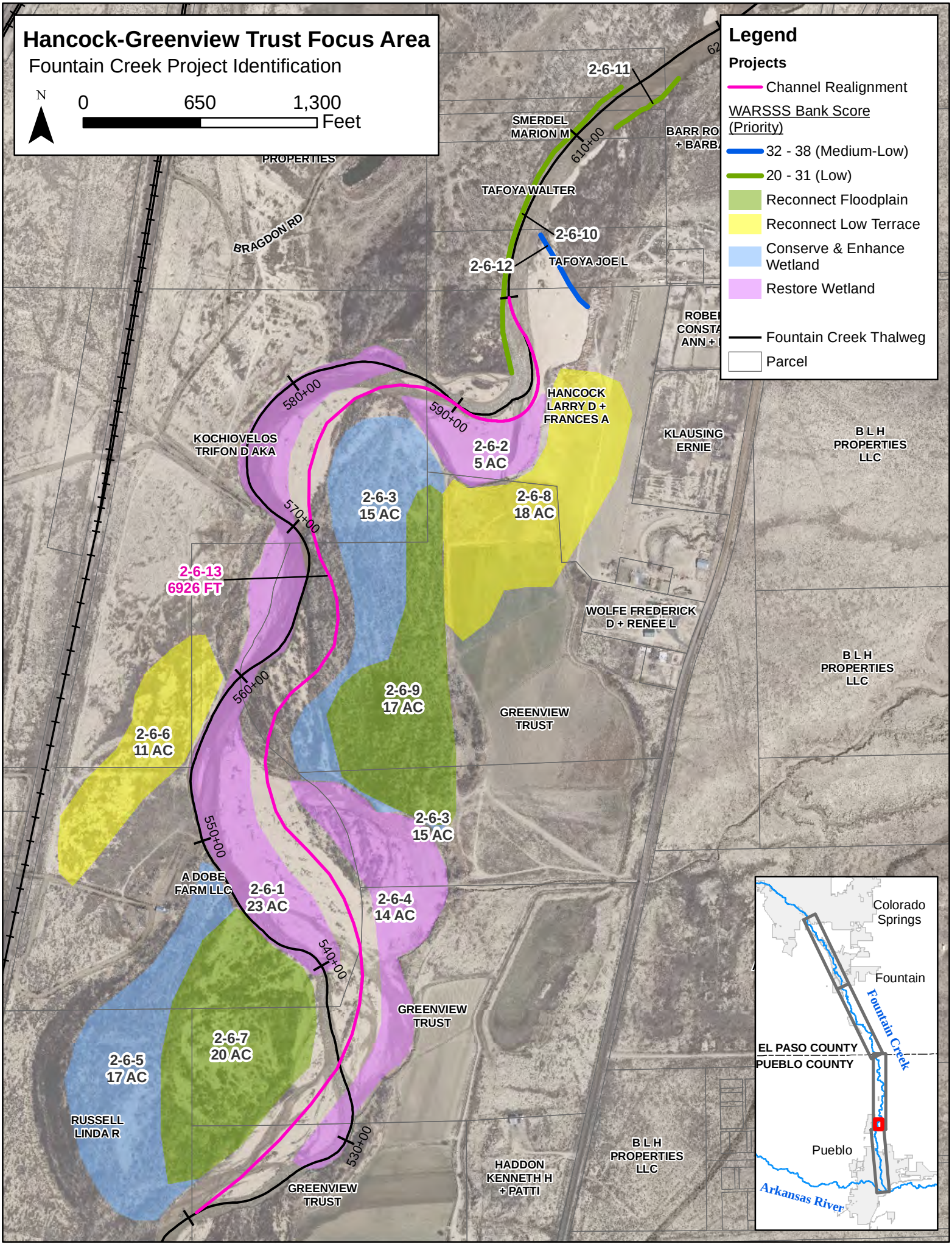

Wood Valley Ditch Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
Legend
Projects
Utility Crossing Monitoring
Channel Realignment
WARSSS Bank Score (Priority)
47 - 56 (Medium-High)
Reconnect Floodplain
Reconnect Low Terrace
Conserve & Enhance Wetland
Restore Wetland
Side Detention
Surface Diversion
Fountain Creek Thalweg
Parcel
County Boundary
2-1-10
2-1-1
12 AC
2-1-11
2-1-7
24 AC
1280+00
1270+00
T CROSS PROPERTIES LLC
2-1-2
13 AC
1260+00
N COUNTY LINE RD
T CROSS PROPERTIES LLC
2-1-8
1250+00
2-1-5
10 AC
2-1-4
10 AC
Relocated Diversion
T CROSS PROPERTIES LLC
1240+00
2-1-3
35 AC
2-1-9
5076 FT
1230+00
N COUNTY LINE RD
2-1-6
44 AC
FITZPATRICK JENNIFER
1220+00
TOTTEN RD
T CROSS PROPERTIES LLC
WYBERG DANIEL P
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River

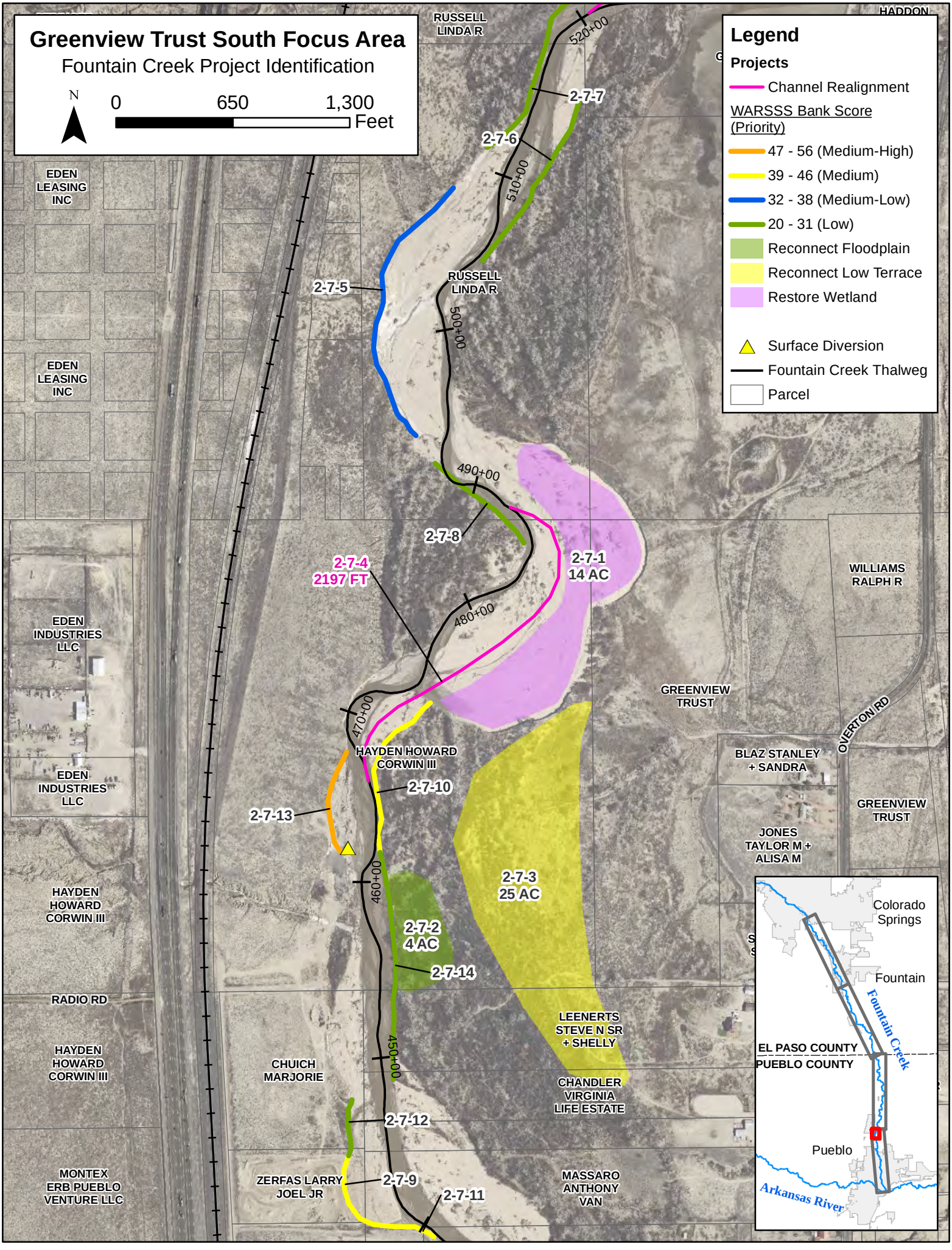

T Cross Properties Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
Legend
Projects
WARSSS Bank Score (Priority)
39 - 46 (Medium)
32 - 38 (Medium-Low)
Reconnect Floodplain
Reconnect Low Terrace
Conserve & Enhance Wetland
Fountain Creek Thalweg
Parcel
T CROSS PROPERTIES LLC
T CROSS PROPERTIES LLC
SMITH MICKEY W + HELEN M
2-2-2 40 AC
2-2-1 143 AC
F F P PROPERTIES LLC
F F P PROPERTIES LLC
2-2-6
2-2-3 8 AC
2-2-4 26 AC
F F P PROPERTIES LLC
MASCIANTONIO FAMILY TRUST
2-2-5
1200+00
1190+00
1180+00
1170+00
1160+00
1150+00
1140+00
1130+00
1120+00
1110+00
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River

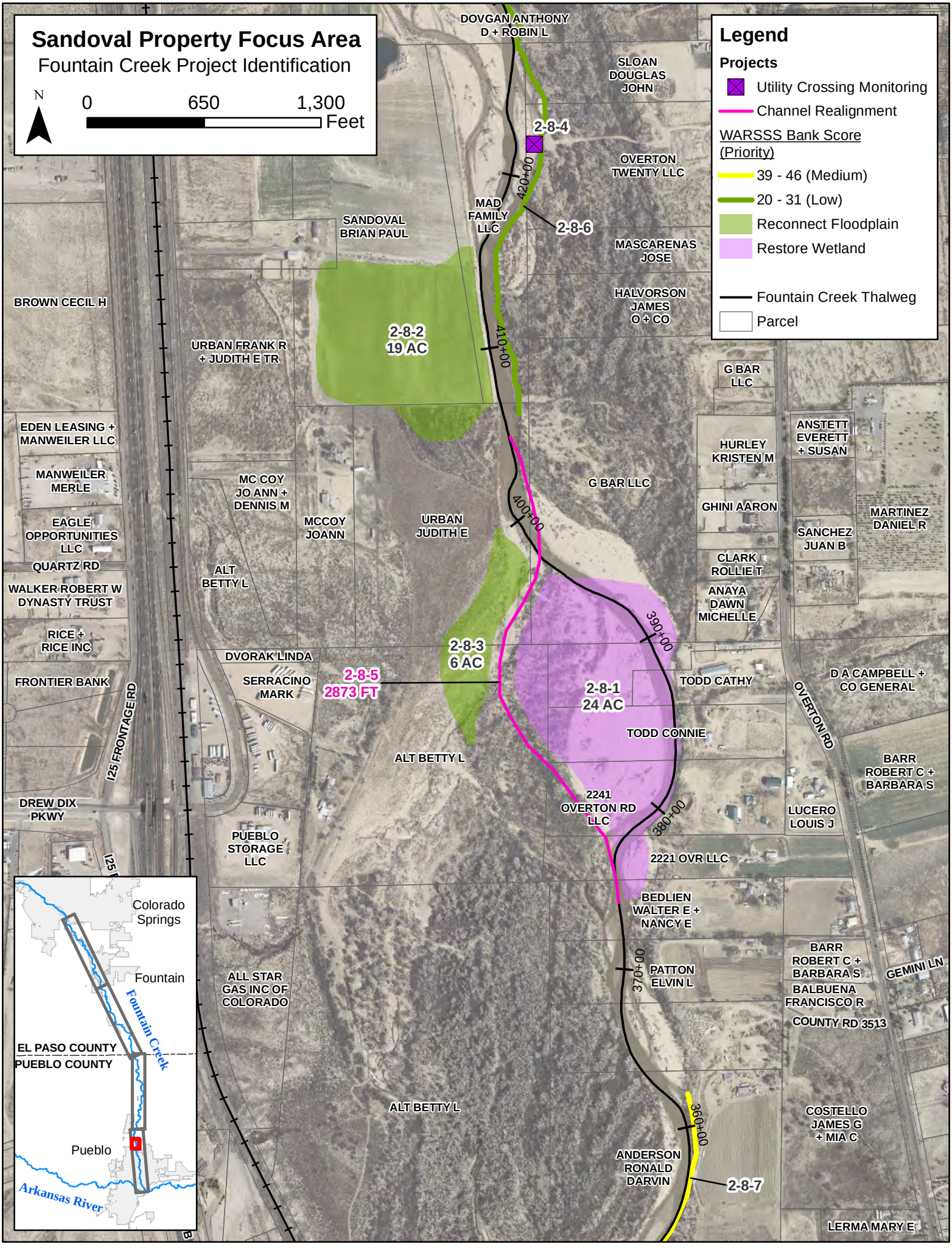

Lower Masciantonio Trust
North Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
MASCIANTONIO FAMILY TRUST
1120+00
1110+00
F F P PROPERTIES LLC
2-3-2
16 AC
2-3-13
1100+00
2-3-1
121 AC
2-3-3
7 AC
2-3-6
1090+00
1080+00
2-3-7
2-3-5
8 AC
1070+00
2-3-8
1060+00
1050+00
2-3-12
2-3-4
64 AC
1040+00
1010+00
2-3-10
1030+00
1020+00
2-3-9
2-3-11
Legend
Projects
WARSSS Bank Score (Priority)
47 - 56 (Medium-High)
32 - 38 (Medium-Low)
20 - 31 (Low)
Reconnect Low Terrace
Conserve & Enhance Wetland
Side Detention
Fountain Creek Thalweg
Parcel
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River
TAFT RICHARD LYNN

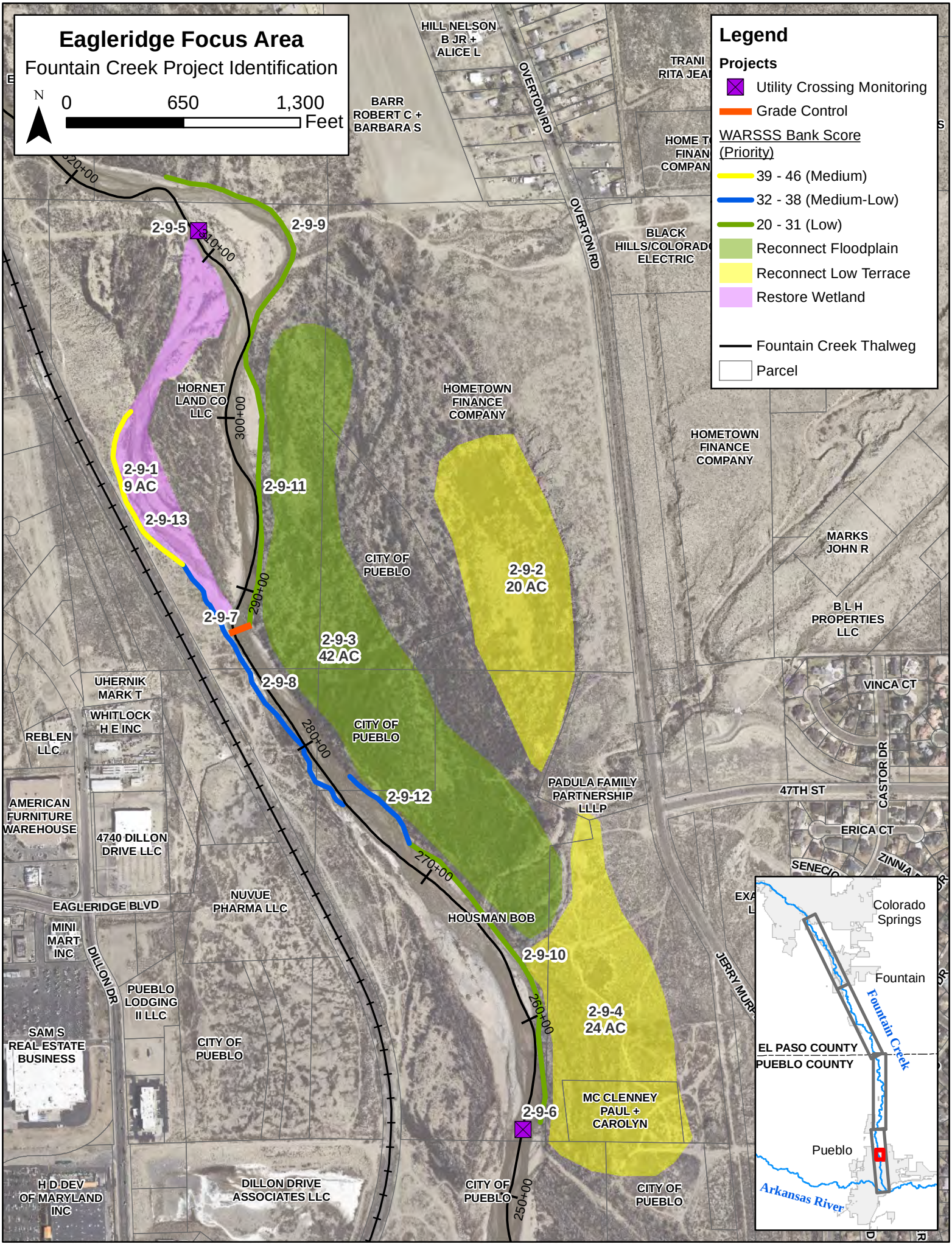

Legend
Projects
WARSSS Bank Score (Priority)
47 - 56 (Medium-High)
39 - 46 (Medium)
32 - 38 (Medium-Low)
20 - 31 (Low)
Conserve & Enhance Wetland
Surface Diversion
Fountain Creek Thalweg
Parcel
Colorado Springs
Fountain
Pueblo
Fountain Creek
Arkansas River
EL PASO COUNTY
PUEBLO COUNTY
2-4-6
2-4-2
2-4-3
2-4-7
2-4-8
2-4-4
2-4-1
138 AC
2-4-9
2-4-5
970+00
960+00
950+00
940+00
930+00
920+00
910+00
900+00
890+00
F F P PROPERTIES LLC
MASCIANTONIO FAMILY TRUST
RHODES CELESTA JANE
MASCIANTONIO FRANK A
ROMERO MIKE R
PROCTOR A K
OVERTON RD
PUEBLO SPRINGS RANCH
PUEBLO SPRINGS LLC
TAFOYA GARY
Lower Masciantonio Trust South Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet


Legend
Projects
WARSSS Bank Score (Priority)
32 - 38 (Medium-Low)
20 - 31 (Low)
Remove Old Approach
Reconnect Floodplain
Conserve & Enhance Wetland
Fountain Creek Thalweg
Remove old approach to Piñon Bridge to reconnect floodplain
Surface Water Flow w/ Sutherland Ditch
2-5-13
3 AC
2-5-5
14 AC
2-5-4
29 AC
2-5-3
55 AC
2-5-2
6 AC
2-5-1
47 AC
2-5-6
2-5-7
2-5-8
2-5-9
2-5-10
2-5-11
2-5-12
880+00
870+00
860+00
850+00
840+00
830+00
820+00
810+00
800+00
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River
Upstream of Piñon Bridge Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet


Hancock-Greenview Trust Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
Legend
Projects
Channel Realignment
WARSSS Bank Score (Priority)
32 - 38 (Medium-Low)
20 - 31 (Low)
Reconnect Floodplain
Reconnect Low Terrace
Conserve & Enhance Wetland
Restore Wetland
Fountain Creek Thalweg
Parcel
2-6-11
SMERDEL MARION M
610+00
TAFOYA WALTER
2-6-10
2-6-12
TAFOYA JOE L
BRAGDON RD
580+00
590+00
HANCOCK LARRY D + FRANCES A
KOCHIOVELOS TRIFON D AKA
2-6-2 5 AC
KLAUSING ERNIE
B L H PROPERTIES LLC
2-6-3 15 AC
2-6-8 18 AC
570+00
2-6-13 6926 FT
WOLFE FREDERICK D + RENEE L
560+00
2-6-9 17 AC
GREENVIEW TRUST
2-6-6 11 AC
2-6-3 15 AC
550+00
A DOBE FARM LLC
2-6-1 23 AC
2-6-4 14 AC
540+00
GREENVIEW TRUST
2-6-7 20 AC
2-6-5 17 AC
RUSSELL LINDA R
530+00
HADDON KENNETH H + PATTI
B L H PROPERTIES LLC
GREENVIEW TRUST
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River


Greenview Trust South Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
Legend
Projects
Channel Realignment
WARSSS Bank Score (Priority)
47 - 56 (Medium-High)
39 - 46 (Medium)
32 - 38 (Medium-Low)
20 - 31 (Low)
Reconnect Floodplain
Reconnect Low Terrace
Restore Wetland
Surface Diversion
Fountain Creek Thalweg
Parcel
RUSSELL LINDA R
HADDON
520+00
2-7-7
2-7-6
510+00
EDEN LEASING INC
2-7-5
500+00
490+00
2-7-8
2-7-4
2197 FT
2-7-1
14 AC
WILLIAMS RALPH R
480+00
EDEN INDUSTRIES LLC
GREENVIEW TRUST
OVERTON RD
470+00
HAYDEN HOWARD CORWIN III
BLAZ STANLEY + SANDRA
2-7-10
2-7-13
GREENVIEW TRUST
JONES TAYLOR M + ALISA M
2-7-3
25 AC
460+00
HAYDEN HOWARD CORWIN III
2-7-2
4 AC
2-7-14
RADIO RD
LEENERTS STEVE N SR + SHELLY
450+00
HAYDEN HOWARD CORWIN III
CHUICH MARJORIE
CHANDLER VIRGINIA LIFE ESTATE
2-7-12
MONTEX ERB PUEBLO VENTURE LLC
ZERFAS LARRY JOEL JR
2-7-9
2-7-11
MASSARO ANTHONY VAN
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River


Sandoval Property Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
Legend
Projects
Utility Crossing Monitoring
Channel Realignment
WARSSS Bank Score (Priority)
39 - 46 (Medium)
20 - 31 (Low)
Reconnect Floodplain
Restore Wetland
Fountain Creek Thalweg
Parcel
2-8-4
2-8-6
2-8-2
19 AC
2-8-3
6 AC
2-8-5
2873 FT
2-8-1
24 AC
2-8-7
420+00
410+00
400+00
390+00
380+00
370+00
360+00
DOVGAN ANTHONY D + ROBIN L
SLOAN DOUGLAS JOHN
OVERTON TWENTY LLC
MAD FAMILY LLC
SANDOVAL BRIAN PAUL
MASCARENAS JOSE
HALVORSON JAMES O + CO
BROWN CECIL H
URBAN FRANK R + JUDITH E TR
G BAR LLC
EDEN LEASING + MANWEILER LLC
MANWEILER MERLE
MC COY JO ANN + DENNIS M
MCCOY JOANN
URBAN JUDITH E
HURLEY KRISTEN M
ANSTETT EVERETT + SUSAN
GHINI AARON
MARTINEZ DANIEL R
SANCHEZ JUAN B
EAGLE OPPORTUNITIES LLC
QUARTZ RD
ALT BETTY L
CLARK ROLLIE T
WALKER ROBERT W DYNASTY TRUST
ANAYA DAWN MICHELLE
RICE + RICE INC
DVORAK LINDA
SERRACINO MARK
FRONTIER BANK
I25 FRONTAGE RD
TODD CATHY
D A CAMPBELL + CO GENERAL
OVERTON RD
TODD CONNIE
BARR ROBERT C + BARBARA S
DREW DIX PKWY
2241 OVERTON RD LLC
LUCERO LOUIS J
PUEBLO STORAGE LLC
2221 OVR LLC
BEDLIEN WALTER E + NANCY E
ALL STAR GAS INC OF COLORADO
PATTON ELVIN L
BARR ROBERT C + BARBARA S
GEMINI LN
BALBUENA FRANCISCO R
COUNTY RD 3513
COSTELLO JAMES G + MIA C
ANDERSON RONALD DARVIN
LERMA MARY E
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River


Eagleridge Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
Legend
Projects
Utility Crossing Monitoring
Grade Control
WARSSS Bank Score (Priority)
39 - 46 (Medium)
32 - 38 (Medium-Low)
20 - 31 (Low)
Reconnect Floodplain
Reconnect Low Terrace
Restore Wetland
Fountain Creek Thalweg
Parcel
2-9-5
2-9-9
2-9-1 9 AC
2-9-13
2-9-11
2-9-7
2-9-3 42 AC
2-9-8
2-9-12
2-9-2 20 AC
2-9-10
2-9-4 24 AC
2-9-6
320+00
310+00
300+00
290+00
280+00
270+00
260+00
250+00
HILL NELSON B JR + ALICE L
BARR ROBERT C + BARBARA S
OVERTON RD
TRANI RITA JEAN
HOME T FINAN COMPAN
BLACK HILLS/COLORADO ELECTRIC
HORNET LAND CO LLC
HOMETOWN FINANCE COMPANY
HOMETOWN FINANCE COMPANY
CITY OF PUEBLO
MARKS JOHN R
B L H PROPERTIES LLC
VINCA CT
CASTOR DR
47TH ST
ERICA CT
SENECIO
ZINNIA
UHERNIK MARK T
WHITLOCK H E INC
REBLEN LLC
CITY OF PUEBLO
PADULA FAMILY PARTNERSHIP LLLP
AMERICAN FURNITURE WAREHOUSE
4740 DILLON DRIVE LLC
EAGLERIDGE BLVD
NUVUE PHARMA LLC
HOUSMAN BOB
MINI MART INC
DILLON DR
PUEBLO LODGING II LLC
SAM S REAL ESTATE BUSINESS
CITY OF PUEBLO
MC CLENNEY PAUL + CAROLYN
JERRY MURR
H D DEV OF MARYLAND INC
DILLON DRIVE ASSOCIATES LLC
CITY OF PUEBLO
CITY OF PUEBLO
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River


Pueblo Levee System Focus Area
Fountain Creek Project Identification
N
0
650
1,300
Feet
Legend
Projects
Remove Railroad Approach and Abutments
Reconnect Floodplain
Reconnect Low Terrace
Fountain Creek Thalweg
Trail
Parcel
2-10-4
3.2 AC
2-10-5
0.85 AC
2-10-2
1.58 AC
2-10-3
4.21 AC
2-10-1
16.01 AC
Remove Railroad Approach and Abutments
Higher ground boundary & direction of slope
Rise areas (~3 ft.) regrading opportunities
50+00
40+00
30+00
20+00
0+00
E 2ND ST
E 1ST ST
E ASH ST
E BEECH ST
SCHOOL DIST NO 60
S KINGSTON AVE
S LA CROSSE AVE
S IOLA AVE
HUDSON AVE
CATALPA ST
DAMSON ST
A T + S F R/W
GRUMA DR
MURRAY RD
FIR ST
P B B LLC
EVERGREEN ST
PINEDA CT
BREWERY RD
GEORGANN CT
GRENADILLO ST
BRADLEY ST
S NORWOOD AVE
RIVERS RUN AVE
S JOPLIN AVE
S PORTLAND AVE
ERA HOLDINGS II LLC
HAMMOND DALE H TR
J B T N LLC
BELTRAMO ROBERT D
STOCKYARD RD
RASMUSSEN TRUST INC
SAARISTO BARBER RUTH
C F + I STEEL LP
WARREN JIM + BERNADETTE
CITY OF PUEBLO
PUEBLO COUNTY
CONS DIST
LOCUST ST
Colorado Springs
Fountain
Fountain Creek
EL PASO COUNTY
PUEBLO COUNTY
Pueblo
Arkansas River

Appendix F – Decision Making Flowchart

Context Statement

The Fountain Creek Watershed includes 927 square miles, with a diversity of public and private ownerships. Portions of the watershed are a major regional tourist and recreational destination. Lower portions of the watershed are dedicated to agricultural production (fruits, vegetables, and food and fiber production). The watershed is home to a large percentage of El Paso and Pueblo County residents. Additionally, the watershed is a major source of water to communities and farms within El Paso and Pueblo Counties, as well as to downstream communities in the lower Arkansas River Valley, east of Pueblo.

The watershed is characterized by extremes in temperature and precipitation, large elevation changes, steep gradients, and diverse ecosystems rich with plant life and wildlife. At approximately 14,000 feet, Pikes Peak is the highest point in the watershed, with the lowest point in the watershed being the confluence of Fountain Creek and the Arkansas River at just over 4,000 feet in the City of Pueblo. On average, Fountain Creek contributes about 35% of flows measured at the Arkansas River near Avondale.

As a typical Colorado front Range river, Fountain Creek is affected by runoff from the adjacent mountains and foothills, intense summer thunderstorms, spring snowmelt runoff, and the effects of urban development. As a result, Fountain Creek has long been a source of flooding within El Paso and Pueblo Counties. The floods have altered the Creek bed, banks, floodplains, and structures and has led to property and infrastructure damage. The flooding has resulted in considerable transport of sediment and debris. Erosion and sediment have resulted in a net loss of flood capacity. Past efforts at flood management include levees in Pueblo, development standards requiring runoff controls in new development in Colorado Springs, and channel stabilization projects. Fountain Creek Watershed Flood Control and Greenway District has a Master Plan to address issues in the Fountain Creek corridor along with channel stabilization and environmental restoration benefits.

A Floodplain Management regional strategy was recommended by the Flood Control Study. The selection of this strategy provides guidance for the type of projects to be completed in Fountain Creek. These include conservation techniques and projects focused on addressing sediment transport and flooding concerns as outlined by the Master Plan and the subsequent Watershed Assessment of River Stability and Sediment Supply (WARSSS) Study. This study identfies locations for these types of projects and developes an implementation strategy based on a holistic approach of evaluating past studies and using currently available data indicators to identify new opportunities to mitigate the effects of flood damage in the watershed and provide effective and lasting protection of at-risk assets, as well as the health, safety, and welfare of the public.

Stakeholder Core Values	Stakeholder Critical Issues	Evaluation Criteria Does the project….
Safety	• Provide flood hazard mitigation to reduce potential flood risk • Address public health • Protect property and public safety • Emergency access	1. Reduce flood risk to the public and residents by providing long term solutions that increase resiliency? 2. Avoid transfer of risks that create impacts downstream to infrastructure, channel, and storm water systems? 3. Increase the number of people and amount of land protected?
Resiliency	• Reduce future flood damage risk • Provide smarter solutions that account for changing conditions (e.g., climate change, development) • Repair / replace failing infrastructure • Improve creek stability • Reduce risk to critical infrastructure • Location of flood mitigation improvement determines who benefits and who does not benefit • Risks of making a situation worse / Unintended consequences • Minimize maintenance requirements • Working with natural systems to maximize benefits • The solution should be sustainable in design and operation / Stand the test of time	4. Withstand flooding and minimize the level of effort to repair? 5. Make use of natural processes to improve resiliency? 6. Protect critical Infrastructure that is at risk?
Constructability/ Costs	• Find funding for future implementation • Includes fiscally responsible costs • Support regional criteria, implementation, and enforcement • Long-term maintenance funding needed • Minimize operations and maintenance costs • Understand the impact of T&E species on constructability	7. Create infrastructure investments that are reasonable to construct and provide the best value for its lifecycle, function, and purpose? 8. Minimize the cost required to operate, maintain, and repair?
Environment	• Restore the natural floodplain functions of storage, infiltration, energy dissipation, and resistance • Impacts during low flow • Restoration and preservation of existing ecosystems versus creating new ecosystems • Reduce erosion and resulting sediment generation / enhance soil stewardship • Improve water quality including turbidity, E. coli, and debris • Enhance current resources within the natural context • Improve wildlife habitat (banking opportunities) • Manage increased storm water discharge due to development • Work with natural systems and manmade/existing infrastructure • Minimize impacts to habitat, animals, and plants	9. Protect or improve the habitat, water quality, and geomorphology of Fountain Creek? 10 Incorporate locally available materials and environmentally friendly processes? 11. Reduce the quantity of sediment deposited in lower Fountain Creek and Arkansas River channels? 12. Meet CWCB's criteria for multi-objective program elements? 13. Impact wetlands?
Community	• Protect infrastructure, tourism, and the economy • Improve appearance and/or enhance the community • Distribute projects within the watershed • Would like a more elegant solution than typical or standard flood control solution • Consider greenway and open space opportunities • Create economic, environmental, and social values along the corridor as described in the Master Plan • Protect water right owners • Property loss affects farmers' ability to operate and plan for the future • Need for better flood monitoring • Collaboration between agencies and communities • Consistent with land use regulations and management • Does not impact aesthetics • Minimize development impact • Minimize economic injustice • Minimize impact to cultural and historic features	14. Provide access, connectivity, and protect opportunities for enhancements to tourist destinations, community facilities, features, and neighborhoods? 15. Provide funding, partnering, and collaboration opportunities by meeting multiple stakeholder objectives? 16. Lend to being supported by current land use regulations or revised land use regulations? 17. Preserve existing water rights? 18. Preserve property rights and uses?
Schedule	• Prioritize projects • Timing required to achieve benefit • Long-term versus short-term perspectives	19. Have a resonable timeframe required to achieve the benefit?

Date: 12/20/19

Fountain Creek Watershed Flood Control & Greenway District

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Presented by:

Matrix

HK associates, inc.

Appendix G – Decision Matrix

Fountain Creek Corridor Floodplain Management Opportunities Study

This sheet includes high ranking alternatives projects with a ranking by individual criteria (Fair=0, Better=1, Best=2) and equal-weighted total score

12/21/2019

Created utilizing the criteria identified in the Decision Making Flow Chart and a Fair/Better/Best ranking system

ID	Criteria	Options Ranking											
		EPC-1 Pinello Ranch	EPC-2 Venetucci Farm	EPC-3 Fountain North	EPC-4 Fountain South	EPC-5 Clear Spring Ranch	EPC-6 Hanna Ranches	EPC-7 Frost	EPC-8 BJ Ranches	PC-1 Wood Valley Ditch	PC-2 T Cross	PC-3 Masciantonio North	PC-4 Masciantonio South
Evaluation Criteria													
1	Reduces flood risk to the public and residents by providing long term solutions that increase resiliency?	1	1	0	0	2	0	2	2	2	1	2	0
2	Avoid transfer of risks that create impacts downstream to infrastructure, channel, and storm water?	1	2	1	1	2	2	2	2	2	0	2	1
3	Increase the number of people and amount of land protected?	1	2	0	0	2	0	2	2	2	1	2	0
4	Withstand flooding and minimize the level of effort to repair?	1	0	0	0	0	1	0	0	0	2	0	0
5	Make use of natural processes to improve resiliency?	1	1	2	2	0	2	0	0	0	2	0	1
6	Protect crticial infrastructure that is at risk?	1	2	1	2	0	0	0	0	2	0	0	0
7	Create infrastructure investments that are reasonable to construct and provides the best value for its lifecycle, function, and purpose?	0	0	0	0	0	2	0	0	1	2	0	1
8	Minimize the effort required to maintain and repair?	1	0	1	1	0	2	0	0	0	2	0	1
9	Protect or improve the habitat, water quality, and geomorphology of Fountain Creek?	1	1	2	2	1	2	2	1	2	1	1	1
10	Incorporate locally available materials and environmentally friendly processes?	1	1	1	1	1	1	1	1	1	2	1	1
11	Reduce the quantity of sediment deposited in lower Fountain Creek and Arkansas River channels?	1	2	2	2	1	2	2	0	2	0	1	1
12	Meet CWCB's criteria for multi-objective program elements?	2	0	1	1	2	0	2	0	2	1	1	0
13	Impact wetlands?	1	0	1	1	1	1	2	1	2	2	1	1
14	Provides access, connectivity, and protects opportunities for enhancements to tourist destinations, community facilities, features, and neighborhoods?	2	1	1	2	2	1	0	0	0	0	0	0
15	Provides funding, partnering, and collaboration opportunities by meeting multiple stakeholders?	2	0	1	2	1	1	0	1	1	0	1	1
16	Lend to being supported by current land use regulations or revised land use regulations?	2	0	2	1	2	2	0	0	0	0	0	2
17	Impact existing water rights?	0	1	0	0	0	0	0	0	0	1	0	2
18	Impact property rights and uses?	2	0	1	1	1	1	0	0	0	0	0	0
19	Have a reasonable timeframe required to achieve the benefit?	0	0	0	0	0	1	1	0	2	1	2	2
Equal Weighted Total (Highest is Best):		21	14	17	19	18	21	16	10	21	18	14	15

ID	Criteria	Fair / Better / Best					
		PC-5 Upstream of Piñon Bridge	PC-6 Hancock Greenview Trust	PC-7 Greenview Trust South	PC-8 Sandoval Property	PC-9 Eagleridge	PC-10 Pueblo Levee System
Evaluation Criteria							
1	Reduces flood risk to the public and residents by providing long term solutions that increase resiliency?	1	1	1	0	1	1
2	Avoid transfer of risks that create impacts downstream to infrastructure, channel, and storm water?	0	1	1	1	0	0
3	Increase the number of people and amount of land protected?	0	1	1	0	1	0
4	Withstand flooding and minimize the level of effort to repair?	1	1	1	1	1	2
5	Make use of natural processes to improve resiliency?	2	2	1	2	1	2
6	Protect crticial infrastructure that is at risk?	0	0	0	1	2	0
7	Create infrastructure investments that are reasonable to construct and provides the best value for its lifecycle, function, and purpose?	1	1	1	2	0	2
8	Minimize the effort required to maintain and repair?	2	2	1	2	0	2
9	Protect or improve the habitat, water quality, and geomorphology of Fountain Creek?	1	2	2	2	1	1
10	Incorporate locally available materials and environmentally friendly processes?	2	1	1	1	1	2
11	Reduce the quantity of sediment deposited in lower Fountain Creek and Arkansas River channels?	0	2	2	2	0	0
12	Meet CWCB's criteria for multi-objective program elements?	1	2	2	2	2	0
13	Impact wetlands?	2	2	2	1	1	1
14	Provides access, connectivity, and protects opportunities for enhancements to tourist destinations, community facilities, features, and neighborhoods?	0	2	2	0	0	1
15	Provides funding, partnering, and collaboration opportunities by meeting multiple stakeholders?	0	1	1	0	1	1
16	Lend to being supported by current land use regulations or revised land use regulations?	2	2	2	0	0	2
17	Impact existing water rights?	0	0	0	0	0	0
18	Impact property rights and uses?	0	1	1	0	1	1
19	Have a reasonable timeframe required to achieve the benefit?	1	2	1	0	0	2
Equal Weighted Total (Highest is Best):		16	26	23	17	13	20

ID	Criteria	Options Ranking				
		EPC-1 Pinello Ranch	EPC-2 Venetucci Farm	EPC-3 Fountain North	EPC-4 Fountain South	EPC-5 Clear Spring Ranch
Evaluation Criteria						
1	Reduces flood risk to the public and residents by providing long term solutions that increase resiliency?	Reduces flood risk, no public safety risk, improves multi-objective resiliency	Reduces flood risk, no public safety risk, improves multi-objective resiliency	Does little for flood risk but increases resiliency	Does little for flood risk but increases resiliency	Reduces flood risk, no public safety risk, improves multi-objective resiliency
2	Avoid transfer of risks that create impacts downstream to infrastructure, channel, and storm water?	Attenuate flows	Attenuate flows	Attenuate flows	Attenuate flows	Attenuate flows
3	Increase the number of people and amount of land protected?	Some land protected	Land protected and downstream flow attenuated	No	No	Land protected and downstream flow attenuated
4	Withstand flooding and minimize the level of effort to repair?	Moderate flood resiliency, minimal repair effort	Engineering-intensive	Engineering-intensive	Engineering-intensive	Engineering-intensive
5	Make use of natural processes to improve resiliency?	Some natural processes	Some natural processes	Natural processes	Natural processes	No
6	Protect critical infrastructure that is at risk?	Utility crossing, non-building	Protects critical buildings	Protects proximate trail	Protects critical infrastructure	No
7	Create infrastructure investments that are reasonable to construct and provide the best value for its lifecycle, function, and purpose?	Moderate, requires significant earthwork	Moderate, requires significant earthwork	Moderate, requires significant earthwork	Moderate, requires significant earthwork	Moderate, requires significant earthwork
8	Minimize the cost required to operate, maintain, and repair?	Moderate	Lowest	Moderate	Moderate	Lowest
9	Protect or improve the habitat, water quality, and geomorphology of Fountain Creek?	Improves water quality and habitat	Improves water quality and habitat	Improves habitat, water quality, and geomorphology	Improves habitat, water quality, and geomorphology	Improves water quality and habitat
10	Incorporate locally available materials and environmentally friendly processes?	Predominantly Earthwork with some concrete and rock structures	Predominantly Earthwork with some concrete and rock structures	Predominantly Earthwork with some concrete and rock structures	Predominantly Earthwork with some concrete and rock structures	Predominantly Earthwork with some concrete and rock structures
11	Reduce the quantity of sediment deposited in lower Fountain Creek and Arkansas River channels?	Moderate	Highest	Highest	Highest	Moderate
12	Meet CWCB's criteria for multi-objective program elements?	Highest	Lowest	Moderate	Moderate	Highest
13	Impact wetlands?	Moderate	Lowest	Moderate	Moderate	Moderate
14	Provide access, connectivity, and protect opportunities for enhancements to tourist destinations, community facilities, features, and neighborhoods?	Proximity to populated area and in existing park	Opportunity for tourism and recreation within populated area	Opportunity for tourism and recreation with El Paso County	Opportunity for tourism and recreation with Town of Fountain	Opportunity for tourism and recreation with existing park
15	Provide funding, partnering, and collaboration opportunities by meeting multiple stakeholder objectives?	Opportunities with multiple stakeholders including El Paso County, City of Colorado Springs, Pikes Peak Community Foundation	No	Opportunities for partnership with El Paso County	Opportunities for partnership with El Paso County and the Town of Fountain	Opportunities for partnership with City of Colorado Springs
16	Lend to being supported by current land use regulations or revised land use regulations?	Highest	Lowest	Highest	Moderate	Highest
17	Preserve existing water rights?	Potential water rights coordination	Potential water rights coordination	Potential water rights coordination	Potential water rights coordination	Potential water rights coordination
18	Preserve property rights and uses?	Highest	Lowest	Moderate	Moderate	Moderate
19	Have a reasonable timeframe required to achieve the benefit?	Lowest	Lowest	Lowest	Lowest	Lowest

ID	Criteria	EPC-6 Hanna Ranches	EPC-7 Frost	EPC-8 BJ Ranches	PC-1 Wood Valley Ditch	PC-2 T Cross
Evaluation Criteria						
1	Reduces flood risk to the public and residents by providing long term solutions that increase resiliency?	Does little for flood risk but increases resiliency	Reduces flood risk, no public safety risk, improves multi-objective resiliency	Reduces flood risk, no public safety risk, improves multi-objective resiliency	Reduces flood risk, no public safety risk, improves multi-objective resiliency	Reduces flood risk, no public safety risk, improves multi-objective resiliency
2	Avoid transfer of risks that create impacts downstream to infrastructure, channel, and storm water?	Attenuate flows	Attenuate flows	Attenuate flows	Attenuate flows	No risk reduction
3	Increase the number of people and amount of land protected?	No	Land protected and downstream flow attenuated	Land protected and downstream flow attenuated	Land protected and downstream flow attenuated	Some land protected
4	Withstand flooding and minimize the level of effort to repair?	Moderate flood resiliency, minimal repair effort	Engineering-intensive	Engineering-intensive	Engineering-intensive	Good flood resiliency, minimal repair effort
5	Make use of natural processes to improve resiliency?	Natural processes	No	No	No	Natural processes
6	Protect critical infrastructure that is at risk?	No	No	No	Utility crossing, diversion	No
7	Create infrastructure investments that are reasonable to construct and provide the best value for its lifecycle, function, and purpose?	Lower costs, provides environmental enhancement	Moderate, requires significant earthwork	Moderate, requires significant earthwork	Moderate, requires some earthwork	Lower costs, provides environmental enhancement
8	Minimize the cost required to operate, maintain, and repair?	Highest	Lowest	Lowest	Lowest	Highest
9	Protect or improve the habitat, water quality, and geomorphology of Fountain Creek?	Improves habitat, water quality, and geomorphology	Improves habitat, water quality, and geomorphology	Improves water quality and habitat	Improves habitat, water quality, and geomorphology	Improves water quality and habitat
10	Incorporate locally available materials and environmentally friendly processes?	Predominantly Earthwork with some concrete and rock structures	Predominantly Earthwork with some concrete and rock structures	Predominantly Earthwork with some concrete and rock structures	Predominantly Earthwork with some concrete and rock structures	Local plant materials, minimally invasive
11	Reduce the quantity of sediment deposited in lower Fountain Creek and Arkansas River channels?	Highest	Highest	Lowest	Highest	Lowest
12	Meet CWCB's criteria for multi-objective program elements?	Lowest	Highest	Lowest	Highest	Moderate
13	Impact wetlands?	Moderate	Highest	Moderate	Highest	Highest
14	Provide access, connectivity, and protect opportunities for enhancements to tourist destinations, community facilities, features, and neighborhoods?	Opportunity for tourism and recreation with City of Colorado Springs	No	No	No	No
15	Provide funding, partnering, and collaboration opportunities by meeting multiple stakeholder objectives?	Opportunities for partnership with City of Colorado Springs	No	Opportunities for partnership with State of Colorado	Opportunities for partnership with an ongoing discussion	No
16	Lend to being supported by current land use regulations or revised land use regulations?	Highest	Lowest	Lowest	Lowest	Lowest
17	Preserve existing water rights?	Potential water rights coordination	Potential water rights coordination	Potential water rights coordination	Potential water rights coordination	Potential water rights coordination
18	Preserve property rights and uses?	Moderate	Lowest	Lowest	Lowest	Lowest
19	Have a reasonable timeframe required to achieve the benefit?	Moderate	Moderate	Lowest	Highest with an ongoing discussion	Moderate

ID	Criteria	PC-3 Masciantonio North	PC-4 Masciantonio South	PC-5 Upstream of Piñon Bridge	PC-6 Hancock Greenview Trust	PC-7 Greenview Trust South
Evaluation Criteria						
1	Reduces flood risk to the public and residents by providing long term solutions that increase resiliency?	Reduces flood risk, no public safety risk, improves multi-objective resiliency	Does little for flood risk but increases resiliency	Reduces flood risk, no public safety risk, improves multi-objective resiliency	Reduces flood risk, no public safety risk, improves multi-objective resiliency	Reduces flood risk, no public safety risk, improves multi-objective resiliency
2	Avoid transfer of risks that create impacts downstream to infrastructure, channel, and storm water?	Attenuate flows	Attenuate flows	No risk reduction	Attenuate flows	Attenuate flows
3	Increase the number of people and amount of land protected?	Land protected and downstream flow attenuated	No	No	Some land protected	Some land protected
4	Withstand flooding and minimize the level of effort to repair?	Engineering-intensive	Engineering-intensive	Moderate flood resiliency, minimal repair effort	Moderate flood resiliency, minimal repair effort	Moderate flood resiliency, minimal repair effort
5	Make use of natural processes to improve resiliency?	No	Some natural processes	Natural processes	Natural processes	Some natural processes
6	Protect critical infrastructure that is at risk?	No	No	No	No	No
7	Create infrastructure investments that are reasonable to construct and provide the best value for its lifecycle, function, and purpose?	Moderate, requires significant earthwork	Moderate, requires some earthwork	Moderate, requires some earthwork	Moderate, requires some earthwork	Moderate, requires some earthwork
8	Minimize the cost required to operate, maintain, and repair?	Lowest	Moderate	Highest	Highest	Moderate
9	Protect or improve the habitat, water quality, and geomorphology of Fountain Creek?	Improves water quality and habitat	Improves water quality and habitat	Improves water quality and habitat	Improves habitat, water quality, and geomorphology	Improves habitat, water quality, and geomorphology
10	Incorporate locally available materials and environmentally friendly processes?	Predominantly Earthwork with some concrete and rock structures	Predominantly Earthwork with some concrete and rock structures	Local plant materials, minimally invasive	Predominantly Earthwork with some concrete and rock structures	Predominantly Earthwork with some concrete and rock structures
11	Reduce the quantity of sediment deposited in lower Fountain Creek and Arkansas River channels?	Moderate	Moderate	Lowest	Highest	Highest
12	Meet CWCB's criteria for multi-objective program elements?	Moderate	Lowest	Moderate	Highest	Highest
13	Impact wetlands?	Moderate	Moderate	Highest	Highest	Highest
14	Provide access, connectivity, and protect opportunities for enhancements to tourist destinations, community facilities, features, and neighborhoods?	No	No	No	Opportunity for tourism and recreation with nature center	Opportunity for tourism and recreation with nature center
15	Provide funding, partnering, and collaboration opportunities by meeting multiple stakeholder objectives?	Opportunities for partnership with Masciantonio Trust	Opportunities for partnership with Masciantonio Trust	No	Opportunities for partnership with an ongoing discussion	Opportunities for partnership with an ongoing discussion
16	Lend to being supported by current land use regulations or revised land use regulations?	Lowest	Highest	Highest	Highest	Highest
17	Preserve existing water rights?	Potential water rights coordination	Yes	Potential water rights coordination	Potential water rights coordination	Potential water rights coordination
18	Preserve property rights and uses?	Lowest	Lowest	Lowest	Moderate	Moderate
19	Have a reasonable timeframe required to achieve the benefit?	Highest	Highest	Moderate	Highest with an ongoing discussion	Moderate

ID	Criteria	Fair / Better / Best		
		PC-8 Sandoval Property	PC-9 Eagleridge	PC-10 Pueblo Levee System
Evaluation Criteria				
1	Reduces flood risk to the public and residents by providing long term solutions that increase resiliency?	Does little for flood risk but increases resiliency	Reduces flood risk, no public safety risk, improves multi-objective resiliency	Reduces flood risk, no public safety risk, improves multi-objective resiliency
2	Avoid transfer of risks that create impacts downstream to infrastructure, channel, and storm water?	Attenuate flows	No risk reduction	No risk reduction
3	Increase the number of people and amount of land protected?	No	Some land protected	No
4	Withstand flooding and minimize the level of effort to repair?	Moderate flood resiliency, minimal repair effort	Moderate flood resiliency, minimal repair effort	Good flood resiliency, minimal repair effort
5	Make use of natural processes to improve resiliency?	Natural processes	Some natural processes	Natural processes
6	Protect critical infrastructure that is at risk?	Utility crossing	Utility crossing, protects railroad	No
7	Create infrastructure investments that are reasonable to construct and provide the best value for its lifecycle, function, and purpose?	Lower costs, provides environmental enhancement	Moderate, requires significant earthwork	Lower costs, provides environmental enhancement
8	Minimize the cost required to operate, maintain, and repair?	Highest	Lowest	Highest
9	Protect or improve the habitat, water quality, and geomorphology of Fountain Creek?	Improves habitat, water quality, and geomorphology	Improves water quality and habitat	Improves water quality and habitat
10	Incorporate locally available materials and environmentally friendly processes?	Predominantly Earthwork with some concrete and rock structures	Predominantly Earthwork with some concrete and rock structures	Local plant materials, minimally invasive
11	Reduce the quantity of sediment deposited in lower Fountain Creek and Arkansas River channels?	Highest	Lowest	Lowest
12	Meet CWCB's criteria for multi-objective program elements?	Highest	Highest	Lowest
13	Impact wetlands?	Moderate	Moderate	Moderate
14	Provide access, connectivity, and protect opportunities for enhancements to tourist destinations, community facilities, features, and neighborhoods?	No	No	Opportunity for tourism and recreation with City of Pueblo
15	Provide funding, partnering, and collaboration opportunities by meeting multiple stakeholder objectives?	No	Opportunities for partnership with the City of Pueblo	Opportunities for partnership with the City of Pueblo
16	Lend to being supported by current land use regulations or revised land use regulations?	Lowest	Lowest	Highest
17	Preserve existing water rights?	Potential water rights coordination	Potential water rights coordination	Potential water rights coordination
18	Preserve property rights and uses?	Lowest	Moderate	Moderate
19	Have a reasonable timeframe required to achieve the benefit?	Lowest	Lowest	Highest as there appears to be momentum

Appendix H – Cost Tables

Fountain Creek FMO Conceptual Costs

Improvement	Subcategory	Cost	Unit
Utility Crossing Monitoring	Utility Crossing Monitoring	Labor	HR
Grade Control	Grade Control	$ 4,000	LF
Channel Realignment	Channel Realignment Reshaping and Replanting	$ 500	LF
	Channel Realignment Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	$ 2,000	LF
WARSSS Banks	Bank Reshaping and Replanting	$ 250	LF
	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	$ 1,000	LF
	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	$ 2,000	LF
Side Detention*	Side Detention	$ 25,000	AF
	Land Acquisition	$ 50,000	AC
Conservation Easement**	Conservation Easement	$ 5,000	AC
Wetland Habitat***	Restore Wetland	$ 41,500	AC
	Conserve & Enhance Wetland	$ 13,300	AC
Earthwork (assumes 2 feet of excavation)****	Reconnect Floodplain	$ 15	CY
	Reconnect Low Terrace	$ 15	CY
Removal*****	Removal	$ 28	CY

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

*Documented in the Jimmy Camp Creek DBPS - FSD Costs Memo and the El Paso County Parks land value (2013).
**Average of estimates from THK via real estate broker (October 2019) and stakeholder input from Westervelt (November 2019).
***Restore Wetland: Assumes $1,500 for riparian seeding, $30,000 for willows, and $10,000 for ECB (coconut material and half the unit). Costs reflect latest bid data for Barr Farm phases.
Conserve & Enhance Wetland: Assumes $5,000 per acre for conservation easement and an additonal 20% of the per acre cost for restoring wetland for a total of $13,300 per acre.
These costs do not include securing water for the wetlands.
****Earthwork costs do include a safety factor for hauling if required.
*****Environmental considerations not included in cost.

Pinello Ranch

El Paso County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
1-1-1	Reconnect Low Terrace		242,130.68	CY	$ 15.00	$ 3,631,960.23
1-1-2	Reconnect Floodplain		95,213.49	CY	$ 15.00	$ 1,428,202.37
	Restore Wetland		9.84	AC	$ 41,500.00	$ 408,198.34
1-1-3	Reconnect Floodplain		211,705.46	CY	$ 15.00	$ 3,175,581.96
	Restore Wetland		21.87	AC	$ 41,500.00	$ 907,621.57
1-1-4	Reconnect Low Terrace		1,171,449.42	CY	$ 15.00	$ 17,571,741.24
1-1-5	Utility Crossing Monitoring	Transmission Tower	NA	HR	Labor	NA
1-1-6	Grade Control		133.67	LF	$ 4,000.00	$ 534,668.28
1-1-7	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP051	2,428.01	LF	$ 2,000.00	$ 4,856,015.43
1-1-8	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP004	643.16	LF	$ 2,000.00	$ 1,286,311.07
1-1-9	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP005	1,184.89	LF	$ 2,000.00	$ 2,369,776.23
1-1-10	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP052	580.26	LF	$ 2,000.00	$ 1,160,529.00

Estimated Total Cost $ 37,330,605.71

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Venetucci Farm

El Paso County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
1-2-1	Reconnect Low Terrace		479,389.98	CY	$ 15.00	$ 7,190,849.73
1-2-2	Reconnect Low Terrace		89,724.51	CY	$ 15.00	$ 1,345,867.65
1-2-3	Grade Control		129.20	LF	$ 4,000.00	$ 516,810.64
1-2-4	Grade Control		131.29	LF	$ 4,000.00	$ 525,143.27
1-2-5	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP053	276.42	LF	$ 2,000.00	$ 552,844.12
1-2-6	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP054	621.08	LF	$ 2,000.00	$ 1,242,157.26
1-2-7	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP012	277.22	LF	$ 2,000.00	$ 554,435.78
1-2-8	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP057	1,224.31	LF	$ 2,000.00	$ 2,448,619.43
1-2-9	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP008	1,006.87	LF	$ 2,000.00	$ 2,013,735.89
1-2-10	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP009	697.65	LF	$ 2,000.00	$ 1,395,293.52
1-2-11	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP056	671.30	LF	$ 2,000.00	$ 1,342,600.69
1-2-12	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	EP011	1,260.23	LF	$ 1,000.00	$ 1,260,228.45
1-2-13	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP007	599.11	LF	$ 2,000.00	$ 1,198,229.53
1-2-14	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP055	216.44	LF	$ 2,000.00	$ 432,876.83
1-2-15	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP010	515.25	LF	$ 2,000.00	$ 1,030,499.22
1-2-16	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP058	263.82	LF	$ 2,000.00	$ 527,646.34
1-2-17	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP013	1,187.72	LF	$ 2,000.00	$ 2,375,445.24
1-2-18	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP059	585.67	LF	$ 2,000.00	$ 1,171,341.61

Estimated Total Cost $ 27,124,625.17

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Fountain North

El Paso County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
1-3-1	Reconnect Floodplain		129,975.81	CY	$ 15.00	$ 1,949,637.11
	Restore Wetland		13.43	AC	$ 41,500.00	$ 557,230.99
1-3-2	Reconnect Floodplain		471,563.41	CY	$ 15.00	$ 7,073,451.14
	Conservation Easement		40.50	PAC	$ 5,000.00	$ 202,500.00
	Restore Wetland		48.72	AC	$ 41,500.00	$ 2,021,681.97
1-3-3	Reconnect Floodplain		257,889.21	CY	$ 15.00	$ 3,868,338.16
	Restore Wetland		26.64	AC	$ 41,500.00	$ 1,105,620.07
1-3-4	Reconnect Floodplain		18,729.08	CY	$ 15.00	$ 280,936.18
	Restore Wetland		1.93	AC	$ 41,500.00	$ 80,295.12
1-3-5	Reconnect Floodplain		97,263.49	CY	$ 15.00	$ 1,458,952.39
	Restore Wetland		10.05	AC	$ 41,500.00	$ 416,987.08
1-3-6	Restore Wetland		16.63	AC	$ 41,500.00	$ 690,113.97
	Conservation Easement		5.00	PAC	$ 5,000.00	$ 25,000.00
1-3-7	Reconnect Floodplain		49,973.00	CY	$ 15.00	$ 749,595.03
	Restore Wetland		5.16	AC	$ 41,500.00	$ 214,243.76
1-3-8	Channel Realignment Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening		1,503.80	LF	$ 2,000.00	$ 3,007,609.88
1-3-9	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP061	1,776.94	LF	$ 2,000.00	$ 3,553,881.51
1-3-10	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	EP060	899.75	LF	$ 1,000.00	$ 899,746.87
1-3-11	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP016	1,617.00	LF	$ 2,000.00	$ 3,234,001.96

Estimated Total Cost $ 31,389,823.18

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Fountain South

El Paso County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
1-4-1	Reconnect Floodplain		58,107.96	CY	$ 15.00	$ 871,619.34
	Restore Wetland		6.00	AC	$ 41,500.00	$ 249,119.85
1-4-2	Restore Wetland		9.80	AC	$ 41,500.00	$ 406,557.29
	Conservation Easement		8.00	PAC	$ 5,000.00	$ 40,000.00
1-4-3	Reconnect Floodplain		124,908.04	CY	$ 15.00	$ 1,873,620.55
	Conservation Easement		11.30	PAC	$ 5,000.00	$ 56,500.00
	Restore Wetland		12.90	AC	$ 41,500.00	$ 535,504.50
1-4-4	Reconnect Floodplain		124,217.16	CY	$ 15.00	$ 1,863,257.42
	Conservation Easement		0.30	PAC	$ 5,000.00	$ 1,500.00
	Restore Wetland		12.83	AC	$ 41,500.00	$ 532,542.58
1-4-5	Reconnect Floodplain		115,052.13	CY	$ 15.00	$ 1,725,782.01
	Restore Wetland		11.89	AC	$ 41,500.00	$ 493,250.37
1-4-6	Restore Wetland		7.62	AC	$ 41,500.00	$ 316,226.93
1-4-7	Restore Wetland		3.75	AC	$ 41,500.00	$ 155,790.43
	Conservation Easement		0.27	PAC	$ 5,000.00	$ 1,350.00
1-4-8	Channel Realignment Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening		1,805.23	LF	$ 2,000.00	$ 3,610,463.36
1-4-9	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP018	2,287.63	LF	$ 2,000.00	$ 4,575,261.91
1-4-10	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP066	475.60	LF	$ 2,000.00	$ 951,196.99
1-4-11	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP024	166.78	LF	$ 2,000.00	$ 333,567.01
1-4-12	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP070	517.32	LF	$ 2,000.00	$ 1,034,642.94
1-4-13	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP025	270.71	LF	$ 2,000.00	$ 541,422.88
1-4-14	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	EP063	1,370.12	LF	$ 1,000.00	$ 1,370,123.98
1-4-15	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP064	858.24	LF	$ 2,000.00	$ 1,716,472.99
1-4-16	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP065	872.87	LF	$ 2,000.00	$ 1,745,736.94
1-4-17	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP019	1,099.12	LF	$ 2,000.00	$ 2,198,241.46
1-4-18	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP020	1,769.62	LF	$ 2,000.00	$ 3,539,249.77
1-4-19	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP069	191.30	LF	$ 2,000.00	$ 382,608.99

Estimated Total Cost $ 31,121,610.48

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Clear Spring Ranch

El Paso County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
1-5-1	Reconnect Floodplain		78,826.07	CY	$ 15.00	$ 1,182,391.04
	Restore Wetland		8.14	AC	$ 41,500.00	$ 337,942.34
1-5-2	Reconnect Floodplain		105,775.51	CY	$ 15.00	$ 1,586,632.71
	Conservation Easement		5.78	PAC	$ 5,000.00	$ 28,900.00
	Restore Wetland		10.93	AC	$ 41,500.00	$ 453,479.73
1-5-3	Side Detention		240.82	AF	$ 25,000.00	$ 6,020,491.26
1-5-4	Restore Wetland		20.13	AC	$ 41,500.00	$ 835,209.10
1-5-5	Grade Control		156.39	LF	$ 4,000.00	$ 625,569.84
1-5-6	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP077	1,007.92	LF	$ 2,000.00	$ 2,015,843.73
1-5-7	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP033	2,461.66	LF	$ 2,000.00	$ 4,923,319.69
1-5-8	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP082	1,784.92	LF	$ 2,000.00	$ 3,569,847.03
1-5-9	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP078	432.04	LF	$ 2,000.00	$ 864,083.63
1-5-10	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP032	2,368.71	LF	$ 2,000.00	$ 4,737,421.83
1-5-11	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP079	590.41	LF	$ 2,000.00	$ 1,180,810.97
1-5-12	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	EP080	1,241.19	LF	$ 1,000.00	$ 1,241,188.52
1-5-13	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP081	333.65	LF	$ 2,000.00	$ 667,301.68
1-5-14	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP034	893.51	LF	$ 2,000.00	$ 1,787,014.61

Estimated Total Cost $ 32,057,447.71

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Hanna Ranches

El Paso County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
1-6-1	Restore Wetland		34.60	AC	$ 41,500.00	$ 1,436,064.70
1-6-2	Restore Wetland		17.49	AC	$ 41,500.00	$ 725,974.42
	Conservation Easement		12.78	PAC	$ 5,000.00	$ 63,900.00
1-6-3	Restore Wetland		15.95	AC	$ 41,500.00	$ 661,842.46
	Conservation Easement		15.95	PAC	$ 5,000.00	$ 79,740.06
1-6-4	Channel Realignment Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening		2,286.76	LF	$ 2,000.00	$ 4,573,518.69
1-6-5	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP083	244.32	LF	$ 2,000.00	$ 488,637.17
1-6-6	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP085	227.16	LF	$ 2,000.00	$ 454,315.65

Estimated Total Cost $ 8,483,993.15

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Frost

El Paso County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
1-7-1	Side Detention		519.69	AF	$ 25,000.00	$ 12,992,235.78
	Land Acquisition		103.94	PAC	$ 50,000.00	$ 5,196,894.31
1-7-2	Conserve & Enhance Wetland		88.11	AC	$ 13,300.00	$ 1,171,889.43
1-7-3	Restore Wetland		13.28	AC	$ 41,500.00	$ 551,234.89
	Conservation Easement		13.28	PAC	$ 5,000.00	$ 66,413.84
1-7-4	Channel Realignment Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening		2,119.33	LF	$ 2,000.00	$ 4,238,652.46
1-7-5	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP042	1,058.59	LF	$ 2,000.00	$ 2,117,187.18
1-7-6	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP089	704.31	LF	$ 2,000.00	$ 1,408,614.56
1-7-7	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP088	640.51	LF	$ 2,000.00	$ 1,281,029.02
1-7-8	Bank Reshaping and Replanting	EP043	387.27	LF	$ 250.00	$ 96,818.56
1-7-9	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP090	379.37	LF	$ 2,000.00	$ 758,744.90

Estimated Total Cost $ 29,879,714.95

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

BJ Ranches

El Paso County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
1-8-1	Side Detention		500.67	AF	$ 25,000.00	$ 12,516,680.21
	Land Acquisition		94.40	PAC	$ 50,000.00	$ 4,720,000.00
1-8-2	Restore Wetland		7.64	AC	$ 41,500.00	$ 317,238.54
	Conservation Easement		7.19	PAC	$ 5,000.00	$ 35,950.00
1-8-3	Restore Wetland		15.23	AC	$ 41,500.00	$ 631,842.54
	Conservation Easement		15.23	PAC	$ 5,000.00	$ 76,125.61
1-8-4	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	EP098	2,136.14	LF	$ 1,000.00	$ 2,136,144.86
1-8-5	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	EP099	1,215.35	LF	$ 1,000.00	$ 1,215,354.71
1-8-6	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	EP046	789.56	LF	$ 1,000.00	$ 789,562.56
1-8-7	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP047	1,182.40	LF	$ 2,000.00	$ 2,364,793.86
1-8-8	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP096	963.21	LF	$ 2,000.00	$ 1,926,419.84
1-8-9	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP097	548.65	LF	$ 2,000.00	$ 1,097,305.17
1-8-10	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	EP048	2,068.62	LF	$ 1,000.00	$ 2,068,620.00
1-8-11	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	EP049	1,390.38	LF	$ 2,000.00	$ 2,780,760.00

Estimated Total Cost $ 32,676,797.90

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Non-Focus Area Projects

El Paso County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
1-X-1	Reconnect Low Terrace		146,127.45	CY	$ 15.00	$ 2,191,911.70
1-X-2	Reconnect Floodplain		121,716.07	CY	$ 15.00	$ 1,825,741.06
	Restore Wetland		12.57	AC	$ 41,500.00	$ 521,819.93
1-X-3	Reconnect Floodplain		56,405.75	CY	$ 15.00	$ 846,086.31
	Restore Wetland		5.83	AC	$ 41,500.00	$ 241,822.19
1-X-4	Reconnect Floodplain		137,789.02	CY	$ 15.00	$ 2,066,835.25
	Conservation Easement		4.71	PAC	$ 5,000.00	$ 23,550.00
	Restore Wetland		14.23	AC	$ 41,500.00	$ 590,727.70
1-X-5	Reconnect Low Terrace		107,341.17	CY	$ 15.00	$ 1,610,117.57
1-X-6	Reconnect Low Terrace		357,172.11	CY	$ 15.00	$ 5,357,581.70
1-X-7	Side Detention		261.28	AF	$ 25,000.00	$ 6,532,043.43
1-X-8	Side Detention		464.55	AF	$ 25,000.00	$ 11,613,766.04
1-X-9	Side Detention		318.22	AF	$ 25,000.00	$ 7,955,576.50
	Land Acquisition		63.64	PAC	$ 50,000.00	$ 3,182,230.60
1-X-10	Conserve & Enhance Wetland		191.64	AC	$ 13,300.00	$ 2,548,874.15
1-X-15	Utility Crossing Monitoring	16" DIP CSU water line	NA	HR	Labor	NA
1-X-16	Utility Crossing Monitoring	Hazardous liquid pipeline	NA	HR	Labor	NA
1-X-18	Conserve & Enhance Wetland		490.03	AC	$ 13,300.00	$ 6,517,399.00
				Estimated Total Cost		$ 53,626,083.13

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Wood Valley Ditch

Pueblo County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
2-1-1	Reconnect Floodplain		113,729.47	CY	$ 15.00	$ 1,705,942.02
	Conservation Easement		11.75	PAC	$ 5,000.00	$ 58,744.56
	Restore Wetland		11.75	AC	$ 41,500.00	$ 487,579.85
2-1-2	Reconnect Floodplain		121,995.16	CY	$ 15.00	$ 1,829,927.47
	Conservation Easement		12.60	PAC	$ 5,000.00	$ 63,014.03
	Restore Wetland		12.60	AC	$ 41,500.00	$ 523,016.46
2-1-3	Restore Wetland		35.46	AC	$ 41,500.00	$ 1,471,519.47
	Conservation Easement		35.46	PAC	$ 5,000.00	$ 177,291.50
2-1-4	Conserve & Enhance Wetland		9.50	AC	$ 13,300.00	$ 126,380.85
2-1-5	Conserve & Enhance Wetland		10.27	AC	$ 13,300.00	$ 136,617.64
2-1-6	Side Detention		221.47	AF	$ 25,000.00	$ 5,536,824.72
	Land Acquisition		44.29	PAC	$ 50,000.00	$ 2,214,729.89
2-1-7	Reconnect Low Terrace		233,881.63	CY	$ 15.00	$ 3,508,224.45
2-1-8	Utility Crossing Monitoring	Transmission tower	NA	HR	Labor	NA
2-1-9	Channel Realignment Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening		3,931.88	LF	$ 2,000.00	$ 7,863,759.67
2-1-10	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC056	1,024.19	LF	$ 2,000.00	$ 2,048,389.97
2-1-11	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC001	756.90	LF	$ 2,000.00	$ 1,513,807.65

Estimated Total Cost $ 29,265,770.21

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

T Cross Properties

Pueblo County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
2-2-1	Conserve & Enhance Wetland		143.06	AC	$ 13,300.00	$ 1,902,712.52
2-2-2	Conserve & Enhance Wetland		40.13	AC	$ 13,300.00	$ 533,747.56
2-2-3	Reconnect Floodplain		77,923.37	CY	$ 15.00	$ 1,168,850.50
	Conservation Easement		8.05	PAC	$ 5,000.00	$ 40,249.67
	Restore Wetland		8.05	AC	$ 41,500.00	$ 334,072.28
2-2-4	Reconnect Low Terrace		251,613.52	CY	$ 15.00	$ 3,774,202.81
2-2-5	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC004	1,857.97	LF	$ 2,000.00	$ 3,715,934.22
2-2-6	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC060	1,456.84	LF	$ 2,000.00	$ 2,913,689.01

Estimated Total Cost $ 14,383,458.58

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Lower Masciantonio Trust North

Pueblo County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
2-3-1	Side Detention		603.70	AC	$ 25,000.00	$ 15,092,609.64
	Land Acquisition		120.74	PAC	$ 50,000.00	$ 6,037,043.86
2-3-2	Conserve & Enhance Wetland		15.83	AC	$ 13,300.00	$ 210,536.45
2-3-3	Conserve & Enhance Wetland		6.98	AC	$ 13,300.00	$ 92,895.56
2-3-4	Conserve & Enhance Wetland		63.93	AC	$ 13,300.00	$ 850,275.49
2-3-5	Reconnect Low Terrace		77,285.76	CY	$ 15.00	$ 1,159,286.44
2-3-6	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC005	1,264.88	LF	$ 2,000.00	$ 2,529,753.37
2-3-7	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	PC062	2,246.58	LF	$ 1,000.00	$ 2,246,582.36
2-3-8	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	PC006	1,250.27	LF	$ 1,000.00	$ 1,250,270.49
2-3-9	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	PC007	1,017.21	LF	$ 1,000.00	$ 1,017,208.03
2-3-10	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	PC064	1,245.56	LF	$ 1,000.00	$ 1,245,561.16
2-3-11	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC008	273.96	LF	$ 2,000.00	$ 547,921.25
2-3-12	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC063	852.91	LF	$ 2,000.00	$ 1,705,826.95
2-3-13	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC061	1,885.40	LF	$ 2,000.00	$ 3,770,797.47

Estimated Total Cost $ 37,756,568.52

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Lower Masciantonio Trust South

Pueblo County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
2-4-1	Conserve & Enhance Wetland		138.00	AC	$ 13,300.00	$ 1,835,368.39
2-4-2	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control		700.32	LF	$ 2,000.00	$ 1,400,648.79
2-4-3	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control		2,590.63	LF	$ 2,000.00	$ 5,181,269.25
2-4-4	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control		4,721.34	LF	$ 2,000.00	$ 9,442,677.86
2-4-5	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control		1,182.06	LF	$ 2,000.00	$ 2,364,122.24
2-4-6	Bank Reshaping and Replanting		446.17	LF	$ 250.00	$ 111,542.96
2-4-7	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control		250.43	LF	$ 2,000.00	$ 500,866.67
2-4-8	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control		1,052.84	LF	$ 2,000.00	$ 2,105,671.83
2-4-9	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening		823.5129073	LF	$ 1,000.00	$ 823,512.91

Estimated Total Cost $ 23,765,680.90

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Upstream of Piñon Bridge

Pueblo County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
2-5-1	Conserve & Enhance Wetland		46.79	AC	$ 13,300.00	$ 622,276.68
2-5-2	Reconnect Floodplain		60,454.41	CY	$ 15.00	$ 906,816.10
	Conservation Easement		6.25	PAC	$ 5,000.00	$ 31,226.45
	Restore Wetland		6.25	AC	$ 41,500.00	$ 259,179.53
2-5-3	Conserve & Enhance Wetland		54.51	AC	$ 13,300.00	$ 724,963.48
2-5-4	Reconnect Floodplain		280,318.75	CY	$ 15.00	$ 4,204,781.26
	Conservation Easement		28.96	PAC	$ 5,000.00	$ 144,792.74
	Restore Wetland		28.96	AC	$ 41,500.00	$ 1,201,779.77
2-5-5	Reconnect Floodplain		139,703.25	CY	$ 15.00	$ 2,095,548.75
	Conservation Easement		14.43	PAC	$ 5,000.00	$ 72,160.77
	Restore Wetland		14.43	AC	$ 41,500.00	$ 598,934.39
2-5-6	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC071	1,186.57	LF	$ 2,000.00	$ 2,373,132.21
2-5-7	Bank Reshaping and Replanting	PC073	646.19	LF	$ 250.00	$ 161,547.10
2-5-8	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC014	3365.81	LF	$ 2,000.00	$ 6,731,613.55
2-5-9	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC016	636.81	LF	$ 2,000.00	$ 1,273,619.75
2-5-10	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	PC015	735.17	LF	$ 1,000.00	$ 735,169.69
2-5-11	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC074	591.28	LF	$ 2,000.00	$ 1,182,569.97
2-5-12	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	PC072	618.36	LF	$ 1,000.00	$ 618,362.51
2-5-13	Remove Old Approach to Piñon Bridge	Higher earthwork cost for hauling	21,000.00	CY	$ 28.00	$ 588,000.00

Estimated Total Cost $ 24,526,474.69

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Hancock-Greenview Trust

Pueblo County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
2-6-1	Restore Wetland		22.71	AC	$ 41,500.00	$ 942,318.83
	Conservation Easement		22.71	PAC	$ 5,000.00	$ 113,532.39
2-6-2	Restore Wetland		5.16	AC	$ 41,500.00	$ 214,341.41
	Conservation Easement		5.16	PAC	$ 5,000.00	$ 25,824.27
2-6-3	Conserve & Enhance Wetland		14.95	AC	$ 13,300.00	$ 198,807.53
2-6-4	Restore Wetland		14.02	AC	$ 41,500.00	$ 581,731.71
	Conservation Easement		14.02	PAC	$ 5,000.00	$ 70,088.16
2-6-5	Conserve & Enhance Wetland		16.64	AC	$ 13,300.00	$ 221,276.94
2-6-6	Reconnect Low Terrace		107,406.13	CY	$ 15.00	$ 1,611,091.88
2-6-7	Reconnect Floodplain		194,958.70	CY	$ 15.00	$ 2,924,380.45
	Conservation Easement		20.14	PAC	$ 5,000.00	$ 100,701.81
	Restore Wetland		20.14	AC	$ 41,500.00	$ 835,824.99
2-6-8	Reconnect Low Terrace		174,853.72	CY	$ 15.00	$ 2,622,805.82
2-6-9	Reconnect Floodplain		161,934.19	CY	$ 15.00	$ 2,429,012.86
	Conservation Easement		16.73	PAC	$ 5,000.00	$ 83,643.69
	Restore Wetland		16.73	AC	$ 41,500.00	$ 694,242.65
2-6-10	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC024	1,816.45	LF	$ 2,000.00	$ 3,632,894.21
2-6-11	Bank Reshaping and Replanting	PC083	447.46	LF	$ 250.00	$ 111,864.10
2-6-12	Bank Reshaping and Replanting	PC084	478.94	LF	$ 250.00	$ 119,735.81
2-6-13	Channel Realignment Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening		4,524.64	LF	$ 2,000.00	$ 9,049,286.42

Estimated Total Cost $ 26,583,405.93

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Greenview Trust South

Pueblo County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
2-7-1	Restore Wetland		13.57	AC	$ 41,500.00	$ 563,025.49
	Conservation Easement		13.57	PAC	$ 5,000.00	$ 67,834.40
2-7-2	Reconnect Floodplain		37285.02	CY	$ 15.00	$ 559,275.23
	Conservation Easement		3.85	PAC	$ 5,000.00	$ 19,258.79
	Restore Wetland		3.85	AC	$ 41,500.00	$ 159,847.95
2-7-3	Reconnect Low Terrace		237489.11	CY	$ 15.00	$ 3,562,336.65
2-7-4	Channel Realignment Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening		1,150.74	LF	$ 2,000.00	$ 2,301,486.04
2-7-5	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC030	1,606.45	LF	$ 2,000.00	$ 3,212,900.94
2-7-6	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC092	1,053.46	LF	$ 2,000.00	$ 2,106,922.96
2-7-7	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC029	980.18	LF	$ 2,000.00	$ 1,960,367.25
2-7-8	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC031	667.99	LF	$ 2,000.00	$ 1,335,981.76
2-7-9	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC036	471.68	LF	$ 2,000.00	$ 943,366.17
2-7-10	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC095	970.10	LF	$ 2,000.00	$ 1,940,192.71
2-7-11	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC037	339.86	LF	$ 2,000.00	$ 679,726.45
2-7-12	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC035	320.92	LF	$ 2,000.00	$ 641,834.99
2-7-13	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	PC034	609.16	LF	$ 1,000.00	$ 609,157.21
2-7-14	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC096	1271.25	LF	$ 2,000.00	$ 2,542,508.56

Estimated Total Cost $ 23,206,023.53

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Sandoval Property

Pueblo County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
2-8-1	Restore Wetland		23.71	AC	$ 41,500.00	$ 983,918.08
	Conservation Easement		23.71	PAC	$ 5,000.00	$ 118,544.35
2-8-2	Reconnect Floodplain		179,232.29	CY	$ 15.00	$ 2,688,484.34
	Conservation Easement		18.52	PAC	$ 5,000.00	$ 92,578.66
	Restore Wetland		18.52	AC	$ 41,500.00	$ 768,402.89
2-8-3	Reconnect Floodplain		55,210.18	CY	$ 15.00	$ 828,152.64
	Conservation Easement		5.70	PAC	$ 5,000.00	$ 28,517.65
	Restore Wetland		5.70	AC	$ 41,500.00	$ 236,696.52
2-8-4	Utility Crossing Monitoring	Transmission Tower	NA	HR	Labor	NA
2-8-5	Channel Realignment Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening		1,688.19	LF	$ 2,000.00	$ 3,376,376.82
2-8-6	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC097	2,697.32	LF	$ 2,000.00	$ 5,394,649.16
2-8-7	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	PC099	974.24	LF	$ 1,000.00	$ 974,236.73

Estimated Total Cost $ 15,490,557.83

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Eagleridge

Pueblo County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
2-9-1	Restore Wetland		9.34	AC	$ 41,500.00	$ 387,786.23
	Conservation Easement		9.34	PAC	$ 5,000.00	$ 46,721.23
2-9-2	Reconnect Low Terrace		195,204.72	CY	$ 15.00	$ 2,928,070.87
2-9-3	Reconnect Floodplain		408,848.10	CY	$ 15.00	$ 6,132,721.56
	Conservation Easement		27.14	PAC	$ 5,000.00	$ 135,700.00
	Restore Wetland		42.24	AC	$ 41,500.00	$ 1,752,809.54
2-9-4	Reconnect Low Terrace		236,634.83	CY	$ 15.00	$ 3,549,522.44
2-9-5	Utility Crossing Monitoring	Tranmission Tower	NA	HR	Labor	NA
2-9-6	Utility Crossing Monitoring	Water Line	NA	HR	Labor	NA
2-9-7	Grade Control		129.82	LF	$ 4,000.00	$ 519,277.90
2-9-8	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC043	1,668.29	LF	$ 2,000.00	$ 3,336,570.97
2-9-9	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	PC101	1,545.12	LF	$ 1,000.00	$ 1,545,120.60
2-9-10	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC104	1,836.13	LF	$ 2,000.00	$ 3,672,253.76
2-9-11	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening and Grade Control	PC102	1,515.91	LF	$ 2,000.00	$ 3,031,813.09
2-9-12	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	PC103	510.95	LF	$ 1,000.00	$ 510,948.14
2-9-13	Bank Reshaping and Replanting Including Planform and Section Earthwork with Bank Hardening	PC042	1,017.75	LF	$ 1,000.00	$ 1,017,754.84

Estimated Total Cost **$ 28,567,071.16**

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Pueblo Levee System

Pueblo County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
2-10-1	Reconnect Floodplain		154,955.36	CY	$ 15.00	$ 2,324,330.35
	Restore Wetland		16.01	AC	$ 41,500.00	$ 664,323.07
2-10-2	Reconnect Low Terrace		15,251.31	CY	$ 15.00	$ 228,769.58
2-10-3	Remove Railroad Approach and Abutments		7,873.00	CY	$ 28.00	$ 220,444.00
	Remove Railroad Bridge Piers	5 piers + padded cost	5.00	NA	$ 3,000.00	$ 15,000.00
2-10-4	Reconnect Floodplain		10,325.33	CY	$ 15.00	$ 154,880.00
2-10-5	Reconnect Floodplain		2,742.67	CY	$ 15.00	$ 41,140.00

Estimated Total Cost **$ 3,648,887.00**

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Non-Focus Area Projects

Pueblo County

Project ID	Project	Description	Quantity	Unit	Unit Cost	Cost
2-X-11	Conserve & Enhance Wetland		18.11	AC	$ 13,300.00	$ 240,907.96
2-X-12	Restore Wetland		14.84	AC	$ 41,500.00	$ 615,904.77
	Conservation Easement		14.84	PAC	$ 5,000.00	$ 74,205.39
2-X-13	Reconnect Low Terrace		28,613.45	CY	$ 15.00	$ 429,201.75
2-X-14	Reconnect Low Terrace		224,943.43	CY	$ 15.00	$ 3,374,151.52
2-X-17	Grade Control		156.31	LF	$ 4,000.00	$ 625,240.08
2-X-19	Reconnect Floodplain		2,678.13	CY	$ 15.00	$ 40,172.00
					Estimated Total Cost	**$ 5,399,783.48**

Unit Key	
AC	Acre
AF	Acre-Foot
PAC	Private Acre
CY	Cubic Yard
LF	Linear Foot
HR	Labor Hours

Appendix I – Stakeholder Meeting Summaries

Floodplain Management Opportunities Study

Kick-off Meeting Summary

April 25, 2019 9:00 – 10:30am

Location: Matrix Design Group, 2435 Research Parkway

Attendees: Larry Small, Graham Thompson, Chris Martin

1. Scope
    a. Project goal – compile a GIS database which contains potential project locations for restoring the natural function of Fountain Creek through the techniques outlined by the Floodplain Management Alternative from the Flood Control Study. This study will provide scoring of all identified projects and a prioritized ranking of the top 25 projects, making recommendations on a feasible implementation strategy.
    b. Task 1 – Data Collection
        i. Current authoritative datasets
        ii. Previous studies (Watershed Management Plan, Corridor Restoration Master Plan, WARSSS, Flood Control Study, various Creek Rehabilitation Projects)
        iii. Deliverables
            1. Updated GIS database
            2. Technical Memorandum
    c. Task 2 – Fountain Creek Channel Plan and Profile
        i. 1:400 scale interactive GIS plan view workmaps
        ii. CAD-based profile – Profile will be based on approximate thalweg as derived from the 2018/2016 LiDAR; the study centerline maybe different than the thalweg to accommodate comparisons to previous studies
        iii. Define segment breaks and slope characteristics
        iv. Deliverables
            1. Updated interactive workmaps
            2. Profile
    d. Task 3 – Geomorphometric Delineation of Floodplains and Terraces
        i. Land Surface Dynamics Tool sample area – As this software continues to be supported and improved, a new requirement has surfaced since the time the scope for this project was completed. There is a new version of the tool that accommodates a 64-bit computer architecture. Larry agreed that the time savings we would achieve in a 64-bit environment more than offset the cost of upgrading a computer to Windows 10 Enterprise, which is a tool requirement.
        ii. Evaluate, refine, and implement for the study area

iii. Will assist in determining potential areas to reconnect the Creek to the floodplain (Task 5)

iv. Deliverables

1. Floodplains and terraces added to plan view workmaps

The Land Surface Dynamics Tool will also be used to generate the thalweg required for Task 2.

e. Task 4 – Departure Analysis

i. Primarily based on bankfull width, belt width, meander wavelength, radius of curvature, and changes in slope – It will be informative to compare these metrics against those measured during the Watershed Management Plan and U.S. Army Corps of Engineers Geomorphology Study

ii. Will assist in determining areas to restore to functional form (Task 5)

iii. Deliverables

1. An addendum to the Task 1 Technical Memorandum to provide summary tables of departure analysis and findings

f. Task 5 – Identify Opportunities

i. Wetland/riparian zone restoration/preservation (THK associates, Inc.)

ii. Channel realignment

iii. Grade control

iv. Reconnect channel to floodplain

v. Infrastructure protection

vi. Side detention – In general, implementation of side detention maybe the most difficult due to a variety of factors. This study will continue to evaluate side detention as one possible project type

vii. Purchase property or establish conservation easements

viii. Deliverables

1. Updated plan view workmaps

g. Task 6 – Develop Implementation Strategy

i. Establish metrics for all projects (scoring) – Discussion was had about incorporating the identified WARSSS projects into the new scoring methodology to have one master list of projects. This topic will be revisited when work on this task commences

ii. Prioritized ranking of top 25 projects

iii. Evaluate opportunistic versus systematic implementation approach

iv. Evaluate level of change since the Corridor Restoration Master Plan

v. Discuss and generally identify high sediment producing tributaries and watershed areas – This discussion will center on those areas primarily

outside of Colorado Springs as the City is implementing their own plans to reduce sediment

vi. Deliverables

1. Technical Memorandum and maps providing scoring of all identified projects and a prioritized ranking of the top 25 projects and recommendations on a feasible implementation strategy

h. Task 7 – Final Report

i. Deliverables

1. Written technical report and supporting documentation

i. Task 8 – Project Management and Meetings

i. Deliverables

1. Monthly meeting agenda and summaries – Monthly meetings will be referred to as stakeholder meetings
2. Draft in-process work summaries
3. Final deliverables (5 hardcopies and 5 digital)
4. Presentation of findings to TAC, CAG, and Board of Directors

2. Proposed Schedule and Budget

Budget & Timeline Table

Task	Description	Target Start Date	Target Completion Date	Total
1	Data Collection	3/1/2019	3/20/2019	$12,000.00
2	Fountain Creek Channel Plan and Profile	3/21/2019	5/20/2019	$16,000.00
3	Geomorphometric Delineation of Floodplain and Terraces	5/21/2019	7/10/2019	$20,000.00
4	Departure Analysis	7/11/2019	8/31/2019	$16,000.00
5	Identify Opportunities	9/1/2019	10/21/2019	$20,000.00
6	Develop Implementation Strategy	10/22/2019	11/21/2019	$14,000.00
7	Final Report	11/22/2019	1/31/2020	$10,000.00
8	Project Management and Meetings	3/1/2019	1/31/2020	$12,000.00
	TOTALS			**$120,000.00**

The general schedule is acceptable. However, it was expressed that a cursory list of high priority projects be provided in the August/September timeframe for the Annual Plan and the drafting of 2020 projects.

3. Progress

a. Task 1: 90% complete – The outstanding datasets are 2018 LiDAR data and imagery for El Paso County. They will be received shortly.

b. Task 2

i. Determine appropriate thalweg and establish methodology

c. Next Steps

i. CAD-based profile and plan view workmaps

ii. Land Surface Dynamics Tool sample area output

iii. May progress meeting (date TBD) – May stakeholder meeting will be on the 23rd at 2PM

Data sharing was discussed as related to the GOCO Master Plan upcoming opportunity. It was determined all data could be freely shared except for the 2018 El Paso County imagery, which would require a license agreement with the County. This topic will be revisited if the grant is awarded.

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Floodplain Management Opportunities Study

Stakeholder Meeting #2 Summary

June 5, 2019 10:15 – 10:45am

Location: Matrix Design Group, 2435 Research Parkway

Attendees: Larry Small, Graham Thompson, Chris Martin, Dan Bare, Aaron Sutherlin, Kevin Shanks, Julia Gamec, Lucas Buscher,

1. Progress Update
    a. Task 1 – Data Collection: Complete – All data have been requested and received
    b. Task 2 – Fountain Creek Channel Plan and Profile
        i. 1:400 scale interactive GIS plan view workmaps – Recently collected data have been added to the maps
        ii. GIS-based thalweg – Generated via Arc Hydro from 2018 and 2016 LiDAR data, with the incorporation of as-built contours from recent District projects
        iii. CAD-based profile – Draft profile presented with additional desired modifications discussed
        iv. Define segment breaks and slope characteristics – This is the next step required to break the Creek into similar segments for additional analysis.
    c. Task 3 – Geomorphometric Delineation of Floodplains and Terraces
        i. LSDTopoTools installation and sample area – Sample area is in northern Pueblo County. A handout was presented detailing the various parameters that can be adjusted during the process and the overall sensitivity of the output to these parameters
        ii. Evaluate, refine, and implement for the study area – Next step is to finetune the parameters to reach a decent representation and apply those to the entire study reach
    d. Next Steps
        i. Finalize CAD-based profile and plan view workmaps
        ii. LSDTopoTools draft study output
        iii. Task 4 – Departure Analysis
        iv. June/July stakeholder meeting - Based on the delay of the May stakeholder meeting, it will be determined if a meeting will be held at the end of June for this project

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Floodplain Management Opportunities Study

Stakeholder Meeting #3 Summary

July 18, 2019 2:00 – 4:00pm

Location: Matrix Design Group, 2435 Research Parkway

Attendees: Larry Small, Ian Hartley, Annie Berlemann, David Woolley, Irene Kornelly, Chloe Lewis, Aaron Sutherlin, Dan Bare, Graham Thompson, Jeff Battiste, Chris Martin

Agenda items were generally reviewed. Specific discussion items are indicated in red text.

1. Progress Update
    a. Task 1 – Data Collection: Complete
    b. Task 2 – Fountain Creek Channel Plan and Profile: Complete – Profile is complete with plan maps updated with delineated thalweg and associated stationing
    c. Task 3 – Geomorphometric Delineation of Floodplains and Terraces
        i. Evaluation of various methods to determine best fit
            1. Topographic Approach – In general, the topographic approach failed to give us a continuous dataset within the existing 100-year floodplain. While appropriate for certain applications, it was recommended moving to a more hydraulic approach
                a. LSDTopoTools
                b. TerEx
            2. Hydraulic Approach – Model outputs are continuous and readily allow for identifying possible areas to reconnect the floodplain
                a. HEC-RAS
        ii. HEC-RAS outputs for Bankfull, 5-Year, 10-Year, and 100-Year
            1. Baker Study Hydrology Report for Fountain Creek
            2. Floodplain delineations use latest available elevation data
                a. El Paso County 2018; Pueblo County 2016
            3. Model versioning and post-processing data cleanup – We are checking with FEMA and various floodplain administrators to track down the most recent version of the models for both counties. Our particular application does not necessitate the most updated information, but it would be good to have the latest models for this and other District projects
    d. Task 4 – Departure Analysis – We discussed how the geomorphic delineations serve as a quantitative measurement of how the Creek is performing and these

measurements can be compared to historic numbers. This task is a prerequisite for identifying opportunities (projects)

i. Geomorphic delineations complete (radius of curvature, bankfull width, belt width, meander wavelength, straightway length, pool to pool length, valley length, channel length)

ii. Generate summary calculations by segment break and compare to 2003/2004

e. Task 5 – Identify Opportunities (projects) – The initial cut of identified opportunities, for the August meeting, will be in Pueblo County and focus on reconnecting the floodplain and wetland/riparian opportunities to improve water quality. We will also look for grade control opportunities and, potentially, projects that protect infrastructure, although most of those projects have been recently completed

i. HEC-RAS delineations as opportunities to reconnect/realign the channel to the floodplain

ii. Potential grade control locations from the profile and departure analysis

f. Next Steps

i. Departure Analysis summary

ii. Identify Opportunities (projects)

iii. August stakeholder meeting - August 15th at 2:00pm

g. Schedule

Task	Description	Target Start Date	Target Completion Date
1	Data Collection	3/1/2019	3/20/2019
2	Fountain Creek Channel Plan and Profile	3/21/2019	5/20/2019
3	Geomorphometric Delineation of Floodplain and Terraces	5/21/2019	7/10/2019
4	Departure Analysis	7/11/2019	8/31/2019
5	Identify Opportunities	9/1/2019	10/21/2019
6	Develop Implementation Strategy	10/22/2019	11/21/2019
7	Final Report	11/22/2019	1/31/2020
8	Project Management and Meetings	3/1/2019	1/31/2020

*Note: At the kick-off meeting it was expressed that a cursory list of high priority projects be provided in the August/September timeframe for the Annual Plan and the drafting of 2020 projects. – Initial list will be limited to Pueblo County

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Floodplain Management Opportunities Study

Stakeholder Meeting #4 Summary

August 15, 2019 9:00 – 11:00am

Location: Matrix Design Group, 2435 Research Parkway

Attendees: Larry Small, Ian Hartley, Kevin Binkley, Richard Mulledy, Julie Gamec, Jeff Rice, Erin Powers, Aaron Sutherlin, Dan Bare, Graham Thompson, Jeff Battiste, Chris Martin

Agenda items were generally reviewed. Specific discussion items are indicated in red text.

1. Progress Update
    a. Task 1 – Data Collection: Complete
    b. Task 2 – Fountain Creek Channel Plan and Profile: Complete
    c. Task 3 – Geomorphometric Delineation of Floodplains and Terraces
        i. HEC-RAS Outputs for Flow Years and 1,000 cfs Increments – The team looked at two exhibits covering Pueblo County. One represented inundation areas at twice bankfull flow (6,000 cfs) and the other inundation areas at the 10-year flow event. Subtracting out the bankfull areas provides a representation of "disconnected terraces" that could potentially be reconnected to bankfull. Next steps are to evaluate the feasibility of reconnection in defined projects and expand to El Paso County.
            1. Comparison of HEC-RAS Models – FEMA was contacted to obtain the latest models and model history.
            2. Corps Study Model Determined the Most Consistent – As the Corps model covers the entire study extent, it was advantageous to use this model, as opposed to others that saw minimal updates and did not cover the whole study area. The Anderson model covers the lower 2/3's of the Pueblo County reach and a URS model covers the majority of the El Paso County reach. The new grading associated with the Pueblo Levee project was not incorporated in the modeling results. The grading could be incorporated. It is likely the sediment that was removed has already been replaced and there are minimal floodplain reconnect opportunities in that area.

    d. Task 4 – Departure Analysis
        i. Geomorphic Delineations Complete
        ii. Comparison Calculations by Segment Break
            1. Trends and Outliers – In general, the Creek is compressing between roughly segments 7 and 9 (from the Master Plan),

indicating a lengthening of the Creek and smaller radii of curvature. In general, this increased sinuosity should be considered when identifying and designing opportunities. South of roughly segment 11, the radii of curvature are increasing with the Creek generally straightening. This is mostly due to floodplain encroachment.

e. Task 5 – Identify Opportunities (Projects in Pueblo County)
    i. Criteria
        1. Denuded Areas, Floodplain Restrictions, Coincidence with Previously Identified Opportunities, Areas of High-Water Velocity, Geomorphic Changes, Changes in Slope – When looking at denuded areas it will be important to distinguish between depositional areas and those that are experiencing active scour. In general, revegetation opportunities will be geared toward depositional areas. Areas where a change in slope was identified from the profile, need to be field verified before noting a potential grade control opportunity. More analysis needs to be conducted regarding identifying high-water velocity areas.
    ii. Project Areas – It was discussed that the area north of the Highway 47 project and south of the identified Sandoval project area, may have good opportunities and should be investigated further. In general, these project areas highlight where multiple criteria come together. The next steps are to develop projects in these and other areas, including El Paso County.
        1. Wood Valley Ditch
        2. Lower Masciantonio Trust
        3. Upstream of Piñon Bridge
        4. Greenview Trust
        5. Sandoval Property - The history of this property was discussed with the consensus that it may be difficult to remove the manmade barrier restricting the floodplain.
        6. Pueblo Levee System -- The remaining railroad abutments may be difficult to remove from an environmental contaminant standpoint. There is good consensus with the Master Plan that the area near the Arkansas River confluence holds some opportunities for reconnecting the floodplain and improving habitat.

f. Next Steps
    i. Departure Analysis Summary
    ii. Finetune Pueblo County Projects and Identify El Paso County Projects
    iii. Metrics for Project Prioritization/Ranking
    iv. September Stakeholder Meeting – September 19th, 2 pm

g. Schedule

Task	Description	Target Start Date	Target Completion Date
1	Data Collection	3/1/2019	3/20/2019
2	Fountain Creek Channel Plan and Profile	3/21/2019	5/20/2019
3	Geomorphometric Delineation of Floodplain and Terraces	5/21/2019	7/10/2019
4	Departure Analysis	7/11/2019	8/31/2019
5	Identify Opportunities	9/1/2019	10/21/2019
6	Develop Implementation Strategy	10/22/2019	11/21/2019
7	Final Report	11/22/2019	1/31/2020
8	Project Management and Meetings	3/1/2019	1/31/2020

*Note: At the kick-off meeting it was expressed that a cursory list of high priority projects be provided in the August/September timeframe for the Annual Plan and the drafting of 2020 projects. The initial request has been refined to just include Pueblo County. – Study is on schedule.

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Floodplain Management Opportunities Study

Stakeholder Meeting #5 Summary

September 19, 2019 2:00 – 4:00pm

Location: Matrix Design Group, 2435 Research Parkway

Attendees: Larry Small, Irene Kornelly, Kevin Binkley, Lucy Harrington, Annie Berlemann, Julie Gamec, Aaron Sutherlin, Graham Thompson, Jeff Battiste, Chris Martin

Agenda items were generally reviewed. Specific discussion items are indicated in red text.

1. Progress Update
    a. Task 1 – Data Collection: Complete - The team was notified that Matrix has reached out to various utility providers to obtain Creek crossing locations. Kevin indicated that CSU has utilities in the Creek south of Colorado Springs to Fountain. Data has since been incorporated into the project database.
    b. Task 2 – Fountain Creek Channel Plan and Profile: Complete
    c. Task 3 – Geomorphometric Delineation of Floodplains and Terraces: Complete
    d. Task 4 – Departure Analysis
        i. Analysis Complete
        ii. Draft Technical Memo to be Delivered
    e. Task 5 – Identify Opportunities
        i. Opportunities, Indicators, and Project Area Summary – Project areas have been identified in El Paso County as well. We reviewed several overview maps of the additional project areas in Pueblo County and the new ones in El Paso County that were identified through our two workshops with THK. Kevin mentioned that CSU has completed, or are in the design phase of, multiple projects along the Creek in El Paso County. Kevin will provide the locations of these projects to be added to the project database. We took a cursory look at possible infrastructure protection areas and reviewed the points of slope inflection in El Paso County.

            We reviewed the types of opportunities this study was attempting to identify and the data indicators that located these opportunities. We also reviewed a cursory table indicating which opportunities were associated with which project areas. It was noted and acknowledged that an additional step is needed to turn the identified project areas into a list of projects.
    f. Task 6 – Develop Implementation Strategy
        i. Multifaceted Projects vs. Homogenous Projects – Larry indicated that multifaceted projects would be prioritized over projects narrower in scope.

Cost considerations will be part of the priority process. A conceptual cost will be associated with major projects based on simplified unit costs (cost per acre, cost per linear foot, etc.).

ii. Technical Criteria and Decision Matrix – Opportunities have been identified throughout the study corridor based on a set of indicators. The project focus areas serve to identify multi-objective, geographic, hotspots within the corridor that will be added to a decision matrix. It was agreed that a comprehensive evaluation of technical criteria was not needed. The decision matrix will serve to rank the projects and generate a list of high priority projects.

g. Next Steps

i. Departure Analysis Technical Memo

ii. Metrics for Project Prioritization/Ranking

iii. October Stakeholder Meeting – October 17th, 2 pm

h. Schedule

Task	Description	Target Start Date	Target Completion Date
1	Data Collection	3/1/2019	3/20/2019
2	Fountain Creek Channel Plan and Profile	3/21/2019	5/20/2019
3	Geomorphometric Delineation of Floodplain and Terraces	5/21/2019	7/10/2019
4	Departure Analysis	7/11/2019	8/31/2019
5	Identify Opportunities	9/1/2019	10/21/2019
6	Develop Implementation Strategy	10/22/2019	11/21/2019
7	Final Report	11/22/2019	1/31/2020
8	Project Management and Meetings	3/1/2019	1/31/2020

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Floodplain Management Opportunities Study

Stakeholder Meeting #6 Summary

October 17, 2019 2:00 – 4:00pm

Location: Matrix Design Group, 2435 Research Parkway

Attendees: Larry Small, Chloe Lewis, Kevin Shanks, Dan Bare, Aaron Sutherlin, Jeff Battiste, Chris Martin

Agenda items were generally reviewed. Specific discussion items are indicated in red text.

1. Progress Update
    a. Task 1 – Data Collection: Complete
    b. Task 2 – Fountain Creek Channel Plan and Profile: Complete – The entire profile was printed and laid out on the conference room table for viewing.
    c. Task 3 – Geomorphometric Delineation of Floodplains and Terraces: Complete
    d. Task 4 – Departure Analysis
        i. Draft Technical Memo to be Delivered
    e. Task 5 – Identify Opportunities
        i. Project Identification and Evaluation Workflow – A process flowchart was reviewed and discussed.
        ii. Overview of Project Locations – Pueblo and El Paso County projects were reviewed at a high level with several detailed focus area examples.
        iii. Types of Projects
            1. Relative Elevation Model
                a. Areas of Constriction vs. Reference Reach – The Relative Elevation Model output was reviewed and explained in reference to identifying projects. We reviewed the stable reference reach in the southern portions of El Paso County and contrasted it with areas of constriction in Pueblo County to illustrate reconnection opportunities. We also reviewed the hillshade to identify the highly erodible landform that makes up the Frost wall.
        iv. Task 5 is Complete
    f. Task 6 – Develop Implementation Strategy
        i. Draft Decision-Making Process Flowchart – We had a general discussion regarding the decision-making process and the incorporation of aspects from both the Flood Control Study and the Monument Creek Restoration Master Plan. There were no revisions from the group. Larry indicated that he would circulate the flowchart amongst the stakeholders to see if

there are any revisions to be presented at the November stakeholders meeting.

ii. Draft Unit Costs – Costs were generally agreed upon. Kevin is inquiring about conservation easements and land acquisition costs which will replace what we currently show. We reviewed a recent bid and determined the $15 per CY is an acceptable number for earthwork.

g. Next Steps

i. Departure Analysis Technical Memo

ii. Draft Decision Matrix and Project Costs

iii. Final Report

iv. November Stakeholder Meeting – November 21st

h. Schedule

Task	Description	Target Start Date	Target Completion Date
1	Data Collection	3/1/2019	3/20/2019
2	Fountain Creek Channel Plan and Profile	3/21/2019	5/20/2019
3	Geomorphometric Delineation of Floodplain and Terraces	5/21/2019	7/10/2019
4	Departure Analysis	7/11/2019	8/31/2019
5	Identify Opportunities	9/1/2019	10/21/2019
6	Develop Implementation Strategy	10/22/2019	11/21/2019
7	Final Report	11/22/2019	1/31/2020
8	Project Management and Meetings	3/1/2019	1/31/2020

TAC Presentation – 1/8/20
CAG Presentation – 1/10/20
Board Presentation – 1/24/20
Final Invoice to Chris Sturm – 1/31/20

Contact Information

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Chris Martin chris_martin@matrixdesigngroup.com

Floodplain Management Opportunities Study

Stakeholder Meeting #7 Summary

November 21, 2019 2:00 – 4:00pm

Location: Matrix Design Group, 2435 Research Parkway

Attendees: Larry Small, Mark Shea, Annie Berlemann, Lucy Harrington, Kevin Shanks, Graham Thompson, Dan Bare, Aaron Sutherlin, Jeff Battiste, Chris Martin

Agenda items were generally reviewed. Specific discussion items are indicated in red text.

1. Progress Update
    a. Task 1 – Data Collection: Complete
    b. Task 2 – Fountain Creek Channel Plan and Profile: Complete
    c. Task 3 – Geomorphometric Delineation of Floodplains and Terraces: Complete
    d. Task 4 – Departure Analysis: Complete
    e. Task 5 – Identify Opportunities: Complete
    f. Task 6 – Develop Implementation Strategy
        i. Decision-Making Process Flowchart – The flowchart was quickly reviewed and stakeholders were asked to provide any feedback.
        ii. Draft Decision Matrix – A draft decision matrix was quickly reviewed and stakeholders were asked to provide any feedback.
        iii. Unit Costs – The unit costs were discussed with the following comments made:

            -Two notes were suggested to clarify the unit costs. The Wetland Habitat cost does not include securing water for the wetlands. The Earthwork cost does include a safety factor for hauling if required.

            -The final report will note that these conceptual costs do not include realized construction efficiencies associated with adjacent, concurrent projects.

            -It was suggested that the $4,000 per acre for conservation easements might be closer to $7,000 per acre. That is the going rate in Morgan County. We will investigate further. It was also pointed out that the final report should detail why conservation easements and land acquisition are at the same unit price.

            -We will review our detention unit cost to make sure it is the best number.

        iv. Project Costs Comparison – Reviewed dynamic costing spreadsheet.

g. Task 7 – Final Report
    i. Final Indicator Maps - Reviewed
    ii. Final Focus Area Detail Maps - Reviewed
    iii. Final Workmaps - Reviewed
    iv. Draft Report in Progress

h. Next Steps
    i. Final Report
    ii. December Stakeholder Meeting – This study will not be discussed in December and this represents the last stakeholder meeting for this study.

i. Schedule

Task	Description	Target Start Date	Target Completion Date
1	Data Collection	3/1/2019	3/20/2019
2	Fountain Creek Channel Plan and Profile	3/21/2019	5/20/2019
3	Geomorphometric Delineation of Floodplain and Terraces	5/21/2019	7/10/2019
4	Departure Analysis	7/11/2019	8/31/2019
5	Identify Opportunities	9/1/2019	10/21/2019
6	Develop Implementation Strategy	10/22/2019	11/21/2019
7	Final Report	11/22/2019	1/31/2020
8	Project Management and Meetings	3/1/2019	1/31/2020

TAC Presentation – 1/8/2020
CAG Presentation – 1/10/2020
Board Presentation – 1/24/2020

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Appendix J – Stakeholder Meeting Sign-In Sheets

Overton Road Bank Restoration & Floodplain Management Opportunities

Meeting Attendance Record: **Date: 7/18/2019 2:00 p.m.** **Location: Matrix Design Group, Inc., Colorado Springs Office**

Name	Organization/Dept./Div.	Phone	Email
Larry Small	Fountain Creek District	719.447.5012	LSmall42@comcast.net
Aaron Sutherlin	Matrix	719.575.0100	Aaron_Sutherlin@matrixdesigngroup.com
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Graham Thompson	Matrix (Phone-in)	719.575.0100	Graham_Thompson@matrixdesigngroup.com
Chris Martin	Matrix	719.575.0100	Chris_Martin@matrixdesigngroup.com
Dan Bare	Matrix	719.575.0100	Dan_Bare@matrixdesigngroup.com
Irene Kornelly	CAG / District	719-591-5157	ikornelly@pcisys.net
DAVID WOOLLEY	CITY OF FOUNTAIN	719 641 1383	dwoolley@fountaincolorado.org
ANNIE BERLEMANN	Colo Springs Utilities	719.668.4585	aberlemann@csv.org
Chloe Lewis	Westerwelt Ecological	303 710 2852	clewis@westerwelt.com
Ian Hartley	CAG	719 547 3648	ianhartley4008@yahoo.com
Christine Lowenberg	CAG / Lowlands, LLC	318.450.2292	christine@lowlandsllc.com

Floodplain Management Opportunities Study (Overton Rd + Bare 2)

Meeting Attendance Record: **Date: 8/15/2019 9:00 am** **Location: Matrix Design Group, Inc., Colorado Springs Office**

Name	Organization/Dept./Div.	Phone	Email	Initial
Larry Small	Fountain Creek Watershed District	719-447-5012	lSmall42@comcast.net	
Aaron Sutherlin	Matrix Design Group	719-575-0100	Aaron_sutherlin@matrixdesigngroup.com	
Dan Bare	Matrix Design Group	719-575-0100	Dan_bare@matrixdesigngroup.com	
Graham Thompson	Matrix Design Group	850-279-4298	Graham_thompson@matrixdesigngroup.com	Via phone
Chris Martin	Matrix Design Group	303-572-0200	Chris_martin@matrixdesigngroup.com	
Kevin Binkley	Colorado Springs Utilities	719-668-3748	kbinkley@csu.org	KRB
RICHARD MULLEDY	CITY OF COLORADO SPRINGS			
Ian Hartley	Fountain Creek Dist		ianhartley4008@yahoo.com	
Julie Gamec	TTK	303-770-7201	jgamec@tnkassoc.com	
Jeff Battiste	Matrix			
Jeff Rice	El Paso County	7195207877	jeffrice@elpasoco.com	JR
Erin Powers	City of Colorado Springs / SWENT	719-385-5852	erin.powers@coloradosprings.gov	EP

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Overton Road Bank Restoration
&
Floodplain Management Opportunities Study

Meeting Attendance Record: **Date: 9/19/2019 2:00 p.m.** **Location: Matrix Design Group, Inc., Colorado Springs Office**

Name	Organization/Dept./Div.	Phone	Email
Larry Small	Fountain Creek District	719.447.5012	LSmall42@comcast.net
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Lucy Harrington	westervelt.eco.services	720-955-3029	lharrington@westervelt.com
Annie Berlemann	aberlemann@csu.org	719.668.4585	aberlemann@csu.org
Kevin Binkley	Colorado Springs Utilities/City Stormwater Enterprise ~~[illegible]~~	719-668-3748	kbinkley@csu.org kevin.binkley@coloradosprings.gov

Matrix

Overton Road Bank Restoration,
Floodplain Management Opportunities Study,
Barr Farm Phase 2

Meeting Attendance Record: **Date: 10/17/2019 2:00 p.m. Location: Matrix Design Group, Inc., Colorado Springs Office**

Name	Organization/Dept./Div.	Phone	Email
Larry Small	Fountain Creek District	719.447.5012	LSmall42@comcast.net
Aaron Sutherlin	Matrix	719.575.0100	Aaron_Sutherlin@matrixdesigngroup.com
Jeff Battiste	Matrix	719.575.0100	Jeff_Battiste@matrixdesigngroup.com
Chris Martin	Matrix	719.575.0100	Chris_Martin@matrixdesigngroup.com
Dan Bare	Matrix	719.575.0100	Dan_Bare@matrixdesigngroup.com
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Matrix

Floodplain Management Opportunities Study, Barr Farm Phase II, Overton Road Bank Restoration

Meeting Attendance Record: **Date: 11/21/2019 2:00 pm** **Location: Matrix Design Group, Inc., Colorado Springs Office**

Name	Organization/Dept./Div.	Phone	Email	Initial
Larry Small	Fountain Creek Watershed District	719-447-5012	lSmall42@comcast.net	
Aaron Sutherlin	Matrix Design Group	719-575-0100	Aaron_sutherlin@matrixdesigngroup.com	
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Lucy Harrington				

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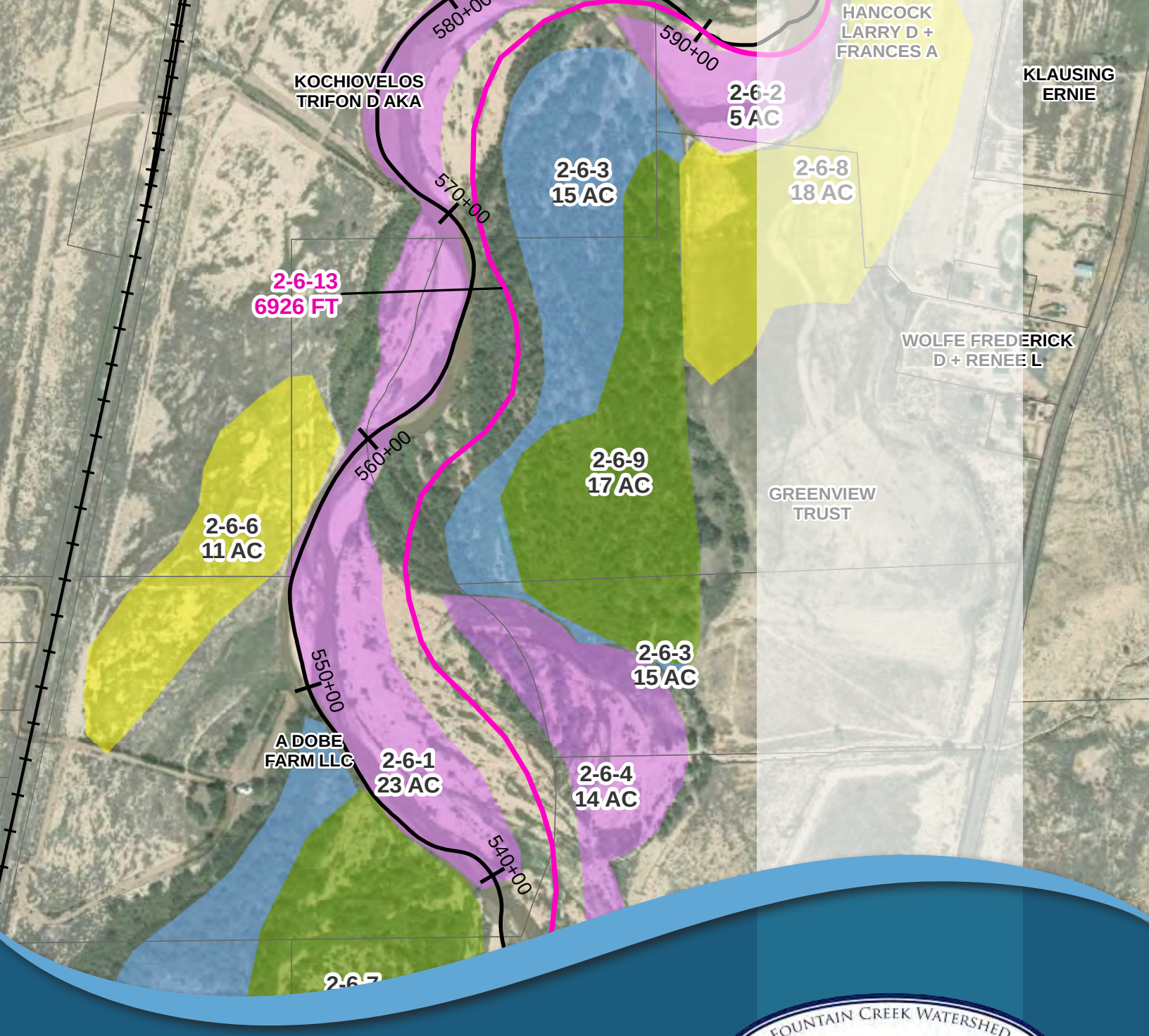

FOUNTAIN CREEK WATERSHED
FLOOD CONTROL & GREENWAY DISTRICT

Larry Small, Executive Director

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719-447-5012