

Report Summary
Chacon Creek, Laredo, Texas
Feasibility Report and Environmental Assessment

Study Authority. Authority for the Chacon Creek Feasibility Study is provided in Section 1201(22) of the Water Infrastructure Improvements of the Nation Act (Public Law 114-322) also known as the Water Resources Development Act of 2016, which reads:

SEC. 1201. AUTHORIZATION OF PROPOSED FEASIBILITY STUDIES.

The Secretary is authorized to conduct a feasibility study for the following projects for water resources development and conservation and other purposes, as identified in the reports titled ‘‘Report to Congress on Future Water Resources Development’’ submitted to Congress on January 29, 2015, and January 29, 2016, respectively, pursuant to section 7001 of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 2282d) or otherwise reviewed by Congress: (22) CHACON CREEK, CITY OF LAREDO, TEXAS.—Project for flood damage reduction, ecosystem restoration, and recreation, Chacon Creek, city of Laredo, Texas.

Additionally, the authority for non-Federal preparation of feasibility studies for review, comment, and approval by the Secretary of the Army is contained in Section 203 of the WRDA of 1986, as amended by Section 1014 of the WRRDA of 2014, which reads:

SEC. 1014. STUDY AND CONSTRUCTION OF WATER RESOURCES DEVELOPMENT PROJECTS BY NON-FEDERAL INTERESTS

(a) STUDIES.—Section 203 of the Water Resources Development Act of 1986 (33 U.S.C. 2231) is amended to read as follows:

‘‘SEC. 203. STUDY OF WATER RESOURCES DEVELOPMENT PROJECTS BY NON-FEDERAL INTERESTS.

‘‘(a) SUBMISSION TO SECRETARY.—

‘‘(1) IN GENERAL.—A non-Federal interest may undertake a feasibility study of a proposed water resources development project and submit the study to the Secretary.

‘‘(2) GUIDELINES.—To assist non-Federal interests, the Secretary, as soon as practicable, shall issue guidelines for feasibility studies of water resources development projects to provide sufficient information for the formulation of the studies.

‘‘(b) REVIEW BY SECRETARY.—The Secretary shall review each feasibility study received under subsection (a)(1) for the purpose of determining whether or not the study, and the process under which the study was developed, each comply with Federal laws and regulations applicable to feasibility studies of water resources development projects.

‘‘(c) SUBMISSION TO CONGRESS.—Not later than 180 days after the date of receipt of a feasibility study of a project under subsection (a)(1), the Secretary shall submit to the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives a report that describes—

‘‘(1) the results of the Secretary’s review of the study under subsection (b), including a determination of whether the project is feasible;

‘‘(2) any recommendations the Secretary may have concerning the plan or design of the project; and

‘‘(3) any conditions the Secretary may require for construction of the project.

‘‘(d) CREDIT.—If a project for which a feasibility study has been submitted under subsection (a)(1) is

authorized by a law enacted after the date of the submission to Congress under subsection (c), the Secretary shall credit toward the non-Federal share of the cost of construction of the project an amount equal to the portion of the cost of developing the study that would have been the responsibility of the United States if the study had been developed by the Secretary.”

Further, Section 203 authorization for non-Federal Interests to prepare feasibility studies was last amended by Section 1126 of the Water Infrastructure Improvements for the Nation Act (Public Law 114-322) to allow for the provision of technical assistance, by addition of part (e), as follows:

SEC. 1126. STUDY OF WATER RESOURCES DEVELOPMENT PROJECTS BY NON- FEDERAL INTERESTS.

Section 203 of the Water Resources Development Act of 1986 (33 U.S.C. 2231) is amended by adding at the end the following:

“(e) TECHNICAL ASSISTANCE.—At the request of a non-Federal interest, the Secretary may provide to the non-Federal interest technical assistance relating to any aspect of a feasibility study if the non-Federal interest contracts with the Secretary to pay all costs of providing such technical assistance.”

Study Purpose and Scope. The primary purpose of the Chacon Creek Feasibility Study is to identify the Federal interest in providing implementable measures to reduce the risk of flooding and restore degraded aquatic ecosystems. These measures include but are not limited to:

- Measures that will reduce the risk of flooding along Chacon Creek
- Measures that will restore degraded aquatic and riparian habitat to more natural condition and compliment planned ecosystem restoration measures
- Recreational amenities that will reduce excess demand and complement planned ecosystem restoration measures

To this end, the study scope is to evaluate the existing conditions and future without-project conditions, identify the problems and opportunities, develop alternatives to reduce the risk of flooding, restore degraded ecosystems, and provide increased recreational opportunities, evaluate those alternatives, develop a Tentatively Selected Plan, and ultimately recommend a plan to Congress for authorization that has Federal interest.

Project Location. The study area is in the City of Laredo (City), Webb County, Texas, at the northern border of the Rio Grande. Located in the eastern half of the city, Chacon Creek originates north of Lake Casa Blanca and flows about five miles to the southwest where it forms a confluence with the Rio Grande. Lake Casa Blanca and Chacon Creek are located along what used to be the eastern and southern edges of development associated with the City. In recent years, urban development east of Chacon Creek and along the eastern tributaries has filled in much of the watershed. The Laredo International Airport is located immediately west of Lake Casa Blanca in the northern part of the lower Chacon Creek watershed. The Rio Grande Basin is depicted in Figure 1. The Chacon Creek Basin is depicted in Figure 2.

The study area encompasses the lands along Chacon Creek within the 500-year floodplain and contains approximately 1,006 acres along the main stem and Tributary 2. The drainage areas, lengths, and gradients of Chacon Creek and associated tributaries are presented in Table 1. Tinaja and TexMex Creeks

were not included because no structures exist in the 500-year floodplain. Tributary 3, though outside the city limits when the floodplain was originally delineated, has not been an area that has historically had flooding problems. The City has Conditional Letters of Map Revisions (CLOMRs) on file, issued by the Federal Emergency Management Agency (FEMA) for modification of existing regulatory floodways for this area.

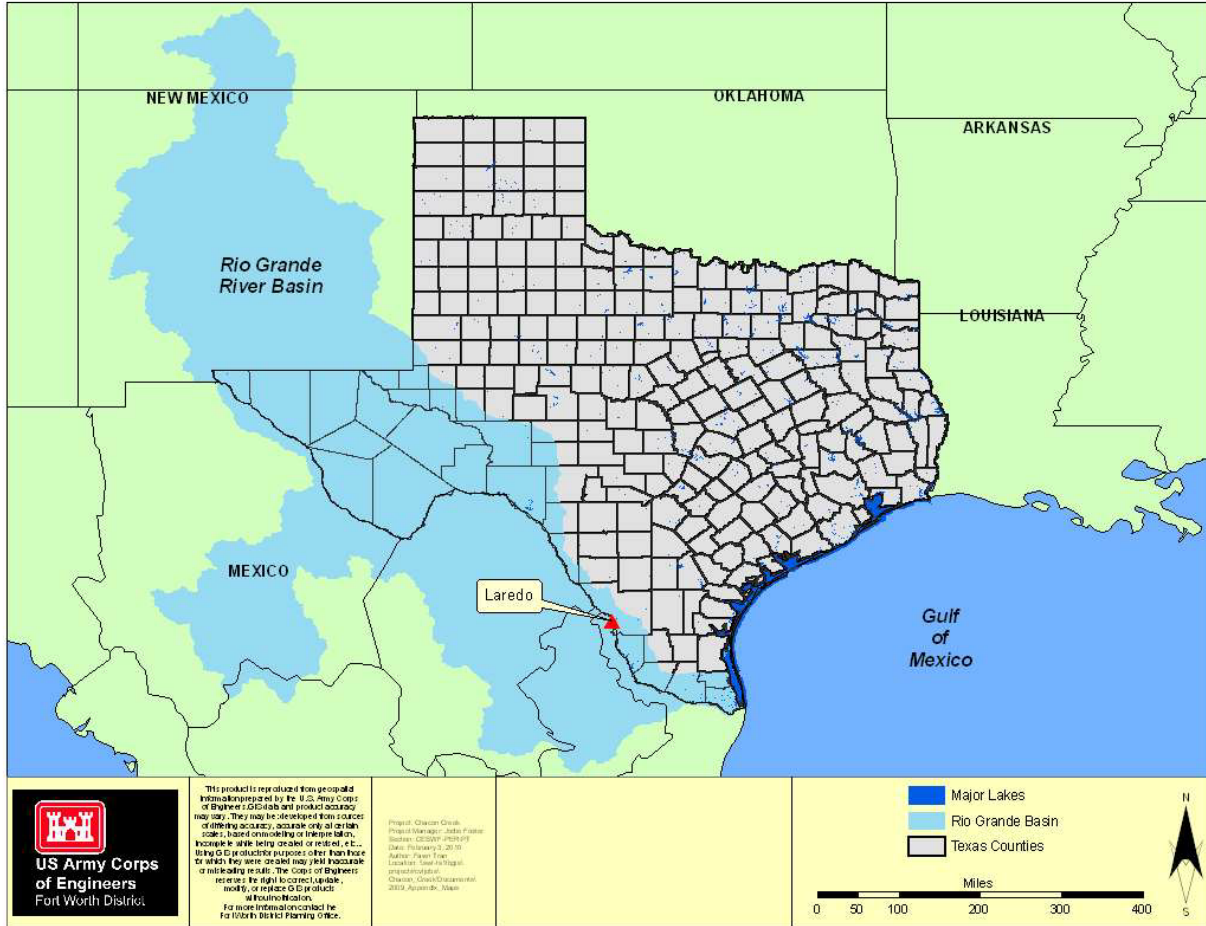


Figure 1. Rio Grande Basin

	Problem	Opportunity
5	Lost and reduced habitat values of wetlands due to urbanization	Restore wetlands
6	Shortage of recreational facilities	Provide recreational facilities to meet current and future demands

Chacon Creek and Lake Casa Blanca are located along what used to be the eastern and northern edges of development associated with the City of Laredo. Recent development east of Chacon Creek and along the eastern tributaries has filled in much of the watershed. A majority of the study area is bordered by residential and commercial development. Much of the watershed west of Chacon Creek, and a substantial portion of lands adjacent to the study area within the 100-year floodplain, have been developed. Chacon Creek is located in a high urban growth corridor and has flooded adjacent residences and businesses.

Development in the 100-year floodplain began in the 1970s and the city joined FEMA’s Regular Program, in which Flood Insurance Rate Maps (FIRM) went into effect and marked communities’ participation in the final phase of the National Flood Insurance Program in 1982. Continued urban development within the watershed has increased the amount of impervious surfaces and contributes to more flooding and high flow volumes characteristic of Chacon Creek after high rainfall events.

Congressional Interests. The study area lies within the jurisdiction of Texas Congressional District 28, which is represented in the U.S. Congress by the Honorable Henry Cuellar. The U.S. Senators for Texas are the Honorable John Cornyn and Honorable Ted Cruz.

Cooperating Agencies. A coordination letter requesting Federal Resource Agency participation was sent out on March 10, 2023. A subsequent Resource Agency coordination meeting was held on June 16, 2023. Resource agencies in attendance included the Environmental Protection Agency, The U.S. Fish and Wildlife Department, the Texas Commission on Environmental Quality, the Texas Parks and Wildlife Department, and the Natural Resources Conservation Service.

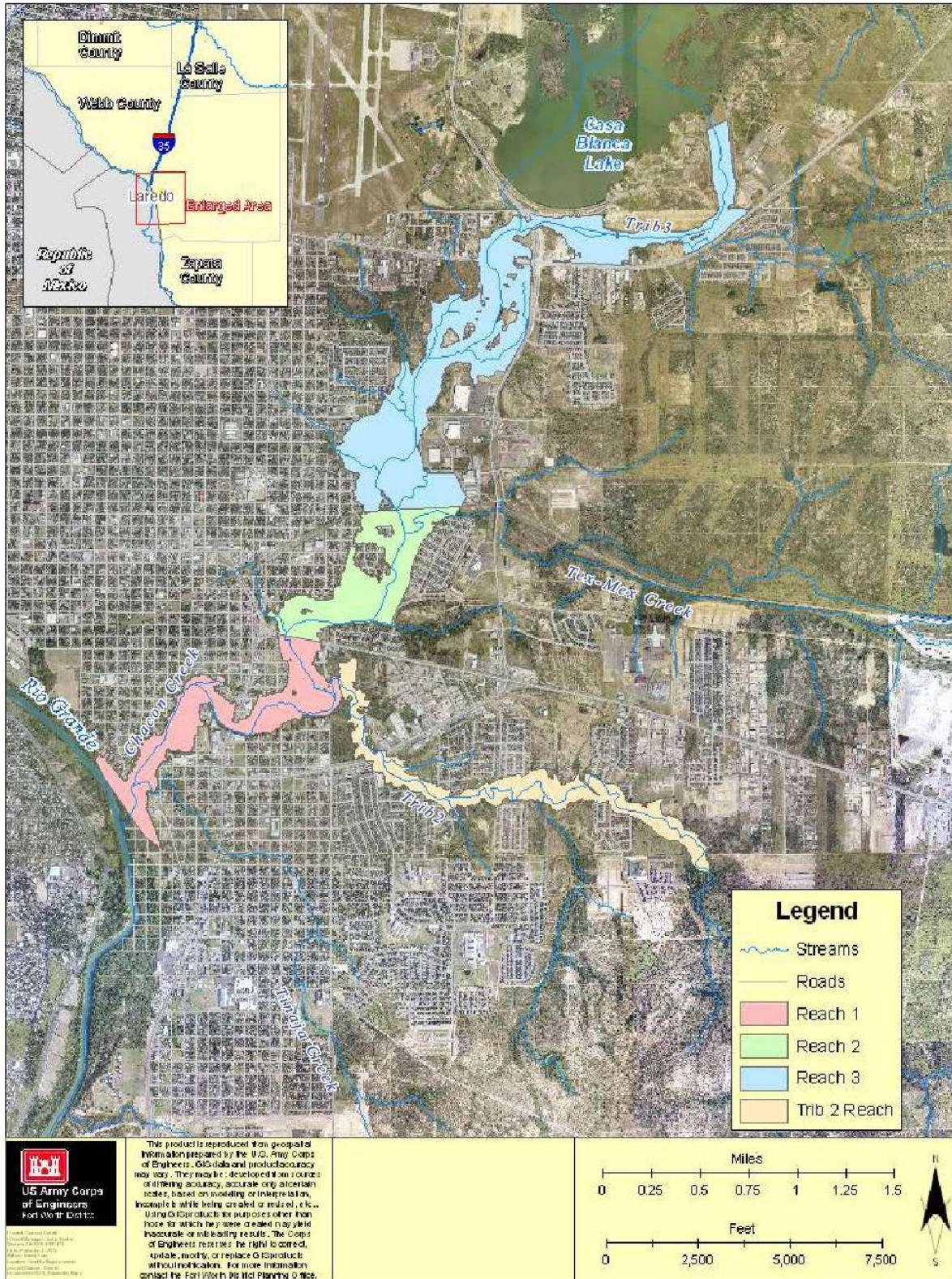


Figure 3. Study Area

Planning Objectives. Plans formulated during this study were evaluated based on their contributions to

NED that are consistent with protection of the Nation's environment and on their contributions to NER. In addition to the National goals, additional planning objectives evolved from meetings with the local sponsors, state and Federal agencies, and from observations made in the area. Specific needs, desires, and goals of the community were identified. The following planning objectives were identified for this study:

Reduce flood damages along Chacon Creek and decrease the number of residents who reside in the 10% ACE by 75 %.

Reduce risk to life, health, and safety of the residents along Chacon Creek by decreasing the risk of flooding to the extent practicable.

1. Reduce emergency costs associated with the occurrence of large flood events along Chacon Creek.
2. Reduce risk to life, health, and safety of the residents along Chacon Creek by decreasing the risk of flooding to the extent practicable.
3. Reduce emergency costs associated with the occurrence of large flood events along Chacon Creek.
4. Avoid or minimize project impacts to threatened and endangered species.
5. Restore and maintain the natural character of floodplains.
6. Maximize opportunities for public use within floodplains by connecting park facilities along Chacon Creek.
7. Restore a diverse and sustainable ecosystem for Chacon Creek.
8. The formulation of alternatives should avoid areas that are either known or suspected to be contaminated and/or contain hazardous, toxic, and radioactive waste.
9. Measures for flood risk management should strive to minimize the use of concrete or other hard surfaces.
10. The lower portions of the study area where the EPA and the city have performed the streambank stabilization project and planted trees should be considered valuable wildlife habitat and potential migratory areas for the Federally Listed endangered ocelot and Gulf Coast jaguarundi. Project recreation features should avoid clearing riparian areas and other brush vegetation in these areas.

Planning Constraints. To provide direction for the plan formulation efforts, the following constraints were taken into account:

1. The formulation of alternatives that reduce flood damages and flood fighting costs in one area should not result in measurable increases in the extent and magnitude of flooding in another area.
2. Project considerations would avoid conflicts with the Rio Grande Compact of 1938, which established interstate apportionments of Rio Grande waters between the states of Colorado, New Mexico, and Texas.
3. Formulation of alternatives should minimize and avoid adverse aesthetic and visual impacts, avoid any long-term adverse impacts to air and water quality, and minimize noise pollution to the extent possible.
4. Modifications to the Texas Mexican International Railway Bridge should be avoided due to the expected cost of modifications and anticipated traffic delays.

Formulation Strategies, Management Measures, and Alternatives.

Flood Risk Management Plan

Federal Principles and Guidelines state that the Federal objective of water and related land resources planning is to contribute to National Economic Development (NED) while protecting the Nation's environment, in accordance with national environmental statutes, applicable executive orders, and other Federal planning requirements. Benefits from reducing flood hazards accrue primarily through the reduction in actual or potential damages to affected land uses, but can also apply to the provision of recreational opportunities.

The future without-project condition provides the basis from which alternative plans are formulated and impacts are assessed. Alternatives, both structural and non-structural, are analyzed and described in terms of their expected performance, not in terms of specific levels of protection. The selected plan, or NED plan, should seek to provide a maximum of net benefits. Net benefits are calculated by annualizing the project costs as well as project benefits and then subtracting the annualized costs from the annualized benefits.

Structural Measures

- Channel Modifications
- Detention
- Levees/Floodwalls
- Levees/Floodwalls

Non-Structural Measures

- Floodplain Evacuation
- Flood-Proofing
- Flood Warning Systems

Recreational Alternatives

Formulation of recreation alternatives utilized the unit day value (UDV) method since UDV's are widely accepted and the methodology is straightforward. Benefits were not calculated for existing park facilities because any potential alternatives that included recreational features would replace any existing recreational amenities. The City of Laredo performed a local survey to determine the city's future recreational demand. The analysis done by the City included interviews with key City of Laredo staff, organized recreation providers, and user groups, phone surveys for each of the eight Council Districts, four public meetings for the eight Council Districts, inventory/supply analysis, GIS analysis of land use, projected growth, the City's Thoroughfare Master Plan, consideration of natural land features such as slope and hydrography, and facility standards analysis of park service areas. The local survey was conducted in March 2007 by The Earl Survey Research Laboratory at Texas Tech University. Latent demand identified by city staff, user groups, and survey respondents included features such as volleyball courts, playgrounds, picnic tables, pavilions, trails, and multipurpose fields.

Final Array of Alternatives for Flood Risk Management and Recreation. For the flood risk management and recreation components of the study, Table 2 summarizes all of the alternatives that were

investigated in detail, along with the associated costs, net benefits, and benefit-to-cost ratios. These alternatives consist of the final array identified in the initial 2010 feasibility report updated in 2018 as part of the Section 203 report submitted by the City of Laredo.

Ecosystem Restoration. With-project and future without-project conditions were compared using the Institute of Water Resources decision support software IWR Planning Suite II (v2.0.9), which facilitates the evaluation and comparison of ecosystem restoration plans with non-monetary outputs (AAHUs). The cost of preconstruction, engineering, and design (PED), construction management, and actual construction cost of ecosystem restoration measures were annualized to use as the cost for each plan being evaluated.

The Habitat Evaluation Procedures (HEP) (USFWS, 1980, 1981) study was used to evaluate the suitability of existing riparian and wetland habitats for wildlife in the study area, and to quantify the amount of habitat currently available. HEP is a system that uses a habitat sampling approach to assess existing and future habitat suitability, compare study alternatives, and analyze mitigation measures to offset study impacts. Species listed below were selected due to their likeliness to use small drainages in the southern Texas plains ecoregion:

- American coot (*Fulica americana*)
- Belted kingfisher (*Ceryle alcyon*)
- Eastern cottontail (*Sylvilagus floridanus*)
- Red-winged blackbird (*Agelaius phoeniceus*)
- Slider turtle (*Pseudemys scripta*)

In total, there are three general ecosystem restoration activities in this study, the creation and restoration of wetlands, improvement to riverine habitat, and reforestation of riparian habitat. To evaluate these actions, the activities were separated into seven measures, each measure with a series of scales. Table 2 provides a summary of these measures and scales.

Table 2. Ecosystem Restoration Summary

Measure	Scale	Description
Wetland Site A	A1	Weir height 1 foot, width 110 feet, to create approximately 3.56 acres of wetland
	A2	Weir height 2 feet, width 120 feet, to create approximately 5.99 acres of wetland
	A3	Weir height 3 feet, width 250 feet, to create approximately 7.93 acres of wetland
Wetland Site B	B1	Weir height 1 foot, width 55 feet, to create approximately 3.65 acres of wetland
	B2	Weir height 2 feet, width 150 feet, to create approximately 6.05 acres of wetland
	B3	Weir height 3 feet, width 190 feet, to create approximately 8.69 acres of wetland
Wetland Site C	C1	Weir height 1 foot, width 45 feet, to create a approximately 0.15 acre of wetland, debris removal
	C2	Weir height 2 feet, width 55 feet, to create approximately 1.17 acres of wetland, debris removal
	C3	Weir height 3 feet, width 65 feet, to create approximately 2.07 acres of wetland, debris removal

Riverine Reach D	D1	Addition of a 250 x 25 foot riffle structure, to create a total of 0.93 acre of riffle benefit
	D2	Addition of a 500 x 25 foot riffle structure, to create a total of 1.51 acres of riffle benefit
	D3	Addition of a 750 x 25 foot riffle structure, to create a total of 2.08 acres of riffle benefit
	D4	Addition of a 1,000x 25 foot riffle structure, to create a total of 2.66 acres of riffle benefit
Riverine Reach E	E1	Addition of a 250 x 15 foot riffle structure, to create a total of 0.58 acre of riffle benefit
	E2	Addition of a 500 x 25 foot riffle structure, to create a total of 0.93 acre of riffle benefit
	E3	Addition of a 750 x 25 foot riffle structure, to create a total of 1.27 acres of riffle benefit
	E4	Addition of a 1,000x 25 foot riffle structure, to create a total of 1.62 acres of riffle benefit
Riverine Reach F	F1	Addition of a 250 x 11 foot riffle structure, to create a total of 0.63 acre of riffle benefit, removal of concrete structure partially obstructing flow
	F2	Addition of a 500 x 11 foot riffle structure, to create a total of 0.90 acre of riffle benefit, removal of concrete structure partially obstructing flow
	F3	Addition of a 750 x 11 foot riffle structure, to create a total of 1.17 acres of riffle benefit, removal of concrete structure partially obstructing flow
	F4	Addition of a 1,000x 11 foot riffle structure, to create a total of 1.44 acres of riffle benefit
Riparian G	G1	Reforestation of non-forested area, including buffelgrass control, planting, and irrigation
	G2	Removal of salt cedar from forested areas
	G3	G1 + G2

The ICA procedure identified 15 best buy plans. For each best-buy plan, Table 3 provides an outline of the plan's restoration components (measures and scales), along with the Total Cost, Total Output, Average Annual Cost, Incremental Average Annual Cost, Incremental Output, and Incremental Average Annual Cost per Output.

Table 3. Best-buy Plans Cost/Output Summary

Plan	Measure and Scale							Output	Cost		Incremental		
	A	B	C	D	E	F	G		Annual	Average (\$/HU)	Annual Cost	Output (HU)	Cost per Output
1	0	0	0	0	0	0	0	0	\$0	\$0	\$0	0	\$0
2	0	1	0	0	0	0	0	2.542	\$5,689	\$2,238	\$5,689	2.542	\$2,238
3	2	1	0	0	0	0	0	6.936	\$17,189	\$2,478	\$11,500	4.394	\$2,617
4	2	3	0	0	0	0	0	10.813	\$30,710	\$2,840	\$13,521	3.877	\$3,487
5	2	3	3	0	0	0	0	12.292	\$36,614	\$2,979	\$5,904	1.479	\$3,992
6	2	3	3	0	0	0	3	163.916	\$979,469	\$5,975	\$942,855	151.624	\$6,218
7	3	3	3	0	0	0	3	165.414	\$990,733	\$5,989	\$11,264	1.498	\$7,519
8	3	3	3	0	0	1	3	165.851	\$996,886	\$6,011	\$6,153	0.437	\$14,080
9	3	3	3	1	0	1	3	166.547	\$1,008,038	\$6,053	\$11,152	0.696	\$16,023
10	3	3	3	1	1	1	3	166.972	\$1,015,460	\$6,082	\$7,422	0.425	\$17,464
11	3	3	3	2	1	1	3	167.454	\$1,025,713	\$6,125	\$10,253	0.482	\$21,272
12	3	3	3	4	1	1	3	168.407	\$1,046,207	\$6,212	\$20,494	0.953	\$21,505
13	3	3	3	3	2	1	3	168.697	\$1,053,064	\$6,242	\$6,857	0.29	\$23,645
14	3	3	3	4	4	1	3	169.264	\$1,066,771	\$6,302	\$13,707	0.567	\$24,175
15	3	3	3	4	4	4	3	169.929	\$1,083,324	\$6,375	\$16,553	0.665	\$24,892

Plan 6 is the NER Plan and includes elements for improving water quality, improving herbaceous cover, reduction in erosion and turbidity, controlling invasive species, and enhancing the quality of wetland, riverine, and riparian habitats. The NER Plan would restore 401 acres of riparian woodlands by removing buffelgrass, Arundo cane, and salt cedar, and planting native species. Three wetland sites will also be restored and will total approximately 17 acres.

Recommended Plan: NED/NER Plan

This alternative consists of a combination of the recommended NED plan (A10) and the recommended NER plan (Plan 6) discussed in the previous section. As stated, this alternative includes the permanent evacuation of 73 residential structures generating \$629,000 in EAD benefits. Recreational amenities added to the evacuated areas add \$911,300 in recreation benefits. The total investment cost of the NED component of the plan is \$21,218,200 including interest during construction, with net benefits of \$345,900 and a benefit/cost ratio of 1.29-to-1.00.

The NER component of the plan would restore three wetland sites and implement riparian restoration to produce a net increase of 163.9 AAHUs compared to the No Action alternative. The overall restoration would result in the restoration of over 400 acres of aquatic habitat at an average annual cost of \$979,469 or \$5,975 per AAHU.

Table 4. Detailed Investigation Summary (February 2018 Prices)

Cost Item	Reach 1 Structural (A2)	Reach 1 10-Year w/Recreation (A3)	Reach 2 10-Year w/Recreation (A4)	Reach 2 Partial 25-Year w/Recreation (A5)	Reach 2 “VDS Plan” (A6)	Reach 2 25-Year w/ VDS Rec. (A7)	Reach 2 VDS Plan w/Small Channel (A8)	Reach 1 10-Year w/Rec. & “VDS Plan” (A10)
Structures	31	11	42	62	62	111	62	73
Parcels	26	9	37	57	57	109	57	66
Without EAD	\$805.50	\$86.20	\$805.50	\$805.50	\$805.50	\$805.50	\$805.50	\$891.70
Residual EAD	\$163.20	\$18.70	\$288.70	\$244.00	\$244.00	\$112.30	\$120.00	\$262.70
EAD Benefits	\$642.30	\$67.50	\$516.80	\$561.50	\$561.50	\$693.20	\$685.50	\$629.00
Recreation Benefits	\$28.50	\$157.60	\$448.60	\$628.80	\$674.90	\$674.90	\$674.90	\$911.30
Total Benefits	\$670.80	\$225.10	\$965.40	\$1,190.30	\$1,236.40	\$1,368.10	\$1,360.40	\$1,540.30
Structure and Land	\$3,320.50	\$1,757.00	\$4,498.90	\$6,641.20	\$6,641.20	\$11,889.80	\$6,641.20	\$8,398.20
Demolition, Cleanup	\$669.80	\$237.60	\$907.40	\$1,339.50	\$1,339.50	\$2,398.20	\$1,339.50	\$1,577.20
Real Estate Admin	\$498.10	\$263.50	\$674.90	\$996.20	\$996.20	\$1,783.50	\$996.20	\$1,259.70
Recreation Costs	\$161.20	\$1,228.10	\$5,814.70	\$7,780.00	\$7,838.40	\$7,838.40	\$7,838.40	\$9,066.50
Other Costs	\$2,860.10	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2,591.40	\$0.00
Total Costs	\$7,509.80	\$3,486.30	\$11,895.80	\$16,756.90	\$16,815.40	\$23,910.00	\$19,406.80	\$20,301.70
Investment								
Total First Cost	\$7,509.80	\$3,486.30	\$11,895.80	\$16,756.90	\$16,815.40	\$23,910.00	\$19,406.80	\$20,301.70
Interest During Const.	\$333.40	\$156.90	\$537.60	\$756.80	\$759.50	\$1,075.60	\$873.60	\$916.40
Total Investment Cost	\$7,843.20	\$3,643.20	\$12,433.40	\$17,513.70	\$17,574.90	\$24,985.60	\$20,280.40	\$21,218.20
Annual Charges								
Interest	\$345.60	\$162.70	\$557.30	\$784.40	\$787.20	\$1,114.90	\$905.60	\$949.90
Amortization	\$46.00	\$21.70	\$74.30	\$104.50	\$104.80	\$148.40	\$120.60	\$126.50
O&M	\$59.00	\$29.50	\$82.50	\$88.40	\$88.40	\$88.40	\$117.90	\$117.90
Total Annual Charges	\$450.50	\$213.90	\$714.10	\$977.30	\$980.50	\$1,351.70	\$1,144.10	\$1,194.30
Annual Benefits								
Inundation Reduction	\$642.30	\$67.50	\$516.80	\$561.50	\$561.50	\$693.20	\$685.50	\$629.00

Recreation	\$28.50	\$157.60	\$448.60	\$628.80	\$674.90	\$674.90	\$674.90	\$911.30
Total Annual Benefits	\$670.80	\$225.10	\$965.40	\$1,190.30	\$1,236.40	\$1,368.10	\$1,360.40	\$1,540.30
Net Annual Benefits	\$220.30	\$11.20	\$251.30	\$213.00	\$255.90	\$16.30	\$216.30	\$345.90
Benefit/Cost Ratio	1.49	1.05	1.35	1.22	1.26	1.01	1.19	1.29

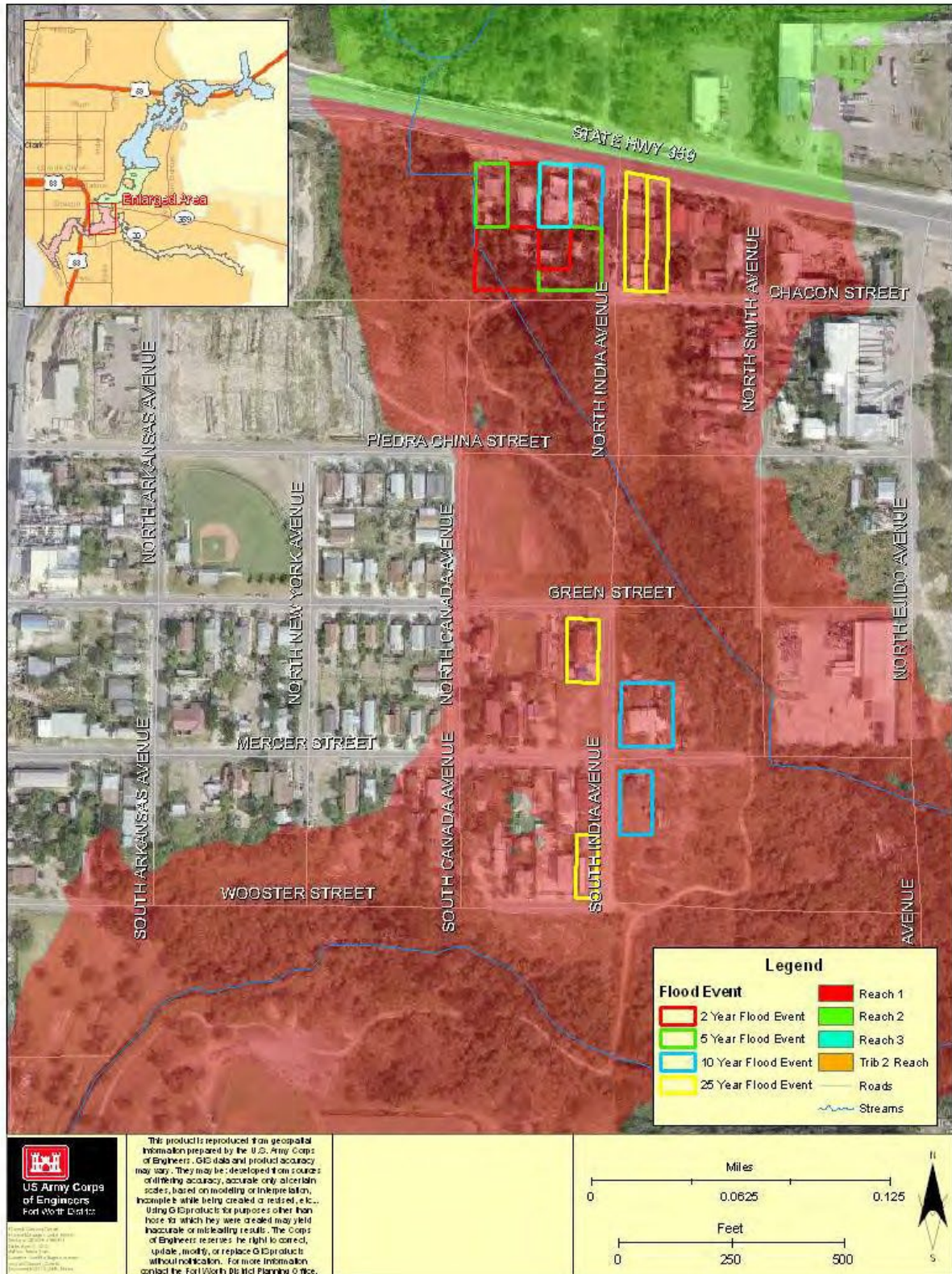


Figure 4. Reach 1 Permanent Evacuation



Figure 5. (A6) Reach 2 VDS with Recreation

Modifications to Existing NED Recommended Plan

Based on discussions with the City of Laredo, as well as a field visit and recent aerial imagery, eleven (11) structure evacuations have already been removed from the structure inventory. Since these structures are no longer there, they are not included in the updated benefits calculations. Figure 3 shows the location of the structures that have been removed from the analysis.

The following table displays the economic summary of the recommended plan including costs, benefits, and benefit-to-cost ratios associated with the flood risk management, recreation, ecosystem restoration components in 2018 following the removal of eleven structures from the structure file. First costs for the flood risk management component increased by 132 percent between 2018 and 2024. Recreation first costs increased 82 percent, and ecosystem restoration first costs increased almost 264 percent between 2018 and 2024.

Table 5. Economic Summary for Tentatively Selected Plan (Feb. 2018 and October 2023 Price Level; 2.75%)

Flood Risk Management	2018	2024
Estimated First Cost	\$13,726,000	\$31,842,000
Average Annual Costs	\$523,000	\$1,159,000
Average Annual Benefits	\$594,000	\$643,000
Net Benefits	\$72,000	(\$516,000)
Benefit to Cost Ratio	1.14	0.55
Recreation	2018	2024
Estimated First Costs	\$11,662,000	\$21,234,000
Average Annual Investment Costs	\$432,000	\$808,000
Average Annual OMRRR	\$121,000	\$148,000
Average Annual Costs	\$553,000	\$956,000
Average Annual Benefits	\$860,000	\$1,051,000
Net Benefits	\$307,000	\$95,000
Benefit to Cost Ratio	1.56	1.1
Combined FRM and Recreation	2018	2024
Average Annual Costs	\$1,075,000	\$2,115,000
Average Annual Benefits	\$1,454,000	\$1,694,000
Net Benefits	\$379,000	(\$421,000)
Benefit to Cost Ratio	1.35	0.8
Ecosystem Restoration	2018	2024
Estimated First Cost	\$26,901,000	\$97,848,000
Average Annual Investment Cost	\$1,024,000	\$3,724,000
Average Annual OMRRR	\$5,000	\$6,000
Average Annual Cost	\$1,029,000	\$3,731,000
Output (AAHUs)	248	248

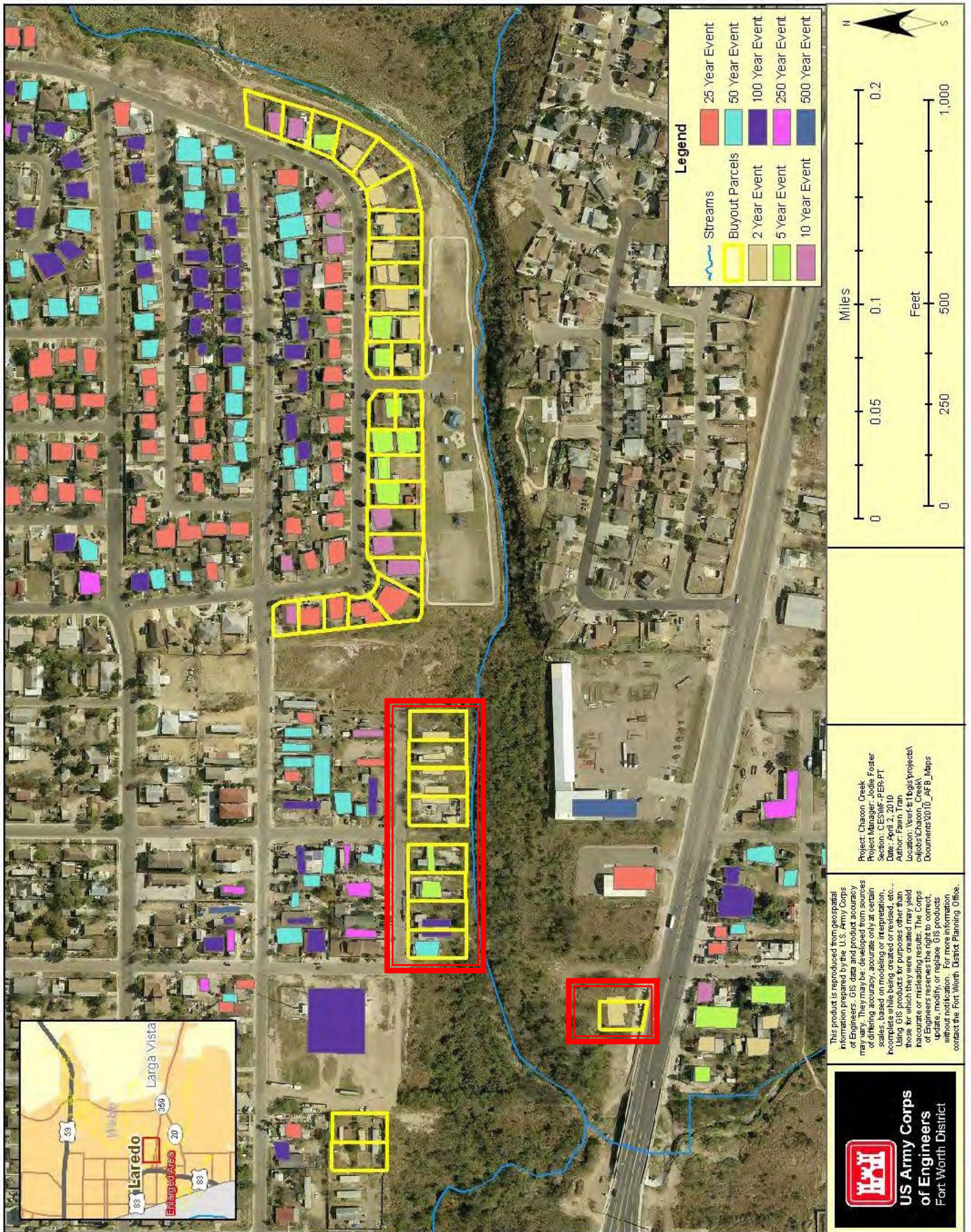


Figure 6. Structures Removed from 2018 Analysis

Cost Sharing. Table 6 shows the cost allocation for the recommended plan. The total fully funded project cost is \$165.86 million with \$104.023 million coming from the federal government, making up 62.7 percent of the cost share and the remainder, \$61.837 million (37.3 percent), coming from the non-federal sponsor.

Table 6. Cost Allocation (FY2023)

Feature	Federal	Non-Federal	Total
Flood Risk Management			
Planning, Engineering & Design	\$1,670,000		\$1,670,000
Construction Management	\$881,000		\$881,000
Land and Damages		\$25,182,000	\$25,182,000
Relocation Assistance		\$6,057,000	\$6,057,000
Unadjusted Total	\$2,551,000	\$31,239,000	\$33,790,000
<i>Adjustment to achieve 65/35</i>	<i>(\$19,412,000)</i>	\$19,412,000	
Subtotal Flood-Risk Management	\$21,963,000	\$11,826,000	\$33,790,000
Recreation			
Recreation Facilities (Cost Shared)	\$7,821,000	\$7,821,000	\$15,642,000
Recreation Facilities (Betterments)		\$635,000	\$635,000
Planning, Engineering & Design	\$2,242,000	\$2,242,000	\$4,483,000
Construction Management	\$1,182,000	\$1,182,000	\$2,364,000
Recreation Cost Share	\$11,245,000	\$11,880,000	\$23,124,000
Ecosystem Restoration			
Fish & Wildlife Facilities	\$31,498,000		\$31,498,000
Land and Damages		\$63,607,000	\$63,607,000
Planning, Engineering & Design	\$8,325,000		\$8,325,000
Construction Management	\$4,570,000		\$4,570,000
Adaptive Management & Monitoring		\$946,000	\$946,000
Unadjusted Total	\$44,393,000	\$64,553,000	\$108,946,000
<i>Adjustment to achieve 65/35</i>	<i>(\$26,422,000)</i>	\$26,422,000	
Subtotal Ecosystem Restoration	\$70,815,000	\$38,131,000	\$108,946,000
Total Cost Apportionment	\$104,023,000	\$61,837,000	\$165,860,000
Cost Percentage	62.7%	37.3%	100%

Environmental Compliance. The integrated Environmental Assessment (EA) has been prepared in compliance with the National Environmental Policy Act, 42 U.S.C. section 4321, et seq., White House Council on Environmental Quality regulations 40 C.F.R. Parts 1500-1508, and Engineer Regulations, 33 C.F.R. Part 230. Table 6 presents the TSP's status of compliance with applicable environmental laws, Executive Orders, and other environmental concerns.

Table 7. Plan Relationship to Environmental Protection Statutes and Other Environmental Requirements

Policies	Compliance of Plan
<i>Public Laws</i>	
Archeological and Historic Preservation Act, 1974, as amended	In Full Compliance
Archeological Resources Protection Act, 1979, as amended	In Full Compliance
Clean Air Act, 1977, as amended	In Full Compliance
Clean Water Act, 1972, as amended	In Full Compliance
Coastal Zone Management Act, 1972, as amended	Not Applicable
Endangered Species Act, 1973, as amended	In Full Compliance
Farmland Protection Policy Act	Not Applicable

Fish and Wildlife Coordination Act, 1958, as amended	In Progress
Magnuson Fisheries Conservation and Management Act	Not Applicable
Migratory Bird Treaty Act, 1918, as amended	In Full Compliance
National Environmental Policy Act, 1969, as amended	In Full Compliance
National Historic Preservation Act, 1966, as amended	In Full Compliance
Native American Graves Protection and Repatriation Act, 1990	In Full Compliance
Rivers and Harbors Act, 1899	Not Applicable
Wild and Scenic Rivers Act, as amended	Not Applicable

Executive Orders

Environmental Justice (E.O. 12898)	In Full Compliance
Flood Plain Management (E.O. 11988)	In Full Compliance
Protection of Wetlands (E.O. 11990)	In Full Compliance
Protection of Children from Environmental Health Risks (E.O. 13045)	In Full Compliance
Invasive Species (E.O. 13112)	In Full Compliance

Others

FAA Advisory Circular 150-5200-33	In Full Compliance
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