

CIVIL WORKS REVIEW BOARD

**REPORT SUMMARY
FOR
TRUCKEE MEADOWS, FLOOD CONTROL PROJECT, NEVADA**

SCHEDULE

Feasibility Scoping Meeting:	10 JUN 1998
Alternative Formulation Briefing:	05 FEB 2013
AFB Guidance Memorandum:	28 FEB 2013
Division Engineer Transmittal:	02 AUG 2013
Received at CECW-PC:	08 AUG 2013
CWRB Briefing:	17 DEC 2013
30-Day S&A Review start:	XX DATE 2013
30-Day S&A Review end:	XX DATE 2013
Record of Decision (ROD) Executed:	XX DATE 2013

STUDY INFORMATION

Study Authority

The Truckee Meadows Flood Control Project¹ was authorized by WRDA 1988, § 3(a)(10), which reads:

Truckee Meadows, Nevada.--The project for flood control, Truckee Meadows, Nevada: Report of the Chief of Engineers, dated July 25, 1986, at a total cost of \$78,400,000, with an estimated first Federal cost of \$39,200,000 and an estimated first non-Federal cost of \$39,200,000; except that the Secretary is authorized to carry out fish and wildlife enhancement as a purpose of such project, including fish and wildlife enhancement measures described in the District Engineer's Report, dated July 1985, at an additional total cost of \$4,140,000.

After a general reevaluation of the authorized project was initiated, the 1990 Tribes Water Rights Settlement Act, § 207, provided direction regarding the conduct of the study as follows:

The Secretary of the Army, in consultation with and with the assistance of the Pyramid Lake Tribe, State of Nevada, Environmental Protection Agency, the Secretary [of Interior], and other interested parties, is authorized and directed to incorporate into its ongoing reconnaissance level study of the Truckee River, a study of the rehabilitation of the lower Truckee River to and including the river terminus delta at Pyramid Lake, for the benefit of the Pyramid Lake fishery. Such study shall analyze, among other relevant factors, the feasibility of:

¹ A previous USACE project was authorized and constructed pursuant to the FCA 1954, § 203, and the FCA 1962, § 203.

- Restoring riparian habitat and vegetative cover
- Stabilizing the course of the Truckee River to minimize erosion
- Improving spawning and migratory habitat for the cui-ui
- Improving spawning and migratory habitat for the Lahontan cutthroat trout
- Improving or replacing existing facilities, or creating new facilities, to enable the efficient passage of cui-ui and Lahontan cutthroat trout through or around the delta at the mouth of the Truckee River, and to upstream reaches above Derby Dam, to obtain access to upstream spawning habitat.

The Secretary of the Army received additional guidance regarding USACE's conduct of the GRR pursuant to the House Report associated with the Energy and Water Development Appropriations Act (EWDAA) of 1996, providing:

The Secretary of the Army is directed to initiate a general reevaluation report for the Truckee Meadows Flood Control project, Nevada, authorized in the Water Resources Development Act of 1988. Of the \$400,000 provided in the conference agreement for the lower Truckee River, Nevada, project, \$50,000 is appropriated for this investigation. The report will consider additional flood protection at and below Reno, Nevada, through levee/channel improvements, local impoundments, and potential reoperation of existing reservoirs in the watershed. The report will also consider the potential for environmental restoration along the Truckee River and tributaries in the Reno-Sparks area.

During the current general reevaluation, EWDAA 2006, § 113, was passed, which states:

Truckee Meadows Flood Control Project, Nevada: The non-Federal funds expended for purchase of lands, easements and rights-of-way, implementation of project monitoring and assessment, and construction and implementation of recreation, ecosystem restoration, and water quality improvement features, including the provision of 6,700 acre-feet of water rights no later than the effective date of the Truckee River Operating Agreement for revegetation, reestablishment and maintenance of riverine and riparian habitat of the lower Truckee River and Pyramid Lake, whether expended prior to or after the signing of the Project Cooperation Agreement (PCA), shall be fully credited to the non-Federal sponsor's share of costs for the project: Provided, that for the purposes of benefit-cost ratio calculations in the General Reevaluation Report (GRR), the Truckee Meadows Nevada Flood Control Project shall be defined as a single unit and non-separable.

Study Sponsor

The reevaluation study is being accomplished with close coordination with the potential non-federal sponsor, the Truckee River Flood Management Authority (TRFMA). TRFMA is a joint powers authority for Washoe County and the cities of Reno and Sparks.

Study Purpose and Scope

The Truckee Meadows Flood Control Project was authorized under the WRDA 1988, § 3(a)(1), but was deferred during the Pre-construction Engineering and Design (PED) phase when changes in real estate costs made the project economically infeasible. In 1996, local communities requested that flooding problems in Truckee Meadows be reevaluated. As a result of consultations with local communities at that time, a decision was made to expand the study area beyond Truckee Meadows downstream to Pyramid Lake and to consider ecosystem restoration as a project purpose.

This GRR summarizes the plan formulation process for a comprehensive solution to water resources problems in the Truckee River watershed. The USACE planning process initially sought to identify a comprehensive solution for flood, ecosystem, and recreation problems including detailed evaluation of a locally developed plan resulting from a community coalition process. Despite several iterative attempts, those efforts did not result in a project that USACE could recommend. The primary purpose of the reevaluation study is to assess the feasibility of modifying the Federally-authorized project to reduce flood damages in the Truckee Meadows project area while avoiding or minimizing adverse effects.

Within the primary purpose, the specific goal of this study is to identify a complete plan that will yield an economically justified and environmentally sustainable project that accomplishes the following:

- Reduces flood damages to populated areas
- Provides access and recreation to the public, as feasible
- Avoids and minimizes effects to riparian and aquatic habitats
- Complies with pertinent planning and environmental laws, regulations, and policy
- Complements other Federal, state, and local plans and projects for the Truckee River and vicinity

Project Location/Congressional District

The study area includes approximately 60 miles of the Truckee River beginning just upstream of Reno, passing through Sparks and the Truckee Meadows, and ending at the river's terminus, Pyramid Lake, on Pyramid Lake Paiute tribal lands. Because of the size of the land area and the number of river miles, the study area was divided into four general reaches: Verdi Reach, Downtown Reno Reach, Truckee Meadows Reach, and Lower Truckee River Reach (see Figure 1).

The study area is located in Nevada's 2nd Congressional District which is represented by Congressman Mark Amodei. Senator Harry Reid and Senator Dean Heller are the senate representatives for the State of Nevada.



Figure 1. Study Reaches

History of the Truckee Meadows GRR

USACE completed the Truckee Meadows (Reno-Sparks Metropolitan Area), Nevada Feasibility Report and Environmental Impact Statement in 1985. The flood control features of the project included construction of floodwalls, levees, and replacement of bridges along the Truckee River. The project also included channel excavation, and a detention basin and levees to mitigate potential increases in downstream flooding due to upstream flood control features. The total estimated first cost of the project was \$78.4 million, and the estimated first Federal cost was \$39.2 million (unadjusted 1986 dollars). Annual benefits included \$9.7 million for flood control and \$2.4 million for recreation. Authorized by Congress in WRDA 1988, the project was to be carried out in accordance with the Chief’s Report dated July 25, 1986. The authorization included flood control, recreation, and fish and wildlife enhancement purposes.

In fiscal year 1988, the Preconstruction Engineering and Design (PED) phase for the authorized project was initiated. In addition to further technical studies, the PED phase included evaluating the project based on changes in existing conditions, laws, and requirements since the project was initially studied and authorized. In particular, WRDA 1986 was enacted between completion of the feasibility report and congressional authorization, and resulted in changes in the evaluation of real estate costs. Application of these changes to the authorized plan resulted in a revised benefit-

cost ratio less than 1.0 to 1, based on the information available at that time. Because the project appeared to lack economic feasibility, it was placed in a deferred status.

In 1996, local communities requested a reevaluation of flood problems in Truckee Meadows. In response, USACE received funding with guidance to conduct a reevaluation of the authorized project (see House Report associated with EWDA 1996) and potential flood and related problems and needs in mid-1996. The Truckee Meadows, Nevada; Reconnaissance Reevaluation Report was completed in August 1997. The conclusions of the study were that: (1) there continues to be a substantial demonstrated flood problem in the study area; (2) in addition to flood control, there is a need for environmental restoration and recreation features along the river consistent with any plan to reduce the risk of flooding; (3) plans to help reduce flood problems and enhance recreation and environmental opportunities in the area appear economically feasible and locally desirable; and (4) Washoe County and the cities of Reno and Sparks support increased flood protection in the area and support continuing PED studies, with the first step being to conduct a GRR.

STUDY OBJECTIVES AND CONSTRAINTS

Problems and Opportunities

Problem: Flooding poses a life and safety hazard to downtown Reno and Truckee Meadows.

The Truckee Meadows has a long history of flooding from the Truckee River. Five significant floods were recorded in the area in the nineteenth century and at least nine in the twentieth century. Implementation of flood control measures, beginning about 1960, reduced the magnitude and frequency of flood events. The threat to public safety from flooding includes exposure to floodwaters, accidents during evacuation, and accidents during flood fighting. Life safety concerns in the study area are limited due to increased warning times and limited residential areas within the floodplain. Loss of life has occurred during the last several flood events, including the 1997 flood event when one life was lost.

Problem: Flooding incurs damages to structures and their contents in the Downtown Reno and Truckee Meadows reaches.

The 1997 flood is the event of record for the Truckee River and caused over \$700 million in reported flood-related damages, \$450 million of which was in the Truckee Meadows area. Much of the damage occurred in the industrial areas of the cities of Sparks and Reno, and at the Reno-Tahoe International Airport.

Problem: The quality and quantity of riparian and related floodplain habitats have diminished along the Truckee River.

The Truckee River was an integral part of a healthy riparian forest dominated by a cottonwood forest, willows, and alders. Habitat supported by the Truckee River began to decline with the settlement of the area by European emigrants in the early 1850's. Degradation continued through the turn of the century with the completion of the Newlands Project that diverted flows of the Truckee River into the adjacent Carson River watershed for irrigation. Associated floodplain habitats have also decreased significantly, especially wetlands habitat.

Problem: The Truckee River is no longer a stable river system.

River damming, diminished flows, riparian forest destruction, and channel alterations all have contributed to channel instability throughout the study area. The banks in some areas have been stabilized with rock to protect the land from erosion. The Truckee River suffers in some reaches from considerable erosion that undercuts streamside habitat and results in barren streambanks with no habitat value.

Problem: The quality and quantity of aquatic habitat have diminished, causing adverse effects on the aquatic ecosystem, including special status fish species.

The Truckee River suffers from persistent water quality problems. Flows entering the study area have a high nutrient content largely from treated sewage effluent, agricultural runoff, and urban stormwater runoff. High instream temperatures are another significant water quality problem. Many factors influence instream temperature within the downstream reach of the Truckee River: loss of overstory shading through direct and indirect removal of riparian vegetation, lower than normal water flow levels due to diversions, naturally occurring thermal springs (upstream on Steamboat Creek), natural and human-induced surface runoff including agricultural flows, and decomposition of organic materials. High water temperatures result in less than optimum habitat conditions for cold water fish species including the Federally listed cui-ui lake sucker (*Chasmistes cujus*) and the Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) (LCT), and allow for the introduction of warm water species (native and nonnative) in their place.

Problem: Passage of spawning fish species from Pyramid Lake is obstructed by various artificial barriers.

Construction of dams and water diversions has severely affected the movement of aquatic species throughout the Truckee River system. In particular, these structures act as complete or partial barriers to the upstream migration of the Federally listed LCT and cui-ui fish species to their historic spawning and rearing habitat. As a result, these native fish species are often forced to use sub-optimal habitats, reducing fish productivity and annual survivorship. Barriers are located starting at Marble Bluff Dam just upstream of Pyramid Lake up through the Verdi Reach into California.

Problem: Recreation opportunities have not kept pace with the increased demand stemming from increased population in the Reno/Sparks area.

The increase in population within the Reno-Sparks metropolitan area has caused an increase in demand for recreation. Existing facilities are unable to meet the current and projected future demand. The following opportunities have been identified:

- *Opportunity: Incorporate environmentally sustainable design into flood risk reduction features and restore fish passage on the Truckee River downstream to Pyramid Lake.*
- *Opportunity: Incorporate recreation features associated with flood risk reduction and ecosystem restoration features.*

Planning Objectives

The planning objectives are:

- Reduce flood damages in the Downtown Reno and Truckee Meadows reaches along the Truckee River and tributaries from overbank flows to the fullest extent consistent with Federal participation and community financial capabilities.
- Reduce the potential for loss of life from flooding from the Truckee River.
- Improve fish passage at the dams and water diversion structures along the Truckee River between Lake Tahoe and Pyramid Lake.
- Increase recreational opportunities along the Truckee River between Highway 395 and Vista.

Planning Constraints

The planning constraints are:

- Avoid adverse effects to threatened and endangered species, including the cui-ui and Lahontan cutthroat trout.
- Avoid adversely affecting adjudicated water allocation in the Truckee River.
- Limit recreation features within the runway clear zone or runway protection zone at the Reno/Tahoe International Airport.

Without-Project Conditions

Key assumptions regarding future without-project conditions used in the formulation of the recommended plan include:

- The existing floodwalls and levees will continue to serve as flood control features for the Downtown Reno Reach. The Sierra, Virginia, Center and Lake Street bridges will continue to be a constraint on water passage on the Truckee River through downtown Reno.
- The Reno-Sparks area will remain at risk from flooding without a Federal project. Floodplain management, flood warning systems, and emergency preparedness are expected to continue in the region.
- A regional water management plan will remain in place that addresses groundwater and surface water quality, water supply, flood and water drainage management, and other plan requirements.
- Reservoir storage requirements and in-stream flow requirements are assumed to remain the same under future without-project conditions.
- Truckee River Operating Agreement (TROA) will be fully implemented in the future without-project condition.

- Local work undertaken after approval of consideration for crediting under Section 104 is assumed to not be in place under the without-project condition.

ALTERNATIVES

Plan Formulation Rationale

Preliminary flood risk management alternatives were formulated for the Downtown Reno reach and the Truckee Meadows reach, which have hydraulically separate floodplains. Flood risk management can be implemented in the Truckee Meadows Reach without affecting the Downtown Reno reach. However, improvements to conveyance in the Downtown Reno reach would increase flows in the Truckee Meadows Reach.

Management Measures

Various structural and non-structural management measures were identified to achieve the planning objectives and avoid the planning constraints. Management measures were screened based on how well they met the study objectives and formulation criteria, and some measures were dropped from further consideration at that point. Tables 1 lists the management measures considered for the study.

Table 1. Summary of Flood Risk Management Measures Considered

Measures	Effectiveness ¹	Efficiency ²	Dropped	Retained
<i>Non-Structural Measures</i>				
Flood Insurance		In place	✓	
Early Flood Warning System		In place	✓	
Flood-proofing	Medium			✓
Large Scale Floodplain Evacuation	Low	Inefficient	✓	
Small Scale Floodplain Evacuation	Medium			✓
Dedication of Developed Floodplain to Natural Storage	Low	Inefficient	✓	
Dedication of Undeveloped Floodplain to Natural Storage	High			✓
Floodplain Management Plan	Medium			✓
<i>Structural Measures</i>				
<i>Storage/Detention</i>				
New Upstream Reservoirs	Low	Inefficient	✓	
Upstream Detention with Weirs	Low	Inefficient	✓	
On-stream Storage	Low		✓	
Upstream, Off-Channel Detention		Inefficient	✓	
Increase Storage at Upstream Reservoirs	Low		✓	
Tahoe Reoperation (precautionary release)	Low		✓	
Enclosed Detention Facility at University Farms	Medium			✓
Mustang Ranch Detention facility	Medium			✓
Huffaker Hills Detention facility	Medium			✓
Bypass Tunnel to Huffaker Hills Reservoir		Inefficient	✓	
<i>Increase Channel Flow Capacity</i>				
Channelization Keystone Ave to Arlington Ave	Low		✓	
Channelization Arlington Ave to Virginia St	Medium			✓
Channel Widening Sierra St to Lake St	Medium			✓
Culvert Around Replaced Lake Street Bridge	Medium			✓

Measures	Effectiveness ¹	Efficiency ²	Dropped	Retained
Plazas	Medium			✓
Containment at First Street	Low		✓	
Widening on the South Bank	Medium	Inefficient	✓	
Downtown Buyout	Medium	Inefficient	✓	
Channelization at Glendale Park Area	Low	Inefficient	✓	
Terracing Upstream of Steamboat Confluence	High			✓
Terracing Downstream of Steamboat Confl.	High			✓
Extension of Airport Culvert on Boynton Slough	Medium			✓
Channel Widening (to channel bottom)	Low	Inefficient	✓	
Channel Deepening at Vista Reefs	Low	Inefficient	✓	
North Truckee Drain Realignment	High			✓
Reduce Flow Constrictions at Bridges				
Bridge Rehabilitation	Medium			✓
Bridge Preservation	Low		✓	
Replacement of Downtown Reno Bridges	Medium			✓
Mini Spans at Center and Sierra Street Bridges	Medium			✓
New Span at Virginia Street Bridge	Medium			✓
Wells Avenue Lower Bridge Removal	Medium			✓
Arlington Avenue Bridge Replacement	Low	Inefficient	✓	
Center Street Bridge Replacement		Inefficient	✓	
Culverts Around Existing Downtown Bridges	Low	Inefficient	✓	
Virginia Street Bridge Bypass	Low	Inefficient	✓	
Culverts Around New Bridges (Sierra, Virginia, Lake, Center Streets)	Low		✓	
Bridge Lengthening at Rock and McCarran Boulevards	Medium			✓
Bypass Channel at McCarran Boulevard	Medium			✓
Floodwalls/Levees				
Floodwalls	High			✓
Setback Floodwalls	High			✓
Movable Barrier Floodwall System (MBFS)	Low		✓	
Modular Floodwalls	High	Inefficient	✓	
Tilt-up Floodwalls	Medium	Inefficient	✓	
Levees/Berms	High			✓
Setback Levees	High			✓
Modify Other Infrastructure				
Enlarge North Truckee Drain Capacity	Medium			✓
Remove/Relocate Diversion Structures	Low		✓	
Reduce Width of Riverside Drive	Low		✓	
Road Closure Bladders	Medium			✓
Extend culverts at Peckham Lane on Boynton Slough	Medium			✓

¹ Effectiveness is determined by how well a measure meets the planning objectives.

² Efficiency is determined by the potential benefits and costs of the measure.

Table 2. Summary of Ecosystem Restoration (Fish Passage) Measures Considered

Measures	Effectiveness ¹	Efficiency ²	Dropped	Retained
Eliminate Irrigation Diversions	High			✓
Alter Irrigation Diversions	Medium			✓
Combine Diversion Structures	Low		✓	
Modify Existing Fish Ladders	Medium			✓
Install Bypass Channel	High			✓
Install Fish Ladder	Medium			✓
Replace Diversion Structure with Pump Diversion	Medium			✓
Install Fish Screen				✓

¹Effectiveness is determined by how well a measure meets the planning objectives.

²Efficiency is determined by the potential benefits and costs of the measure.

Table 3. Summary of Recreation Measures Considered

Measures	Effectiveness ¹	Efficiency ²	Dropped	Retained
Trail-Based Amenities				
Create a Paved Maintenance Road/Bikeway	High			✓
Create Unpaved Trails	High			✓
Provide Trailhead Access and Amenities	Medium			✓
Construct Pedestrian Bridges	Medium			✓
Provide ADA compatible pathways	Medium			✓
Truckee Meadows Features				
Sports Courts	Low	Not policy compliant	✓	
Small and Large Open Fields	Medium			✓
League-Size Soccer Complex	Low	Not policy compliant	✓	
Diamond Sports Facility	Low	Not policy compliant	✓	
Small and Medium Soccer Fields	Low	Not policy compliant	✓	
Playground	High			✓
Picnic Sites & Shelters	High			✓
Fishing Access	High			✓
Non-Motorized Water Craft--Kayak & Canoe Access	High			✓
Natural Amphitheatre	Low	Not policy compliant	✓	

¹Effectiveness is determined by how well a measure meets the planning objectives.

²Efficiency is determined by the potential benefits and costs of the measure.

Downtown Reno Alternatives

For Downtown Reno reach, which includes the Truckee River area from about Booth Street to U.S Highway 395, seven preliminary flood risk management alternatives, including a non-structural alternative, were evaluated. The structural alternatives focused on the modification of multiple bridges, along with increases in channel capacity, levees, and floodwalls. None of the

preliminary alternatives were found to be economically justified, so no plan was carried forward for detailed evaluation.

Truckee Meadows Alternatives

For the Truckee Meadows reach, which includes the Truckee River area from U.S. Highway 395 to the Vista, three preliminary alternatives representing different strategies were initially evaluated. All three alternatives included levees and floodwalls along portions of the Truckee River between Highway 395 and Vista. Alternative 1 was limited to levees and floodwalls as the primary features. Alternative 2 also included detention facilities at Huffaker Hills, UNR Farms, and Mustang Ranch. Alternative 3 included floodplain terracing in addition to levees and floodwalls. In response to stakeholder input, eight additional preliminary alternatives focused on increasing storage opportunities at Huffaker Hills, UNR Farms, and Upper Lockwood were also evaluated. The preliminary alternatives were developed to a level of detail to allow a basic comparison of costs and benefits. None of the eight additional storage alternatives were found to be economically justified.

The three alternatives in the final array were evaluated at three levels of performance to economically optimize flood risk management. Preliminary benefits and costs for each level of performance were developed to identify the plan with the maximum net benefits. The cost estimates were preliminary in nature using conceptual designs, historic bid information, and professional judgment. These estimates were only used for screening. Ranking of the alternatives based on preliminary net benefits is shown in Table 4 (1 = highest rank). (Only the relative ranking of alternatives is shown here.)

Table 4. Comparison of Flood Risk Management Plans

Alternative (nominal level of performance¹)	First Costs² (\$1000)	Rank Based on Preliminary Net Benefits
No-Action	0	8
Alternative 1a (50)	\$ 321.3	4
Alternative 1b (100)	\$ 513.3	7
Alternative 1c (117)	\$ 555.0	6
Alternative 2a (50)	\$ 315.9	5
Alternative 2b (100)	\$ 598.1	10
Alternative 2c (117)	\$ 614.1	9
Alternative 3a (50)	\$ 325.4	2
Alternative 3c (100)	\$ 482.8	3
Alternative 3d (117)	\$ 488.3	1

¹ Nominal level of performance = 90% assurance of safely containing indicated event water surface elevation behind the lines of protection. For example, alternative 1a would safely contain the 2% (1/50) ACE water surface elevation 90% of the time.

² October 2007 prices

The lowest net benefit produced by Alternative 3 at any level of performance exceeded the highest net benefit produced by either Alternative 1 or 2. Therefore, Alternative 3 was identified as the most cost effective plan.

Although Alternative 3 was ranked the highest, it had not yet been demonstrated to be the NED plan for flood risk management. Alternative 3 was the focus of a reformulation workshop with the non-Federal sponsor and USACE vertical team members held in November 2011 to identify a Federally-supportable flood risk management plan. The reformulation workshop assessed the incremental costs and benefits of the various elements of Alternative 3 to ensure that each added element was incrementally justified. The workshop resulted in more focused evaluation of the 2% Annual Chance Exceedance (ACE) scale of Alternative 3 (2% event is also commonly called the 1:50, 1/50, or “50-year” event). Terracing downstream of Steamboat Creek was eliminated from Alternative 3, and capping of People’s Drain outlets was added, as a result of the workshop. The 2% ACE scale of the reformulated Alternative 3 was identified as the NED Plan.

During refinement of the preliminary hydraulic design, adjustments to the design were made where the project performance could be substantially improved at minimum additional cost. This resulted in an AEP near 1% for the main economic impact areas of concern.

Recreation Alternatives

The USACE recreation plan was formulated based on policy-compliant recreation features. The strategy used to formulate recreation alternatives was to start with a relatively few basic recreation measures and add more optional features (playground and group picnic shelters) as additional increments. The measures were evaluated against their ability to meet the planning objective and the four P&G screening criteria, particularly effectiveness. Three scales of recreation features were evaluated to complement the NED plan for flood risk management.

Alternative A includes 50 individual picnic areas, 4 kayak and canoe launch areas, 13 fishing areas, 9,700 lf of paved trails, and 8,900 lf of unpaved trails. Alternative B adds a playground and a small group picnic shelter to Plan A. Alternative C adds a medium group picnic shelter to Plan B. Costs and benefits were developed for each of the three alternatives. Alternative C has the greatest net recreation benefits; therefore, Alternative C is identified as the NED recreation plan.

Ecosystem Restoration

The Truckee Meadows project was authorized by Congress in WRDA 1988 for flood control and fish and wildlife enhancement purposes. Since the 1990’s, there has been a strong local interest in reestablishing a “living river” corridor to convey flood flows, reestablish native habitat and restore fish passage along the Truckee River. Fish and wildlife restoration was considered during USACE’s general reevaluation of the project. In 2012, USACE and the Administration, in coordination with the sponsor, decided to give priority to flood risk reduction to expedite completion of the study. As a result, habitat restoration was deferred. Measures to avoid or minimize adverse effects on existing habitats and sensitive species, including revegetation, landscaping, and erosion protection on project lands, have been included in the Recommended Plan. The District Engineer’s recommendation includes retaining the existing authorized fish and wildlife enhancement (i.e., ecosystem restoration) purpose of the Truckee Meadows Flood Control Project for potential future implementation.

Restoration of fish passage on the Truckee River was evaluated in detail pursuant to the 1990 Tribes Water Rights Settlement Act, § 207. USACE's Engineer Research and Development Center developed measures to address upstream and downstream fish passage problems at 18 barriers between Pyramid Lake and Fleisch diversion dam in California. Three best buy plans were identified, including the most cost effective plan, which would restore fish access to approximately 90 miles of the Truckee River at a preliminary estimated cost of \$47 million. In 2012, USACE and the Administration, in coordination with the sponsor, decided to refocus plan selection on the primary project purpose of flood risk management to expedite completion of the study consistent with Administration and sponsor priorities. Federal interest in a plan for the restoration of fish passage has been established, but that plan is not being recommended for implementation by USACE at this time.

Recommended Plan

The Recommended Plan is the NED Plan. The Recommended Plan consists of no action in the Downtown Reno Reach, flood risk management in the Truckee Meadows Reach (Alternative 3 - Floodplain Terrace Plan) and recreation in the Truckee Meadows Reach (Alternative C). The principal features of the Recommended Plan are (1) construction of floodwalls, levees, and floodplain terracing in the Truckee Meadows Reach, and (2) basic recreation features in the Truckee Meadows Reach. A summary description follows and is also shown in Table 5.

Plan Features

The Recommended Plan efficiently reduces flood damages in high-value commercial and industrial areas near the Truckee River, including the Reno-Tahoe International Airport, by containing flood flows with levees and floodwalls, enlarging the existing channel with floodplain terracing, and by detaining peak flows in a designated overflow area. The designated overflow area is on the south side of the river near the mouth of Steamboat Creek and is largely occupied by the Nevada Agricultural Experiment Station (also known as UNR Farms). The NED Plan provides at least 90% assurance of safely passing the 2% ACE in major damage areas and includes basic recreation features that are compliant with USACE policy.

The Recommended Plan includes approximately 9,650 lineal feet of on-bank (6,500 feet) and in-channel (3,150 feet) floodwalls along the north bank and 31,000 lineal feet of levees along the north and south banks of the Truckee Meadows Reach (see Figure 2). The floodplain terracing feature involves excavating a benched area along portions of the south (right) bank of the Truckee River between Greg Street to McCarran Boulevard. Vertically, the excavation would extend down to just above the two-year water surface elevation (WSE). A second bench, approximately 2 feet higher in elevation, would be extended approximately 50-70 feet to the landside of most of the length of the low bench. Floodplain terracing would increase the flood flow channel capacity and thereby reduce water surface elevations in the Truckee Meadows area during a flood.

Erosion will be controlled on the excavated surfaces of the terraces through establishment of permanent vegetative cover. Native trees grasses and shrubs will be utilized as they will provide a self sustaining cover of vegetation to serve both the purpose of stabilization and exclusion of

noxious weeds. Hydraulic design of the Recommended Plan assumed that the terraces will be covered by mature vegetation, so the vegetation will not need to be managed to maintain the design hydraulic capacity of the terraces.

The Recommended Plan for recreation consists of one small group picnic shelter, one medium group picnic shelter, 50 individual picnic areas, one playground, an access road, parking and restrooms located north of Mill Street between Greg Street and McCarran Boulevard. In addition, 9,700 linear feet of paved trails and 8,900 linear feet of unpaved trails will be constructed linking the picnic areas with four kayak and canoe input areas and 13 fishing areas along the river (see Figure 2). All recreation features would be located on lands required for flood risk management purposes.

Table 5. Project Features – Truckee Meadows Reach

Features	Description
Levees	31,000 lf on north/south banks of Truckee River
Floodwalls (on-bank)	6,500 lf on north and south banks of Truckee River
Floodwalls (in-channel)	3,150 lf on north and south banks of Truckee River
Floodplain terrace	150 to 250 feet to the landside of the south bank of the Truckee River from Greg Street to just upstream of McCarran Boulevard. A higher bench, approximately 2 feet higher in elevation, would be extended approximately 50-70 feet to the landside of the low bench.
Box culverts on North Truckee Drain (NTD)	NTD placed in 2 box culverts for approximately 3,100 lf. The new drainage structure includes an approximately 200-lineal-foot extension to the existing People’s Drain. Cap 2 junction structures of People’s Drain.
Interior drainage	14 cfs pumping station just upstream of Glendale and new flap gates and vertical sluice gates for all existing storm drains.
Seepage prevention	Seepage berms, drainage blankets, impervious berms, and relief wells
Bridge pier/Scour protection	11,600 lf rock scour protection. Pier protection at 3 bridges between US Hwy 395 and Vista.



Figure 2. Alternative 3 - Floodplain Terrace Plan Truckee Meadows Reach

Induced Flooding from the Recommended Plan

Hydraulic modeling of the NED Plan found that 1% ACE flood elevations would increase between 0.0 and 0.6 foot in several areas near the downstream end of the project compared to the without-project condition. These include:

- **UNR Farms and southern periphery:** The flood elevation increase in the UNR Farms area is up to 0.6 foot. USACE-estimated with-project 1% ACE flood elevations would exceed the first floor elevations of an estimated 900 existing structures (mostly single-family residences and multiplex apartment buildings) on the southern periphery of the UNR Farms area that are also within the USACE without-project 1% ACE floodplain. An estimated additional 175 residences that are outside of the USACE without-project 1% ACE floodplain would be within the limits of the with-project floodplain, but it is estimated that their first floors would still be above the with-project flood elevation. The estimated increase in the 2% ACE flood elevations would affect about 22 existing

structures south of UNR Farms, most of which would have an estimated increase of 0.2 to 0.4 foot.

- North Truckee Drain: The 1% ACE flood elevation on both sides of the NTD immediately north of I-80 would be increased by approximately 0.5 to 1 foot due to backwater effects in the NTD.

USACE policy allows mitigation for induced flooding to be recommended as a project feature when it is economically justified or there are overriding reasons of safety, economic, or social concerns, or a determination of a real estate taking has been made (ER 1105-2-100, para.3-3.b.(5)). Potential mitigation measures for induced flooding were considered by the District, but none were found to be economically justified. The structural and non-structural measures considered for the south side of the Truckee River were: raising or wet floodproofing existing residential and commercial structures, levees and floodwalls to protect existing structures, a detention basin with perimeter levees in the UNR Farms area, excavation of the hydraulic constriction downstream of Truckee Meadows including downstream hydraulic and environmental mitigation, or purchase/ removal of the affected structures. The structural and non-structural measures considered for the north side of the Truckee River were a pump station, ring levees, or raising/wet flood-proofing existing residential and commercial structures. Raising/flood-proofing structures on the south side and a pump station on the north side were found to be the least costly options based on rough cost estimates for each measure by District civil and cost engineering staff using their professional experience. The average annual flood risk management benefits for those measures were found to be far less than required to justify their costs. Any increase in flooding will be an important concern for adversely affected property owners. However, because of the small increase in flood elevations and the low recurrence frequency of induced flooding, those concerns are not considered to be overriding safety, economic, or social concerns under USACE policy, and no real estate taking would occur specifically due to the increase in water surface elevations. Therefore, mitigation for induced flooding is not proposed as a project feature of the Federally-funded NED Plan.

National Flood Insurance Program Compliance

The increased 1% ACE flood elevations caused by the NED Plan (based on feasibility level hydraulic modeling) would trigger a National Flood Insurance Program (NFIP) regulatory requirement (44 CFR 60.3(d)) that communities must seek conditional approval from FEMA before allowing certain encroachments upon a floodplain. Applications for such conditional approvals must certify, among other things, that no structures are located in areas that would be impacted by increased base flood elevations (44 CFR 65.12(a)(5)). Under USACE policy (ER 1105-2-100, para.3-3.b.(5) and (10)), compliance with the NFIP is a non-Federal responsibility and compliance costs would be borne by non-Federal interests. Estimated additional costs of NFIP compliance that would result from the USACE project are identified as associated costs of the project and are included in the economic costs of the project.

The associated economic cost for NFIP compliance is the estimated minimum cost for the non-Federal interests to comply with the NFIP if the NED plan is implemented. Participation in and compliance with applicable Federal floodplain management and flood insurance programs is a requirement of non-Federal sponsor participation in Federal flood control projects under Section

402 of WRDA 1986, as amended. The NFIP compliance costs are not based on specific features proposed by the sponsor. The estimated NFIP compliance costs are based on the least-cost features that could be added to the NED Plan by local interests to achieve NFIP compliance, without modifying the NED Plan. NFIP compliance costs have been included in the associated economic costs pursuant to the joint FEMA-USACE memorandum, subject: FEMA/USACE Joint Actions on Planning for Flood Risk Management Projects, signed in June 2012. Incidental flood damage reduction benefits resulting from NFIP compliance have been included in the economic analysis.

USACE considered several options for NFIP compliance and determined that non-structural methods including house raising would likely be the least-cost option on the south side of the Truckee River. Through coordination with regional FEMA staff, it was verified that raising the first floors of affected residences above the new base flood elevation would comply with the NFIP regulation. Approximately 764 homes and 128 multiplex apartment buildings would need to be raised in the area south of the river. Additionally, four commercial structures and three public buildings would also need to be raised or “wet flood-proofed” with closures and sealing. The preliminary cost estimate to raise and flood-proof structures for NFIP compliance on the south side of the Truckee River is \$172 million. For the north side of the Truckee River, a 400-cfs capacity pump station on the North Truckee Drain with an outfall to the Truckee River would be the least-cost option. The estimated first cost for the pump station is \$23 million. Therefore, the total estimated minimum non-Federal costs cost for NFIP compliance is \$195 million.

Because compliance with the NFIP is a non-Federal responsibility, the affected NFIP communities could develop their own plan for compliance with the NFIP and would not be required to implement the specific assumed least-cost features. The estimated NFIP compliance costs are subject to change based on more detailed hydraulic analysis during final design of the project, including the results of NFIP hydraulic modeling assumptions and methods, and more detailed surveys of the elevations of existing structures.

Cost Estimate

The first cost was estimated on the basis of October 2013 price levels and amounts to \$300,940,000. Estimated average annual costs were based on a 3.5 percent interest rate, a period of analysis of 50 years, and construction ending in 2018. Table 6 shows the project first costs. Project first costs do not include associated economic costs (i.e., NFIP compliance costs). Project first costs include the sunk PED costs, which are estimated to be \$42,200,000 at the time the GRR is completed.

Table 6. Estimated First Costs of Recommended Plan¹

Cost Account ²	Description	Total First Costs (\$1,000)
01	Lands and Damages ³	\$88,061
02	Relocations	\$10,789
09	Channels	\$46,765
11	Levees	\$60,501
14	Recreation	\$8,030
16	Bank Stabilization	\$12,594
18	Cultural Resources	\$1,843
30	Planning, Engineering, Design	\$61,487
31	Construction Management	\$10,870
	Total Project First Cost	\$300,940

¹ October 2013 price levels.

² PED includes \$42,200,000 sunk costs.

³ Lands and Damages include \$22,000,000 additional non-Federal credit for expenditures to date in excess of current fair market value in accordance with Sec 113 of EWDA 2006.

Cost-Sharing Requirements

A summary of cost sharing requirements based on current price levels is presented in Table 7. The estimated total first cost for the Recommended Plan is \$300,940,000. Federal costs for the Recommended Plan, which is the NED plan, are estimated to be \$184,270,000. Cost sharing based on the fully funded cost estimate is presented in Table 8 using the current estimated project schedule and projected future rates of price escalation.

Credit for Section 104 Work

Tables 7 and 8 include an estimated credit for Section 104 work that has been completed by the sponsor. Eligibility for Section 104 credit for levee and floodwall construction between U.S. 395 and Glendale Bridge was approved by the ASA(CW) on February 8, 2008. The completed work, locally identified as the Reno-Sparks Indian Colony (RSIC) project, consists of approximately 2,241 linear feet of floodwall/levee on the south bank of the Truckee River. The RSIC flood control work was designed to provide a 0.9% AEP (also referred to as 1:117 or “117-year”) level of performance. The design of the work was reviewed by USACE prior to construction for consistency with USACE standards.

The Recommended Plan includes a levee that would provide an approximately 2% ACE (also referred to as 1:50 or “50-year”) level of performance along the same alignment as the RSIC floodwall/levee. The amount credited under Section 104 will not exceed the amount that is a reasonable estimate of the reduction in Federal project expenditures resulting from substitution of the local work for authorized project elements. The maximum amount creditable will be the actual expenditures made by non-Federal entities. The estimated Section 104 credit for construction work, based on the current feasibility-level cost estimate for the Recommended Plan is \$2,406,000.

Application of Section 113 Credit for Expenditures for Lands, Easements, and Rights of Way

The total estimated LERRD cost in Table 7 includes the cost for crediting the sponsor based on expenditures for lands, easements and rights-of-way (LER) required for the Recommended Plan according to the provisions of Section 113 of the Energy and Water Development Appropriations Act of 2006 (Pub. L. 109-103, § 113, 119 Stat. 2247, 2254). Since there is no way to reliably predict the sponsor's future expenditures for LER, which could be more or less than the current estimated fair market value, the costs in Table 7 assume that future sponsor expenditures for LER will be equivalent to the current fair market value. The full effect of Section 113 on credit for LER would not be known until the sponsor completes all expenditures for LER. Consequently, Section 113 could result in unanticipated increases in Federal costs that are beyond the control of USACE. Crediting of LER under Section 113 would have no effect on the economic analysis for the project because economic costs are determined by current fair market values, rather than expenditures.

Crediting the sponsor for expenditures to date for lands, easements, and rights-of-way (LER) pursuant to Section 113, in lieu of crediting based on current fair market values, would increase the estimated sponsor credit and total project financial costs by approximately \$22,000,000. As a result, the sponsor would not be required to provide an additional cash contribution (over the 5% minimum cash contribution) to meet the minimum 35% non-Federal cost-share for FRM. The sponsor's estimated cost-share for FRM (based on LERRD plus a minimum of 5% cash) would increase from 35% to 38.6%, including an estimated \$1,100,000 increase in the minimum 5% non-Federal cash contribution. Because there would be no additional non-Federal cash contribution required after the Section 113 credit is given, credit for Section 104 work would have to be given by the Federal Government acquiring an equivalent amount of LERRD in lieu of the sponsor (per ER 1165-2-29). It is anticipated that USACE would most likely provide the credit by performing an equivalent amount of utility/facility relocations, as relocations must often be closely coordinated with construction work that is managed by USACE. The net increase in Federal costs would be \$3,831,000 compared to costs without Section 113 crediting, based on current cost estimates.

Table 7. Summary of Cost Sharing for Recommended Plan (Oct 2013 Price Level)¹

Item	Federal (\$1,000)	Non-Federal (\$1,000)	Total (\$1,000)
Flood Risk Management			
Construction ^{2,5}	\$187,918	\$2,406	\$ \$190,324
LERRD ³	3,902	94,758	98,660
Minimum Cash Contribution (5%)	- 14,449	14,449	
Additional Cash Contribution	0	0	
Sub-total Flood Risk Management	177,371	111,613	288,984
Recreation			
Construction ²	9,923		9,923
LERRD ^{3,4}	32	158	190
Cash Contribution	-4,899	4,899	
Sub-total Recreation	5,057	5,057	10,113
Cultural Resources Data Recovery	1,843		1,843
Total	\$184,270	\$116,670	\$ \$300,940

1 October 2013 price levels; Includes estimated Section 104 credit for RSIC levee.

2 Construction costs include PED and Construction Management costs.

3 Federal costs on this line include administrative costs and \$2,406,000 in LERRD performed as Section 104 credit because there is no required non-Federal additional cash contribution (per ER 1165-2-29). Non-Federal costs include Section 113 credit for expenditures to date.

4 Recreation LERRD limited to upgrade of FRM easements to fee title.

5 Non-Federal Construction includes estimated creditable cost for completed Sec 104 work (\$2,406,000).

Table 8. Summary of Cost Sharing for Recommended Plan (Fully Funded)¹

Item	Federal (\$1,000)	Non-Federal (\$1,000)	Total (\$1,000)
Flood Risk Management			
Construction ^{2,5}	\$207,640	\$2,758	\$210,398
LERRD ³	4,403	98,538	102,941
Minimum Cash Contribution (5%)	-15,668	15,668	
Additional Cash Contribution	0	0	
Sub-total Flood Risk Management	196,395	116,964	313,359
Recreation			
Construction ²	11,696		11,696
LERRD ^{3,4}	35	166	201
Cash Contribution	-5,783	5,783	
Sub-total Recreation	5,949	5,949	11,897
Cultural Resources Data Recovery	2,044		2,044
Total	\$204,388	\$122,912	\$327,300

1 Total Project Cost (Fully Funded); Includes estimated Section 104 credit for RSIC levee at fully funded cost.

2 Construction costs include PED and Construction Management costs.

3 LERRD (Lands, Easements, Rights-of-Way, Relocations and Disposal areas) include Federal administrative costs.

4 Recreation LERRD limited to upgrade of FRM easements to fee title.

5 Non-Federal Construction includes estimated creditable cost for completed Sec 104 work (\$2,758,000).

Economic Evaluation

Table 9 displays the economic costs and benefits of the Recommended Plan. The total economic costs, including the associated cost for NFIP compliance, were allocated to the purposes of flood risk management (FRM) and recreation. A separate benefit-cost analysis was completed for each purpose. The estimated NFIP compliance costs included in the economic costs are based on the least-cost features that could be added to the NED Plan by local interests to achieve NFIP compliance, without modifying the NED Plan. The Recommended Plan provides \$25.9 million of annual benefits from flood risk management, resulting in \$6.2 million in annual net benefits and a benefit-to-cost ratio of 1.3 to 1 for flood risk management. The Recommended Plan also provides basic recreation features with an annual benefit of \$625,000, resulting in \$13,000 in net annual benefits and a benefit-to-cost ratio of 1.0 to 1 for recreation. The overall benefit-to-cost ratio for the Recommended Plan is 1.3 to 1.

Table 9. Economic Costs and Benefits of Recommended Plan¹

Item	Project Purpose	
	FRM (\$1,000)	Recreation (\$1,000)
Investment Cost		
NED First Cost ²	\$266,984	\$10,113
NFIP Compliance Associated Cost ³	\$195,000	
Less Sunk PED costs	(\$42,200)	
Interest During Construction ⁴	\$25,602	\$227
Total Investment Cost	\$445,386	\$10,340
Annual Cost		
Interest and Amortization	\$18,987	\$441
OMRR&R ⁵	\$691	\$171
Total Annual Costs	\$19,678	\$612
Annual Benefits (NED Plan)	\$24,880	\$625
Annual NFIP Compliance Benefits ⁶	\$1,019	
Total Annual Benefits	\$25,899	\$625
Net Annual Benefits	\$6,221	\$13
Benefit-Cost Ratio	1.3	1.0
Water Resources Planning Rate: 3.5%		
Benefit-Cost Ratio	0.7	0.7
OMB Circular No. A-94 Rate: 7%		

¹ Based on October 2013 price levels, 3.5 percent rate of interest, and a 50-year period of analysis. See Economic Appendix regarding economic uncertainty.

² Cultural resources data recovery costs (\$1,843,000) are not included in economic costs per USACE policy.

³ Estimated least cost for NFIP compliance by local interests to address induced flooding (see Section 6.1.8).

⁴ Includes IDC for least-cost NFIP compliance measures.

⁵ Operation, Maintenance, Repair, Replacement, and Rehabilitation.

⁶ Incidental benefits from least-cost NFIP compliance measures.

Project Implementation

Section 902 Limit

The cost of the Recommended Plan would significantly exceed the Section 902 limit for the authorized project, which is currently estimated to be \$184,249,000. Therefore, additional Congressional authorization will be required to implement the Recommended Plan.

Design and Construction

Following completion of the final GRR and EIS, USACE will enter into a Design Agreement with the sponsor and then prepare detailed designs, including plans and specifications. After Congressional authorization of the project, appropriation of construction funds, completion of a project partnership agreement, completion of the plans and specifications, and provision of LERRD by the sponsor, USACE will award and manage contracts to construct the project.

Operation, Maintenance, Repair, Rehabilitation, and Replacement

The sponsor would be responsible for the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of the project in accordance with the OMRR&R manual. The estimated average annual OMRR&R costs for the Recommended Plan are \$862,000. This includes \$691,000 for flood risk management features and \$171,000 for recreation features.

The Recommended Plan would include deauthorization of the part of the existing Truckee River and Tributaries Project between Glendale Avenue and Vista upon completion and transfer to the sponsor of all elements of the Recommended Plan for the Truckee Meadows Flood Control Project within that same reach. Deauthorization of the obsolete part of the Truckee River and Tributaries Project (which is currently maintained by the State of Nevada) will ensure that the non-Federal sponsor for the Truckee Meadows Flood Control Project has full and clear responsibility, as between the Department of the Army and the sponsor, for OMRR&R of all Federal flood risk management elements between Glendale Avenue and Vista. OMRR&R responsibilities for the parts of the Truckee River and Tributaries Project upstream of Glendale Avenue or downstream of Vista would not be changed by the Recommended Plan.

Stakeholder Involvement

The public and concerned resource agencies have been invited to participate in all phases of the Truckee Meadows Flood Control Project since the initiation of the General Reevaluation Study in 1996. This has included opportunities to comment on the 1997 Reconnaissance Report, the Notice of Initiation, the Public Scoping Meeting conducted in 1999, and public workshops in 2000, 2003, 2005, and 2013. Additional efforts included disseminating information through a project web site and publishing a monthly newsletter. Public involvement encouraged the consideration of setback levees and floodplain terracing as flood risk management measures that would minimize the physical isolation of the river from the surrounding community. Public involvement also influenced the types of recreation features included in the Recommended Plan.

Environmental Compliance

An evaluation of environmental effects determined that the Recommended Plan has the potential for adverse effects on a variety of environmental resource areas. In all cases except for public health and safety and aesthetics, the potential adverse environmental effects would be reduced to a less than significant level through project design, construction practices, preconstruction surveys and analysis, regulatory requirements, and best management practices. No compensatory mitigation would be required. More detailed hydraulic models will be developed in the PED phase to support a higher resolution evaluation of induced flooding and changes in sediment transport within the downstream reaches. A Clean Water Act (CWA) Section 404(b)(1) analysis was conducted on the Recommended Plan and is included in the Environmental Impact Statement. A CWA Section 401 water quality certification will be requested from the Nevada Department of Environmental Protection (NDEP). A National Pollutant Discharge Elimination System (NPDES) general construction permit would also be required. A Storm Water Pollution Prevention Plan (SWPPP) and Spill Prevention Control and Countermeasures Plan (SPCCP) would be developed by the contractor prior to construction.

The potential for effects to wetlands, vegetation communities, and special status species has been greatly reduced through construction design. Direct effects to migratory birds and other sensitive species would be minimized by implementing preconstruction surveys and scheduling of construction activities. The Draft Coordination Act Report received from the USFWS included recommendations for avoidance and minimization of effects to fish and wildlife resources in and downstream of the project area (USFWS 2012). Most of those recommendations have been incorporated into the Recommended Plan as environmental commitments. A Final Coordination Act Report has been received from USFWS on 4 December 2013. USACE has determined that the project is likely to adversely affect the Federally-listed endangered cui-ui (*Chasmistes cujus*) and threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) fish species. A biological opinion has been received from USFWS 4 December 2013.

USACE and the Nevada State Historic Preservation Officer (SHPO) signed and executed a Programmatic Agreement (PA) for the Recommended Plan on August 23, 2005, and amended the PA on March 29, 2010. Concurring parties also signing the PA included the cities of Reno and Sparks, and Washoe County. The draft GRR and EIS were circulated for 45 days to agencies, organizations, and individuals who have an interest in the proposed project. All comments received were considered and responded to, and revisions were made to the final EIS based on those comments, as appropriate.

Environmental Operating Principles

The Recommended Plan supports each of the seven USACE Environmental Operating Principles (EOPs). The environmental operating principles are met in the following ways:

Environmental balance and sustainability (EOPs 1, 2, 3, and 4)

- Recommended Plan avoids or minimizes environmental impacts while maximizing future safety and economic benefits to the community.
- Recommended Plan uses environmentally sustainable design of the flood risk management features, including revegetation of floodplain terraces with native species, to avoid or minimize significant adverse effects.

Planning with the environment (EOP 1, 2, 4, 5, and 7)

- Worked with local resource agencies during planning to minimize impacts to the environment.
- Potential for ecosystem restoration was evaluated and coordinated with local stakeholders and local resource agencies.

Leverage scientific, economic, and social knowledge base (EOP 6)

- Available scientific, economic, and social information was used whenever possible in the planning process.
- Environmental experts were consulted during the planning process, including the Engineer Research and Development Center, US Fish and Wildlife Service, Community

Coalition, Desert Research Institute, Bureau of Reclamation, Nevada State Historic Preservation Officer, TRFMA, consultants, Pyramid Lake Paiute Tribe, and others.

Seeks public input and comment (win-win solutions) (EOP 7)

- Held stakeholder meetings and public workshops throughout the planning process.
- Worked with local Community Coalition to integrate project goals and public concerns during the planning process. Local public meetings were held during review of the draft GRR and EIS.

Peer and Legal Reviews

ATR was managed by the Flood Risk Management Planning Center of Expertise (FRM-PCX) and conducted by a qualified interdisciplinary team of USACE personnel from the Los Angeles, San Francisco, Alaska, Huntington, and Walla Walla Districts, and the Hydrologic Engineering Center. Comments included clarification of the following issues: mitigation for induced erosion, mitigation for induced flooding, cost estimates, NFIP compliance costs, and reasonable optimization of NED Plan.

Final Agency Technical Review was certified on 24 July 2013 with all review comments satisfactorily addressed. Final legal review was completed 25 July 2013 by Sacramento District Counsel. The Cost Engineering Center of Expertise (CX) Review was completed by the Walla Walla District CX and certified 24 July 2013.

Independent External Peer Review of the final report was coordinated by the FRM-PCX via a contract with Battelle, Inc, and conducted by appropriate outside reviewers familiar with the study area and its resources. Comments made by the IEPR team and responses to those comments are documented in the IEPR package which was completed in September 2013.

Policy Compliance Review

The Policy Compliance Review conducted to date is documented in the Policy Guidance Memorandum dated 3 December 2013. All comments have been incorporated into the final GRR, EIS, and appendices as appropriate.

State and Agency Review

(To be inserted by HQUSACE after the S&A Review ends.)