APPENDIX H

Fountain Creek Watershed Study
Project Management Plan

U.S. Army Corps of Engineers
City of Colorado Springs

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Fountain Creek Watershed Study
Synopsis of Project Scope

This scope of work and cost estimate describes the work to be accomplished under the Fountain Creek Watershed Study. Both have been prepared in coordination with the local sponsor, the City of Colorado Springs, as well as other stakeholders in the basin.

Under authority of a House Resolution adopted on September 23, 1976, the Albuquerque District prepared an expedited reconnaissance report in accordance with section 905(b) of the Water Resources Development Act of 1986. The purpose of the report was to determine if there is a Federal interest in participating in cost shared feasibility level studies of water resource problems and opportunities in the Fountain Creek Watershed. The report was initiated on March 1, 2001, and submitted on October 16, 2001, with the recommendation that further feasibility level studies be pursued. The reconnaissance report was approved on November 7, 2001, with the stipulation that the District conduct the study as a watershed study.

As a watershed study, the associated report is not intended to be a decision document. That is, it is not intended to recommend, or serve as the basis for authorizing a specific project. The primary goal is to develop the study from a regional perspective in which all local participating governments benefit by "spinning off" projects under other authorities to address flood control, erosion, sedimentation and environmental restoration problems. The planning process and key objectives of the study include:

- Incorporate public input and involvement
- Assess watershed characteristics and conditions
- Outline watershed issues/concerns with erosion/sedimentation as a key component
- Analyze watershed issues/concerns (using GIS where practical and information available)
- Develop, evaluate and prioritize conceptual alternatives including structural and non-structural measures
- Spin-off projects under other authorities as appropriate throughout the study
- Complete watershed plan and final report

Major tasks and activities include:

First, the study will define, and evaluate existing conditions in the watershed. This will be accomplished primarily through comprehensive hydrologic, hydraulic, and geomorphic modeling. Additionally, environmental studies will be performed in order to characterize the basin, and to develop the baseline data for any potential NEPA processes associated with future projects done in the watershed. Other work will consist of a preliminary economic evaluation, geotechnical sampling to support the sediment evaluation, analysis of existing data, preliminary identification of utilities, infrastructure, and other constraints, real estate evaluation, and public involvement. The use of GIS mapping and analysis will be an important tool in these work activities, subject to the availability of information and required level of effort. Possible areas for GIS mapping/analysis include: soils, geology, channel stability/instability, sediment

generation/deposition, flood hazards, infrastructure/buildings/property, habitat, wetlands, land use, corridor vegetation, etc.

Second, once existing conditions are analyzed, the study will attempt to identify, and prioritize remedial projects, both structural and non-structural, which address flood control, erosion, sedimentation, and environmental restoration in the basin. The non-structural measures will include those that may enhance overall water quality or reduce water quality impacts. These projects will be developed to a conceptual level of detail so that preliminary cost estimates can be determined in order to establish priorities. Potential projects will also be evaluated as to their eligibility for Federal involvement. It will be the goal of the study team to identify viable projects early, so that they can be pursued via other authorities.

Information revealed, or unforeseen circumstances during the course of the study may be cause to revise the scope of the study. This will be done by mutual agreement between the Corps and the City of Colorado Springs. In addition, there will be several agreed to "checkpoints" whereby representatives of both the Corps and the City will evaluate the progress of the study and, if necessary, take corrective action such as re-establishing milestones, revising scope, or revising cost estimates.

The product of this study will be a watershed study plan and report, addressing approximately 150 miles of Fountain Creek and its tributaries (see Appendix A), and will document the information described above. Organization of the final report will be structured to reflect this watershed plan and study and the overall planning process as noted above. The plan will provide a framework for future work in the basin, and it is hoped that the study will be adopted regionally as the recognized baseline for watershed planning. It is anticipated that the study will take approximately 3 years to complete.

This study will be a cooperative effort between the Corps of Engineers and the City of Colorado Springs as the lead sponsor, along with 10 other local governments in the watershed, the Colorado Water Conservation Board, and the Colorado Department of Local Affairs. As the lead sponsor, the City will be the signatory to the Feasibility Cost Sharing Agreement. The City, in turn, will enter into cost-sharing agreements with the other participating entities in the watershed. Estimated total project costs, including in-kind services to be provided by the City of Colorado Springs, are shown in the "Summary of Costs" table below. The City will also allow appropriate in-kind services from other participating entities and will submit all appropriate in-kind services to the Corps on behalf of the City of Colorado Springs. Upon approval by the Corps, the City will provide the in-kind service credit to the appropriate participating entities. The City, through their designated representative(s), will be an integral part of the project team. They will be party to decisions made regarding the study, reviews, negotiations for engineering and other services, public involvement, and will also provide in-kind services as determined by this scope of work.

I. Aerial Photography, Surveys and Mapping

Scope of Work. New aerial photography and mapping will be required in support of the hydrologic, and geomorphologic modeling, as well as environmental surveys. The new mapping (approximately 60 creek miles as outlined in Appendix A) will supplement existing mapping that is being provided by the City (Colorado Springs Utilities). The City (through Colorado Springs Utilities) will provide the new mapping and will ensure compatibility with their existing mapping as an in-kind service creditable to the City's share of the study. In addition, supplemental ground surveys will be needed to supplement the existing mapping provided by the City. It is estimated that 174 cross sections, 1000 ft. in length, will be needed to accurately perform hydrologic and sediment modeling. Ground surveys will be contracted by the Corps.

II. Hydrology and Hydraulics

Scope of Work. Hydrology, hydraulics and sediment modeling will be done to varying levels of detail depending on stream reach. The individual reaches, and their corresponding levels of analysis are outlined in Appendix A. Peaks and hydrographs for six frequency discharges (5yr, 10yr, 25yr, 50yr, 100yr, 500yr) will be determined by modifying an existing HEC-HMS model, which is currently being prepared for the Fountain Creek Hydrologic Analysis, which is being done by the Corps in cooperation with the Colorado Water Conservation Board. The HEC-HMS model will be created to produce discharge-frequency curves and provide existing conditions of the watershed. Future "without project" aggradation and degradation will be forecasted by calculating sediment transport supply and capacity. Overflow boundaries at critical areas along Fountain Creek and/or its tributaries will be analyzed for existing conditions and "with project" conditions, if applicable. Potential bank erosion will be analyzed and a stable channel design will be provided for all potential alternatives. Each alternative will be analyzed and designed to provide the maximum benefit without jeopardizing engineering integrity. Hydraulic analysis will consist of determining pre-project floodplains and water surface profiles in accordance with Appendix A. Water surface profiles will be computed using the HEC-RAS program. Cross sections will be derived from the digital terrain model using the INROADS program and/or Geo-RAS (ArcView). Cross sections will be supplemented with field measurements and surveying. The Government will select hydraulic loss coefficients during site visits. Future condition without-project floodplains will be based on the results of the stream morphology/sediment transport study. Existing and future baseflow (incl. wastewater discharges and water/irrigation use) conditions will be determined and erosion impacts analyzed. Assumptions for future condition hydrologic and hydraulic analysis will be mutually agreed to by the City and the Corps. These modeling and analysis efforts will be used in conjunction with GIS to enhance study analysis and evaluation of alternatives. Estimated costs for this activity were done using a unit cost per-mile of stream reach based on the level of analysis, which is shown in Appendix A. This activity will be accomplished by the Corps using contract and in-house labor.

III. Geotechnical Studies

Scope of Work. In order to characterize the surficial soils and sediments within the Fountain Creek and its tributaries, the Corps proposes to sample and analyze surface and near-surface soils and sediments. Results of the sampling and analysis will be incorporated into the watershed study report. The Corps and/or its contractor will collect soil and sediment samples to include an initial field/site reconnaissance, followed by collection of samples utilizing simple auger drilling methods. A report will be then generated presenting soils and sediments geotechnical characteristics in tabulated and narrative styles. The results of field reconnaissance, drilling/soil and sediment collection will be utilized to support hydraulic characteristics of the reaches within the Fountain Creek Drainage and its tributaries. The geotechnical data will also be available to support necessary designs, specifically, geotechnical materials requirements (stone, gabions, etc.) and preliminary designs for structures. These recommendations will be included in the final report.

IV. Civil Engineering

Scope of Work. The work will include conceptual development of alternatives identified for possible selection of the remedial projects addressing project purposes identified in the feasibility agreement. The remedial project solutions will be developed and designed by contract to an extent sufficient to arrive at a project cost estimate required for plan formulation and the selection process. Project sketches and pertinent design informations will be presented in an engineering appendix to the watershed study. The appendix will include a narrative of all design features and cost estimates. Structural features will be designed so that a firm estimate of costs can be made based upon unit quantities of materials. Minor features may be estimated on a lump sum basis after determining the size of the feature and comparison of costs of similar features. Estimates of first cost shall be based on current average unit construction price levels and itemized into major unit elements.

V. Economics

Scope of Work. This item will be performed by the Corps and will include the following:

Gather Historical Flood Damage Information
Determine Future Conditions in the Basin
Delineate the Affected Area into Economic/Hydrologic Reaches
Determine Existing Inventory, Project Floodplain Growth
Determine Depth/Damage, Erosion Damage (Existing, and Future)
Determine Economic Feasibility of Proposed Conceptual Plans

Future basin land use will be estimated to insure that project formulation and analysis accounts for flow changes over time (including stormwater runoff and impacts to baseflow from wastewater discharges and water/irrigation use). Changes in land use patterns may impact drainage conditions, which affect project sizing, damages and benefits. The projections will be made using available mapping, examining Federal and State demographic estimates, local master plans, and consulting with local planners. This activity will use information developed by the local sponsor. The "Determine Future Conditions in the Basin" activity is performed to evaluate the impacts of future development to the H&H data applied to the existing structures (as in changes in stage for a given event) or new structures (as in expanded floodplains, infill within existing floodplains). The Corps will use available mapping, demographic estimates, and consultations with local experts to gain a sense of what the Fountain Creek watershed will look like in the future, in terms of number, location and quality of damageable property types. The existing inventory serves as a guideline for valuing that future growth.

To present the report to the public and the Corps' review authorities, a succinct narrative report of the economic evaluations discussed above shall be prepared in accordance with applicable Corps regulations. Documentation of the source material and a display of the results of the economic analysis will be presented.

VI. Real Estate Analysis

Scope of Work. A real estate evaluation will be conducted by the Corps which will provide a gross appraisal of land use and land values that may be affected by proposed implementation projects. The evaluation will be based largely on the review of existing data, including county assessors records, comparable sales, etc. The real estate analysis differs from the economic analysis in that it typically supports the design and cost functions of the study team as they formulate a given alternative's cost , whereas the economic valuation of a given property, per Corps guidance, is the depreciated replacement cost of the improvements, excluding land value. The Corps' Real Estate Division will also provide assistance, if needed, to the City in obtaining any necessary rights of entry required during the prosecution of the watershed study. The real estate evaluation will be presented in the watershed study report.

VII. Environmental Studies

Scope of Work. Environmental work will consist of conducting an inventory of existing natural resources including geology, soils, in-stream biota, wildlife and threatened and endangered species along the 150 miles of river corridor. Review of existing GIS information will be performed. Historical conditions of natural resources will be evaluated including vegetation, in-stream biota, wildlife, and threatened and endangered species. An analysis of the status and trends of wetlands within the watershed will be performed, and a data search will be conducted to determine the amount of wetland acreage that has been lost through filling or converted for other uses such as agriculture

and urban development. In addition, future trends of wetland loss will be estimated. Mapping of vegetation types along creek corridors, including non-native vegetation, esp. Russian olive (*Eleagus angustifolia*) and salt cedar (*Tamarix chinensis*) will be performed. The change in the amount of infrastructure and impervious surfaces, and its impact to the watershed will be evaluated. The use of best management practices in the watershed will be analyzed. The study will include an investigation of wastewater and agricultural return flows, as well as an analysis of agricultural practices within the watershed. When appropriate, this information will be used to prepare GIS maps and conduct GIS analysis. Emphasis will be placed on identifying environmentally sensitive areas which might prevent project development. The Corps' Environmental Branch intends to accomplish the environmental studies task via contract. The environmental studies will be presented as a section of the watershed study report, and will also include a compilation of existing ecosystem restoration projects that have occurred or are planned in the watershed. The estimated costs include contract oversight by the Corps.

VIII. Hazardous and Toxic Waste Studies

Scope of Work. A literature and data search, including available GIS information, will be conducted by the Corps to identify known hazardous, toxic, or radiological waste sites in the study reach. The known sites, if any, will be summarized, and an inventory and possible GIS map of available data (e.g. agency, location, etc.) will be produced for use in further development of implementation projects. Samples taken pursuant to Section III, Geotechnical Studies, will undergo laboratory analysis to test for contaminants. Results of the literature and data search, as well as sampling results, will be summarized and incorporated into the watershed study report. Emphasis will be placed on identifying any HTRW which might prevent project development.

IX. Cultural Resource Studies

Scope of Work. The Corps and/or its contractor will examine existing data to determine the number and location of known archaeological sites including those documented historic properties listed on the State Register and National Register of Historic Places that occur within the watershed. A determination will be made as to areas that have been surveyed for cultural resources and those areas that have not been surveyed. On a general basis, the rate at which new site discoveries are being reported and properties listed will be studied, and an investigation will be done into how natural processes and cultural changes in land-use such as encroachment on watershed streams and development are affecting known sites and cultural properties. The Corps will consult and coordinate data acquisition with the Colorado State Historic Preservation Officer. Results of the analysis and possible GIS mapping will be summarized and incorporated into the watershed study report.

X. Cost Estimates

Scope of Work. The Corps' Cost Engineering Branch will develop very preliminary estimates based on a conceptual level of design for alternatives that are identified in the watershed study. This scope of work assumes up to 10 different project alternatives. Preparation of the estimates will include necessary site visits, construction quantities evaluation, and development of unit cost construction estimates. The draft cost estimates will be revised and finalized, incorporating design refinements and other changes. The estimates will be presented in the watershed study report, including narrative descriptions of the assumptions and methodology used.

XI. Public Involvement

Scope of Work. The responsibility for this task will be shared between the Corps and the Local Sponsor. It is anticipated that some or all of the work will be contracted to a firm which specializes in public involvement. It is also estimated that the City, as well as the other participating entities, will provide in-kind services to this task. Generally, this effort will include developing a public involvement plan; developing a mailing list of all public and private interests, including Federal and State agencies, who will be kept informed of study progress and results; conducting one public workshop which will serve as a scoping meeting; and conducting a final public meeting to present study conclusions. The public workshop will solicit input from local interests as well as concerns to be addressed in the study. Additional public meetings may be held throughout the study as necessary to keep the public informed of the progress. The meetings may be held during the monthly watershed committee meetings. The Fountain Creek Watershed Technical Advisory Committee meetings will be held on a monthly basis, and will be used to brief the status of the watershed study efforts. A final public meeting will be held to present the findings of the study. Oral testimony at the final public meeting as well as written comments received during the public review session will be considered official comments to the draft report. All comments will be addressed and responded to, prior to finalizing the report.

XII. Plan Formulation

Scope of Work. The Corps' project team will include a planner who will be responsible for the overall formulation of study objectives and alternatives, and day-to-day organization and management of the watershed study. The planner will work with the other team members to establish schedules for production and delivery of the various elements of the study. The planner, working with the project manager and the other team members (which includes the local sponsor) will first establish the without-project or "baseline" condition of the watershed. Next, preliminary objectives will be identified, to include opportunities and constraints, which will be defined for Ecosystem Restoration, Sediment Management, Flood Damage Reduction, Erosion Protection, and Recreation (as

part of a multi-use project). Opportunities and constraints to be considered will include utilities, infrastructure, environmental and other items. From this, the team will identify potential structural and non-structural measures for evaluation. The array of potential actions will be evaluated without respect to organizational (Corps) constraints, and will be presented in the findings of the study based on technical and economic feasibility, prioritized based on need, and categorized in accordance with the likelihood of Federal participation. The planner will be responsible for compilation, quality control, and review of the final watershed study report, as well as incorporation of review comments, reproduction, and distribution.

XIII. Report Preparation

Scope of Work. Documentation of study findings and results will be continuous by each organization as work proceeds. The work associated with this task will consist of preparing and reproducing preliminary drafts, a final draft, and the final report on the study. The final report will include a Main Report with appendices, including GIS mapping/analysis. Organization of the final report will be structured to reflect this watershed plan and study and the overall planning process as outlined in the "Synopsis". The Corps and the City will discuss and agree on the specific outline and content of the final report. Preliminary in-progress review reports will be prepared for two checkpoint meetings with the Independent Technical Review Team, and South Pacific Division (SPD). All report completion activities include assembling pertinent data, writing, editing, typing, drafting, revising, reproducing, and distributing the draft watershed plan, related technical appendices, and GIS information. Reproduction of both the draft and final reports will be done via contract. This estimate assumes distribution of both draft and final reports to all stakeholder representatives.

XIV. Technical Review

Scope of Work. All planning documents will be reviewed prior to being finalized. The quality control process will include technical team meetings, meetings with the local sponsor and stakeholders, and Corps in-house technical review. The quality control process will be on-going throughout the study (seamless peer review), but at particular milestones, specific efforts will be made to assess the quality and progress of the study (independent technical/policy review). Corps Independent Technical Review (ITR) guidelines will be followed, including development of a Quality Control Plan. Review teams will be established at the beginning of the study. Completion of specific documents will be identified by specific milestone dates. The Review Team will perform their review at the specific milestones and document each review. A South Pacific Division representative will participate in the initial Review Strategy meeting as part of the Division's quality assurance partnership with the District. Division representatives will, throughout the course of the study, aid in resolving technical issues that cannot be resolved within the District level teams. The estimated cost for this task assumes credit for in-kind review on the part of the City and other local participating entities with the City.

XV. Project Management

Scope of Work. The Corps project manager is responsible for managing the overall study, including cost and schedule through use of the Project Management Information System (PROMIS), preparation of present and future budget year submissions; coordination with the non-Federal sponsor, maintenance of the Project Management Plan, which presents the Federal and non-Federal requirements, costs, and schedule required for implementation of the recommended plan. The Corps project manager, with assistance from the non-Federal project manager (City in-kind services), will monitor expenditures, prepare project management reports as needed, and report study status and issues to the District Engineer.

XVI. Supervision and Administration

a. Scope of Work. This task includes the District-wide supervision and administration overseeing the prosecution of work throughout the study and report preparation. .