Section 206 Preliminary Restoration Plan
Steamboat Creek
02 October 2001
Final Report
(SPD Comments Incorporated 08 Nov 2001)

1. Project: Steamboat Creek, Nevada. PWI 168744. Nevada's 2nd Congressional District.

2. Location: Steamboat Creek Watershed, University of Nevada, Reno (UNR), Main Station Farms Property, Washoe County, State of Nevada.

Steamboat Creek originates at the outlet of Little Washoe Lake and meanders northeast 17.5 miles to its confluence with the Truckee River. It is the principal drainage for Washoe Valley, Pleasant Valley, and Truckee Meadows, Nevada. The watershed encompasses approximately 230 square miles. The land in the study area is under County or UNR ownership, while upstream of the study area, the land within the creek corridor is 98 percent privately owned. The proposed project study area of Steamboat Creek is the terminal 1.1 miles located approximately 3 miles east of Reno, Nevada (Figure 1). The project study area for restoration is approximately 200 acres.

3. Description of Proposed Ecosystem Restoration:

a. What is being proposed?

The terminus of the creek and habitat along it has become degraded by an earlier Corps project on the Truckee River, since it is currently a straightened incised channel. Incision up to 10 feet has destabilized banks, causing (1) erosion and dehydration of the historic riparian flood plain, (2) removal of riparian vegetation, and (3) significant sediment pollution. The preliminary restoration plan for the proposed project is engineering a restoration solution on this 200-acre site that actively restores 1.1 miles along Steamboat Creek to a more naturally functioning lotic riparian area (Figure 2). In comparison to current environmental conditions, creating a new channel and establishing native riparian vegetation would also provide other benefits for vegetation, wildlife, and humans by improving the water quality in this stream and to areas below the confluence of the Truckee River.

The preliminary restoration plan for the proposed project on Steamboat Creek includes excavation of a new channel through the alfalfa fields to the west of the current creek location. The objective is to create a restored stream channel length from approximately 1.1 miles to 2.2 miles, with an overall gradient of less than 0.05 percent and a pool/riffle sequence every 5 to 7 times bankfull width. The conceptual design for the new channel is a single threaded, low-gradient, meandering channel. A sinuosity in the range of 2 to 3 is desired for the restored channel. To reconnect this stream to a flood plain, the channel would be designed so that overbank flooding would access a 700-foot-wide meander belt and a 1,770-foot-wide riparian corridor during periods of bankfull flow. The existing creek channel would be used as an overflow channel.

As a goal, the desired bed material for the restored channel would be coarse sand in the 0.6- to 1.0-millimeter range. Sediment supplies in this area would contribute to point bar formation within the active channel. Overbank deposition of smaller suspended bed load would help augment a vegetated flood plain. Control of upstream sediment supply could prove necessary to retain a balance for this reach. Placing grade control structures could be necessary at both the inception and terminus of the restored channel to prevent further incision.

Appropriate native obligate wetland species would be planted above a set base flow in channel and on flood plains. In accordance with Corps planting establishment guidelines,

**Figure 1. Steamboat Creek Watershed and Study Area**

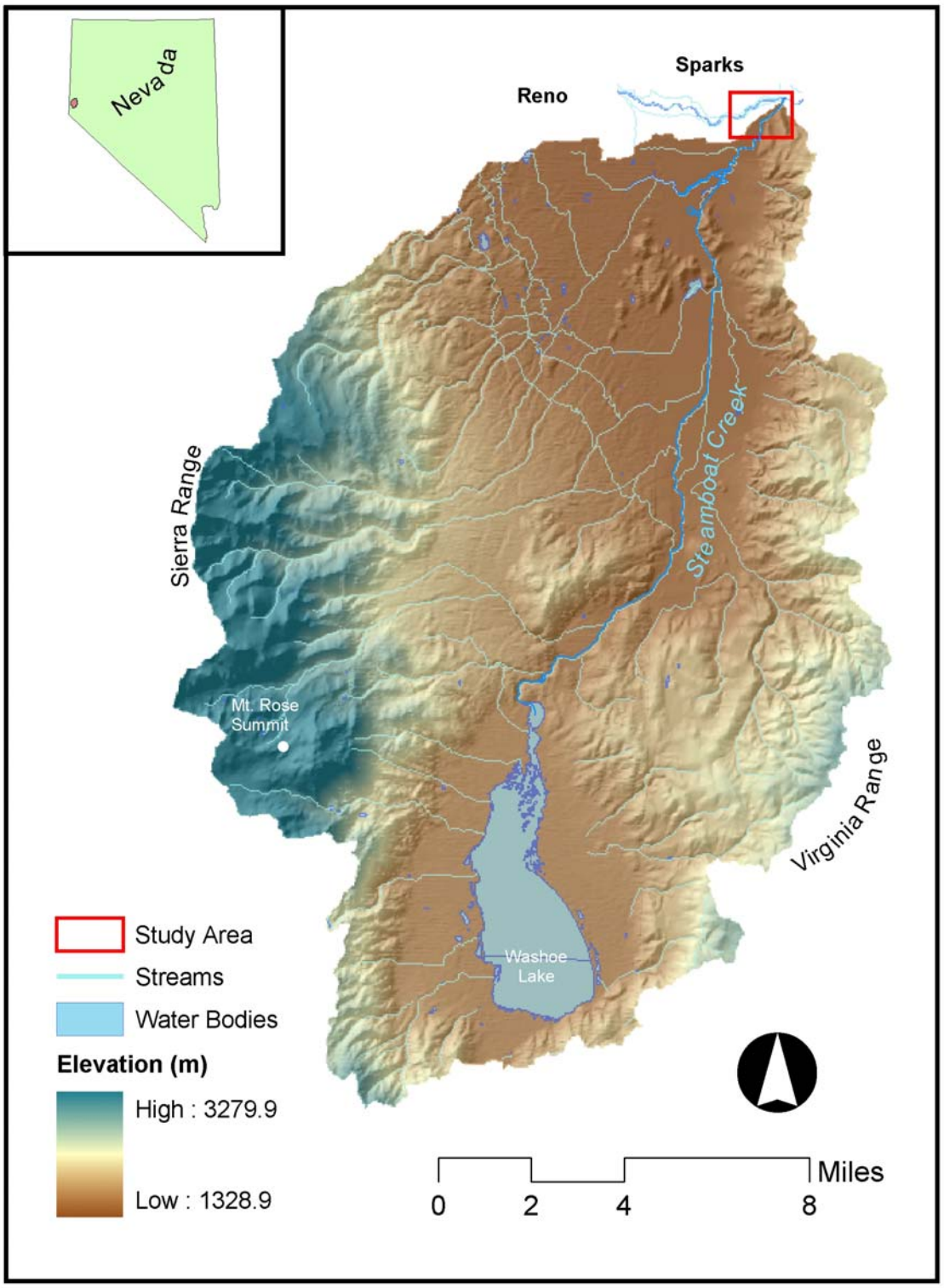
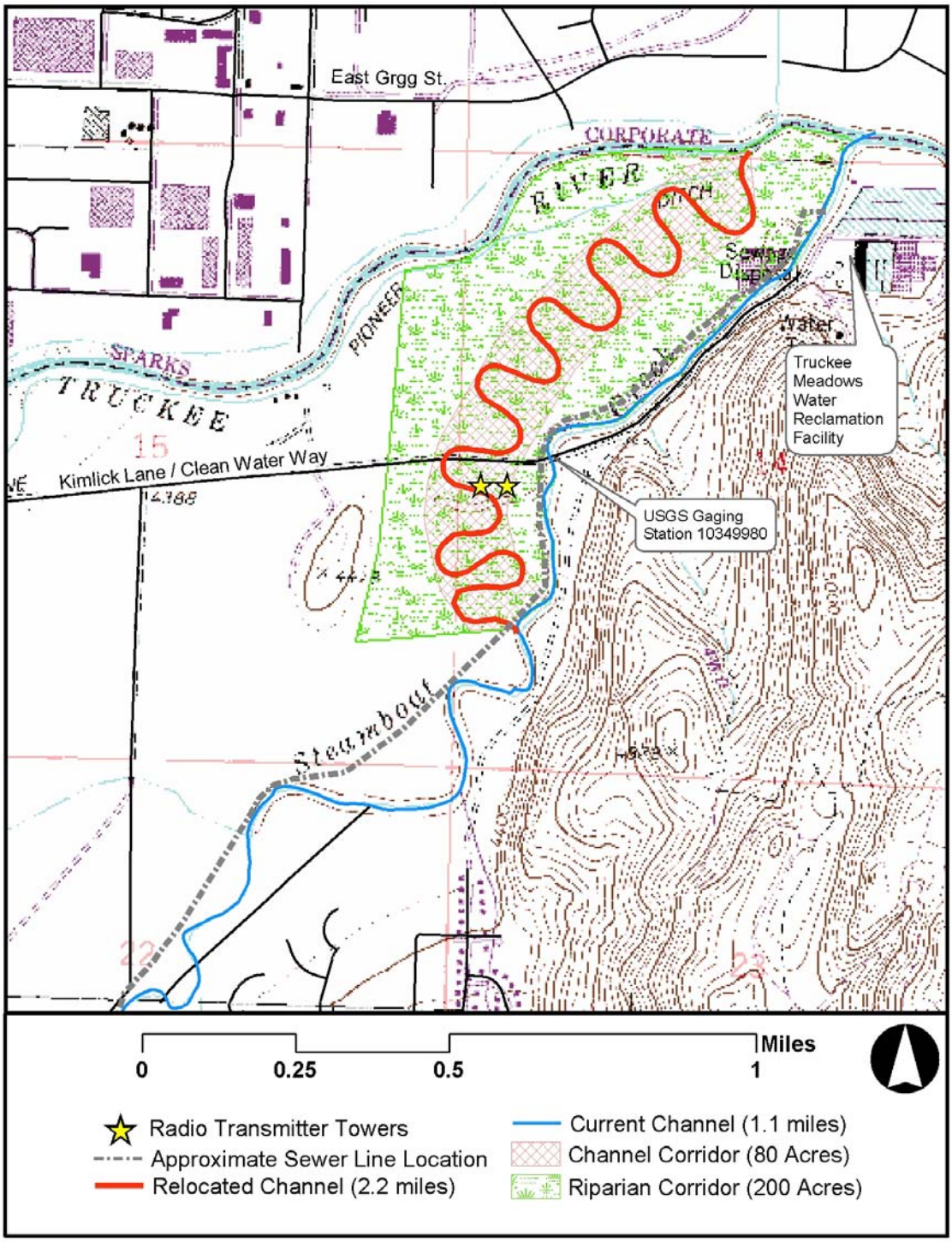


**Figure 2. Project Area and Proposed Restoration Features**



vegetation would be irrigated for a period of 3 years or longer, if necessary. Planting wetland species and grasses would allow banks to withstand stream shear and power forces associated with flood events. Initial conversations with the Truckee Meadows Wastewater Reclamation Facility located nearby have indicated that effluent from the plant, which is cleaner than current Steamboat Creek water, could be used for irrigation.

Within the 700-foot meander belt, the area of proposed wetland creation would be approximately 80 acres, and approximately 200 acres would be created within the riparian corridor. The original channel would be left intact after this period and used as an overflow channel during times of high water. This would reduce potentially damaging flows throughout the project area.

b. Corps project features or operations to be modified.

For the proposed Section 206 project, there could be some alteration to, and/or coordination with the proposed the General Investigation (GI) study of the Truckee River (Truckee Meadows Flood Damage Reduction Study), a community based flood control project.

c. Major features of the proposed project.

Flood plain restoration
Channel relocation
Native obligate and facultative wetland vegetation planting
Nonnative invasive species removal and control
Irrigation for vegetation establishment
Grade control
Source sediment monitoring and control
Revegetation of old channel to create additional riparian habitat

d. Why is the project proposed?

In January 1996, the Washoe-Storey Conservation District hired the firms of Jeff Codega Planning/Design, Inc., and WESTEC, Inc., to prepare a stream restoration plan for Steamboat Creek. Under the guidance of the Steamboat Creek Steering Committee and Washoe-Storey Conservation District, the plan was developed to meet the District's water quality improvement goals for this ecosystem.

The Washoe-Storey Conservation District initiated the Steamboat Creek Restoration Plan because Steamboat Creek is considered the major contributing tributary of non-point pollution to the Truckee River. Non-point source pollution in the forms of excess sediment, nitrogen, phosphorus, and trace metals has resulted in the tributary as being listed as "target impaired waters" by the Nevada Division of Environmental Protection (NDEP).[1] This plan was funded by the NDEP through a Clean Water Act 319(h) grant and a Regional Water Planning Commission grant to promote voluntary efforts by the community to improve water quality. The plan builds on information developed by WESTEC, Inc., in their Steamboat Creek fluvial geomorphology study that discussed flow and sediment transport conditions and the potential for physical changes including aggradation, degradation, lateral channel migration, and excessive bank erosion.

[1] This statement is based on information presented in the Truckee River Total Maximum Daily Loads & Wasteload Allocations, NDEP, February 1994.

Steamboat Creek is an important watercourse within the Truckee Meadows. It provides or could provide many benefits that would be substantially enhanced through wetlands restoration, including fish and wildlife habitat (food and cover), esthetics, education, water quality enhancement, and flood attenuation.

The linkage between the proposed project on Steamboat Creek and water quality is attributable to amelioration of a source problem and construction of a sink area. The lower Steamboat Creek flood plain area was historically a wetland. It diverted 1840-50's wagon trains unable to traverse the marshy ground. Over the long term, the lower Steamboat Creek wetlands have been storing nutrients and other pollutants. Phosphorus and nitrogen sequestration was associated with sediment deposition and plant uptake, while denitrification removed some nitrogen from the wetlands. Denitrifying bacteria thrive with the high organic carbon and frequently fluctuating aerobic/anaerobic conditions in a flowing-water streamside wetland. Under the guidance of the U.S. Army Corps of Engineers (Corps) to reduce flooding effects, the Truckee River flood control project removed approximately 10 vertical feet of Vista Reefs in 1960. The steeper stream gradient or head cut caused Steamboat Creek to incise through its bed of highly erodible material. Incision dried up the wetlands, prevented flood plain dissipation of stream energy and capture of pollutants. Incision released the stored sediments, nutrients, and other chemicals through accelerated bank erosion. While incision stopped water quality-improving functions, restoration could eventually reestablish these functions.

This proposed Section 206 ecosystem restoration project on Steamboat Creek builds on the ongoing cooperative effort to remedy the problems inherent in this watershed and those that might be exacerbated by further development. Having completed a restoration plan for Steamboat Creek, the Steamboat Creek Restoration Steering Committee, under the guidance and coordination of the Washoe-Storey Conservation District, recently received a Nationwide Permit #27 from the Corps to permit stream restoration activities within the watershed.

For an ecosystem restoration project of this nature, the University of Nevada, Reno, Main Station Farm, owned and operated by the Nevada Agricultural Experiment Station (NAES), represents unique opportunities. Because it is at the lower reach of Steamboat Creek and the need for flood plain width increases as stream size increases and gradient decreases, the suggested meander belt width is 700 feet in this channel reach below Pembroke Lane. Based upon the geomorphic analysis by Chad Gourley (provided in the Steamboat Creek Restoration Plan), a suggested flood plain and riparian corridor width would range from approximately 300 feet to 800 feet. Fortunately, the UNR land has stayed in a mostly rural land use, and the agricultural research land area in question could be converted to wetlands pending the expected approval by UNR officials. Unfortunately, the economics of land use in an urban fringe and the mandate for highest and best use of the land could preclude some alternatives that would otherwise be considered in the feasibility study. Recently, the NAES put the idea of wetlands restoration/creation into their strategic plan even though pressure continues for a land sale for a non-wetlands-compatible land use. If necessary, planning work would include measures in the design that would avoid or minimize the potential effects on the existing major sewer line and radio transmitter towers.

The upstream watershed was naturally erosive because it is composed of deeply weathered and recently uplifted decomposed granite. With disturbance of the watershed by deforestation associated with the Comstock, and the more recent rapid expansion of roads and urbanization, bursts of sediment could become a problem. Too much aggradation of the flood plain could cause reentrenchment of the channel; and this result would be a problem for a channel that depends on flood plain access for its sustainability. However, there is an opportunity at this site to control the flood plain and stream gradient by adjusting base-level elevation just before Steamboat Creek enters the Truckee River. Currently, the bottom of Steamboat Creek drops through a gabion-armored section into the Truckee River. Adjustments could accommodate flood plain aggradation,

followed by base-level elevation, and continued frequent access of the flood plain. Ironically, the blasting of Vista Reefs and the stream degradation it caused could add an element of vertical flexibility for sustainability of this project in the long term.

e. Expected outputs and how they will be measured.

The significance of this Section 206 project on Steamboat Creek is that it would restore stream and riparian habitat for two Federal and State-listed species, the Lahontan cutthroat trout and cui-ui. The restoration would form a narrow, deep, and sinuous active channel that floods often across a broad, well-vegetated wetland flood plain. As an added benefit for fish and wildlife, this would also improve water quality by avoiding the current erosion of gully banks, depositing fine sediment from upstream, storing nutrients as mineral and organic matter, and promoting denitrification through plant uptake. The Corps would use a modified HEP analysis to determine habitat units gained; or determine the number of acres and river miles of habitat created by measuring it from the plans and specifications provided in the feasibility phase. An incremental analysis would be used to determine the cost effectiveness of each alternative. The outputs and objectives for this project include:

Restore approximately 2.2 miles of lotic riparian stream corridor
Restore approximately 80 acres of active flood plain
Decrease water warming by insulation
Increase habitat for native fisheries, migratory birds, and aquatic invertebrates
Increase native obligate wetland vegetation
Reduce nonnative invasive plant species
Reduce sediment and nutrient pollution to the Truckee River
Increase floodflow attenuation
Increase groundwater recharge

The general plan formulation process, feasibility study, outputs, and design plan would each be reviewed by faculty from numerous different disciplines, the Corps, and Washoe-Storey Conservation District. The standard for the quality of management plans is public involvement. Each feasibility study document would be used in open dialog with numerous interests outside the UNR team. The involvement of the Steamboat Creek Restoration Steering Committee and specific stakeholders represent peer review and public involvement from the beginning by a diversity of agency views and professional disciplines. This would include representation by NDEP, U.S. Fish and Wildlife Service, Corps, Natural Resources Conservation Service, Agriculture Research Service (ARS), U.S. Environmental Protection Agency (EPA), Washoe County, Reno, Sparks, and others. Peer review would include wetlands, vegetation, hydrology, soils, geomorphology, fish and wildlife biology, ecology, engineering, environmental geochemistry, economics, and water quality. The entire UNR faculty contributing their time have PhD's in their respective fields. The past success of the Steering Committee under the guidance of the Washoe-Storey Conservation District is evidence of the District's ability to lead an effort that incorporates the goals and ideas of many agencies and community representatives.

As the design is implemented, the progress and effects would be monitored by UNR to learn how the proposed ecosystem restoration project for Steamboat Creek functions. Specific questions would be identified with sampling and data requirements. However, it is anticipated that photographs and measurements would be used to monitor various parameters such as weeds; wetland vegetation establishment, survival, growth and spread; erosion and deposition; particle size distribution and nutrient chemistry of deposited sediment; water quality including phosphorus, nitrogen, temperature, total organic carbon, and total suspended solids; and changes to channel and flood plain form. In the short and long term, this project would often be used as a class field project by UNR classes and students to both use and gather relevant data.

Even though the goal is to eventually achieve a self-maintaining system, the project would probably need some maintenance as it evolves. The monitoring information would allow us to detect this need and prescribe corrective action. Problems that could emerge include sedimentation and the need to raise the base level, and invasion of noxious weeds that would require the need for integrated weed management.

f. Importance of the proposed outputs.

A restoration effort in compliance with the BMP's provided in the Steamboat Creek Restoration Plan, as well as ones implemented by the Corps as standard operating procedures, would produce significant social and ecological benefits, benefit threatened and endangered species, and minimize short-term adverse effects to the environment. This project would attenuate damaging floodflows along this reach and reduce those entering the Truckee River. Groundwater recharge would also be significantly increased, allowing more stored water for future use. It would also produce a more esthetically pleasing land use in this area, and could provide future recreational opportunities.

Ecologically, a geomorphically stable, naturally functioning reach of Steamboat Creek at its confluence with the Truckee River would help to offset past land use and stream alteration activities that have been contributing to excessive nutrient and sediment pollution, and affecting fish species such as the endangered cui-ui and threatened Lahontan cutthroat trout. To offset urbanization effects, the creation of 80 acres of riparian flood plain would also help to improve water quality along this reach of Steamboat Creek and to restore essential habitat for these two Federally and State-listed species, as well as habitat for many other fish and wildlife species inhabiting these two streams.

Denitrification through plant uptake would be significantly increased in this area and thereby provide ecosystem and economic benefits. Currently, Truckee Meadows Wastewater Reclamation Facility spends a large amount of time and money on denitrification. This project could help diminish this expense.

g. Lands, easements, rights-of-way, relocations, and disposal areas.

UNR is expected to transfer fee title of the land to the sponsor. The total potential area for land acquisition is approximately 200 acres. The fair market value of land ranges between $2,000 and $16,000 per acre in this area. The market value of the university's lands north of Pembroke Drive was estimated to be $4,000 per acre, without water rights. These lands are in a flood zone and it is a considerable distance from utility connections. It is not reasonable or probable that these lands have near or even intermediate term development potential. Therefore, the market value of these lands would be at the low end of the range of sale prices. Based upon this, it could produce an estimated land value of about $800,000 depending on the value of water rights. This figure could represent up to 31 percent (if there are riparian water rights) of the total cost based on an active relocation of the channel and maintenance of newly planted riparian vegetation. If the channel were moved west across the current agricultural fields, there would be an additional cost in adjustment to the existing road at Kimlick Lane. Disposal of the excavated material would also require land area. The cost of disposal or beneficial use of this material would depend on its physical and chemical characteristics and on local sites for disposal or use in fill material. The GI study of the Truckee River (Truckee Meadows Flood Damage Reduction Study), a community-based flood control program, faces similar considerations.

h. Relationship of the proposed project to other Federal or non-Federal planned or completed projects and regional or watershed plans.

With a land lease from the UNR, the City of Reno is planning the construction of a golf course adjacent to this project. The Cooperative Extension of the UNR has initiated a 2-year feasibility study to investigate the potential for restoration along this reach of the creek. There is also the GI study of the Truckee River initiated near this site.

i. Alternatives considered.

Aside from excavating a new channel to the west, a smaller scale project is being considered as a second alternative. This alternative for analysis in the feasibility study is a reduced project without moving or crossing the sewer pipes or towers. One of the major impediments to the existing plan is the presence of the sewer pipeline, which runs 15 feet to 20 feet below the surface along the creek in portions of this reach. A potential increase in expense that could limit this project is modifying the alignment of the channel or modifying the location or position of the sewer line through the project area and the radio transmitter towers. Looking downstream, portions of the sewer line flank the left bank (see Figure 2). The radio transmitter towers are located southwest of the Clean Water Way Bridge (see Figure 2). These utilities could substantially reduce the overall size of the project to perhaps 40 acres or less if construction and mitigation costs exceed the CAP limit of $5 million.

If excavation would disturb the pipeline and towers and relocation of the new proposed channel is not an option, a smaller restoration project along the current creek could be pursued. This project would involve actively widening current gully walls and creating a sinuous, deeper, narrower channel. Because controlled irrigation would not be as effective in this case and the newly created channel would be subject to potentially damaging floodflows, some bioengineering techniques could be used. One alternative would be the use of geo-textiles in combination with toe stabilization and vegetation planting to armor streambanks and gully walls. This project could also include the addition of fish habitat and creation of pool/riffle sequences. This alternative is not preferred by the local sponsor since it would not achieve the habitat restoration goals and objectives. During the feasibility phase, the local sponsor and the Corps could consider other alternatives, which would allow for the expansion of a larger project to be constructed with more environmental benefits, but it would not exceed the CAP limit of $5 million.

j. Study methodologies.

- The Washoe-Storey Conservation District staff and Board members would work in cooperation with UNR team members, representatives from the Cities of Reno and Sparks, the Truckee Meadows Water Reclamation Facility, and the Corps to coordinate study methods and monitoring practices. The UNR team includes professionals to oversee study methods while encouraging the growth and development of students. Although the progression of the proposed project on Steamboat Creek could result in changes to the following sequence of steps, they seem appropriate and would be the general process until modified. Hydraulic channel design and modeling would be tools used to formulate the project features for ecosystem restoration.

- Under its own funding source, the UNR team would meet and discuss the technical issues requiring inventory data and the level of data intensity needed to address the issues raised. For instance, it is anticipated that a grid of soil auger holes (anticipated to extend 15 feet deep at 400-foot spacing) would be drilled to sample soil grain size, boron,

mercury, organic matter, and Atterberg limits by horizon. About 100 samples would be collected.

- In compliance with Corps policy and the State Historic Preservation Act, the scope and cost estimate for an archeologist's services will be administered during the feasibility phase by the staff representative of the Corps Environmental Resources Branch. The archeological resources onsite must be appropriately identified by the Corps archeologist specialist or a qualified archeologist, coordinated with the State Historic Preservation Officer, and mitigated, if necessary, before soil-disturbing activities begin.
- The UNR team, in collaboration with the Corps and the sponsor, would discuss these data and any other relevant information and write a feasibility study that considers any relevant alternatives.
- The feasibility study would be discussed with stakeholders and with the Steamboat Creek Restoration Steering Committee to present the preferred alternative that optimizes environmental benefits gained in the draft environmental assessment.
- The preferred alternative would be written up as a project design with appropriate project phases and design specifications, including any needed blueprint plans for cut, fill, gradient, channel geometry, channel morphology, water control structures, soil materials, level of compaction, plant materials, plant material propagation and establishment techniques, criteria for effectiveness, monitoring criteria, and options for future project management that would address anticipated contingencies.
- The designed project would be permitted, as needed, with each permitting entity becoming involved in design modification, if needed.
- The project would be contracted in appropriate phases to comply with the agreed-upon design and permit requirements for such things as erosion control and risk reduction. For example, the major wetland area would probably be excavated, shaped, planted, and irrigated from a controlled flow of creek water long before the vegetation becomes established sufficiently for the erosion resistance needed for handling floodflows. Fortunately, Steamboat Creek flows along the edge of UNR property and can therefore remain isolated from the new stream/wetland construction area by leaving a newly created berm as the new flood plain/riparian corridor was graded down. The berm would separate the existing channel as a flood overflow channel to give some relief to the new channel in times of heavy flows. The area occupied by it and the old channel would become part of the edge of the flood plain or off-stream lentic wetlands.

4. Consistency Statement: NA

5. Views of Sponsor:

Washoe-Storey Conservation District, the local sponsor, prepared preliminary concepts of this project, which are generally discussed in the Steamboat Creek Restoration Plan. Sponsor support of this Section 206 project, which is included in this PRP (see enclosed letter), and the goals and objectives previously identified in item 3e above are consistent with their BMP's. BMP's must be approved by the sponsor.

6. Views of Federal, State, and Regional Agencies:

A feasibility study for this project has been funded by the U.S. EPA through the NDEP. The working group assembled to participate in this study includes representatives from the UNR, Western Nevada Resource Conservation and Development (WNRC&D), Natural Resource Conservation Service, Washoe-Storey Conservation District, U.S. Bureau of Reclamation, and Truckee Meadows Wastewater Reclamation Facility. The City of Reno is also interested in relocating the terminus of the creek westward to make a small parcel of land available along the current channel. Initial project design accommodates this need.

7. Environmental Compliance Requirements:

The Corps and local sponsor would ensure that the proposed project complies with Corps policies, regulations, and all Federal and State laws, including the Endangered Species Act, Fish and Wildlife Coordination Act, National Environmental Policy Act, Clean Water Act, Clean Air Act, and State Historic Preservation Act. Due to the degraded habitat conditions, the nature and design of the habitat restoration work is not expected to result in causing significant adverse effects to the physical, environmental, cultural, and sociological resources, and therefore, an environmental impact statement would not be required. Based upon this determination, the preparation of an environmental assessment/finding of no significant impact would be incorporated into the Detailed Project Report (DPR) as an appendix.

8. Costs and Benefits:

a. Costs.

Specific project costs are unknown at this point. It is anticipated, however, that in addition to the cost of acquiring real estate, the proposed project could cost up to $2 million per mile, bringing the total project cost to about $3.8 million. Refer to paragraph 11 for Financial Data.

b. Benefits.

Direct and indirect anthropogenic influences on riparian systems create a multitude of water quality concerns and problems. In this case, a lowering of the base-level and alterations to the original channel morphology to move water more quickly through the system have severely limited the natural functions of the stream and resulted in moderate to severe channel incision. This incision has lowered water levels, destabilized streambanks, produced excessive sediment and nutrient contamination, and compromised valuable riparian habitat. Reversion to a more naturally functional stable channel would help to ameliorate many of these problems and result in the following environmental and sociological benefits:

- Attenuate floodflows to adjacent lands
- Recharge groundwater
- Reduce sediment and nutrient pollution to the Truckee River
- Create wetland habitat
- Restore riparian habitat
- Restore habitat for fish, waterfowl, and invertebrate species
- Improved esthetic value
- Potential recreational use

9. Schedule:

The PRP is scheduled for completion in August 2001. The DPR is scheduled to be completed in the second quarter of FY03.

10. Supplemental Information:

There are two ongoing studies in the study area that predicates the goals and objectives (previously identified above in item 3e) proposed in this PRP for Steamboat Creek. The first study is the Steamboat Creek Restoration Plan, dated January 15, 1998 (last revision), an independent study undertaken and produced by the Washoe-Storey Conservation District. This 1998 plan contains significant information related to environmental restoration and water control projects on Steamboat Creek. The purpose of the 1998 plan is to identify locations where restoration initiatives

can best be considered. The restoration recommendations contained in this PRP are consistent with the goals and objectives of the 1998 plan. This proposed Continuing Authorities Program Section 206 project is identified as a recommended area for restoration.

The second study is being conducted by the Corps' Sacramento District, which is undertaking a large basin-wide GI study of the Truckee River (Truckee Meadows Flood Damage Reduction Study). The study area under this investigation encompasses the Steamboat Creek ecosystem restoration project area. This GI study is in the preconstruction engineering and design phase, and a general redesign report is being prepared. As with the District plan, this ecosystem restoration plan parallels the goals and objectives for not only Steamboat Creek, but also the Reno-Sparks-Truckee River Meadows basin. The recommendations in this report do not conflict with the general basin-wide flooding and ecosystem restoration efforts of the Truckee GI study. The restoration concepts in this PRP are well defined and, assuming a positive recommendation is made, can be initiated much quicker than if the project is executed under the basin-wide GI study. This proposed Section 206 project on Steamboat Creek would also provide incidental flood control and ecosystem restoration benefits that are consistent with the GI study.

Although this site presents great restoration opportunities, there are also potential constraints due to environmental problems. Steamboat Hot Springs represents a water quality challenge that suggests a need for caution in downstream projects. Boron is toxic to plants at levels often found along Steamboat Creek. Some entities speculate that these elevated levels added difficulty to the Reno/Tahoe - Cannon International Airport wetlands mitigation project (Airport wetlands mitigation project) along this part of Steamboat Creek. This mitigation area is located about 0.5 mile south of the project study area. Some of the plantings from this project were not successful either due to the lack of watering during drought years or high boron concentrations. Mercury is also a potential problem. Mercury methylization could occur faster in wetlands where historic mining and milling operations introduced excess mercury along Steamboat Creek. The potential presence of these constituents suggests this is an issue needing further study and discussion. These potential issues are currently being investigated in an ongoing study by UNR. If these constituents were present at unacceptable Federal and State levels based on the results of the ongoing study, the project would consider modifying this alternative or adding another alternative. The alternative would be designed to incorporate the Corps standard operating procedures (use of best management practices) and include measures that avoid the disturbance of methyl mercury and boron where its concentrations are at unacceptable levels. Full HTRW compliance will be obtained at the completion of the Detailed Project Report. Costs associated with HTRW investigations for mercury and boron contamination in soils shall be cost shared.