CHAPTER 1.0

INTRODUCTION

The severe storms of 1986 and 1997 revealed the inadequacies of Sacramento's existing flood control system and the urgent need for increase flood protection appropriate for a major metropolitan area. Significant work is underway to reduce the risk of flooding from the American River. This work is the product of agreements and partnerships between numerous agencies and organizations, notably the U.S. Army Corps of Engineers (Corps), the State of California Reclamation Board (Reclamation Board), the Sacramento Area Flood Control Agency (SAFCA), and the U.S. Bureau of Reclamation (Bureau). After this work is completed in 2007, the Sacramento area will benefit from a reduction in its risk of flooding to approximately a 1-in-164 chance (from a 1-in-85 chance) in any given year. Although this is a significant decrease in risk, the substantial loss of life and property that would result from uncontrolled American River flows justifies continued study and further improvements to Sacramento's flood control system.

The Lower American River flood plain has significant natural ecosystem assets that have become increasingly valued in California. Surface and subsurface river flows and water from tributary runoff provide opportunities to improve riparian woodlands, wetlands, and flood plain grasslands along the Lower American River.

The Integrated Document and its supplemental appendices explore alternatives for providing a comprehensive solution to the Sacramento area's flood control problems. The Integrated Document explains both the plan formulation process used to identify and compare alternatives and the environmental effects of the alternatives. Each alternative contributes to the ecosystem restoration of portions of the Lower American River.

During plan formulation, a rationale was developed for creating alternatives; evaluating the alternatives; determining the Federal interest; and selecting a recommended plan, which includes cost sharing and other Federal and local cooperation. The plan formulation portion is described in Chapter 4. The Integrated Document for the American River Watershed, California, Long-Term Study supplements the 1991 American River Watershed Investigation Feasibility Report and the 1996 American River Watershed Project Supplemental Information Report (SIR).

1.1 Purpose and Need

1.1.1 Purpose

The Corps, the Reclamation Board, and SAFCA the sponsors of the American River Watershed Long-Term Study are seeking to plan, design, and implement a flood damage reduction project that would significantly decrease the risk of flooding along the main stem of the American River in the Sacramento area. The objective of the Reclamation Board and SAFCA is to reduce the risk of flooding to the maximum extent possible, which has often been described as reducing the flood risk to no greater than a 1-in-200 chance in any given year. The Corps' policy is to provide increased flood damage reduction consistent with applicable Federal planning principles and guidelines that focus on identifying and providing financial assistance for the plan that maximizes national economic development (known as the NED Plan) while

protecting the nation's environment. The NED Plan describes the maximum net economic benefits as determined by average annual benefits, including flood damages avoided, less average annual costs.

In addition to flood damage reduction, a primary mission of the Corps' Civil Works program is ecosystem restoration. Ecosystem restoration is focused on returning natural areas or ecosystems to a close approximation of their conditions prior to disturbance or to less degraded, more natural conditions. Ecosystem restoration is formulated in accordance with the principles and guidelines for water and related land resources studies. A National Ecosystem Restoration (NER) Plan, which reflects the ecosystem restoration plan that maximizes benefits at the least cost, will be identified.

1.1.2 Need

The realization of the need for a decrease in flood risk for Sacramento arose in February 1986 when major storms in northern California caused record floodflows in the American River watershed. The 1986 storm was the largest documented storm of record. Outflows from Folsom Dam, together with high flows in the Sacramento River, caused the river stages to exceed the designed safety margin of levees protecting the city of Sacramento. Emergency repair work was required at several locations along the Garden Highway and in the Pocket area of Sacramento. If these storms had lasted much longer, major sections of the levee likely would have failed, causing probable loss of human life and billions of dollars in damages.

In January 1997, extreme rainfall in the Upper American River watershed again revealed the need for increased flood protection. High rainfall in the Sierra Nevada mountains resulted in record flows in both the Sacramento and the San Joaquin rivers. Several gaging stations used to measure the water level in streams and rivers recorded the largest precipitation peaks in the history of their operation. The effects of the 1986 and 1997 storms raised concerns over the adequacy of the existing flood control system, which led to a series of investigations of the need to provide additional protection for the Sacramento metropolitan area. The 2002 Integrated Document is the result of these recent investigations.

1.2 Authorization

The basic authority for the overall study is the Flood Control Act of 1962 (Public Law [PL] 87-874), which states:

> Sec 209. The Secretary of the Army is hereby authorized and directed to cause surveys for flood control and allied purposes, including channel and major drainage improvements, and floods aggravated by or due to wind or tidal effects, to be made under the direction of the Chief of Engineers, in drainage areas of the United States and its territorial possessions, which include the following named localities: …
>
> Sacramento River Basin and streams in northern California draining into the Pacific Ocean for the purposes of developing, where feasible, multipurpose water

resource projects, particularly those which would be eligible under the provisions of title III of Public Law 85-500.

Although this authorization applies to the overall study of the American River watershed, specific direction for the current effort is provided by Section 566 of the Water Resources Development Act (WRDA) of 1999 (PL 106-53):

SEC. 566. FOLSOM DAM AND RESERVOIR ADDITIONAL STORAGE AND ADDITIONAL FLOOD CONTROL STUDIES.

(a) FOLSOM FLOOD CONTROL STUDIES–

(1) IN GENERAL–The Secretary, in consultation with the State of California and local water resources agencies, shall undertake a study of increasing surcharge flood control storage at the Folsom Dam and Reservoir.

(2) LIMITATIONS–The study of the Folsom Dam and Reservoir undertaken under paragraph (1) shall assume that there is to be no increase in conservation storage at the Folsom Reservoir.

(3) REPORT–Not later than March 1, 2000, the Secretary shall transmit to Congress a report on the results of the study under this subsection.

(b) AMERICAN AND SACRAMENTO RIVERS FLOOD CONTROL STUDY–

(1) IN GENERAL–The Secretary shall undertake a study of all levees on the American River and on the Sacramento River downstream and immediately upstream of the confluence of such Rivers to assess opportunities to increase potential flood protection through levee modifications.

(2) DEADLINE FOR COMPLETION–Not later than March 1, 2000, the Secretary shall transmit to Congress a report on the results of the study undertaken under this subsection.

Corps headquarters provided the following guidance for implementing Section 566 through a memorandum dated January 18, 2000:

- Prepare a feasibility-level report that addresses increasing the surcharge flood control storage at Folsom Dam and Reservoir assuming no increase in conservation storage at Folsom Reservoir;

- Prepare a feasibility-level report that addresses all the levees on the American River and on the Sacramento River downstream of and immediately upstream of the confluence of such rivers to assess opportunities to increase flood protection through levee modifications, and

- Prepare an interim report to meet the Section 566 requirements for a report on March 1, 2000. (The interim report was completed and made available in January 2000.)

Thus, flood control alternatives considered in this study will focus on increasing Folsom Dam flood storage; modifying Lower American River and downstream levees; and a combination of modifying Lower American River and downstream levees and increasing Folsom Dam storage.

1.3 Study Location

The city of Sacramento is located where the American River joins the Sacramento River. The American River watershed, or drainage basin, covers approximately 2,100 square miles northeast of Sacramento and includes portions of Placer, El Dorado, and Sacramento counties (Plate 1-1). Runoff from this basin flows through Folsom Reservoir and passes through Sacramento in a channel controlled by a system of levees. Folsom Dam and Reservoir are part of the Federal Central Valley Project (CVP), one of California's major water delivery systems.

1.4 Background

The effects of the February 1986 storms raised concerns over the adequacy of the existing flood control system, which led to a series of investigations for the purpose of providing additional flood protection to the Sacramento area. Plate 1-2 displays the timeline of these investigations.

In 1991, the Corps, the Reclamation Board, and SAFCA completed the initial feasibility study for the main stem American River and the Natomas Basin. (The Natomas Basin is just north of downtown Sacramento, at the confluence of the American and Sacramento rivers.) The purpose of that study was to define the flood risks to the Sacramento area, develop flood protection alternatives consistent with other water resource needs and opportunities in the study area, and recommend a plan for implementation. Many alternatives were evaluated in that study. The resulting plan, recommended in the 1991 Feasibility Report, was a flood detention dam just downstream of the confluence of the North and Middle Forks of the American River and levee improvements in the Natomas Basin. This plan would reduce the risk of flooding in Sacramento to a 1-in-270 chance of occurring in any given year.

Following completion of the Feasibility Report, Congress provided guidance relating to the American River Study in Section 9159 of the Department of Defense Appropriations Act of 1993 (PL 102-396). This act authorized the construction of much of the work identified in the Natomas Basin as described in the Feasibility Report. It also directed that additional studies be conducted to identify a project for increased flood protection along the American River. In response to Congressional direction, the Corps and its local sponsors, the Reclamation Board and SAFCA, prepared the 1996 SIR to provide information in addition to that presented in the 1991 Feasibility Report. The SIR was a comprehensive analysis that reformulated measures and alternatives to increase flood protection for the Sacramento Area. The report presented three candidate plans: the Folsom Modification Plan, the Folsom Stepped Release Plan, and the Detention Dam Plan. The Detention Dam Plan was the National Economic Development (NED) Plan.

In 1996, Congress considered the findings in the 1996 SIR and addressed the desires of local and regional interests. In the WRDA of 1996, Congress authorized the following elements of the plans recommended in the SIR:

- Levee modifications along both banks of the Lower American River
- Levee modifications along the east bank of the Sacramento River downstream from the Natomas Cross Canal
- Installation of streamflow gages upstream from Folsom Reservoir and modification to a flood warning system along the Lower American River

These flood control elements are known as "Common Features." Construction is presently underway to implement these project elements.

WRDA 1996 also authorized continued reoperation of Folsom Reservoir to achieve variable flood control space.

In 1999, the Corps, SAFCA, and the Reclamation Board prepared an information paper that provided additional information on four plans that were identified by various interest groups to reduce the flood risks to the Sacramento area.

The four plans are as follows:

- Folsom Modification Plan – This plan primarily consists of increasing the release capacity of Folsom Dam by constructing five new river outlets below the existing auxiliary spillway, enlarging the eight existing river outlets, and modifying the existing stilling basin and increasing the operational flood control storage space in Folsom Reservoir. The plan also includes strengthening existing levees along the Lower American River.
- Folsom Stepped Release Plan – This plan consists of features similar to the Folsom Modification Plan, "stepping" the objective release from Folsom Dam during infrequent floods from 115,000 cubic feet per second (cfs) to 145,000 and 180,000 cfs.
- Folsom Enlargement Plan – This plan primarily includes raising the existing dam and dikes at Folsom 6½ feet, replacing all eight spillway gates and bridge across the top at the dam, enlarging the eight existing outlet works at Folsom, constructing five new outlets, and increasing the stability of existing levees along the Lower American River.
- Folsom Modification and Upstream Storage Plan – The principal feature of this plan is a flood detention dam 350 feet high on the North Fork of the American River near Auburn. The plan also includes features similar to those of the Folsom Modification Plan.

Under Section 101 of WRDA of 1999, Congress authorized physical and operational modifications at Folsom Dam, generally consistent with the SIR and the Folsom Dam Modification Plan described in the SAFCA Information Report entitled Next Step for Flood Control along the American River, prepared by SAFCA in March 1998. These modifications, which are being refined and designed by the Corps, are as follows:

- Enlarging existing river outlets
- Modifying surcharge storage
- Updating the Folsom Dam Flood Management Plan to take advantage of improved weather forecasting
- Completing a revised water control manual for Folsom Dam that modifies the variable flood control space originally instituted by Folsom reoperation

These modifications are expected to be completed in 2008.

Section 366 of WRDA of 1999 authorized modifications to the Common Features project authorized in WRDA of 1996. These modifications primarily consist of additional strengthening and raising of levees along the American River and Natomas Cross Canal. Construction of these features is expected to be completed in 2004. Detailed design efforts are underway to implement Section 101 and Section 366 project features (Plate 1-2).

1.5 National Environmental Policy Act and California Environmental Quality Act

NEPA is the Nation's charter for environmental protection. The act establishes policy, sets goals, and provides a means for carrying out its policy. Section 102(2) of the act contains action-forcing provisions to make sure that Federal agencies act according to the letter and spirit of the act, including a provision to prepare a detailed statement now called an Environmental Impact Statement (EIS) on the effects of a proposed Federal action. The Federal regulations for implementing the procedural provisions of NEPA were published by the Council on Environmental Quality (CEQ) in the Code of Federal Regulations (CFR) as 40 CFR Parts 1500-1508 (43 Federal Register 55978-56007, November 29, 1978).

This report integrates plan formulation with documentation of environmental effects. This report is also a Supplemental Environmental Impact Statement/Supplemental Environmental Impact Report (SEIS/SEIR) to the 1991 and 1996 studies. The SEIS satisfies the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended, and the SEIR satisfies the requirements of the California Environmental Quality Act (CEQA).

This report employs the concept of integration established in the CEQ's NEPA regulations. Integration is based on the CEQ provision to combine documents. The CEQ provision states that "any environmental document in compliance with NEPA may be combined with any other agency document to reduce duplication and paperwork" (40 CFR 1506.4). The Corps regulations permit an EIS ("environmental document") to be either a self-standing

document, combined with and bound in a feasibility report ("agency document"), or an integration of NEPA-required discussions in the text of the report. To reduce paperwork and redundancies and to consolidate documentation into one consistent report, the Corps elected to integrate discussions that normally would appear in an EIS into the feasibility report. Sections in this integrated report that include NEPA-required discussions are marked with an asterisk in the table of contents to assist readers in identifying such material.

CEQA encourages the preparation of joint documents and the close cooperation of Federal and State agencies involved with the same project (CEQA Guidelines Section 15222). This reduces duplication of effort between Federal and State agencies and is consistent with the NEPA guidelines that encourage Federal agencies to work closely with State and local agencies.

CEQA also indicates that an Environmental Impact Report (EIR) may be prepared as part of a project report and that the report sections required in an EIR be identified (CEQA Guidelines Section 15120). The Supplemental Plan Formulation Report/EIS/EIR meets these requirements. The sections of this report required under CEQA are identified in the Table of Contents by a pound sign (#).

1.6 Public Review of Draft Report

Public review of the draft report, part of the NEPA and CEQA processes, occurred in September and October of 2001. However, the draft report did not select or recommend a plan. The local sponsors, SAFCA and the Reclamation Board, have used the public comments from this review to identify a locally preferred plan and to develop the final version of the report. This report presents a summary of the information developed to date on existing conditions and future conditions with and without the project; flood control and ecosystem restoration problems and opportunities; a description of the alternative formulation process; a description and comparison of the alternatives, including their effects, and the recommended plan.

1.7 Public Concerns

1.7.1 Public Scoping

Background

The process of determining the scope, focus, and content of an EIS/EIR is known as scoping. Scoping assists the lead agencies in determining the substantive issues to be addressed. The purposes of scoping are to: help identify the range of actions, alternatives, and environmental effects to be evaluated in depth in the EIS/EIR; bring together interested governmental agencies, project sponsors, and other interested parties to discuss and help resolve concerns; and eliminate from further study those issues that are not important to the decision-making process.

This section provides an overview of the scoping process for the American River Watershed Project Long-Term Study and the SEIS/SEIR. A scoping report included in Attachment 2 of Appendix A provides additional detail on the scoping process and the outcome of that process.

Tools used during scoping include the notice of intent (NOI) prepared by the Federal lead agency; the notice of preparation (NOP) prepared by the State lead agency; scoping meetings; and early consultation with governmental agencies and the public.

Notice of Intent and Notice of Preparation

The Corps published the NOI to prepare a supplemental EIS/EIR on the American River Watershed Project in August 2000. The Reclamation Board prepared and issued an NOP to prepare a supplemental EIS/EIR on September 21, 2000. The publication of the NOP began the formal scoping period, which ended on October 20, 2000. During the scoping period, the Corps and the Reclamation Board conducted scoping meetings and received written comments from agencies and the public.

Scoping Meetings

The Corps, the Reclamation Board, and SAFCA held three public scoping meetings in October 20000. The meetings were held in Folsom, Sacramento, and Woodland, California. To publicize the meetings, the Corps mailed approximately 2,000 meeting notices to interested parties throughout the study region and across the state. In addition, a news release was prepared and forwarded to the local news media.

The scoping meetings were conducted in an open-house format. Participants were provided a self-guided view of exhibits describing the flood control history of the Lower American River and the alternatives to be evaluated in the SEIS/SEIR. Attendees were encouraged to talk with representatives of the Corps, the Reclamation Board, and SAFCA. A court reporter was available at each meeting to record oral comments. Three meeting attendees made oral comments at the scoping meetings. Attachment 2 of Appendix A includes the transcripts of those comments.

Before the formal public meetings, SAFCA facilitated additional scoping by organizing a series of meetings with affected parties and interested agencies. At these meetings, SAFCA encouraged comments and participation from the public. The Corps, Reclamation, and SAFCA addressed these comments in the SEIS/SEIR.

Written Comments

Sixteen comment letters were received by the end of the formal CEQA scoping period, on October 20, 2000. The comment letters are included in Attachment 2 of Appendix A.

Comment Summary

As a result of the scoping process for the supplemental EIS/EIR, the following topics were determined to require evaluation to assess potentially significant effects:

- Land use and agriculture
- Transportation and circulation
- Air quality
- Flood protection alternatives
- Water quality
- Water supply
- Levee improvements
- Flood control and flood risk
- Wildlife habitat
- Wetlands and aquatic ecosystems
- Recreation
- Environmental justice
- Cultural resources

1.7.2 Participants and Coordination

Preparation of this report was accomplished with the close coordination and collaboration of the two local sponsors, the Reclamation Board and SAFCA, and the Bureau, which owns and operates Folsom Dam and Reservoir. The study is being coordinated with the U.S. Fish and Wildlife Service (the Service) and National Marine Fisheries Service (NMFS) to ensure compliance with Federal environmental laws and regulations, and with the State of California Division of Safety of Dams to ensure dam safety compliance.

The Reclamation Board is expected to be the non-Federal sponsor for flood control. SAFCA is expected to be the Reclamation Board's local sponsor for flood control and is the non-Federal sponsor for ecosystem restoration. Both sponsors continue to support the American River Long-Term Study. In addition, they both:

- Judge that the Sacramento area flood risk will remain unacceptably high, even after the currently-authorized American River flood control improvements are completed;

- Believe that for them to select a locally-preferred plan for flood control, the scope of this study needs to be expanded somewhat beyond the alternatives requested in Section 566 of WRDA of 1999 (accordingly, this study examines an advance release alternative that would augment advance release already authorized in WRDA of 1999 as part of the flood management plan update);

- Support ecosystem restoration in the Lower American River floodway and support its inclusion in this study.

1.8 Report Organization

This report has been organized to present information regarding the planning process, project alternatives, and potential impacts. It is intended to meet NEPA and CEQA requirements

for assessing potential adverse impacts on the environment, as well as Corps project reevaluation guidelines. Important NEPA and CEQA terms are presented in Table 1-1.

The document has been divided into ten primary chapters (Chapters 2.0 through 11.0), each dealing with a specific subject area relating to the project components, alternatives, and the planning process. In addition, a detailed impact analysis for each resource under evaluation is included as Attachment 1 of Appendix A. The eleven report chapters are followed by six attachments which provide related data including; comments and responses on the draft report, a list of document recipients, a list of preparers, references, an index, glossary, and list of acronyms and abbreviations.

1.8.1 Chapter 1.0, "Introduction"

Chapter 1.0 provides background information concerning the purpose of and need for the American River Long-Term Study, project authorizations, and project status, as well as the scope and intent of the document. It highlights agency and public concerns expressed during the planning process and notes linkages with other related studies and reports.

1.8.2 Chapter 2.0, "Affected Environment"

Chapter 2.0 provides a detailed presentation of the existing environmental conditions in the project area. It includes a discussion of existing conditions with respect to current facilities, projects, and plans. The chapter also includes a complete discussion of environmental resources that would be affected by implementation of project alternatives.

1.8.3 Chapter 3.0, "Problems and Opportunities"

Chapter 3.0 provides an evaluation of the current constraints, level of risk, and opportunities that are to be addressed by the American River Long-Term Study. In doing so, it identifies the existing flood risk with current improvements, current system inadequacies, flood characteristics, and the current goals for reducing flood risk in Sacramento.

1.8.4 Chapter 4.0, "Plan Formulation and Screening of Flood Damage Reduction Measures"

Chapter 4.0 describes the Corps' planning process with respect to the selection of candidate plans for detailed analysis. The chapter explains the criteria applied to the alternative screening process and the rationale and methodology behind selection of alternatives for detailed evaluation. Correspondingly, a discussion is provided for why alternatives or prospective flood damage reduction measures were eliminated from further consideration.

1.8.5 Chapter 5.0, "Flood Control Alternatives"

Chapter 5.0 presents a description of the plan components, accomplishments, design, operations, and environmental effects of the seven candidate plans addressed in this study. These plans are included in one of the following categories: (1) no action, (2) Folsom Dam raise, and (3) enhanced conveyance.

TABLE 1-1. Important NEPA and CEQA Terms
This table lists terms that are used under NEPA and CEQA.

NEPA	CEQA
Cooperating agency	Responsible agency
Proposed action	Proposed project
No-action alternative	No-project alternative
Environmentally preferred alternative	Environmentally superior alternative
Purpose and need	Project objectives
Affected environment	Environmental setting
Environmental impact statement (EIS)	Environmental impact report (EIR)
Notice of intent (NOI)	Notice of preparation (NOP)
Notice of availability (NOA)	Notice of completion (NOC)
Record of decision (ROD)	Findings

1.8.6 Chapter 6.0, "Ecosystem Restoration for Flood Plain and Fisheries Resources"

Chapter 6.0 describes the environmental restoration plan formulation component of the American River Long-Term Study. Opportunities for restoration along the Lower American River are explained, and specific descriptions of potential restoration sites are identified. The chapter also provides a discussion of the restoration measures, alternative plans, and cost effectiveness and incremental cost analyses of alternatives.

1.8.7 Chapter 7.0, "Environmental Effects and Mitigation"

Chapter 7.0 presents a detailed description of the environmental setting, methods, and assumptions used in the effects analysis; the construction and operation-related environmental effects; and the associated mitigation.

1.8.8 Chapter 8.0 "Evaluation and Comparison of Flood Control Alternatives"

Chapter 8.0 describes the environmental mitigation developed for each alternative, based on the environmental evaluation of Chapter 7.0. Cost estimates and an economic evaluation are presented for each alternative. The economics and performance of alternatives are compared.

1.8.9 Chapter 9.0, "Cumulative and Growth-Inducing Effects and Other Required Disclosures"

Chapter 9.0 addresses other requirements directly and indirectly related to the study, including analysis of cumulative and growth-inducing effects; compliance with other applicable laws, policies, and plans; and other coordination and consultation requirements.

1.8.10 Chapter 10.0, "Recommended Plan and Implementation Requirements"

Chapter 10.0 describes the necessary steps leading to plan selection and implementation. The chapter identifies the estimated project timeline for future actions, defines commitments and responsibilities, and verifies the fulfillment of procedural notice and review requirements and final alternative selection criteria.

1.8.11 Chapter 11.0, "Conclusions and Recommendations"

This chapter is a list of conclusions, reached by the Long-Term Study and provides the recommendation of the Corps' District Engineer.

1.8.12 Chapter 12.0, "Comments and Responses"

This chapter presents comments submitted by Federal, state, and local agencies; special interest groups; and the public on the draft Long-Term Study Draft Supplemental Plan Formulation Report/Environmental Impact Statement/Environmental Impact Report (SPFR/EIS/EIR) for the American River Watershed, California. This chapter also presents

responses to comments. Both NEPA and CEQA require the Federal and State lead agencies to respond to comments received during the public comment period.

1.8.13 List of Preparers

The List of Preparers is a listing of the individuals and organizations that contributed to the preparation of the report.

1.8.14 Document Recipients

The Document Recipients section identifies the agencies, organizations, and persons that were sent copies of the Final Supplemental Plan Formulation Report/EIS/EIR.

1.8.15 References

The References section includes studies, reports, analyses, and other reference materials used in preparation of this report.

1.8.16 Index

The Index presents key words for the report and indicates where the reader can find them addressed in the document.

1.8.17 Glossary

The glossary presents an alphabetical listing of important terms, phrases, and acronyms with their definitions to aid the reader in understanding the document.

1.8.18 List of Acronyms and Abbreviations

Definitions of acronyms and other abbreviations used in the main report (Volume I) are provided in a list at the end of the document.

1.8.19 Appendix A, "Environmental"

Appendix A is divided into attachments that contain technical information and supporting information used in the environmental analysis. This appendix also includes the scoping report, Coordination Act Report, Biological Assessment, Biological Data Report, and ecosystem restoration report.

1.8.20 Appendix B, "Economics"

Appendix B reports risk and uncertainty output and with- and without-project flood damages and with-project benefits.

1.8.21 Appendix C, " Engineering"

Appendix C presents the geotechnical, civil, structural, electrical, and mechanical bases of design. It also describes various hydraulic analyses accomplished for the study. The hydrology discussion describes basin hydrology, reservoir simulation methodology, and the flood risk analysis. The appendix also provides detailed cost estimates for the alternatives.

1.8.22 Appendix D, "Real Estate"

Appendix D provides information regarding the real estate requirements associated with each alternative under consideration.