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Stantec

Jimmy Camp Creek Drainage Basin Planning Study

DRAFT Basin Characteristics Report

March 18, 2022

FINAL

Prepared for:

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1.0 INTRODUCTION

1.1 AUTHORIZATION

El Paso County (County), Colorado authorized Stantec Consulting Services Inc. (Stantec), in cooperation with HDR and THK Associates, to conduct the *Jimmy Camp Creek Drainage Basin Planning Study* under Contract 17-067-61. The performance location for this contract is the Jimmy Camp Creek Drainage Basin watershed which spans unincorporated portions of El Paso County, eastern portions of the City of Colorado Springs, and northern portions of the City of Fountain.

1.2 PURPOSE AND SCOPE

The Jimmy Camp Creek Drainage Basin is a largely undeveloped area located in the eastern portion of the Fountain Creek Watershed. Due to its large size, the development potential in the basin (including the major development of Lorson Ranch East), and the need for a responsible drainage fee structure the County required an updated Jimmy Camp Creek Drainage Basin Planning Study (DBPS) to help guide decision making within the drainage basin to address current problems and future development.

Stormwater management is a critical issue that requires prior planning to successfully manage growth in the County. This management is needed to mitigate the impacts of increased stormwater runoff from increased impervious surfaces, which affects the development of the community, the existing storm drainage infrastructure, and receiving channels. The most equitable way to proactively address this issue is to prevent future runoff problems and maintain consistency between infrastructure costs and benefits. The purpose of the Jimmy Camp Creek DBPS is to provide the framework for future stormwater planning and design studies in the Jimmy Camp Creek Drainage Basin within the County.

The main objectives of this DBPS are to analyze the existing and future drainage conditions of the watershed, identify corrective and future capacity improvements, and to establish Drainage and Bridge Fees. This study includes a description of the study process, basin background information, technical analysis and documentation, the proposed plan, and proposed fees. The information developed from this study upon adoption by the County, will be used to mitigate stormwater impacts to the major drainageways within the watershed.

This DBPS is a comprehensive update of the unincorporated County area portions of the Jimmy Camp Creek DBPS published in 2015 (Kiowa Eng). The 2015 study is based on the drainage basin planning criteria in the Colorado Springs Drainage Criteria Manual (COS, 2014).

Specific phases for the study include the following:

Phase 1: Stakeholder Involvement and Public Collaboration Plan
- a. Stakeholder Plan
- b. Stakeholder Engagement Meetings

Phase 2: Problem Identification/Existing and Future Conditions
- a. Basin Technical Information Gathering
- b. Basin Characteristics Review
- c. Hydrologic Model Development
- d. Hydraulic Model Development

Phase 3: Alternative Development, Evaluation and Selection

a. Evaluation Criteria Development
b. Alternatives Development
c. Conceptual Cost Estimates
d. Alternatives Screening and Selection

Phase 4: Plan Development

a. Alternative Conceptual Design Development
b. Drainage Basin Study Report

Phase 5: Fee Development

Phase 6: Plan and Fee Adoption

1.3 PREVIOUS STUDIES – RELATED INVESTIGATIONS

Several drainage plans have been previously completed for the Jimmy Camp Creek Drainage Basin. This includes the West Fork Jimmy Camp Creek DBPS prepared for New Generation Homes, Inc in October 2003 (Kiowa Eng) and the updated Jimmy Camp Creek Drainage Basin Planning Study prepared in 2015 (Kiowa Eng). Certain information from these previous studies is superseded by the information in this updated DBPS.

This DBPS was based on available information from previous studies, Master Development Drainage Plans (MDDPs), Plat information, as well as other DBPSs. The following is a list of maps, plans, and reports which were reviewed while preparing this study:

- City of Colorado Springs Drainage Criteria Manual, Volume 1, March 2014, Revised January 2021.
- City of Colorado Springs Drainage Criteria Manual, Volume 2, prepared by Matrix Design Group/ Wright Water Engineers. March 2014, Revised December 2020.
- City of Fountain Comprehensive Development Plan (Update), prepared by the City of Fountain, August 2005.
- Corral Bluffs Annexation Filing No. 1, prepared by Matrix Design Group, June 17,2021.
- Draft El Paso Master Plan, prepared by Houseal Lavigne. April 23, 2021.
- El Paso County Parks Master Plan, prepared by El Paso County, June 2013.
- FEMA Flood Insurance Study El Paso County, Colorado and Incorporated Areas. Revised Dec 2018.
- Fountain Creek Corridor WARSSS Study, prepared by Matrix Design Group, March 2017.
- Fountain Creek Corridor Restoration Master Plan, prepared by LHK Associates and Matrix Design Group. October 2011.
- Hydrologic Soil Groups of Jimmy Camp Creek Basin, NRCS Web Soil Survey. May 2021.
- Jimmy Camp Creek Annexation Filing No. 1, prepared by Matrix Design Group. June 18, 2021.
- Jimmy Camp Creek Drainage Basin Planning Study, prepared by Kiowa Engineering, March 2015.
- Lorson Ranch East PUD Development, Preliminary Plan and Early Grading Request. Prepared by Thomas-Thomas, Revised July 2017.
- West Fork Jimmy Camp Creek Drainage Basin Planning Study, prepared by Kiowa Engineering Corporation for New Generation Homes, Inc., Oct 2003.

1.4 SUMMARY OF OBTAINED DATA

Data used to complete the analysis for this DBPS includes: topography, aerial photography, soils, land use, stormwater infrastructure, rainfall, field survey, and U.S. Geological Survey (USGS) gage data. Most of the data was collected and utilized in a Geographic Information System (GIS) format. Existing data was used to the extent practical, including previous Jimmy Camp Creek DBPS, FEMA floodplain mapping, CDOT Bridge Data, and development submittals, etc. Table 1-1 lists the major data obtained along with the source and date received.

Table 1-1: Major Data Sources and Data Obtained

Data Obtained	Data Source	Date Received
Aerial Imagery	El Paso County Requested Data	04/2021
2011 Topographic Contours	El Paso County Requested Data	04/2021
LIDAR Data	State of Colorado (2018)	03/2021
Waterlines / Wetlands	El Paso County Requested Data	04/2021
Regulatory Floodplains	El Paso County Requested Data	04/2021
DOT Major Highways	El Paso County Open Source	03/2021
CDOT Structures	Colorado Department of Transportation	03/2021
Municipal Boundaries	El Paso County Open Source	03/2021
Major & Local Roads	Colorado Department of Transportation	04/2021
Future Land Use	El Paso County Requested Data	07/2021
Existing Land Use	El Paso County / The 2016 National Land Cover Database (NLCD)	07/2021
Parcels	El Paso County Requested Data	04/2021
Impervious Percentages	El Paso County Requested Data	07/2021
Soils Data	United States Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) Soil Data	04/2021
Rainfall Data	NOAA Atlas 14 Volume 8 Version 2, Precipitation-Frequency Atlas of the United States	03/2021
Stream Gage Data	United States Geological Survey (USGS) gage 07105900 Jimmy Camp Creek at Fountain, CO	03/2021
County ROW	El Paso County DPW Requested Data	04/2021
Storm Drain Information	El Paso County DPW Requested Data	04/2021

1.5 PROJECT COORDINATION

Throughout the course of preparing this DBPS, project checkpoints were set up that required County concurrence before moving on to the next tasks to help manage the schedule and avoid re-work. The primary reasons for the coordination effort are to obtain technical information, confirm approaches to technical methods, and to identify concerns regarding the development of stormwater facilities within the Basin.

Approximately 55 percent of the Jimmy Camp Creek Drainage Basin lies within the incorporated cities of Fountain and Colorado Springs (Cities). The Cities did not participate in development of this DBPS. Hydraulic analyses were performed only for the portions of the drainage basin that lie in the unincorporated portions of the County. Drainage policies, plans, and drainage fees for the Cities' portions of the Jimmy Camp Creek Drainage Basin will need to be developed separately by the Cities.

The DBPS, along with all technical data and findings, was executed and completed in accordance with applicable County, State, and Federal regulations, criteria, and policies with the intent and goals described herein. Analyses of hydrology, hydraulics, and existing and proposed drainage structures were conducted in accordance with the current County Drainage Criteria Manual (2018).

The completed study will be presented at a meeting of the City of Colorado Springs/El Paso County Drainage Board, which acts as an advisory board to the City Council and the Board of County Commissioners.

1.6 STAKEHOLDER INVOLVEMENT

To promote understanding of the DBPS process and Basin Fee Development and establish a publicly acceptable drainage plan, stakeholder involvement will be integrated throughout the DBPS development. The process used to develop a DBPS provides opportunities for interested parties to offer input on drainage issues, needs, and facilities within a study area. Basin Stakeholders were provided by the County and represented local governments, developers, neighborhood associations, non-profits, environmental groups, the Fountain Creek District, and others. A publicly available website will be utilized to disseminate information to the constituents at key points in the planning process. Two meetings are planned with basin stakeholders at the following key project milestones.

The first stakeholder meeting will be conducted to introduce the planning study scope and process and present the Phase 2 results and Phase 3 evaluation of preferred alternatives. The objectives of the meeting are to solicit information about the drainage conditions in the basin, identify issues to be considered and discuss possible solutions, and receive input for a selected alternative to be used for the proposed plan.

The second stakeholder meeting will be conducted to present the proposed basin plan and costs developed in Phase 4 and Phase 5. The objectives of the meeting are to receive Stakeholder input on the proposed basin plan and costs and discuss the fee calculation method and proposed fees.

1.7 ACKNOWLEDGEMENTS

During the preparation of this DBPS, government agencies and interested individuals were involved in coordination activities on an as needed basis. Representatives from the County provided valuable data resources and commentary during completion of the study. A list of the individuals and agencies involved during the preparation of this DBPS is presented below:

Name	**Agency**
Jennifer Irvine	El Paso County – Dept. of Public Works
Christina Prete	El Paso County – Dept. of Public Works
Steve Jacobsen	El Paso County – Dept. of Public Works
Glen Reese	El Paso County – Dept. of Public Works
Jeff Rice	El Paso County - Planning and Community Development
Joseph Marencik	El Paso County - Dept. of Public Works
Nina Ruiz	El Paso County - Planning and Community Development
Jason Meyer	El Paso County – Community Services Department - Parks
Erin Powers	City of Colorado Springs Stormwater Enterprise
Adam Copper	City of Colorado Springs Stormwater Enterprise
Richard Mulledy	City of Colorado Springs Stormwater Enterprise
Jeff Besse	City of Colorado Springs Stormwater Enterprise
Tim Biolchini	City of Colorado Springs Stormwater Enterprise
Aaron Egbert	City of Colorado Springs Public Works
Peter Wysccki	City of Colorado Springs Planning & Community Development
Meggan Herington	City of Colorado Springs Planning & Community Development
Karen Palus	City of Colorado Springs Parks & Recreation
Kristy Martinez	City of Fountain - Planning
Brandy Williams	City of Fountain - Engineering
Silvia Huffman	City of Fountain - Parks
Kevin Binkley	Colorado Springs Utilities
Mark Shea	Colorado Springs Utilities
Tony Martinez	USACE Planning – Albuquerque District
Deric Clemons	USDA-NRCS (National Resource Conservation Service)
Keith Curtis	Regional Floodplain Administrator
Bill Banks	Fountain Creek Watershed District
Amber Shanklin	Palmer Land Conservation
Kathleen Reilly	Colorado Watershed Coordinator – Arkansas/ Rio Grande Basins
Tamara Allen	CDPHE Watershed Restoration and Protection Unit
Kevin Houck	Colorado Water Conservation Board
John Hunyadi	Colorado Dam Safety Engineer
Mitch Martin	Colorado Parks and Wildlife
David Sutley	FEMA – Region VIII
Representative pending	U.S. Fish and Wildlife Service
Representative pending	Environmental Protection Agency
Representative pending	USGS Central Region Offices

2.0 BASIN CHARACTERISTICS AND ENVIRONMENTAL RESOURCES

The information provided in this section establishes the physical setting of the Jimmy Camp Creek Drainage Basin and identifies environmental resources that need to be considered when developing and selecting alternatives.

2.1 STUDY BASIN

The Jimmy Creek Drainage Basin area is approximately 67.1 square miles, approximately 29.7 square miles of which lie within the unincorporated portions of the County. The watershed is generally bounded by Garrett Road to the north, Blaney Road to the east, Old Pueblo Road to the South, and Powers Boulevard to the west. The Jimmy Camp Creek Drainage Basin is part of the eastern portion of the Fountain Creek Watershed, making up approximately 7% of the watershed. Figure 2-1 shows the location of the Jimmy Camp Creek Drainage Basin within the Fountain Creek Watershed.

The Jimmy Camp Creek Drainage Basin generally slopes from north to south, with all flows eventually draining to Fountain Creek. with its terminus near the City of Fountain historic downtown. The Jimmy Camp Creek Drainage Basin has a maximum elevation of approximately 6,880 feet at Garrett Road in the north and ends with a minimum elevation of approximately 5,490 feet at its confluence with Fountain Creek in the south. The average channel slope of the Jimmy Camp Creek main stem is approximately 1 percent over a length of 24 miles. Jimmy Camp Creek Drainage Basin topography is shown in Figure 2-2.

Soils within the Jimmy Camp Creek Drainage Basin consist mostly of sands and loams, with the loams containing higher sand and gravel content. Jimmy Camp Creek and its tributaries carry a high sediment load, which originates from erosion of the channel banks and bottom as well as deposits from erosion of the land surface.

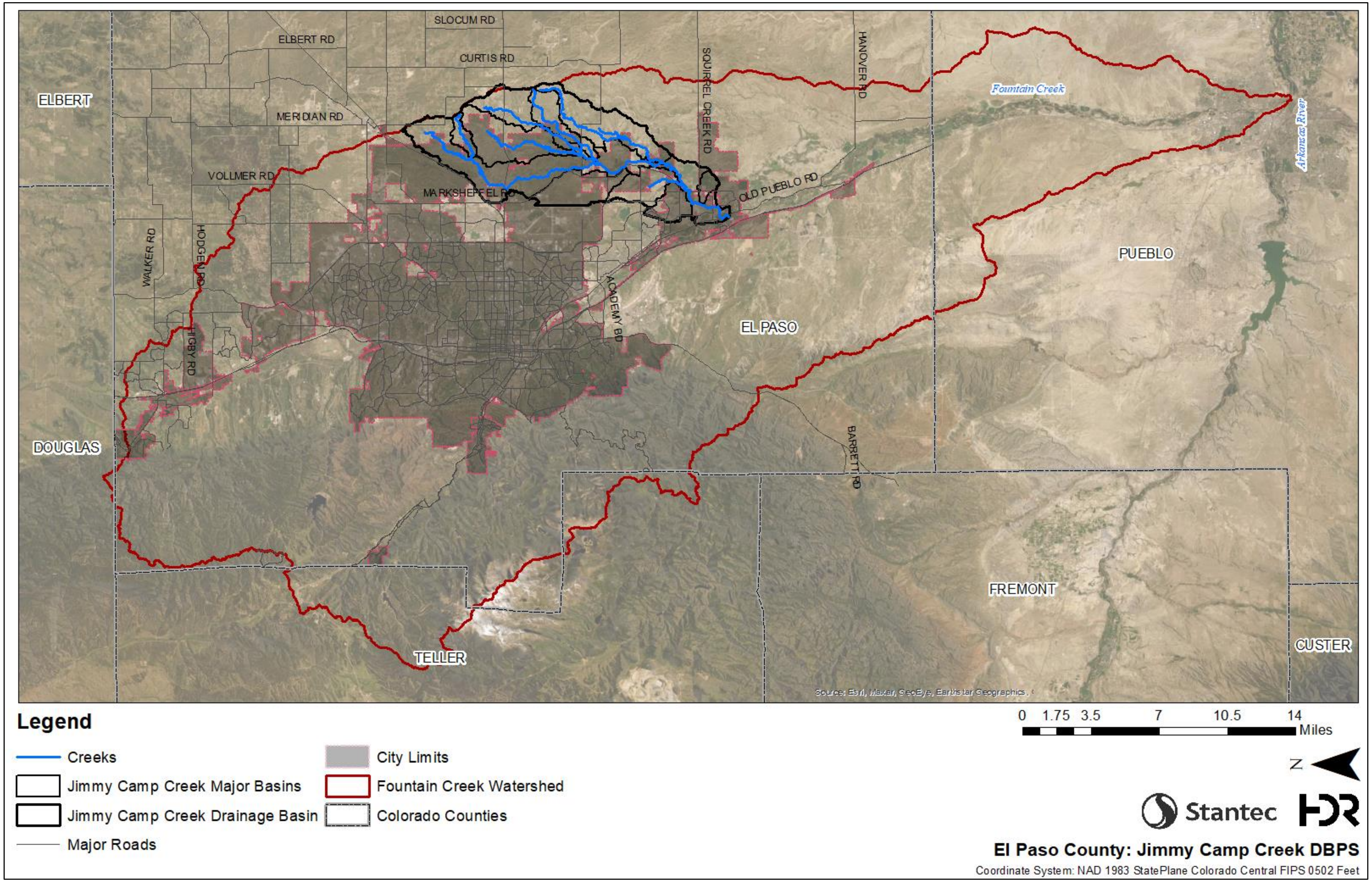

Figure 2-1: Jimmy Camp Creek Vicinity Map

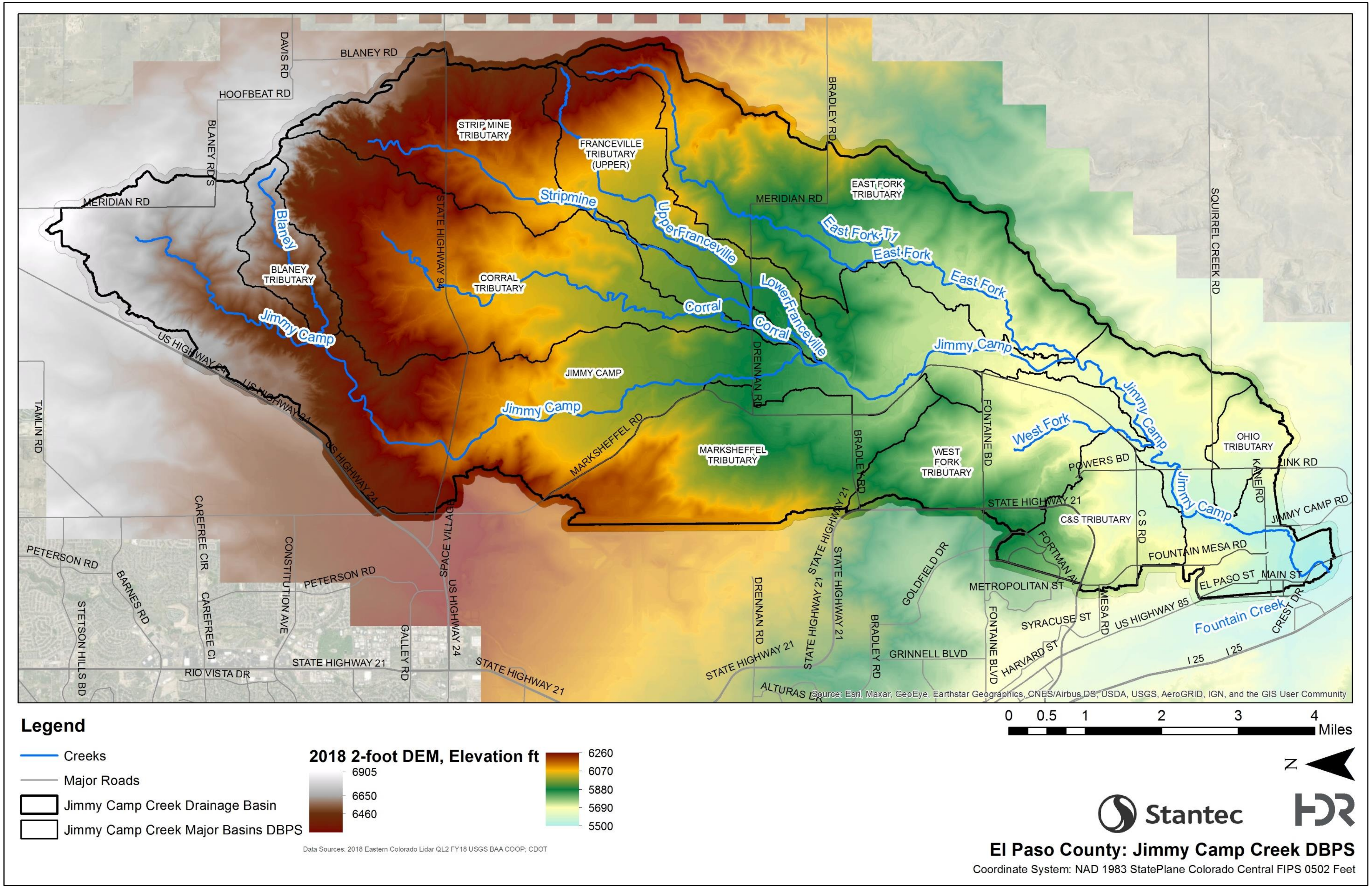

Figure 2-2: Jimmy Camp Creek Drainage Basin Topography

2.2 CLIMATE

This area of El Paso County can be described in general as high plains, with total precipitation amounts typical of a semi-arid region. Winters are generally cold and dry. Precipitation averages approximately from 14 to 16 inches per year, with the majority of this precipitation occurring in spring and summer in the form of rainfall. Thunderstorms are common during the summer months and are typified by quick-moving low-pressure cells which draw moisture from the Gulf of Mexico into the region. Average temperatures range from about 30°F in the winter to 75°F in the summer. The relative humidity ranges from about 25 percent in the summer to 45 percent in the winter.

2.3 GEOLOGY AND SOILS

Soils within the Jimmy Camp Creek Drainage Basin vary between hydrologic soil types A through D, as identified by the U.S. Department of Agriculture, Natural Resources Conservation Service. The predominant hydraulic soil group is type B (53% of the basin) followed by type A (21% of the basin). Type A and B soils give this basin a lower runoff per unit area as compared to basins with soils dominated by Types C and D. The soils consist of deep, well drained soils that formed in alluvium and residium, derived from sedimentary rock. The soils have high to moderate infiltration rates and are extremely susceptible to wind and water erosion where poor vegetation cover exists. The Hydrologic Soil distribution map for the Jimmy Camp Creek Drainage Basin is presented in Section *2.5.3.2 Drainageway Soil Characteristics.*

2.4 LAND USE

The land use information is presented to provide an understanding of the current and future development condition in the watershed. The identification of land uses abutting the drainageways is also useful in the identification of feasible plans for stabilization and aesthetic treatment of the creek. The land use in the basin consists of managed lands, suburban development, large lots or ranchettes, and rural residential (Houseal Lavigne Associates, 2021). Existing land use in developed areas consists primary of mixed-use urban development. Lorson Ranch is the largest developed area in the basin with over 2,000 homes constructed and a planned development for over 4,000 homes, a school, and commercial areas (Lorson Ranch, 2021). Important exceptions include portions of Colorado Springs Municipal Airport, the RAM Off-Road Park and Aztec Family Raceway, Pikes Peak National Cemetery, and a portion of Peterson Air Force Base.

Most of the watershed, particularly in the upper portions, is currently undeveloped. The central portion of the drainage basin is in the Lorson Ranch master development area and future land use was assumed to be built out according to the expected level of development for that area. The basin encompasses part of the Colorado Springs Airport/ Peterson Air Force Base key area identified in the Draft El Paso County Master Plan (2021). This key area is primed for commercial and industrial development, in part due to the establishment of the Commercial Aeronautical Zone (CAZ), which the Board of County Commissioners approved to attract local businesses and spur development on the available land (Houseal Lavigne Associates, 2021).

Additionally, the City of Colorado Springs is planning, as of the date of this report, on annexing and rezoning two properties in the Jimmy Camp Creek basin to parkland. The first property (Jimmy Camp Creek Annexation Filing No.1) consists of 410.3 acres located between the Blaney Rd S. and Meridian Rd. intersection and Jimmy Camp Creek in the upper watershed. The second property (Corral Bluffs Annexation

Filing No. 1) consists of 920.4 acres located north of the Aztec Family Raceway in the northeast corner of the basin. These locations are shown as Open Space in the Future Land Use Map discussed below.

The County provided existing and future land uses, which are shown in Figure 2-3 and Figure 2-4. The land uses have corresponding impervious percentages, which are used in the hydrologic analysis to predict runoff rates and volumes for the purposes of facility evaluation. Data for existing and future impervious area are presented in the Hydrologic Report.

Property ownership along the major drainageways within the unincorporated areas of Jimmy Camp Creek Drainage Basin are mostly private. Along the developed reaches, drainage right-of-ways and greenbelts are maintained by the metro districts, mainly the Lorson Ranch Metropolitan District, Glen Metropolitan District, and Colorado Centre Metro District. Where development has not occurred, the drainageways generally remain under private ownership with no delineated drainage right-of-ways or easements.

There are several public parks and open spaces in the Jimmy Camp Creek Drainage Basin. In the El Paso County Master Park Plan (2013) there is a proposed 21-mile primary regional trail beginning at the confluence of Jimmy Camp Creek and Fountain Creek and continuing northeast, along Jimmy Camp Creek, until reaching the City of Colorado Springs. This trail connects the City of Fountain's Adams Open Space, proposed Corral Bluffs Open Space, and the City of Colorado Springs's proposed Jimmy Camp Creek Open Space.

There are multiple proposed Open Spaces that would be located fully or partially in the Jimmy Camp Creek Drainage Basin. Falcon Garrett Roads Open Space would occupy the broad northeast trending ridge that separates upper Jimmy Camp Creek from the East Fork Sand Creek in the northeast headwaters of the Drainage Basin. Corral Bluffs open space would be connected to the southeast of Falcon Garrett Road and would provide an opportunity for a regional trail alignment linking Fountain Creek with Colorado Spring's proposed Jimmy Camp Creek Park. The proposed Fountain and Jimmy Camp Creek Open Space would protect the floodplains of both creeks and the globally-vulnerable Arkansas darters that live in the spring-fed marshes adjacent to the main creek channels (EPC, 2013).

The Future Land Use industrial areas near Drennan Road and Bradley Road are part of the *Highway 21 Employment Priority Development Area*. This area includes the County Commercial Aeronautical Zone (CAZ) intended to attract local businesses and encourage economic opportunities tied to the Colorado Springs Airport (EPC, 2021).

Roadway and utility easements abut or cross drainageways. Primary districts operating in the unincorporated portions of the basin include Colorado Springs Utilities, Widefield Water and Sanitation District, Southern Colorado Water Conservancy, and Mountain View Electric. In general, utility and roadway crossings occur most frequently in the developed portions of the basin.

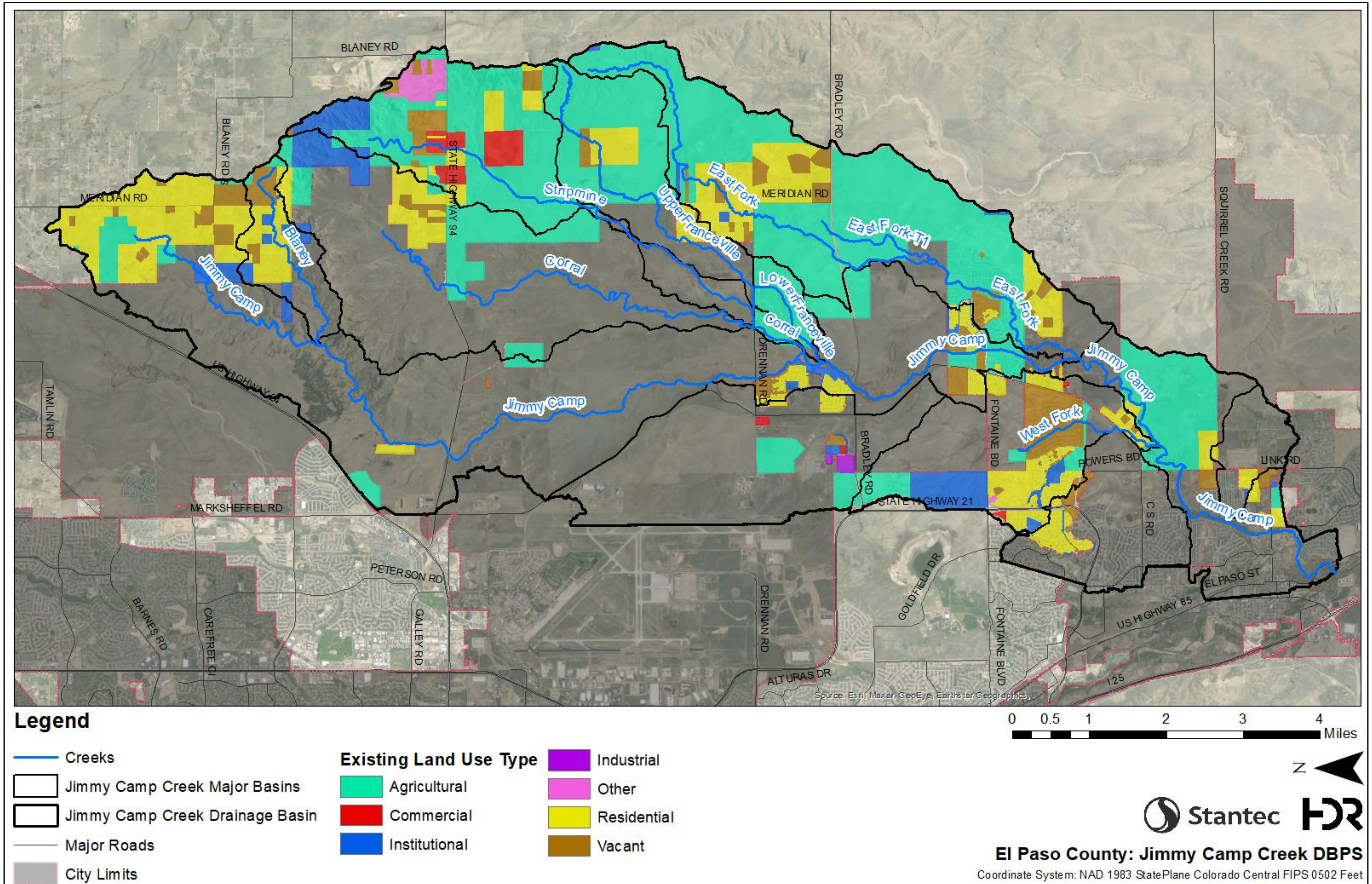

Figure 2-3. Jimmy Camp Creek Existing Land Use Map

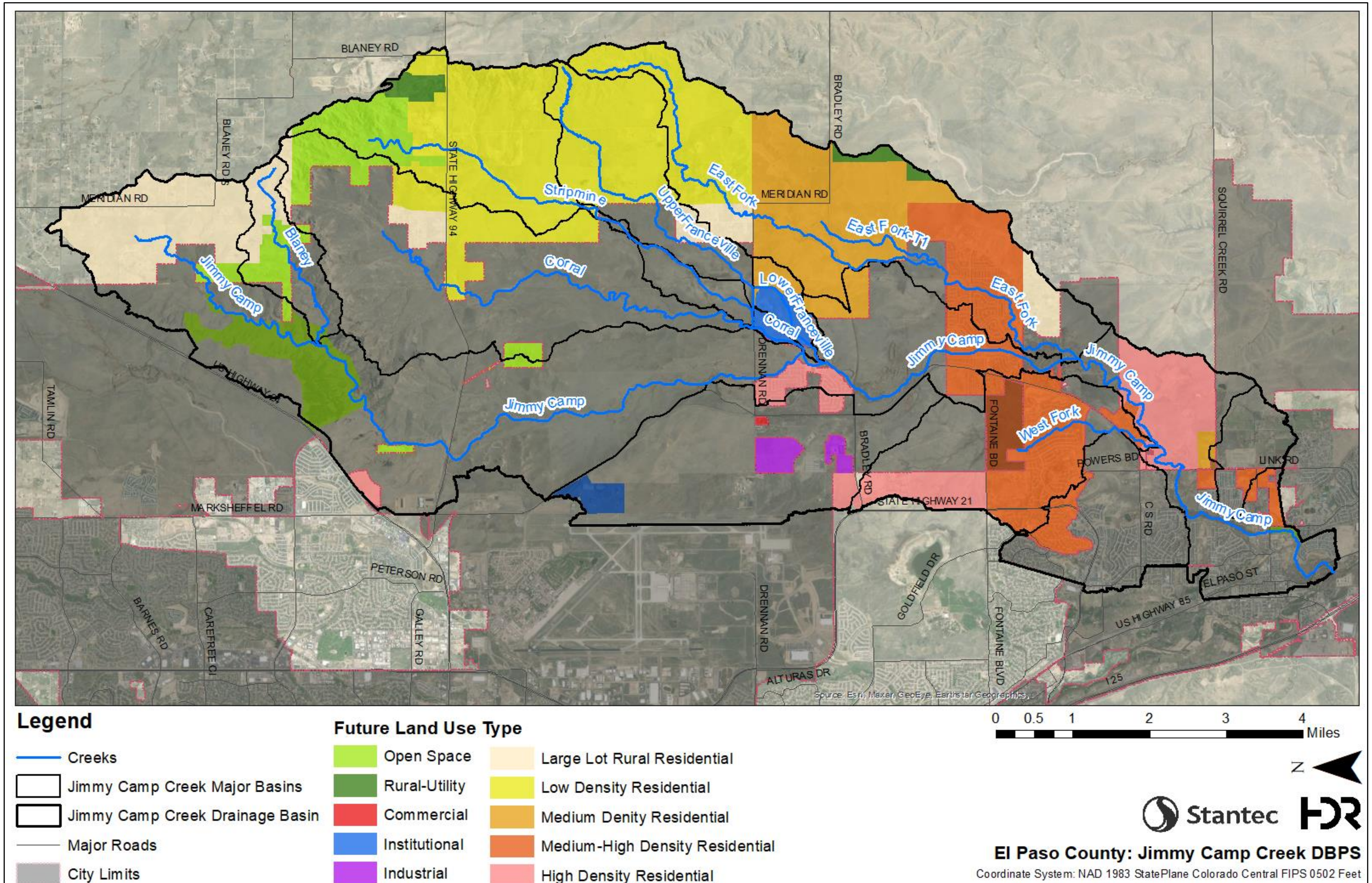

Figure 2-4: Jimmy Camp Creek Future Land Use Map

2.5 ENVIRONMENTAL RESOURCES

This section includes an environmental resource inventory for the drainageways in the Jimmy Camp Creek Drainage Basin, including a description of the endangered species issues, wildlife habitats, and wetland resources that may be important to consider during design and implementation of major outfall systems.

U.S. Geological Survey (USGS) topographic, Natural Resources Conservation Service (NRCS) soil survey, National Wetland Inventory (NWI) wetland maps, and the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) website were used to indicate potential resources. Aerial imagery was also used for analysis.

2.5.1 Stream Characteristics

The Rosgen Stream Classification is used to categorize river morphology. The advantage of the Rosgen Level I Stream Classification method is that it allows for a quick initial delineation of stream types and illustrates the distribution of these types that could be encountered within a study area.

The lower sections of Jimmy Camp Creek, portions of lower East Fork Jimmy Camp Creek, and the entirety of the West Fork Jimmy Camp Creek are difficult to define using the Rosgen system because of the high level of development in the area. This development alters the river's natural system. The lower mainstem of Jimmy Camp Creek has a narrow, incised channel with a wide, highly vegetated floodplain. Due to the presence of an active floodplain, the presence of predominately hydric soils and NWI mapped emergent wetlands in this area, there is a potential for wetland areas to occur outside the stream channel.

Jimmy Camp Creek, the Stripmine Tributary, the Corral Tributary and the northern portion of the Franceville Tributary could loosely be defined as a "C" type stream. Type "C" stream channels are located in narrow to wide valleys constructed from alluvial deposition. This stream type has well-developed, slightly entrenched floodplain and are relatively sinuous.

North of Bradley Road, Jimmy Camp Creek has a wide, shallow, and sandy stream channel connected to the surrounding floodplain. The Stripmine Tributary also has a wide, shallow, sandy stream bottom with a developed floodplain. The Franceville Tributary does not have any channelization north of Drennan Road; however, the channel becomes more defined as you travel north at South Franceville Coal Mine Road. Referencing aerial imagery, this channel seems to have a wide, sandy stream channel. The Corral Tributary has a wide, shallow, and sandy stream channel with associated floodplain. This tributary also has a short erosion control barrier, consisting of large rocks and a retaining wall north of State Highway 90. Each of these areas could be conducive to wetland formation, due to the elevation and the presence of partially hydric soils. However, the NWI does not map any emergent wetlands in these areas.

The lower portions of the East and West Forks of Jimmy Camp Creek have ill-defied, highly vegetated channels. Previous installments of valley wide grade control, dams and large detention basins within these drainages create inconsistencies with the overall characteristics of these channels throughout this reaches. As shown in Figure 2-5 and Figure 2-6, the NWI map shows several palustrine emergent wetlands following these streams. Wetlands could be found in these areas if hydric soil, hydric vegetation, and hydrology are present. Further studies would be needed to determine the present of wetlands in these areas.

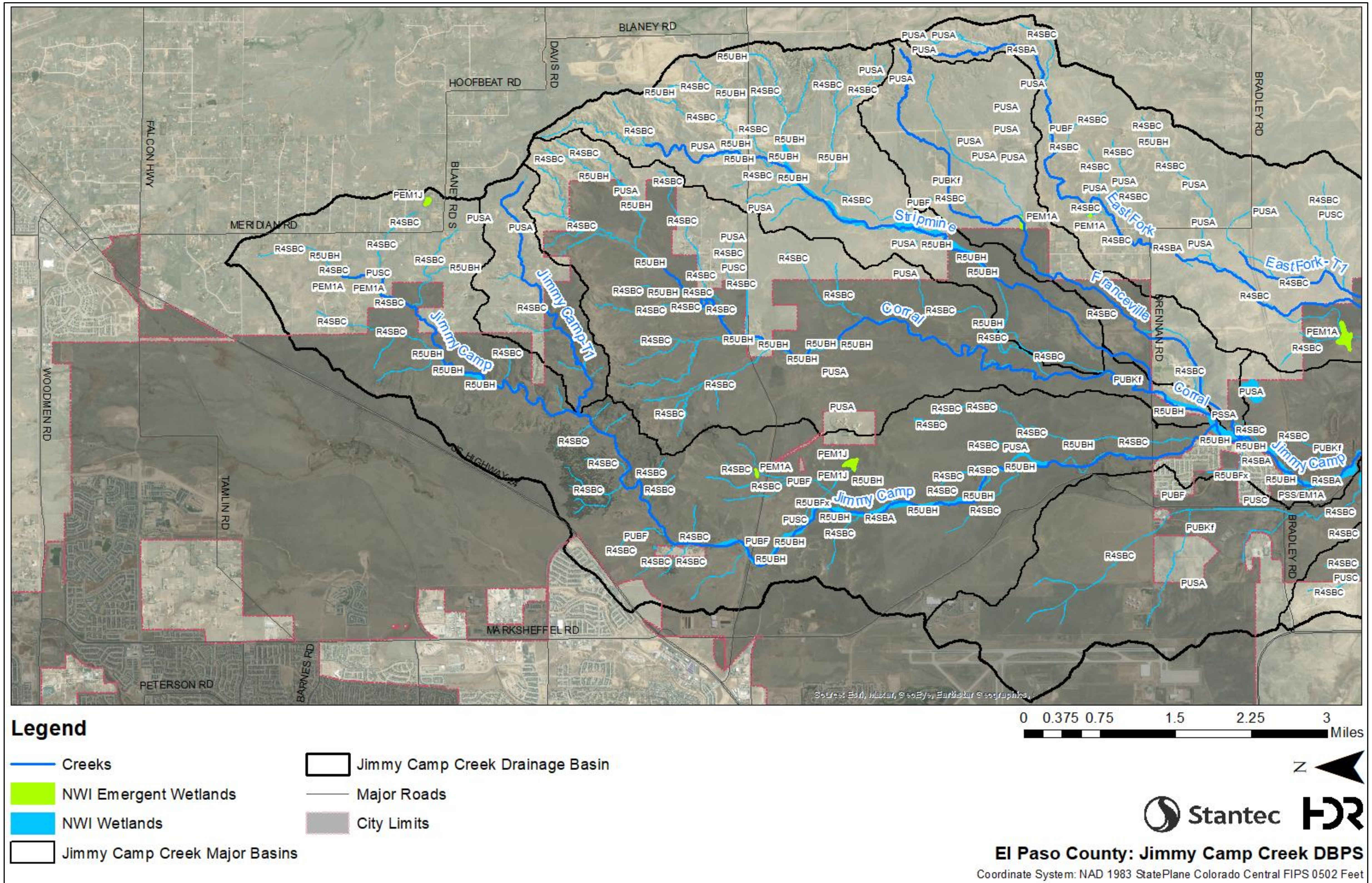

Figure 2-5: NWI Emergent Wetland Areas in Upper Jimmy Camp Creek Drainage Basin

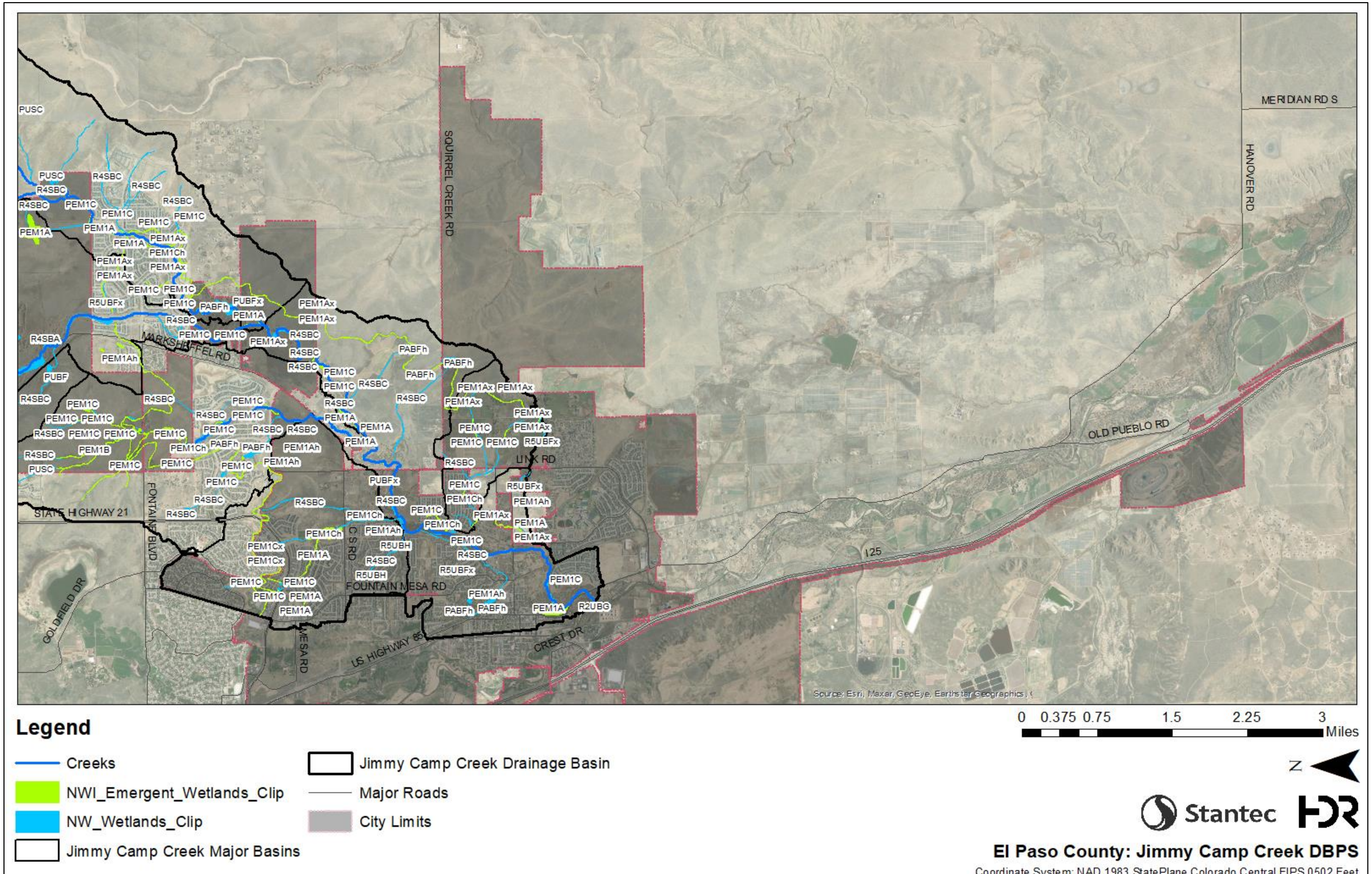

Figure 2-6: NWI Emergent Wetland Areas in Lower Jimmy Camp Creek Drainage Basin

2.5.2 Geomorphic Field Assessment

The field and desktop geomorphic assessment allowed for an understanding of the sediment sources and sinks, as well as identified areas of channel and floodplain instability, providing an accurate understanding of the health and stability of the watershed given the current conditions. The geomorphic assessment methodology was derived from the Prediction Level Assessment (PLA) of the Watershed Assessment of River Stability and Supply (WARSSS) methodology (Rosgen, 2006).

A preliminary desktop analysis was conducted to identify 13 priority areas within the Jimmy Camp Creek Drainage Basin to be studied in greater detail. The desktop analysis involved reviewing GIS data and historical aerial imagery to identify locations of potential reference reaches and unstable reaches. Figure 2-7 shows the locations of the selected priority areas that were identified. Field walks were then conducted of the priority areas to identify areas of instability and stable reference cross sections. Locations with accessibility issues were evaluated using a modified desktop assessment. Three priority areas were not assessed upon field visits as it was determined they were already improved channels and therefore were not natural reference sections. These three priority areas are located in West Fork and East Fork. Table 2-1 contains the Site IDs of the stable reference cross sections and unstable impaired reaches that were assessed, along with their corresponding priority area.

Bank stability and estimated erosion volumes along the impaired reaches was evaluated by conducting Bank Assessment for Non-point source Consequences of Sediment (BANCS assessment). The BANCS method utilizes two components, the Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS). The BANCS method is discussed in more detail in Section 2.5.2.2.

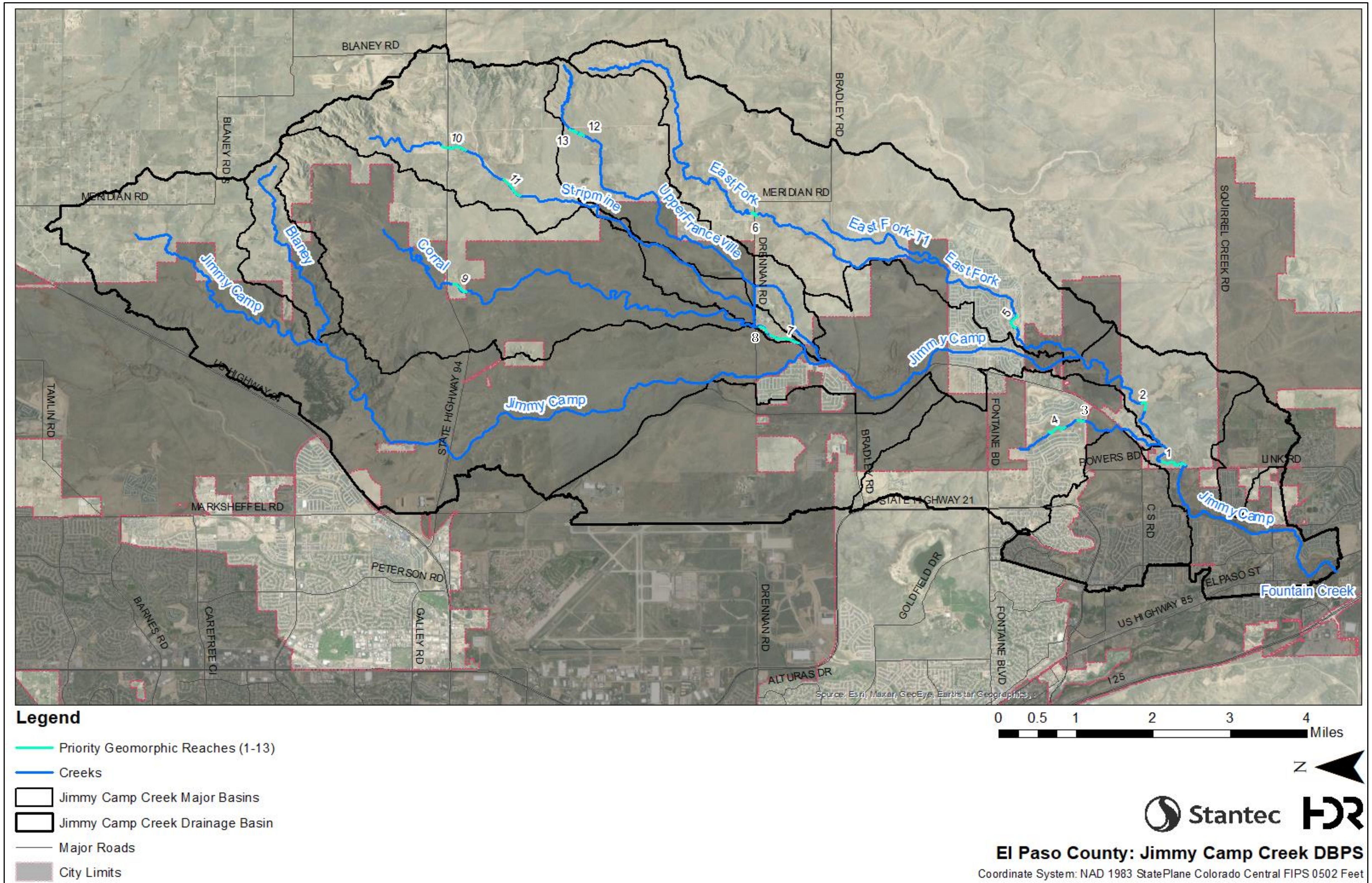

Figure 2-7. Jimmy Camp Creek Drainage Basin Geomorphic Priority Areas.

Table 2-1. Summary of Geomorphic Priority Areas

Reach Name	Reach ID	Priority ID	Site ID	Stability	Assessment Type
Jimmy Camp Creek	J1	1	XS-J1-I	Impaired Reach	Field
Jimmy Camp Creek	J1	1	XS-J1-II	Stable Reference Cross Section	Field
Jimmy Camp Creek	J1	1	XS-J1-III	Stable Reference Cross Section	Field
Jimmy Camp Creek	J1	1	J1-I	Impaired Reach	Field
Jimmy Camp Creek	J2	2	J2-I	Impaired Reach	Field
Jimmy Camp Creek	J2	2	XS-J2-I	Stable Reference Cross Section	Field
West Fork	W1	3	N/A	Already Improved	Not Assessed
West Fork	W1	4	N/A	Already Improved	Not Assessed
East Fork	E1	5	N/A	Already Improved	Not Assessed
East Fork	E2	6	XS-E2-I	Stable Reference Cross Section	Field
East Fork	E2	6	XS-E2-II	Stable Reference Cross Section	Field
East Fork	E2	6	XS-E2-III	Stable Reference Cross Section	Field
East Fork	E2	6	E2-I	Impaired Reach	Field
East Fork	E2	6	E2-II	Impaired Reach	Field
East Fork	E2	6	E2-III	Impaired Reach	Field
East Fork	E2	6	E2-IV	Impaired Reach	Field
Corral Creek	C1	7	C1-I	Impaired Reach	Field
Corral Creek	C1	8	XS-C1-I	Stable Reference Cross Section	Field
Corral Creek	C2	9	C2-I	Impaired Reach	Desktop
Corral Creek	C2	9	C2-II	Impaired Reach	Desktop
Stripmine Creek	S1	10	S1-I	Impaired Reach	Desktop
Stripmine Creek	S1	11	S1-II	Impaired Reach	Desktop
Franceville Creek	F1	12	XS-F1-I	Stable Reference Cross Section	Field
Franceville Creek	F1	12	F1-I	Impaired Reach	Field
Franceville Creek	F1	12	F1-II	Impaired Reach	Field
Franceville Creek	F1	13	XS-F1-II	Stable Reference Cross Section	Field
Franceville Creek	F1	13	F1-III	Impaired Reach	Field

2.5.2.1 Channel Geomorphology

A description of each of the priority areas that were visited in the field is given below. The reaches located in priority areas 9, 10, and 11 were assessed utilizing a desktop methodology and were not assessed in the field. Areas 3, 4, and 5 were not assessed as they have already been improved.

The channel geometry was determined for the nine stable cross sections to be used to inform a stable proposed cross section for the alternatives assessment throughout the Jimmy Camp Creek Drainage Basin. A rapid field assessment was conducted to collect data for the reference cross sections and impaired reaches. No level or surveying equipment was used. The profile for each cross section was estimated from LiDAR. Drainage areas were determined using StreamStats. Table 2-2 shows a summary of the reference cross section attributes.

Table 2-2. Summary of Reference Cross Section Attributes

	Franceville		East Fork			Corral	Jimmy Camp		
Priority ID	**12**	**13**	**6**	**6**	**6**	**8**	**1**	**1**	**2**
Attribute	**XS-F1-I**	**XS-F1-II**	**XS-E2-I**	**XS-E2-II**	**XS-E2-III**	**XS-C1-I**	**XS-J1-II**	**XS-J1-III**	**XS-J2-I**
Drainage Area (sq mi)	0.29	0.29	2.3	2.3	2.3	14.7	60.5	60.5	55
Bed Width (ft)	14.3	9.5	11	12.5	15	32	3	4	15
Bankfull Width (ft)	14.7	39.4	14.0	20.7	19.5	36.0	3.5	8	43.7
Maximum Bankfull Depth (ft)	0.8	1.0	2.0	1.2	3.4	0.8	1	1	0.8
Bankfull Area (sq ft)	11.2	13.5	22.9	20.7	55.4	27.2	3	6	34.6
Floodprone Width (ft)	140	58	75	56	55	96	56	112	163
Channel Slope (ft/ft)	.033	.027	.011	.009	.004	.009	.007	.005	.009

Most of the channels assessed had a well-defined active channel width, and a common feature among the stable channels is a large, well-connected floodplain. Bankfull area was less defined for the channels, for example, despite being at the end of the basin, priority area 1 on Jimmy Camp Creek had a relatively small channel but a large, well-connected floodplain. The channels substrate is dominated by sand and the streams have high supplies of sand that are required to maintain a stable stream bed.

<u>Priority Area 1 Description</u>

Priority Area 1 is located on Jimmy Camp Creek in Reach J1 immediately upstream of Link Road and runs approximately parallel to Link Road for most of the length of the priority area. The bank height is not large, at approximately 4 ft, but there is evidence of an actively eroding bank. At some locations, rubble has been placed along the bank to attempt stabilization as shown in Figure 2-8. The rubble is not continuous, does not have scour protection, and is likely not entirely effective at arresting the bank erosion. The bank is generally only protected by grasses with shallow rooting depths and is composed of erodible sand dominated soils.

In locations where the erosion is already near roadways or bridges, riprap could be used to stabilize the bank. However, large scale channel regrading and bank stabilization should not be performed as this reach contains a wide intact forested floodplain which will assist in stabilizing the stream. Large scale channel reconstruction could inadvertently destroy some of this intact forested floodplain and increase bank instability. Stabilization should only be performed to protect nearby infrastructure. A picture of a typical channel within Reach J1 is shown in Figure 2-9. Note that the main channel is quite small relative to the upstream cross sections. There are likely several reasons for this, one being that the stream is ephemeral, and flow rarely passes through this section of river, the other reasons are that the river is not incised, has ample sediment supply, and most importantly has a thick forested floodplain. The thick forested floodplain has two important features that stabilize river channels:

1. The woody vegetation extracts significant amounts of energy from the flow. Therefore, the force applied to the riverbed and soil substrate is substantially less than that in a non-forested floodplain.

2. The woody vegetation and herbaceous undercovers increase the resistance of the soil to erosion through root reinforcement and provides cover of the soil.

Removing the forested floodplain would tend to transition the channel to be more like the upstream channels that are significantly wider with more unstable banks.

Figure 2-8. Priority Area 1 on Jimmy Camp Creek Reach J1.

Figure 2-9. Typical channel condition within Reach J1 on Jimmy Camp Creek.

Priority Area 2 Description

Priority Area 2 is located in Jimmy Camp Creek Reach J2, directly upstream of Reach J1. The channel is similar in size and the banks are generally densely vegetated as shown in Figure 2-10 and Figure 2-11. The same general recommendations are proposed in this reach as for Reach J1.

Figure 2-10. Priority Area 2 on Jimmy Camp Creek Reach J2.

Figure 2-11. Priority Area 2 on Jimmy Camp Creek Reach J2.

Priority Area 6 Description

Priority Area 6 is located on East Fork Reach E2 at its crossing with Drennan Road. This area is located much higher in the watershed where little woody vegetation exists in the basin. The reach in this vicinity appears to have incised to some degree, presumably due to the constriction caused by the bridge and perhaps development in the basin immediately upstream, though the development is dispersed with lot sizes of approximately 5 acres and does not appear to have significantly increased the impervious area in the drainage area. The channel does not appear to be incised upstream or downstream of this reach, so the constriction of the bridge is a likely reason for incision in this reach.

When constructing improvements in this reach, exposed banks that are eroding should be graded back to a stable slope and sandy soil should be amended with nutrient rich topsoil to create a more suitable growing medium. Banks should then be revegetated with native woody plants and grasses that would stabilize the banks. Because of the dry climate in this area, it may be difficult to establish woody vegetation and therefore riprap may need to be used to stabilize banks.

Figure 2-12. Priority Area 6 on East Fork Reach E2.

Figure 2-13. Priority Area 6 on East Fork Reach E2.

Priority Area 7

Priority Area 7 is located on Corral Creek in Reach C1 downstream of Drennan Road. Its easterly bank in this reach is almost 25 ft high (Figure 2-14). There is established vegetation along the toe of the bank, which is evidence that this bank has not moved in the last few years, but it is likely that bank erosion occurs during high flow years, as evidenced by erosion that occurred between 2011 and 2018. Since 2018, the bank appears relatively stable. Despite the large height of the east bank, the main channel does not appear to be incised as evidenced of the picture immediately upstream (Figure 2-15), that shows a main channel at nearly the same elevation as the floodplain. The high banks in the reach appear to be caused by incision into a terrace that began pre-development in the region. The floodplains in this region are well connected to the main channel and grade stabilization is not recommended for existing conditions flow conditions. However, under conditions of development, where flow volumes are increased, there will likely be grade control required to stabilize the reach.

Figure 2-14. Priority Area 7 on Corral Creek Reach C1.

Figure 2-15. Immediately downstream of Priority Area 7 on Corral Creek.

Priority Area 8

Priority Area 8 is located on Corral Creek in Reach C1 downstream of Drennan Road. It is immediately upstream of the Priority Area 7 and has similar characteristics. No site photos were collected in this reach, but there the channel geometry was measured with survey equipment. The bank height of the active channel was less than 1 foot, which is confirmed by the photograph of the main channel shown in Figure 2-15.

There are also high banks along the east of this reach, but the high banks are not due to recent incision into the floodplain, but rather the channel migrating into older terraces in the area.

Priority Area 9

Priority Area 9 is located on Corral Creek in Reach C2 downstream of State Highway 94. Based upon aerial photography, the river has similar characteristics to Priority Area 7 and 8 on Corral Creek. There are locations where the outside bank is eroding into a high terrace, but the main channel has relatively low banks and does not show signs of being an incising stream.

Priority Area 10

Priority Area 10 is located on Stripmine in Reach S3 upstream and downstream of State Highway 94. Based upon aerial photography, the river has similar characteristics to Coral Creek. There are locations where the outside bank is eroding into a high terrace, but the main channel has relatively low banks and does not show signs of being an incising stream. There is little woody vegetation along the reach and the main channel is wide and shallow with a sandy bed. This reach passes through a dirt bike track and the floodplain is largely devoid of vegetation upstream of State Highway 94.

Priority Area 11

Priority Area 11 is located on Stripmine in Reach S1 approximately 1 mile downstream of State Highway 94. Based upon aerial photography, the stream has similar characteristics to the Priority Area 10, but the floodplain is generally less disturbed and has herbaceous vegetation present on it.

Priority Area 12

Priority Area 12 is located on Franceville Tributary in Reach UF2 downstream of South Franceville Coal Mine Road. A picture looking downstream is shown in Figure 2-16. Banks along the reach are vegetated with herbaceous plants but no woody vegetation. Some banks are 4 to 8 feet high, but these banks are associated with boundaries of the high flows in the channel (i.e. 100-year). The bank heights of the base flow (flows less than 2-year flood) channel are typically less than 2 ft. Therefore, like Corral Creek, the high banks in the reach appear to be caused by incision into a terrace that began pre-development in the region.

Figure 2-16. Priority Area 12 on Franceville Tributary Reach UF2.

2.5.2.2 Estimated Bank Erosion

Increased peak stormwater flows due to development and their impact on channel stability in the receiving systems are a well-studied phenomenon. The response of channels to changes in watershed boundary conditions (e.g. increase in storm hydrology), can be described using Simon's Channel Evolution Model illustrated in Figure 2-17. Increased peak stormwater flows result in increased shear stresses on the bed and bank of the stream causing the channel to downcut into its bed. At some point, the channel will reach a non-erosive layer that will prevent further downcutting. As a result, the stormwater flows will begin to do work on the exposed banks creating a channel widening process. When the channel has widened enough to result in lower energy flows, sediment deposition will begin forming a new low-flow channel with an inset bankfull bench within the limits of the incised terrace walls.

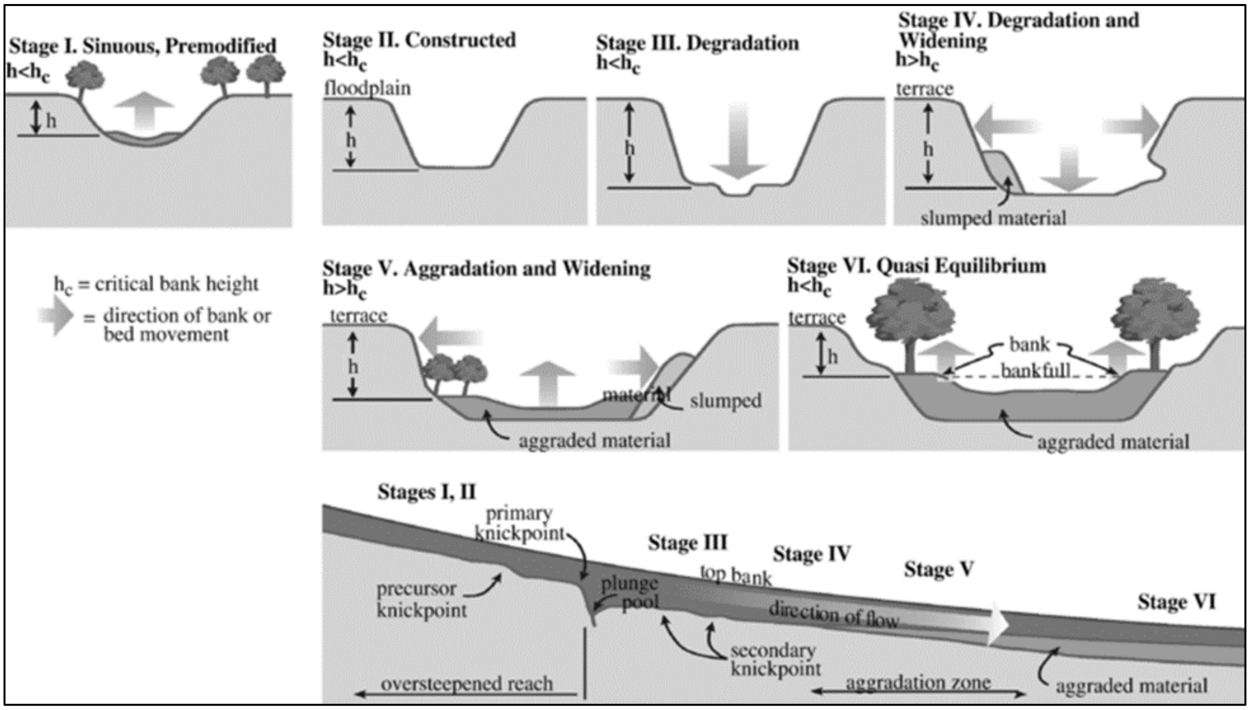

Figure 2-17. Channel Evolution Model Stages (Simon, A., Hupp, C.r., 1986)

The progress of channel evolution occurs naturally, but typically takes place over very long periods of time, with very small incremental changes. However, anthropogenic influences within watersheds can drastically accelerate the rate of change, and cause channels to rapidly change between successional states. In addition, the non-cohesive properties of the natural geology of highly erosive sandy material observed in the Jimmy Camp Creek watershed lends itself to being more impressionable to higher shear stresses. Upon field observation the degradation stages of the channel evolution process are visibly active in some portions of the Jimmy Camp Creek watershed. A few of the studied reaches are displaying signs of instability. Given the overall undeveloped nature of the watershed, channel evolution processes observed in the Jimmy Camp Creek watershed are resulting in mostly minor bank erosion and sediment pollution at this moment.

The BANCS model was used during the field and desktop assessment to estimate an annual rate of erosion (Rosgen, 2006). The unstable reaches located in priority areas 9, 10, and 11 were assessed utilizing a desktop methodology and were not assessed in the field. All other unstable reaches were assessed in the field. This model uses a combination of two bank erosion estimation methods, the Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS), to evaluate and quantify sediment sources from actively eroding stream banks. The product of the BANCS model gives an estimated annual erosion rate.

BEHI takes the following into account: bank height, rooting depth, rooting density, bank angle, surface protection, bank material, and material stratification. Ratios of bank height to bankfull height and root depth to bank depth along with the remaining variables are used to evaluate the susceptibility to erosion for multiple processes. Refer to Figure 2-18 for BEHI variable measurement diagram. After taking the previously mentioned variables into account, a BEHI rating is generated which ranges from ‘Very Low’, minimal source of erosion, to ‘Extreme’, high source of erosion. Documentation of BEHI scores and the field assessment sheets for all Priority Areas can be found in Appendix X.

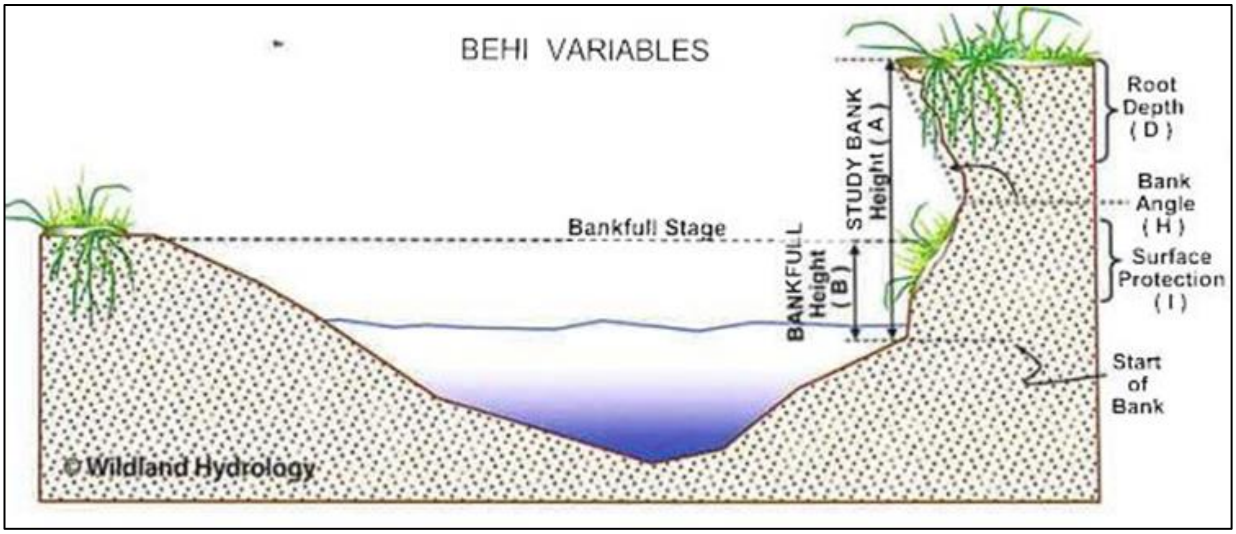

Figure 2-18. BEHI Variables

The NBS method analyzes energy distribution along the study bank. The NBS rating is higher when energy is concentrated toward the study bank. A higher rating indicates a bank that is more susceptible to erosion. There is a total of seven different methods that can be considered when generating an NBS rating. The methods utilized during the field assessment included analysis of channel pattern, transverse bar, or split channel/central bar creating near bank stress or a high velocity gradient.

Once an NBS and BEHI rating are computed for a study bank they are used as input for Figure 2-19 (Rosgen, 2006). Figure 2-19 includes curves of predicted annual streambank erosion rates created by the Colorado USDA Forest Service. The estimated volume of erosion is derived by multiplying the erosion rate produced from Figure 2-19 by the study bank height and length. Table 2-3 includes a summary of the BANCS model for each Priority Area. Appendix X provides a summary of the BANCS model for each assessed reach.

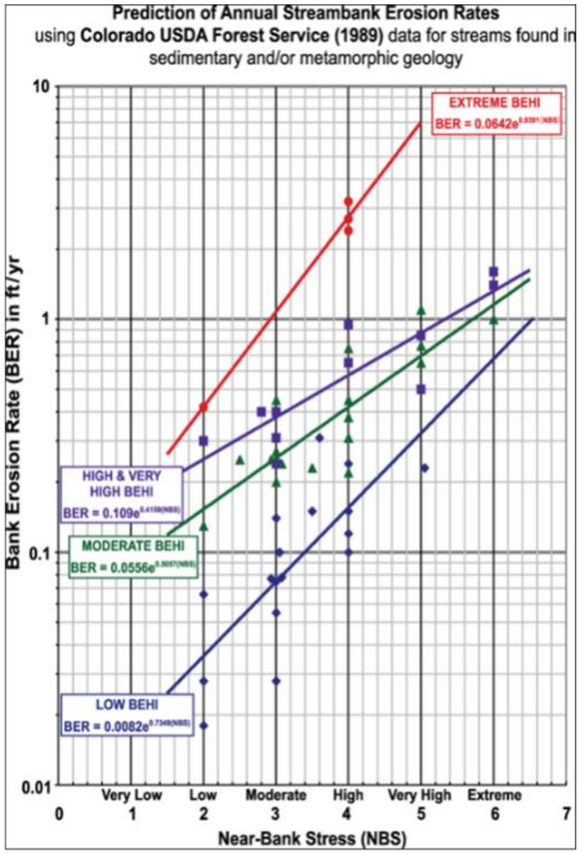

Figure 2-19. Colorado Estimated Bank Erosion Rates

Table 2-3. Jimmy Camp Creek Drainage Basin Estimated Bank Erosion

Reach Name	Priority Area	Site ID	Drainage Area (mi^2)	Length (lf)	Total Erosion (ft^3/yr)	Erosion Volume Rate ($ft^3/yr/ft$)
Jimmy Camp	1	J1-I	60.5	48	3,420	72
Jimmy Camp	2	J2-I	55	540	1,870	3
East Fork	6	E2-I	2.3	148	260	2
East Fork	6	E2-II	2.3	40	90	2
East Fork	6	E2-III	2.3	43	120	3
East Fork	6	E2-IV	2.3	230	230	1
Corral	7	C1-I	14.7	438	73,790	169
Corral	9	C2-I	4.19	500	24,600	49
Corral	9	C2-II	4.19	542	19,050	35
Stripmine	10	S1-I	1.44	585	4,380	7
Stripmine	11	S1-II	2.8	700	9,260	13
Franceville	12	F1-I	0.29	120	690	6
Franceville	12	F1-II	0.29	43	50	1
Franceville	12	F1-III	0.29	50	350	7

In general, under the current conditions, there is relatively minor erosion with the exception of Corral Creek priority area 7, which has a 24-foot-high unstable bank. However, this erosion appears to be part of a natural process of gradual erosion into a high existing terrace.

2.5.3 Wetlands

Wetlands are a key environmental resource that must be considered when planning drainage projects. Three features are needed to identify wetland types and functions: water, soil, and vegetation. These features in the Jimmy Camp Creek Drainage Basin are described below.

2.5.3.1 Wetland Hydrology

Jimmy Camp Creek is an intermittent waterway, i.e., it flows during certain times of the year when smaller upstream waters are flowing and when groundwater provides enough water for stream flow. There is one active stream gage (USGS gage 07105900) within the Jimmy Camp Drainage Basin. The gage is located upstream of East Ohio Avenue near the basin outlet at Fountain Creek. Daily flow data is available for the period from January 1976 to September 2021. The chronological plot of daily flow data (Figure 2-20) shows that there is a small baseflow and short periods of high flow in response to rainfall or snowmelt events. The daily streamflow exceedance plot (Figure 2-21) indicates a baseflow of approximately 0.2-3 cfs.

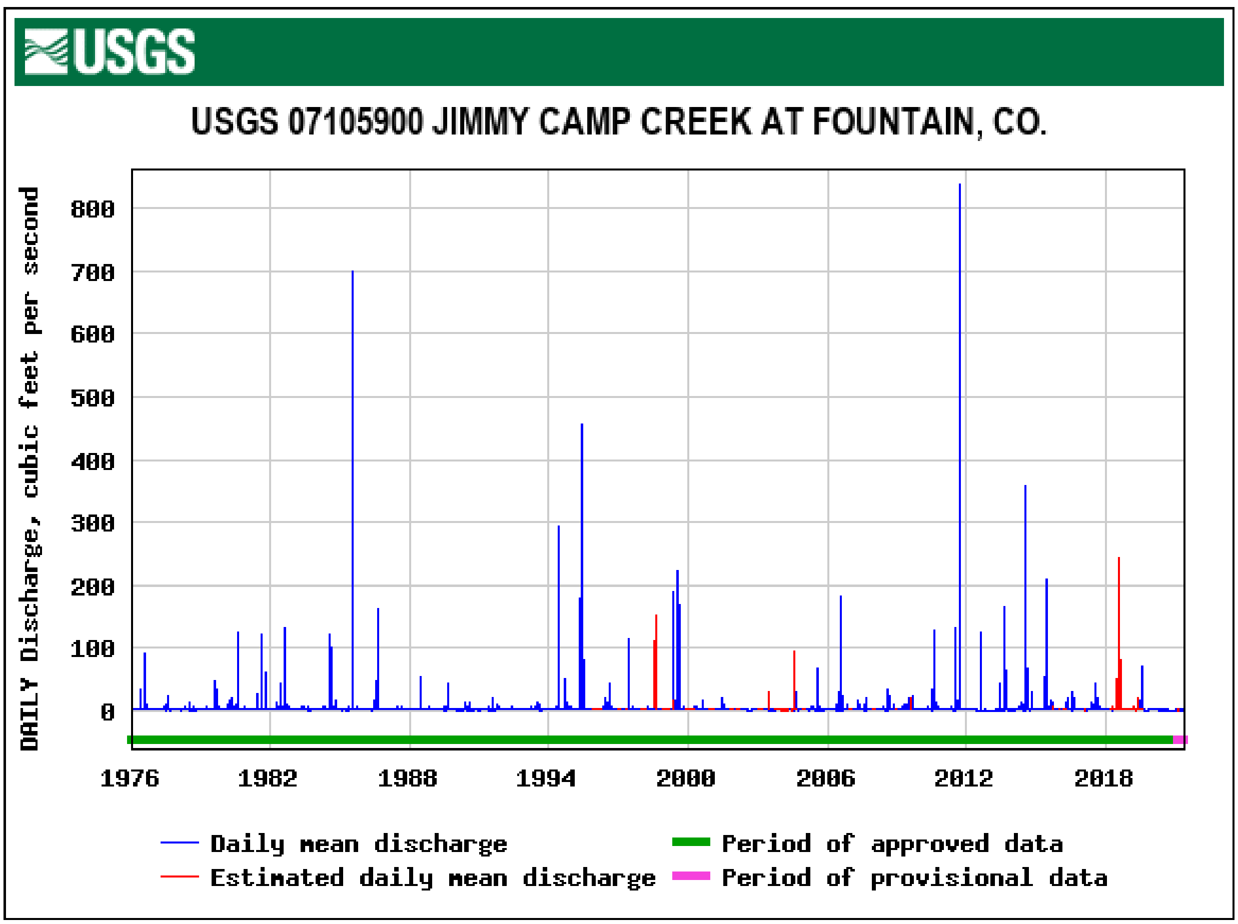

Figure 2-20: Jimmy Camp Creek at Fountain Creek Daily Streamflow, 1976-2021

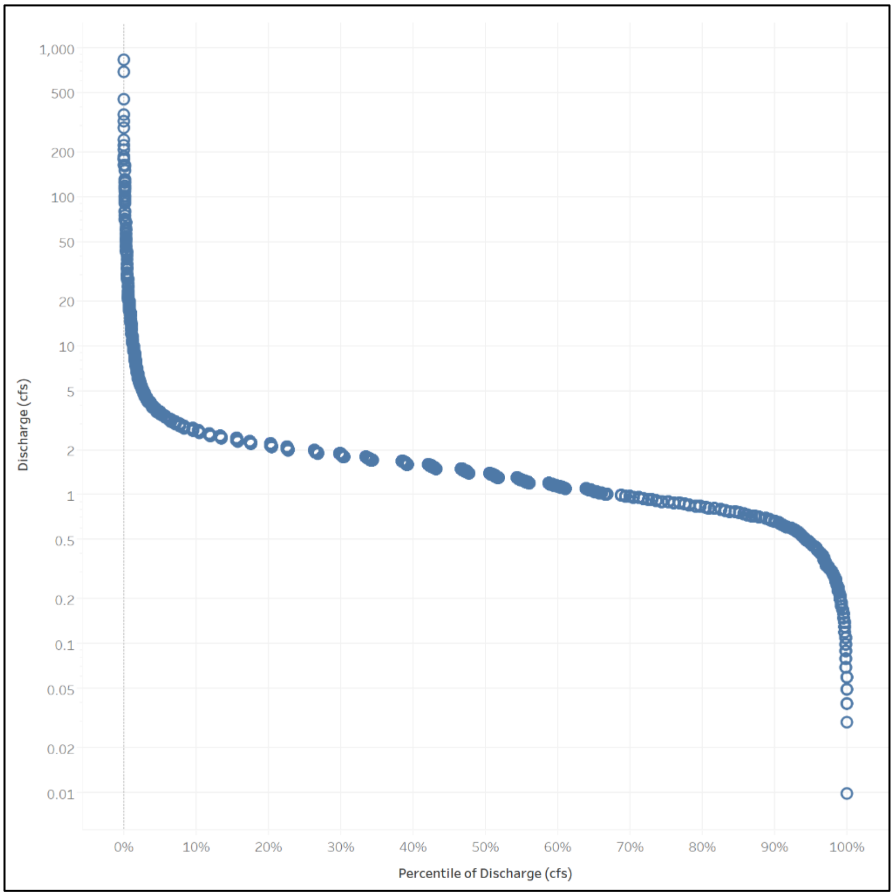

Figure 2-21: USGS 07105900 Jimmy Camp Creek at Fountain Creek Daily Streamflow Exceedance Curve, 1976-2021

Jimmy Camp Creek can be classified as an intermittent stream until it is confluence at Fountain Creek. An intermittent stream may have flow when the water-table is seasonally high but ceases to flow during dry periods. The channel is narrow and more defined to the south and becomes wider and less defined north of Bradley Road. Small wetlands are located sporadically along the channel in the southern part of the Jimmy Camp Creek Drainage Basin.

Both the East and West Fork tributaries, as well as the Stripmine tributary, the Corral tributary, and the Franceville tributary are ephemeral with a sandy bottom. An ephemeral stream is located above the water-table year round and only has flow during and shortly after rain events. Each stream has highly vegetated banks and floodplains. The ordinary high-water mark becomes less apparent to the north where the terrain flattens. Wetlands have a high potential to occur in these areas.

Two portions of the Fountain Mutual Irrigation Company (FMIC) Canal are located within the Jimmy Camp Creek Drainage Basin. Historically the FMIC Canal delivered irrigation water for agricultural shareholders. Currently most shares are owned by municipal water providers, including Colorado Springs Utilities, that use FMIC water to augment depletions from other sources. This has reduced the typical flow of water in the FMIC Canal during the irrigation season.

The portion of Fountain Canal to the east of Jimmy Camp Creek is located mostly within developed neighborhoods and can be defined as ephemeral north of Mesa Ridge Parkway. The channel is highly vegetated once outside the developed areas. The west portion of the Fountain Canal is mostly in a non-developed area. It has a narrow, incised, sandy bottom channel starting at Squirrel Creek Road. The channel becomes more vegetated north of Peaceful Valley Road. This channel can also be defined as ephemeral.

2.5.3.2 Drainageway Soil Characteristics

There are several NRCS Soil mapping units located within the drainageways. Figure 2-22 depicts soil locations and hydric status.

Jimmy Camp Creek, the East Fork tributary, the Stripmine tributary, and the Corral tributary are found mostly in Ellicott loamy coarse sand (Map unit: 28), Stapleton-Bernal sandy loams (Map unit: 85), Ustic Torrifluvents, loamy (Map unit: 101), Blakeland loamy sand (Map unit: 8), Sampson loam (Map unit: 78) and the Lithic haplustepts-Rock outcrop complex (Map unit: 115). The Ellicott loamy coarse sand consists of deep, somewhat excessively drained soils found on floodplains and stream terraces and is formed from sandy alluvium. The Stapleton-Bernal sandy loam consists of deep, well drained soils found on hills and is formed from residuum weather from sandstone. The Ustic Torrifluvents, loamy series consists of deep, well drained soils found on floodplains and stream terraces and is formed from sand, clayey, stratified loam. The Blakeland loamy sand consists of deep, somewhat excessively drained soils found on hills and flats formed from alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock. The Sampson loam consists of deep, well drained soils formed from alluvium and is found on alluvial fans, terraces and depressions. The Lithic Haplustepts-Rock outcrop complex consists of deep, somewhat excessively drained soils formed from sedimentary rock and is found on scarps.

The West Fork tributary is found mostly in Nunn clay loam (Map unit: 59). The Nunn clay loam consists of deep, well drained soils found on fans and terraces and is formed from mixed alluvium. The

Franceville tributary is found mostly in Limon clay (Map unit: 47), Manzanst clay loam (Map unit: 52), Nelson-Tassel fine sandy loams (Map unit: 56), Stapleton sandy loam (Map unit: 84), Truckton sandy loam (Map unit: 96), and Ustic Torrifluvents, loamy (Map unit: 101, described above). The Limon clay consists of deep, well drained soils found on flood plains and alluvial fans and is formed from clayey alluvium derived from shale. The Manzanst clay loam consists of deep, well drained soils formed from clayey alluvium derived from shale and can be found on terraces and drainageways. The Nelson-Tassel fine sandy loams consist of moderately deep, well drained soils formed from calcareous residuum weathered from interbedded sedimentary rock and can be found on hills. The Stapleton sandy loam consists of deep, well drained soils formed from sandy alluvium derived from arkose and can be found on hills. The Truckton sandy loam consists of deep, well drained soils formed from wind re-worked alluvium derived from arkose and can be found on interfluves and fan remnants.

A hydric soil is defined as soil that is formed under conditions of saturation, flooding or ponding for a period during the growing season to develop anaerobic conditions in the upper portion of the soil's profile. Hydric soils are a main indicator of wetlands and also indicate areas of seasonally high groundwater table (within one foot of the surface). NRCS Web Soil Survey lists minor components of hydric soils in the Ellicott loamy coarse sand, Stapleton-Bernal sandy loams, Ustic Torrifluvents, loamy, Blakeland loamy sand, Nunn clay loam and Sampson loam. However, due to the coarse grained and mostly well drained sediments, there are no strong indicators of hydric soils located within the drainages outside active channels, although some areas may be present.

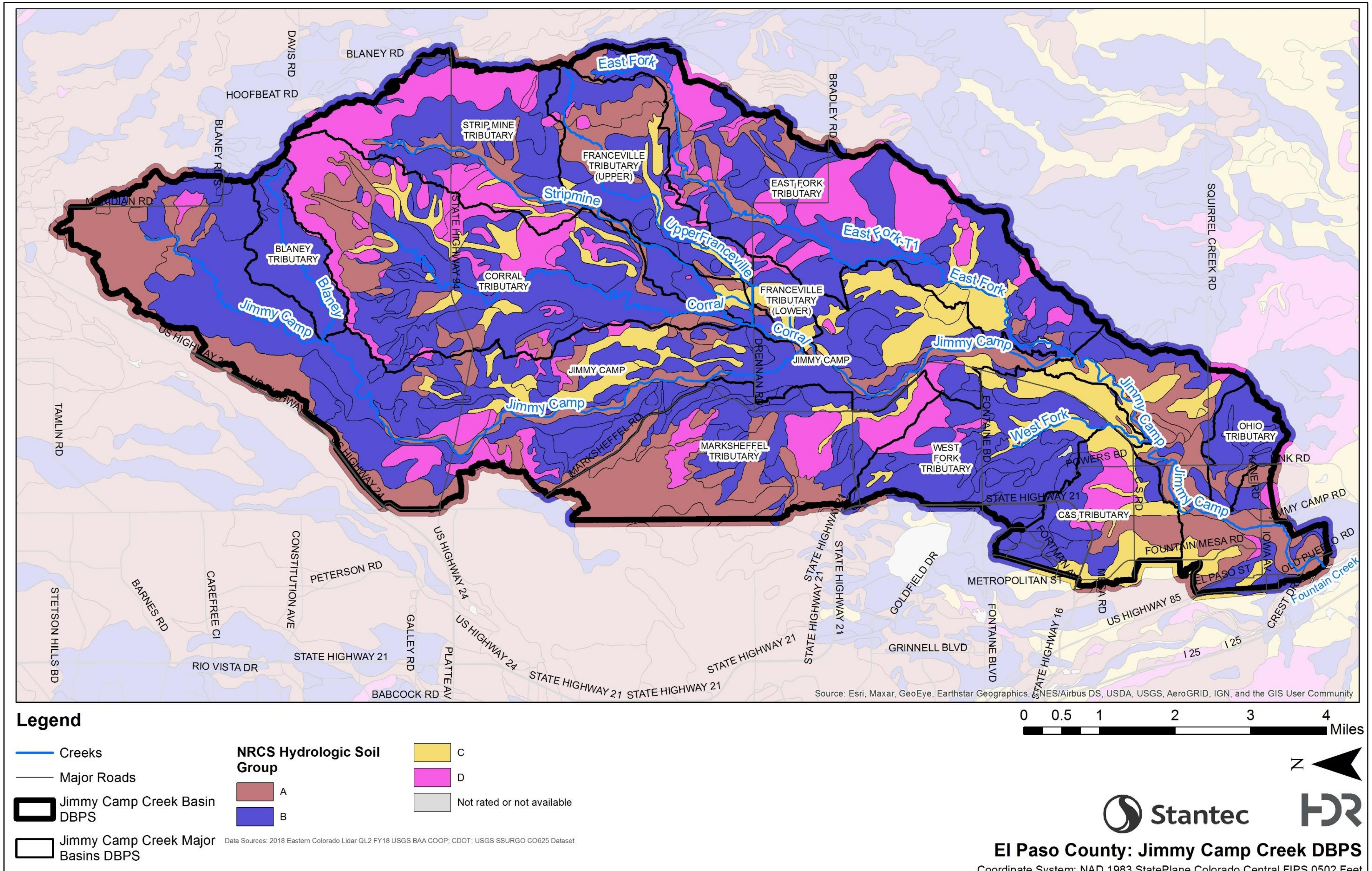

Figure 2-22: NRCS Soils Map for the Jimmy Camp Creek Drainage Basin

2.5.3.3 Vegetation

Land cover types within the basin include: Developed, Agriculture, Western Great Plains Shortgrass Prairie, Western Great Plains Foothill and Piedmont Grassland, Western Great Plains Riparian Woodland and Shrubland, Western Great Plains Floodplain Herbaceous Wetland, Invasive Perennial Grassland and Southern Rocky Mountain Pinyon-Juniper Woodland (Colorado GAP Landcover Data).

Emergent wetlands are present in pockets within and along southern portions of the active channels. These are likely dominated by cattails (*Typha latifolia* OBL), bulrush (*Schoenoplectus lacustris* OBL), and sedges (*Carex* sp. >FACW). These emergent wetlands are also mixed with willow dominated wetlands, commonly sandbar willow (*Salix exigua* OBL), dogwood (*Cornus* sp. >FACW) and cottonwood (*Populus deltoides* FAC).

2.5.3.4 Wetland Maps

Figure 2-23 and Figure 2-24 show the National Wetland Inventory mapping for the Jimmy Camp Creek Drainage Basin. These maps depict approximate locations where hydrology, soils and vegetation indicate the likely presence of wetlands. These maps are adequate for planning purposes; field delineation of wetlands should occur during project design and construction.

2.5.4 Jurisdictional Wetlands and Waterways

Jurisdictional Waters of the United States (WOTUS) are defined as any wetland or waterway hydrologically connected to navigable waters of the United States. Jurisdictional wetlands and waterways are subject to federal regulation. The mainstem and all major tributaries of Jimmy Camp Creek mapped on the USGS map will need to be assessed to determine jurisdictional status. A Department of the US Army Corps of Engineers (USACE) permit under Section 404 of the Clean Water Act may be required for projects that plan to discharge material within the ordinary high-water mark or adjacent wetlands.

Irrigation ditches are also considered jurisdictional waters if they empty into jurisdictional WOTUS. Also, any ponds or wetlands connected to those irrigation ditches are considered jurisdictional. The status of wetland regulations is being reviewed by federal agencies; the types of wetlands covered under Section 404 should be verified at the time of planned channel construction projects.

2.5.5 Potential Endangered and Threatened Species

According to the USFWS Information for Planning and Consultation (IPaC) website, El Paso County is home to multiple endangered (E) and threatened (T) species. These species include: Preble's Meadow Jumping Mouse (*Zapus hudsonius preblei*, T), Least Tern (*Sterna antillarum*, E), Mexican Spotted Owl (*Strix occidentalis lucida*, T), Piping Plover (*Charadrius melodus*, T), Whooping Crane (*Grus americana*, E), Greenback Cutthroat Trout (*Oncorhynchus clarkii stomias*, T), Pallid Sturgeon (*Scaphirhynchus albus*, E), Pawnee Montane Skipper (*Hesperia leonardus montana*, T), Ute Ladies'-tresses (*Spiranthes diluvialis*, T), and the Western Prairie Fringed Orchid (*Platanthera praeclara*, T).

Critical habitat for the Preble's Meadow Jumping Mouse is located near the northeast side of Jimmy Camp Creek Drainage Basin. The other species have habitat requirements that are not met within the Study Area, including vertical-walled rocky cliffs, lakeshores, inland marshes, cold water lakes or streams, oxbows, unplowed calcareous prairies, and sedge meadows.

2.5.6 Environmental Resources Summary

Any channel improvement project affecting a wetland, waterway, or irrigation ditch within the Jimmy Camp Creek Drainage Basin may be subject to regulations by the USACE. Any impacts to riparian ecosystems near/within permitted activities may also need replacement. Detailed wetland delineations may be needed in areas where channel modifications and drainage outfall systems are proposed.

2.5.7 Environmental Permitting Requirements

Areas identified as wetlands, Waters of the U.S., open water, and irrigation ditches may be subject to USACE Section 404 regulations. Impacts may need to be mitigated, and riparian ecosystems impacted in conjunction with permitted activities may also need replacement. Detailed wetland delineation will need to be performed in areas where drainage system improvements are proposed in potential jurisdictional areas and evaluated in relation to permitting requirements in affect at the time of construction.

Other state and local construction permits related to activities in drainage corridors will also apply. Conditions in the Jimmy Camp Creek drainageways are typical of other drainages in El Paso County, so standard permit conditions related to avoiding and mitigating impacts as have been applied to past drainage projects in the County are expected to apply in the Jimmy Camp Creek watershed as well.

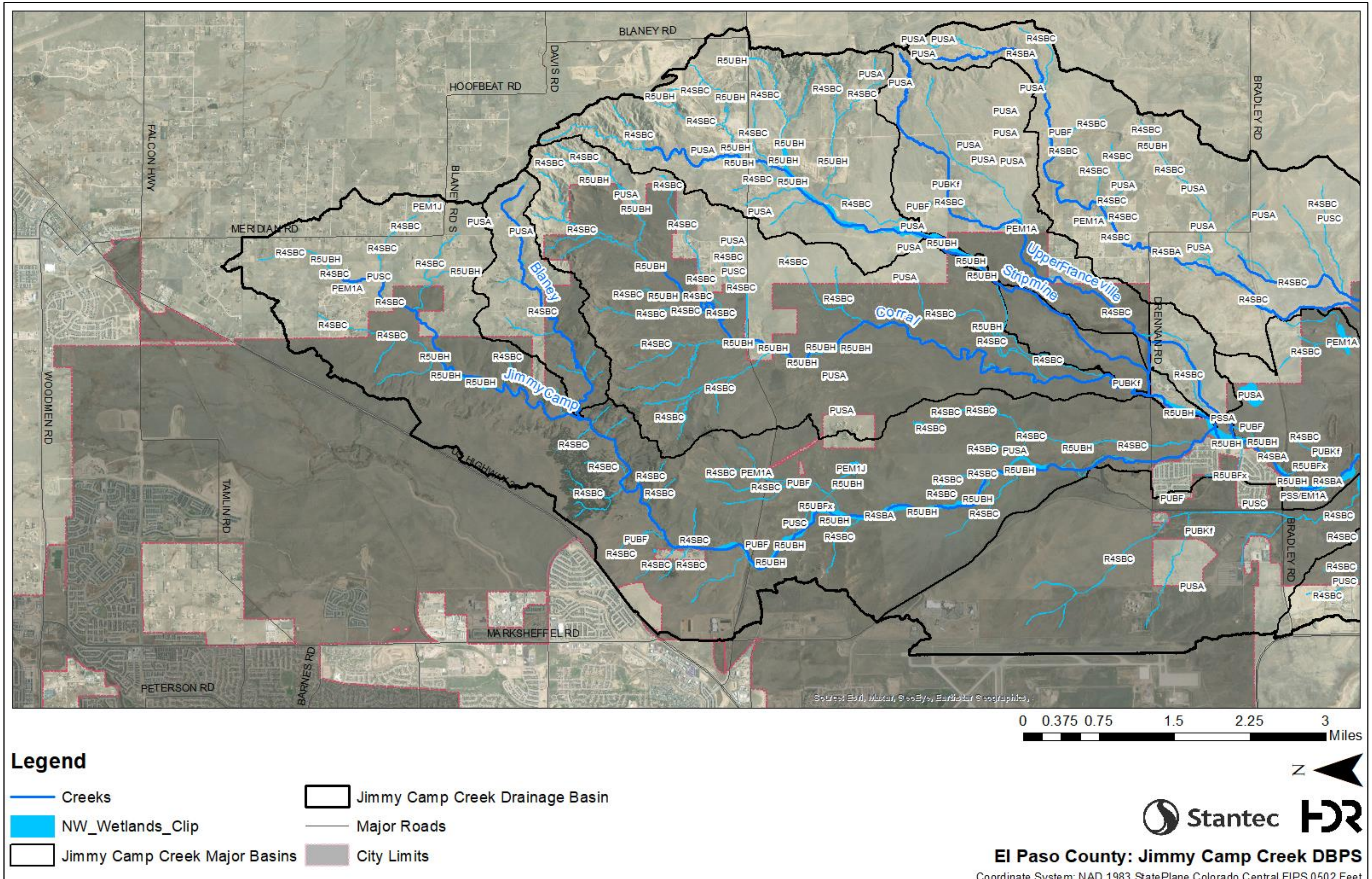

Figure 2-23: NWI Wetlands Located in Upper Jimmy Camp Creek Drainage Basin

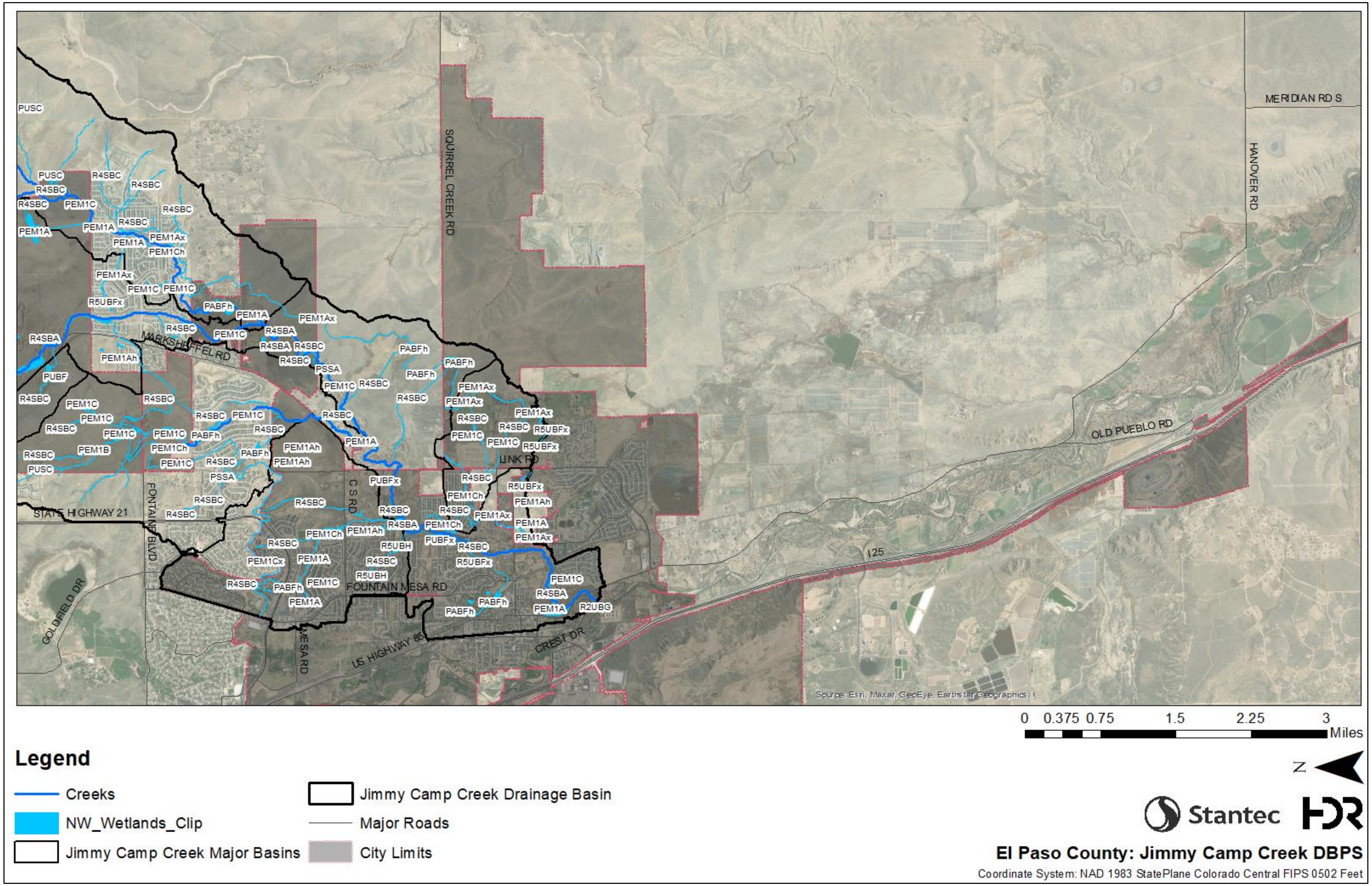

Figure 2-24: NWI Wetlands Located in Lower Jimmy Camp Creek Drainage Basin

2.6 HYDRAULIC STRUCTURES

Several existing hydraulic structures are located in the Jimmy Camp Creek Drainage Basin. In developed areas the channels are improved in some fashion, varying from widened channel cross-sections to widely spaced grade control structures. For most areas outside of these developed sites, natural channels follow their historic alignments and flows are not attenuated. Currently, there are no major regional stormwater ponds in the watershed within the unincorporated County area.

Within the unincorporated County area, 14 existing road bridges and culverts cross the drainage channels in the Jimmy Camp Creek Drainage Basin, and 9 known existing grade control structures attempt to manage downcutting and lateral channel migration. Many of the grade control structures have been constructed as part of the Lorson Ranch development.

2.7 STORMWATER QUALITY CONSIDERATIONS AND PROPOSED PRACTICES

Factors that will affect stormwater quality in the Jimmy Camp Creek Drainage Basin drainageways include urbanization and sedimentation/erosion. El Paso County addresses both factors through development requirements for application of Permanent Best Management Practices (PBMPs) (e.g., onsite stormwater quality ponds, stormwater extended detention, etc.), education and outreach, system maintenance, and other programs.

The DBPS does not include specific recommendations for PBMPs such as stormwater extended detention basins in areas of new development in the Jimmy Camp Creek Drainage Basin. These will be the responsibility of developers in compliance with current criteria and policies.

The primary water quality constituent associated with the drainage corridor that could be affected by DBPS recommendations is sediment. Excessive sediment is a problem identified in the Fountain Creek watershed (THK/Matrix, 2011). A geomorphic analysis of the Jimmy Camp Creek watershed, described in detail in the Hydraulic Report, did determine channel erosion as an issue in the Jimmy Camp Creek Drainage Basin drainageways as evidenced by existing incised channels and eroding banks. Measures in the DBPS to stabilize channels and reduce channel erosion will help reduce sediment production from the Jimmy Camp Creek watershed.

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