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EXECUTIVE SUMMARY

1.1 Introduction

This report on the Chatfield Reservoir Storage Reallocation integrates the National Environmental Policy Act (NEPA) process with the Feasibility Study into a single document. Consistent with the U.S. Army Corps of Engineers' (USACE; the Corps) six-step planning process, NEPA also requires the evaluation and comparison of alternatives. It compares the impacts of the alternatives to the ecological, cultural, and aesthetic resources identified and investigated. The NEPA process documents compliance with applicable environmental statutes, such as the Endangered Species Act, the Clean Air Act, the Clean Water Act, the Fish and Wildlife Coordination Act, and the Historic Preservation Act, among others. The integration of the Feasibility Study and the Environmental Impact Statement (EIS) is intended to reduce process overlap and duplication. The integrated process helps assure that well-defined study conditions and well-researched, thorough assessments of the environmental, cultural, social, and economic resources affected by the proposed activity are incorporated into planning decisions.

1.1.1 Study Authority and Federal Interest

The Chatfield Dam and Lake project on the South Platte River Basin in Colorado was authorized by the Flood Control Act of 1950 (Public Law (P.L.) 81-516) for flood control purposes. Chatfield Dam is a rolled earthfill dam 13,057 feet long with a top width of 30 feet, an ungated concrete spillway 500 feet wide located in the left abutment, and a gated concrete outlet works located in the right abutment. Construction began in 1967 and was completed in August 1973. Ultimately, the project was operated for flood control (P.L. 81-516, P.L. 99-662) and other purposes: Recreation (P.L. 89-72, P.L. 99-662, P.L. 93-251); Fish/Wildlife (P.L. 99-662) and Water Supply (P.L. 99-662). By authority provided under Section 808 of the Water Resources Development Act (WRDA) of 1986 (P.L. 99-622), as amended by Section 3042 of the WRDA 2007 (P.L. 110-114), the Secretary of the Army, upon request of and in coordination with, the Colorado Department of Natural Resources (CDNR), and upon the Chief of Engineers' finding of feasibility and economic justification, may reassign a portion of the flood control storage space in the Chatfield Lake project to joint flood control-conservation purposes, including storage for municipal and industrial water supply, agriculture, environmental restoration, and recreation and fishery habitat protection and enhancement. The reallocation was conditioned upon the appropriate non-federal interests agreeing to repay the cost allocated to such storage in accordance with the provisions of the Water Supply Act of 1958, the Federal Water Project Recreation Act, and such other federal laws as the Secretary determines appropriate. The payments would go to the United States Treasury. The recreation modifications and environmental mitigation work are additionally authorized by Section 103(c)(2) WRDA 1986, requiring non-federal payment of 100 percent of the costs of municipal and industrial water supply projects, and this work will be cost shared pursuant to that section.

Section 116 of the Omnibus Appropriations Act of 2009 (P.L. 111-8) authorized the CDNR to perform modifications of the Chatfield Reservoir and any required mitigation which results from implementation of the project. In a letter, dated February 10, 2012, the Colorado Water Conservation Board, a division of CDNR, proposed to accomplish through its agencies and non-federal project partners, the water providers, all the modification and mitigation work for the

project. In addition, Section 116 directed the Secretary to collaborate with the CDNR and local interests to determine costs to be repaid for reallocated storage (as determined under Section 808, as amended) that reflect the limited reliability of the resource and the capability of non-federal interests to make use of the reallocated storage space.

- ▲▲ This report presents the integrated Feasibility Study and EIS and economic justification required by Section 808, as amended, which the Secretary will consider prior to deciding whether to reassign a portion of the flood control storage space to joint flood control-conservation purposes.

1.1.2 Background

The CWCB requested that the Corps consider reallocating space within Chatfield Reservoir for water supply purposes, on behalf of a group of 12 water users (or water providers) in the Denver metropolitan area. While water supply remains primarily a non-federal responsibility, based on current federal authorities (described in Section 1.4), the Federal Government should participate and cooperate with states and local interests in developing such water supplies in connection with multi-purpose projects. The federally-owned Chatfield Reservoir provides an opportunity to help local communities in the Denver metropolitan (Metro) area to meet a growing demand for water. Therefore, it is the purpose of this study to identify alternatives, compare those alternatives, and select the best alternative for meeting the needs based on solid planning principles.

With the main problem being defined as increasing water demand in the Denver Metro area that exceeds available water supplies, the purpose and need statement is as follows:

The purpose and need is to increase availability of water, providing an additional average year yield of up to approximately 8,539 acre-feet of municipal and industrial (M&I) water, sustainable over the 50-year period of analysis, in the greater Denver Metro area so that a larger proportion of existing and future water needs can be met.

The primary objective of the reallocation is to help enable water providers to supply water to local users, mainly for municipal, industrial, and agricultural needs, in response to rapidly increasing demand. Chatfield Reservoir is well placed to help meet this objective for the following reasons: the reservoir provides a relatively immediate opportunity to increase water supply storage without the development of significant amounts of new infrastructure; it lies directly on the South Platte River (efficient capture of runoff); and it provides an opportunity to gain additional use of an existing federal resource.

Three reservoirs, consisting of Chatfield Reservoir, in conjunction with Cherry Creek and Bear Creek reservoirs (i.e., Tri-Lakes), are managed as a system by the Corps to provide flood protection to the Denver Metro area. This flood protection function is still critically important today and cannot be compromised.

With approximately 1.5 million visitor days annually, Chatfield State Park is one of the most heavily utilized parks, and one of the most vital components, of the Colorado State Parks system. Given its close proximity to both the Denver Metro area and the foothills, Chatfield State Park provides a valuable and unique opportunity for the public to connect to the natural world through camping,

boating, hiking, fishing, biking, horseback riding, and wildlife viewing. Colorado Parks and Wildlife works to protect and enhance fish and wildlife habitat at and around Chatfield State Park.

1.1.3 Project Location

Chatfield Reservoir is located southwest of Denver, at the confluence of the South Platte River and Plum Creek within the South Platte River Basin. The study area encompasses the area in the immediate vicinity of Chatfield Reservoir and extends downstream to where the river intersects the Adams/Weld county line. The reservoir's location is directly on the South Platte River, or "on-channel."

1.1.4 Study Sponsor

The Chatfield Reservoir storage reallocation study is being conducted jointly between USACE and the local sponsor, the CWCBC. The study costs for the project were divided evenly between these two agencies.

1.1.5 Cooperating Agencies

There are a number of entities that have been invited by the Corps to participate in the Chatfield Reservoir storage reallocation study as Cooperating Agencies and Special Technical Advisors. These include selected federal, state, and local government entities, the project participants (i.e., water providers), and several environmental groups. The Cooperating Agencies and Special Technical Advisors were given the opportunity to participate in project meetings and review and comment on the Preliminary Draft chapters of the Feasibility Report/Environmental Impact Statement (FR/EIS). Coordination with agencies and compliance with environmental statutes and regulations are described in Appendix S, including coordination letters.

1.2 Study Objectives

1.2.1 Problems and Opportunities

The water resource problem to be addressed is the inadequate supply of water to meet increasing water supply demand in the Denver Metro area over the next 50 years due to the combined effects of population growth, depletion of nonrenewable groundwater sources, and agricultural water providers' need for augmentation water for alluvial wells.

Problems

1. Population growth resulting in increased M&I water demands:

The CWCBC's "Statewide Water Supply Initiative" (SWSI) estimates the state's population will be between 8.6 and 10.3 million in 2050 compared to a 2010 population of 5.0 million. The SWSI includes several "Identified Projects and Processes" (IPPs), including the Chatfield Reallocation Project, to meet the needs of the Denver Metro area. Even with the IPPs, it is expected that a significant gap in water supply availability would remain (potentially 262,700 to 435,000 acre-feet).

¹On July 1, 2011, Colorado State Parks and the Colorado Division of Wildlife merged to form Colorado Parks and Wildlife.

The 12 prospective recipients of reallocated storage space in Chatfield Reservoir (i.e., water providers) each have immediate and future water needs which will extend beyond current supplies. The water providers project their demand to increase from 249,597 acre-feet in 2010 to at least 365,601 acre-feet in 2050.

2. Reliance of some municipal water providers on nonrenewable Denver Basin groundwater:

The use of Denver Basin groundwater for municipal water supplies has been determined to be an unacceptable long-term supply due to severely increasing costs and the problems of currently reduced water availability and reliability that will continue to worsen in the future (Black & Veatch et al., 2003).

3. Agricultural water providers need augmentation water for alluvial wells:

The agricultural water providers seeking Chatfield storage space are also facing an urgent water supply situation. Numerous agricultural water wells of these users are located in the alluvium adjacent to the South Platte River. These wells generally have junior water rights and when owners of senior water rights downstream place a call (or request water) during the irrigation season the agricultural usage from the wells is curtailed or completely halted under Colorado water law unless so-called “augmentation water” is available for release to the river to cover the out-of-priority depletions from the well pumping. Currently, well pumping from approximately 450 alluvial water wells has been curtailed completely and pumping from another approximately 2,000 wells has been partially reduced by court order until necessary augmentation water is secured. These wells supply water to 25,000 to 30,000 irrigated acres and divert approximately 25,000 acre-feet of water per year. The drought of 2002 to 2007, considered the worst drought in the last 300 years, exacerbated the situation. The well pumping curtailment is severely impacting well users and adversely impacting local economies.

Opportunities

1. Expanding the use of an existing storage facility to provide additional water supplies:

Storage projects capture water during high-flow years and seasons to be used during low-flow periods, a function that is critical to providing reliable water supplies in a semiarid climate such as Colorado’s where the hydrologic events are highly variable.

2. Chatfield Reservoir’s on-channel location:

The “on-channel” location of the reservoir is a significant advantage over off-channel reservoirs that are limited by the design capacity of diversion and delivery facilities. Additionally, this location provides for the reservoir immediately capturing all available flows that can be legally stored.

3. Chatfield Reservoir’s location at a relatively high elevation within the basin:

Chatfield Reservoir’s location and relatively high elevation within the watershed provides the opportunity to deliver water by gravity flow. Since some water providers already receive water

deliveries from Chatfield Reservoir, the need to construct new conveyances (e.g., ditches, pump stations, and pipelines) is less since an existing structure would be used for storage.

4 Ability to store augmentation water for future use:

The Chatfield Reservoir storage reallocation project would give agricultural water providers additional ability to store augmentation water for later release, thereby giving some relief from the well pumping curtailment situation. ▲

▲▲ 1.2.2 Planning Objectives and Constraints

Planning objectives are the intended purposes of the planning process. Constraints are restrictions that limit the extent of the planning process. Constraints can be legal, policy related or study specific.

Planning Objectives

- Increase availability and reliability of water supply by providing an additional average annual yield of up to 8,500 acre-feet of M & I water, sustainable over a 50-year period, to contribute towards meeting a water supply shortfall projected to be 100,000 acre-feet per year by 2050 for the service area of the 12 water providers.
- Provide, over the 50-year planning period, water supply of equivalent quality as currently supplied to the Denver Metro region.
- Maintain adequate levels of downstream flood control, specifically in the Denver Metro area, over the 50-year period of analysis.
- Ensure the provision of in-kind recreation facilities and experiences, to the extent possible, during the 50-year period of analysis.
- Ensure maintenance of environmental benefits by minimizing environmental impacts, fully mitigating unavoidable significant impacts, monitoring to evaluate the level of success and utilizing adaptive management if needed.
- Become less reliant on non-renewable groundwater by utilizing renewable water supplies, thus extending the availability and life of these critical aquifers for use by future generations.
- Be consistent with the USACE Environmental Operating Principles (EOP).
- Be consistent with the USACE Campaign Plan goals.
- Find collaborative solutions to future Denver Metro area water supply needs.

Planning Constraints

- The project must be completed in a reasonable timeframe.
- Financial capability of sponsoring water providers may be constraining because they are responsible for 100 percent of the costs involved in implementing any alternative.

- The project should minimize the use of others' land or, to the extent possible, the availability or capability of other projects.
- Maintain the conservation pool in Chatfield between 5,423 feet msl and 5,432 feet msl consistent with the contract between the Corps of Engineers and the state of Colorado (March 1, 1979). The state of Colorado signed an agreement with Denver Water granting them the exclusive right to store water in Chatfield in the conservation pool. Storage below 5,432 feet msl cannot be reallocated because of the in-place contract and agreement.
- Reallocation of storage above elevation 5,444 feet msl could adversely impact the flood risk management (FRM) purposes of Chatfield, Cherry Creek, and Bear Creek Reservoirs as described in Appendix B – Tri-Lakes Water Control Plans, as documented in the Corps' Chatfield Antecedent Flood Study (Appendix R). Modifications of project structures that would allow additional storage to be reallocated to avoid affecting Chatfield's FRM functions would require additional Congressional authorization.
- Reallocation of storage less than 7,700 acre-feet was considered by the water providers to provide too little water supply benefits for the costs involved.
- Water providers would need to hold existing or newly acquired water rights and existing, new, or change-case water storage rights in order to store water in Chatfield Reservoir, another reservoir, or in gravel pits.
- The water rights of the sponsoring water providers are relatively junior in seniority, and the sponsors would be able to store water only when their water rights were "in priority", or during "run of the river" high river flows. Consequently, the average year yield is low compared to the water storage volume.
- Water providers desiring to install any infrastructure associated with on- or off-channel water storage or water distribution systems on Corps project lands must apply to the Corps for a land availability determination. If Corps project lands are determined to be available for the proposed infrastructure, the water providers must acquire the appropriate real estate easements and pay any Corps charges in accordance with Corps real estate regulations.
- Unavoidable impacts to environmental resources that are considered significant would need to be fully mitigated. This includes impacts to the federally listed threatened Preble's meadow jumping mouse habitat, migratory bird habitat, and wetlands. Costs of mitigation maintenance and monitoring costs, and any increase in Corps operation costs of an Alternative would be borne 100 percent by the non-federal entities receiving storage.
- The project must comply with the Clean Water Act and other applicable environmental laws and regulations.
- For any recreational facilities and areas that would be impacted by higher pool levels with reallocation, recreation modifications are required in-kind (the same type and amount of facilities) within the boundaries of Chatfield State Park prior to utilization of the reallocated storage. The cost of recreation modifications must be borne 100 percent by the non-federal

entities receiving storage, and are included in the total cost of the project included in Table 5-10.

- Design, materials, and elevations of recreation modification structures need to comply with the provisions of the Northwest Division (NWD) Regulation 1110-2-5, Land Development Guidance at Corps Reservoir Projects, as coordinated with USACE, Omaha District staff.
- If reallocation is implemented, losses of income to Colorado Parks and Wildlife and concessionaires at Chatfield State Park during the construction period for recreation modifications and environmental mitigation will be reimbursed by the non-federal entities receiving storage.
- Water resource infrastructure operations, water sources, including storage and conveyance components, should comprise of proven operational and management practices to minimize risk of failure to provide required yield.
- Any storage expansion or reallocation scenario within an existing reservoir that negatively affects the flood risk management function of the reservoir should be avoided. The Alternatives cannot impact dam safety.

1.3 Alternatives

1.3.1 Development of Alternatives/Screening

One of the key aspects of the NEPA process is the assessment of how various alternatives that meet the purpose and need could affect the environment. NEPA requires, at a minimum, that a “proposed action” be compared to a “no action” alternative. The No Action Alternative represents the most likely baseline conditions that would occur if the proposed project were not to move forward. The “action alternatives” are then compared to the No Action Alternative in order to determine the extent and severity of potential impacts. In addition to the procedures and requirements set forth in NEPA, Corps guidance requires an in-depth analysis following procedures outlined in the “Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies,” also known as the Principles and Guidelines (P&G’s)) as part of the evaluation. As a test of financial feasibility, the governing annual cost of storage is compared to the annual cost of the most likely, least costly alternative that would provide an equivalent quality and quantity of water that the non-federal interest would undertake in the absence of using the proposed federal project. The action alternatives identified and evaluated in the FR/EIS are designed to determine the best and highest use of Chatfield Reservoir. To reach these selected action alternatives, an initial screening of concepts was conducted using a defined set of criteria.

Prior to selecting the four main alternatives considered in detail, other potential alternatives were rigorously explored and evaluated. The alternatives identified for initial screening were evaluated with four general criteria described in the P&Gs: completeness, efficiency, effectiveness, and acceptability. These initial screening criteria definitions were developed based on the planning objectives and constraints identified and summarized in Chapter 2 (Section 2.2). In general terms, these four criteria would encompass the following considerations: 1) Ability to meet purpose and need; 2) Cost; 3) Logistics and technology (including water rights/water availability, land availability, permitting and mitigation feasibility, design and construction feasibility, and operational feasibility);

and 4) Environmental impacts (including significance and ability to mitigate). Furthermore, in keeping with Corps guidance, the development of alternatives considered the Corps' EOP and Campaign Plan goals. The broader view of all alternatives to increase the water supplies for the South Platte River Basin is given in SWSI, Sections 8 and 10, which is included as Appendix C of this report. In general, the alternatives considered fell within the categories of the following concepts: (1) increased storage, (2) importation of water, (3) conversion from agricultural use to municipal use, (4) increased non-tributary ground water (NTGW) use, and (5) increased water conservation.

The initial screening process demonstrates that alternatives for the importation of water or agricultural conversion have vastly higher expense and increased environmental impacts compared to the other alternatives. Importation and agricultural water conversion projects are very complex, high-impact projects that are feasible only if large volumes of yield are realized. They generally include new storage reservoirs, hundreds of miles of pipelines, and multiple pump stations. They are not realistic alternatives to a project yielding 8,539 acre-feet per year and therefore have been eliminated from further alternative consideration. As such, storage options, NTGW, and water conservation were the main considerations in the analysis found in this report.

1.3.2 Alternatives Considered in Detail

As mentioned above, several concepts were initially developed and screened using the Corps' planning process. While many alternatives were eliminated from further detailed evaluation, the screening process did lead to the refinement of four main alternatives. The alternatives considered in detail in the FR/EIS are:

1. **No Action—Penley Reservoir combined with Gravel Pit Storage.** Under the No Action Alternative flood control storage space within Chatfield Reservoir would not be reallocated to joint flood control-conservation storage (hereafter referred to as conservation or water supply storage/pool), and the operation of the reservoir would remain the same. For this alternative it was assumed the water providers would use Penley Reservoir and gravel pit storage to meet their future water needs. The water providers would newly construct Penley Reservoir and would install the infrastructure needed to convert existing gravel pits for water storage.
2. **Least Cost Alternative to Chatfield Reservoir storage reallocation—NTGW combined with Gravel Pit Storage.** Normally the No Action Alternative is also the Least Cost Alternative. However, the water providers participating in the Chatfield Reservoir reallocation study are opposed to long-term use of NTGW due to water supply management strategies of becoming less dependent on non-renewable water supplies. For this study, it is assumed that NTGW could provide water to a significant part of upstream water providers through the 50-year planning period, and downstream water providers would be served by the development of gravel pits for water storage.
3. **Reallocation to allow an additional 20,600 acre-feet of Water Supply Storage.** The 20,600 Acre-Foot Reallocation Alternative would reallocate storage from the flood control pool to the conservation pool. The additional storage would be used for M&I water supply, agriculture, recreation, and fishery habitat protection and enhancement purposes. Under this alternative, the base elevation of the flood control pool would be raised from 5,432 to 5,444 feet msl but the

reallocation of storage for this proposal involves only the volume between 5,432 and 5,444 feet msl.

4. Reallocation to allow an additional 7,700 acre-feet of Water Supply Storage combined with NTGW and Gravel Pit Storage. The 7,700 Acre-Foot Reallocation Alternative, like Alternative 3, would reallocate storage from the flood control pool to the conservation pool for multiple purposes. Again, the additional storage would be used for M&I water supply, agriculture, recreation and fishery habitat protection and enhancement purposes. Because the average year yield from Chatfield Reservoir storage reallocation for Alternative 4 is less than the average year yield for Alternative 3, additional water supply sources (NTGW and downstream gravel pit storage) are also included in Alternative 4 so that the total average year yield equals 8,539 acre-feet, but the reallocation of storage for this proposal involves only the volume between 5,432 and 5,437 feet msl.

For consistent comparison purposes, each alternative was designed to provide an average year yield of 8,539 acre-feet, which corresponds with the yield under the maximum (20,600 acre-feet) reallocation alternative (Alternative 3). Alternatives 1 and 2 do not reallocate storage in Chatfield Reservoir, and as such, the current operations and water levels would remain unchanged with the base elevation of the flood control pool at 5432 feet msl. Alternatives 3 and 4 both consider reallocating storage from the flood control pool to the conservation pool, which would result in changes to the reservoir operations and would raise the base elevation of the flood control pool in the reservoir to 5,444 feet msl (Alternative 3) and 5,437 feet msl (Alternative 4). The Corps considers Alternative 3 the preferred alternative. The alternatives are discussed in detail in Chapter 2 of the FR/EIS.

1.3.3 Comparison of Alternatives

Alternatives 1, 2, 3 and 4 are summarized and compared in the following sections.

1.3.3.1 Financial Comparison

Table ES-1 compares the alternative costs needed to provide (yield) 8,539 acre-feet of equivalent quality water to the water providers. The present value of costs to develop, treat, deliver the water, and to operate, maintain, repair, rehabilitate, and replace (OMRR&R) the required facilities for 50 years are included in order to do the comparison of total financial costs of the alternatives.

Table ES-1
Cost of the Alternatives in Millions

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Cost of Chatfield Storage	\$0.0	\$0.0	\$16.0	6.0
Infrastructure Costs	244.9	146.1	0.78	85.0
Environmental Mitigation	\$0.0	\$0.0	\$58.5	\$21.9
Recreation Modification	\$0.0	\$0.0	\$47.3	\$23.5
Present Valued OMRR&R	\$38.48	\$39.99	\$56.04	\$43.70
Total	\$283.4	\$186.1	\$178.7	\$180.2

1.3.3.2 Environmental Comparison

Section 2.8 and summary Table 2-9 of the main report compare the potential environmental impacts of the alternatives. It is difficult to say what the exact new condition of the environmental resources at Chatfield would be for Alternatives 3 and 4 due to the expected but unpredictably high level of fluctuation of water levels associated with these alternatives. For example, it is difficult to say exactly what the impacts to water dependent habitat might be (e.g., cottonwood trees or wetlands) if there is substantial uncertainty in knowing exactly where water surface elevations might be on an annual or seasonal basis. As such, a conservative approach to the impact analysis was taken to reflect the maximum potential impacts that might be associated with the inundation of environmental resources. This worst-case scenario approach was taken to ensure adequate mitigation could be planned and subsequently reasonably attained for any potential impacts that may develop. The table also provides a synopsis of actions to avoid and/or reduce potential impacts. Environmental impacts associated with each alternative are discussed in detail in Chapter 4. In addition, impacts to federally-listed threatened, endangered, and candidate species (T&E species), and their critical habitat, from the preferred alternative (i.e., Alternative 3) are described in the Biological Assessment (Appendix V).

Although a worst-case scenario approach was taken to ensure adequate mitigation would be planned and implemented, it is unlikely that all vegetation and wildlife habitat will be lost below the new reservoir high water line with reallocation (i.e., 5,444 feet msl for Alternative 3) so an adaptive management approach to implementation will be used. Chapter 4 describes the more likely scenario. For example, for Alternative 3 the lower limit of persistent vegetation is estimated to be 5,438 feet msl with losses of upland vegetation and gains of wetland and riparian vegetation between 5,438 feet msl and 5,444 feet msl. The Tree Management Plan (Appendix Z) calls for retaining trees above 5,439 feet msl and using a monitoring and an adaptive management approach to subsequently remove trees between 5,439 feet msl and 5,444 feet msl on an as-needed basis to eliminate potential risks to visitors and dam safety and operations.

1.3.3.3 Environmental Operating Principles (EOP)

The Environmental Operating Principles (EOP) and associated doctrine highlight the Corps' roles in, and responsibilities for, sustainability, preservation, stewardship, and restoration of our nation's natural resources. It is an important sub-goal of the Corps to meet these EOP. Chapter 2, Section 2.8.3 Consistency of Alternatives with the EOP, includes an assessment of the consistency of each of the alternatives with the seven EOP.

1.3.3.4 Trade-off Analysis

A detailed trade-off analysis is presented in Chapter 5. It should be noted, with Alternative 3, the costs are less than with the other alternatives, it provides storage for renewable surface water in an existing reservoir, and because it is located on the South Platte River it can capture flows associated with water providers' junior water rights more efficiently than the other alternatives. Additionally, Alternative 3 would use surface water, a renewable source, rather than NTGW that is not renewable.

1.3.3.5 Key Risks and Uncertainties

The study includes analyses of impacts and costs, and there are uncertainties associated with the assumptions used in these analyses. The key risks and uncertainties include modeling of elevations and downstream flows, mitigation and modification plans, and impacts of flood control benefits.

Chapter 5 includes a discussion of the main sources of uncertainty, such as the modeling of the reservoir pool elevations and downstream flows. Standard models and conservative assumptions were used in the study in order to reduce the uncertainties. While mitigation and modification plans have been developed (including an adaptive management component) in coordination with resource agencies, there is still a level of concern that implementing a reallocation could lead to a somewhat different condition for which environmental mitigation or recreational facility modification has not been designed appropriately. In order to relieve these concerns, the water providers are working closely with resource agencies to reach consensus on potential projects and/or project features that might be implemented that would provide additional benefits where the mitigation and modification plans leave off. These projects would be implemented as a part of the non-federal requirements that lie outside of the federal interest.

1.3.3.6 Impacts to Flood Control

Evaluation of the impacts of reallocation on flood control benefits included evaluation of impacts at Chatfield Reservoir, as well as impacts at Bear Creek Reservoir and Cherry Creek Reservoir, and on the South Platte River from Chatfield Reservoir to Julesburg, Colorado. Impacts on flood control benefits were evaluated through use of a hydrologic model to simulate the operations at Chatfield, Cherry Creek, and Bear Creek Reservoirs for the historical period of record. An adjustment was made in the model to historic streamflows to account for current urbanization through the study reach, and the model was used to develop flow and elevation duration and probability relationships for the reservoirs and for the South Platte River downstream of the reservoirs for with and without project conditions. Reallocation would not impact the primary flood risk management purpose of Chatfield Reservoir. During Tri-Lakes system flood control storage evacuation for Level I (small flood events), as defined in Appendix B – Tri-Lakes Water Control Plans, the reallocation of flood control storage at Chatfield slightly increases releases and affects the timing and duration of releases made from Cherry Creek and Bear Creek Reservoirs though the primary flood risk management purpose for Cherry Creek and Bear Creek Reservoirs is not affected. Reference Appendix B – Tri-Lakes Water Control Plans for an example of how the release magnitudes are affected. There is no change to system flood control storage evacuation releases during Level II (large flood events), as defined in Appendix B – Tri-Lakes Water Control Plans. The target flow past the South Platte River at Denver, Colorado stream gage of 5,000 cfs is unchanged, thus there is no net effect past Henderson and Julesburg, Colorado.

Because the period of record does not include extremely large flood events, the impacts of reallocation on the Reservoir Design Flood and Inflow Design Flood were also evaluated. The Reservoir Design Flood is the size of flood a reservoir is designed to store with minimal or no releases from the reservoir, and this flood normally produces a reservoir pool elevation near the spillway crest. With reallocation, the Reservoir Design Flood could still be controlled with a shorter release shutdown period of three days following that event. The original Reservoir Design Flood was based on a release shutdown period of five days. The Inflow Design Flood (or Spillway Design Flood) is used to determine the size of the spillway and height of the dam embankment. The evaluation of the Inflow Design Flood included a more detailed analysis of the antecedent flooding conditions. With the proposed reallocation, and use of an antecedent flood of 40 percent of the Probable Maximum Flood, the resulting maximum pool elevation in the reservoir was 5520.9 feet msl, as compared to the original maximum pool elevation of 5521.6 feet msl.

1.3.3.7 Choosing the Selected Plan

The Chatfield reallocation alternative with 20,600 acre-feet of reallocated storage is the Selected Plan. This plan is the least cost alternative, the locally-preferred plan and would provide \$8.42 million in annual National Economic Development (NED) benefits. The total annual NED project cost would be \$7.92 million. The adverse impacts to recreation and the environment are mitigable and would be mitigated to the most sustainable alternative to below a level of significance. The Recreation Modification Plan (Appendix M) provides a detailed plan for addressing recreation impacts at Chatfield State Park. A Compensatory Mitigation Plan (CMP), Appendix K, was developed to address environmental impacts associated with Alternative 3.

The water providers continue to work with Colorado Parks and Wildlife (formerly Colorado State Parks and Colorado Division of Wildlife) staff to identify the additional features that will enhance the recreational experience and provide ecological benefits beyond required modification and mitigation plans. The water providers have developed a preliminary list of these additional measures, based on input from Colorado Parks and Wildlife staff and other non-governmental organizations and the general public. See Chapter 6, Section 6.2.3.

1.3.4 Selected Plan

1.3.4.1 Plan Components

The Selected Plan would reallocate 20,600 acre-feet of Chatfield's flood control storage to water supply storage. Environmental mitigation and recreation modifications are significant components of the plan, as they are required to address the adverse impacts caused by changing the operation of the reservoir, which would involve a significant change in how water levels fluctuate within the reservoir. In addition, adaptive management is an integral component of the overall plan, which will help in addressing issues that may arise post-decision.

1.3.4.2 Design/Construction Considerations

The water providers would construct facilities required to collect, transfer, treat, and distribute the additional water reallocated from Chatfield Reservoir. The water providers would finance all environmental mitigation and recreation modifications. The Corps of Engineers, U.S. Fish and Wildlife Service, and state of Colorado would review the design and monitor the construction of mitigation and modification measures.

1.3.4.3 Operation and Maintenance Considerations

The water providers would be responsible for the operation, maintenance, and repair of infrastructure, treatment, and distribution facilities associated with the additional water. They would also provide their share of the Chatfield Project operation, maintenance, repair, rehabilitation, and replacement (OMRR&R) costs. The water providers would be responsible for monitoring the mitigation sites for five years following development and managing the mitigation sites over the period of analysis.

1.3.4.4 Financial Feasibility Considerations

Financial feasibility of the Selected Plan is established by comparing the alternatives from two standpoints: NED costs and financial costs, which are presented in detail in Chapter 5 and

Appendix O. Tables ES-1 and ES-2 show the total implementation and OMRR&R financial costs and the annual financial costs, respectively, for the alternatives.

The financial cost comparison identifies the alternative that minimizes the costs the water providers would expend implementing each alternative. To develop comparable alternatives, for both the financial analysis and the NED analysis the costs were adjusted to the same price level taking into consideration that water must be supplied at the same rate over time (benefits) for all alternatives. The costs are adjusted to a base year that is two years after project approval to allow for construction activities (environmental mitigation and recreation modifications) to be completed prior to implementing the reallocation and raising the conservation pool elevation. Identical water supply increments were assumed for development over an 11-year period after approval, in accordance with Tables 13 and 14 in the CMP. Implementation costs for each alternative were then compared by aggregating each alternative's cost over the 50-year planning period into a revised first cost (present value). As shown in Table ES-2, Alternative 3 is identified as having the lowest annual financial costs for the water providers to implement and has the lowest annual financial costs per acre-foot of average year water yield.

Table ES-2
Annual Financial Costs of the Alternatives

	User Costs in \$Millions			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Annualized Initial/Implement. Costs	\$10.92	\$6.51	\$5.47	\$6.08
Annual OMRR&R Costs	\$1.72	\$1.78	\$2.50	\$1.95
Total Annual Costs	\$12.64	\$8.29	\$7.97	\$8.03
Annual Implementation Cost/acre-foot	\$1,278	\$763	\$640	\$712
Annual OMRR&R Cost/acre-foot	\$201	\$209	\$292	\$228
Total Annual Cost/acre-foot	\$1,479	\$971	\$933	\$940

The NED comparison identifies the alternative that maximizes net benefits by comparing the first cost and annual costs of each alternative to the least costly no action alternative (Alternative 2). NED costs differ from financial costs in that they include interest during construction (IDC) and NED benefits foregone but do not include the cost of storage. The NED Selected Plan is Alternative 3, which has a lower investment cost (first cost plus IDC) and lower annual cost than Alternative 2 by \$38,922,400 and \$493,400, respectively. More details of the Selected Plan are provided in Section 1.3.4.5.

1.3.4.5 Plan Accomplishments

The Selected Plan meets all federal NED goals providing \$8.4 million in annual NED benefits to total annual NED project costs of \$7.92 million. It meets Corps of Engineers goals, and all required environmental mitigation and recreation modifications are reasonably attainable. It provides an average year yield of 8,539 acre-feet at less cost than other alternatives for water supply. From a regional economic perspective, the Selected Plan will provide benefits of 2,257 person-years of employment over a 50-year period in the study area and approximately \$318 million in economic output estimated in the region. Although the Selected Plan will require significant modification of existing recreational facilities to offset impacts of the reallocation, the replacement of roads and facilities that are currently over 30 years old can be viewed as a positive aspect of the project. In addition, while the Selected Plan will require mitigation to offset impacts to mainly terrestrial based effects (wetland and riparian habitats, including Preble's meadow jumping mouse critical habitat), there will be positive environmental effects to the fisheries supported by the reservoir. Namely, the inundation of terrestrial habitats will result in increased habitat structure for use by fish and other

aquatic life. In addition, increased primary productivity as a result of increased shoreline inundation will increase productivity at virtually every trophic level in the aquatic food web.▲

Finally, a payment for the cost of storage estimated to be \$16,046,300 at FY2013 price levels will be made to the U.S. Treasury over 30 years at the applicable federal water supply interest rates.

1.3.4.6 Implementation

The Colorado Department of Natural Resources, through its agencies and non-federal project partners will complete 100 percent of the integral work at no cost to the Federal Government per the 1958 Water Supply Act for this reallocation. Said work will involve every phase of design and construction including but not limited to:

1. on-site and off-site environmental mitigation;
2. modification/re-construction of all impacted recreation facilities;
3. utility relocations;▲
- ▲▲ 4. earthwork and shoreline contouring;
5. road, bridge and parking lot construction;
6. demolition, clearing, and grubbing; and
7. vegetation management

The work tasks identified above are further described in Chapter 6, and Appendices K and M. This work is integral in order to ensure in-kind replacement of facilities and to mitigate environmental impacts.

Agreements between the Federal Government, the state of Colorado and the water providers will be executed prior to the reallocation of storage at Chatfield. The water providers would also construct the infrastructure needed to deliver their water for final use. The water providers would be responsible for any specific construction and/or operational costs associated with the reallocation action, environmental mitigation costs, and recreational modification costs. Prior to entering into storage agreements with the Federal Government, the water providers may need to reach separate agreements with the Colorado State Parks Board and/or the Colorado Wildlife Commission related to the Chatfield project, in accordance with Colorado State Law. The Corps continues to have discussions with the state and the water providers to further refine the legal relationship between the entities.

1.3.5 Public Involvement, Review, and Consultation

As the lead agency for the project, USACE developed a public involvement plan to ensure open communications from the beginning of the NEPA process. Specifically, the public involvement program objectives were to:

- Ensure that affected/interested parties receive accurate, timely information throughout the project by mailing the Scoping Notice and Draft FR/EIS Notice of Availability to parties recorded on the mailing list.
- Provide opportunities for affected/interested parties to convey their concerns and opinions and to ask questions as part of the NEPA process and FR public involvement requirements.
- Comply with NEPA, other applicable laws, and USACE regulations.

Chapter 8, Table 8-1 presents a summary of NEPA public involvement performed by USACE for the Chatfield Reservoir storage reallocation study.

On June 8, 2012, the Notice of Availability of the Draft FR/EIS was posted in the Federal Register. The comment period was open from June 8, 2012 to September 6, 2012. A total of 903 comment letters were received on the Draft FR/EIS during the public comment period. All of the comments were reviewed and categorized based on the topic of the comment. Categories with the most comments (in descending order) were mitigation, alternatives, economics, recreation, water rights, NEPA, downstream flow, planning process, and water quality. The Draft FR/EIS has been revised to incorporate responses to substantive public comments, as appropriate. Appendix DD includes a list of all commenters, the consolidated comments, and the Corps of Engineers' responses to the comments on the Draft FR/EIS. Appendix DD also includes copies of the agency comment letters.

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