

CHATFIELD STORAGE REALLOCATION PROJECT

TECHNICAL ADVISORY COMMITTEE (TAC) TAC RECOMMENDATION DOCUMENT - No. 08

SUBJECT: Joint Use Force Main

Rev 06

Date: November 30, 2016

Purpose:

This document serves as the basis of the TAC recommendation on the subject noted above.

Background:

The Park campground and Marina area are served by a gravity sewer system that conveys flow to a lift station near Roxborough Cove. The lift station pumps the sewage into a force main that crosses Plum Creek and then discharges into a sewer line east of the Park boundary that conveys the flow to the Centennial Water and Sanitation District's (CW&SD) wastewater treatment facility.

When the Chatfield reservoir elevation is increased to El 5444.0, the portion of the force main crossing Plum Creek will be inundated. The FR/EIS (Appendix M) anticipated that the line would be relocated to be outside of the new pool and included the work in the 404(b)(1) analysis (Appendix W) related to dredge and fill compliance.

CW&SD has previously agreed to provide sanitary service for the proposed Shea Homes development that is adjacent to the southern border of the Park. In order to provide this service, a force main from Shea Homes would have to cross Plum Creek to reach the CW&SD's wastewater treatment facility.

At a meeting in June 2016, representatives of the CRMC, CW&SD, Shea Homes, the Park, and the Program Manager met to discuss the feasibility of combining the force main serving the Park and the force main serving Shea Homes into one crossing of Plum Creek. The consensus was that combining the lines appeared to be feasible and to the benefit of both parties. A memorandum based on this meeting was prepared, see the attached reference document.

The concept of the Joint Force Main was presented to the TAC on August 18, 2016 for general information and again on October 19, 2016. Following discussion on August 18, the consensus of the participants was that the joint force main had benefits for Park, that the crossing of Plum Creek had been anticipated in the FR/EIS and the crossing was in compliance with the 404(b)(1) analysis of the Project. At the October 19, 2016 meeting, a desire was expressed to provide a more definitive description of the benefits to the Park along with firming up of the agreements between the CW&SD and the Park.

A meeting with the Park, CW&SD, CRMC and the PgM was held on November 2, 2016 and agreements reached between the Park and CW&SD such that the Park would receive substantial

TAC Recommendation Document 08 Joint Use Force Main

benefits. The CW&SD prepared a letter dated November 17, 2016 to the Park that laid out the agreement (see attached).

Reference Documents:

Letter from CW&SD to Chatfield Park, November 17, 2016
CDM Smith, July 26, 2016. Memo. CSRP – Force Main across Plum Creek Rev 06
FR/EIS, July 2013. Appendix M, pages 3-18 and A1-24
FR/EIS, July 2013. Appendix W, pages 1,2, 11, 24

Requested Action:

The TAC is requested to review the reference documents and consider the recommendation developed by the parties involved to combine the two force mains into one crossing of Plum Creek.

Requested Rationale:

Combining the two force mains has the following benefits to the Park and the Project:

- After construction by the CRMC, the CW&SD will own, operate and maintain the Roxborough Lift Station and the force main across Plum Creek, resulting in substantial operational benefits and reduced risks to the Park
- Reduces the number of crossings of Plum Creek and reduces risk of spills
- The combined crossing, consisting of dual, redundant force mains, would provide more reliable service to the Park and reduce the potential for a sewage spill into Plum Creek
- The permitting process is simplified, as the crossing for the Park is already addressed in the 404(b)(1) analysis in the FR/EIS
- Cost sharing will benefit both parties

TAC Rationale:

Combining the two force mains has the following benefits to the Park and the Project:

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TAC Recommendation:

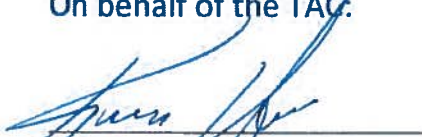
The TAC recommendation is to pursue the proposed joint use force main across Plum Creek as it provides significant benefits to both the Park and the Project. Implementation will require the execution of an agreement between the Park and the CW&SD.

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Joint Use Force Main

TAC Voting:

The TAC members in attendance on October 19, 2016 voted on this Recommendation, in accordance with the TAC Charter Section C. The vote tally was 14 votes to "agree"; 0 votes to "accept"; 0 votes to "reject" the Recommendation with no abstentions from the USACE members present. The recommendation is based on the total votes for "agree" and "accept". TAC-adopted voting procedures also require that any Member voting to "reject" a recommendation to propose alternative(s) for consideration to move the issue forward.

On behalf of the TAC:


Kevin Urie
Chairperson
Kris Wahlers
Vice-Chairperson

REFERENCE DOCUMENTS

1. Letter from CW&SD to Chatfield Park, November 17, 2016
2. CDM Smith, July 26, 2016. Memo. CSRP – Force Main across Plum Creek Rev 06
3. FR/EIS, July 2013. Appendix M, pages 3-18 and A1-24
4. FR/EIS, July 2013. Appendix W, pages 1, 2, 11, 24

CENTENNIAL

WATER AND SANITATION DISTRICT

Reference
Document 1

November 17, 2016

Mr. Scott Roush
Park Manager
Chatfield State Park
11500 N. Roxborough Park Rd.
Littleton, CO 80125
Scott.roush@state.co.us

RE: Proposed Sewer Infrastructure Improvements within Chatfield State Park

Scott,

Centennial Water and Sanitation District (Centennial) currently provides sewer service to the Chatfield State Park (CSP) through an existing lift station that collects wastewater flows from the campgrounds and marina and conveys them through a force main across the Plum Creek drainage to Centennial's system for treatment. As part of the Chatfield Reallocation Project, the existing lift station within CSP must be relocated to a higher elevation and the existing force main must be rerouted to avoid the future inundation limits. Property located immediately south of CSP is located within Centennial's service area and is scheduled for development within the next few years. Centennial recently explored possible wastewater conveyance alternatives to serve the Plum Creek Development in collaboration with the project team for the Chatfield Reservoir Mitigation Company (CRMC) and CSP staff.

The topography of the Plum Creek parcel makes gravity conveyance of wastewater flows from Plum Creek to the Centennial Wastewater Treatment Plant (Centennial WWTP) impossible; therefore, an onsite lift station and force main must be utilized to collect and convey wastewater back to the Centennial WWTP.

Centennial is proposing a joint wastewater conveyance alternative designed to maximize efficiencies and minimize environmental impacts. The preferred alternative includes a lift station located in the northwest corner of the Plum Creek development, with a dual force main in the same trench running east, across the Plum Creek drainage and State Highway 85, to an existing Centennial sewer manhole. The new CSP force main would then run from the relocated lift station location within CSP and run due south to the northern boundary of the Plum Creek development where it would discharge into a proposed Centennial sewer manhole. Wastewater flows from CSP would then flow by gravity westward to the Plum Creek lift station.

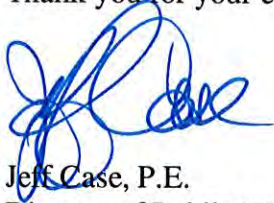


62 West Plaza Drive
Highlands Ranch, Colorado 80129
www.highlandsranch.org

303-791-0430 Telephone
303-791-0437 Engineering Fax
303-791-3290 Financial Services Fax

The proposed alternative reduces the size of the new CSP lift station pumps as it nearly halves the length of force main required to convey flows to Centennial's wastewater system. In addition, Centennial, for purposes of continuity, would propose accepting ownership for operation and maintenance of the State Park lift station and force main upon completion of construction by the CRMC. We are requesting consent of our proposed joint alternative and staff support on our request to the U. S. Army Corps of Engineers to cross CSP with our dual force main. We feel this option is the most efficient and environmentally responsible alternative to provide wastewater treatment for both the Plum Creek Development and Chatfield State Park.

Thank you for your consideration of our request,

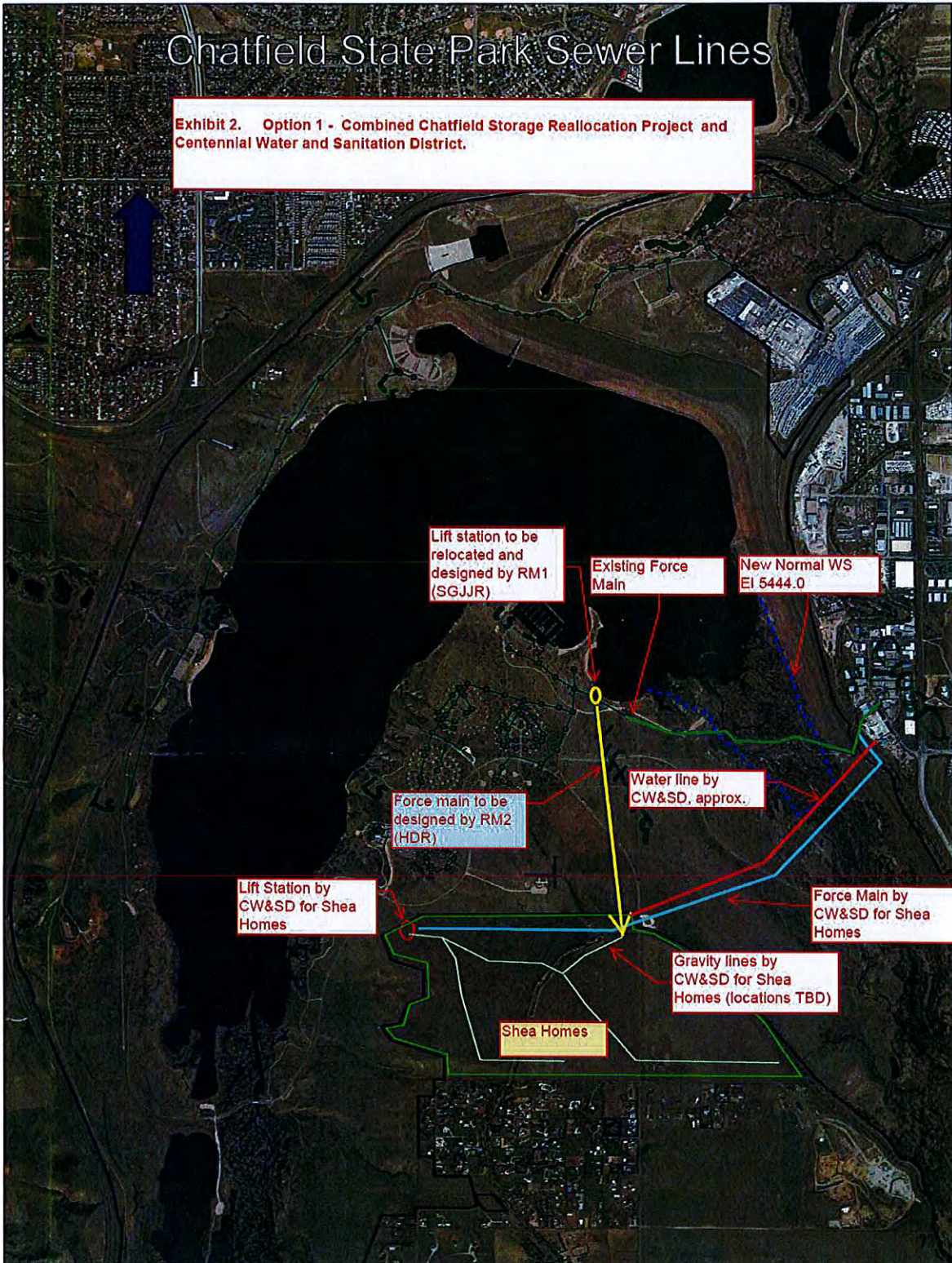


Jeff Case, P.E.
Director of Public Works
Centennial Water and Sanitation District

Cc: Ryan Edwards
Rick McLoud
Barbara Biggs, CDM Smith
Tim Feehan, CRMC

Chatfield State Park Sewer Lines

Exhibit 2. Option 1 - Combined Chattfield Storage Reallocation Project and Centennial Water and Sanitation District.





Memorandum

To: Barbara Biggs, Program Manager

From: Steve Lowry, Deputy Program Manager

Date: July 26, 2016

D R A F T Rev 06

Subject: Chatfield Storage Reallocation Project – Force Main across Plum Creek

All Chatfield State Park facilities on the east side of the Park receive centralized wastewater treatment from the Centennial Water and Sanitation District (CW&SD) through a Park-owned and operated lift station and force main that connects to a CW&SD sanitary sewer manhole east of the Park (see Exhibit 1 – Base Case). As part of the Chatfield Storage Reallocation Project (CSRP), the FR/EIS proposed to relocate the force main originating from the lift station just south of Roxborough Cove across Plum Creek to be out of the inundated area, i.e. above El 5444.0. The FR/EIS included a work item to relocate the sanitary line as well as a cost estimate. In addition, this work was included in the associated 404(b)(1) analysis completed as part of the FR/EIS as open cut construction of the relocated sewer.

Subsequent to the FR/EIS, CW&SD developed plans to provide water and sanitary services to a new Shea Homes development of up to 1,200 homes located adjacent to the Park's southern boundary. Provision of these services will require pipeline crossings of Plum Creek. The proposed 12-inch water line, would be in a separate trench from the redundant 10-inch diameter sewer force mains. Redundancy was proposed to allow for improved operation and maintenance and to provide additional protection of Plum Creek against a possible sewage spill if one of the pipelines were damaged or failed. *If the CSRP force main and the CW&SD force main and water line were to be constructed as two separate projects, the likely alignments would occur as shown in Exhibit 1 which is labeled "base case".*

In discussions with CW&SD in early 2016, the possibility of combining the two projects was considered, as a win-win situation for both parties. The designers for the CSRP and the designers for CW&SD developed Option 1, as shown in Exhibit 2, which combines the two projects. Option 1 proposes the force main from the Roxborough Cove lift station discharges into a CW&SD gravity sewer line on the Shea Homes site. The gravity line would flow to a proposed CW&SD lift station located in the NW corner of the Shea Homes property. The lift station would then pump into a force main that would flow easterly to cross Plum Creek and the railroad embankment and connect into the existing CW&SD sewer system.

At a meeting on June 1, 2016 attended by representatives of the CRMC, the CW&SD, the designers for both entities, ERO representing Shea Homes from a permitting perspective, and the Chatfield Program Manager, various configurations for the water and sanitary systems were discussed. The parties agreed that a decision on the water line crossing Plum Creek may be premature to discuss at this time as other alignment options, that may or may not require crossing Plum Creek within the Park, are still being considered. If the water line alignment is to cross Plum Creek it would likely be a horizontal directional drilling operation to reduce or eliminate environmental permitting requirements. *In addition, the construction of the water line is not part of the CSRP requirements and has no bearing on the location of the sanitary force main.*

Regarding the dual, or redundant force main, the consensus was to present a Base Case that could be constructed just for the Chatfield Project, and an Option 1 that would be a cooperative effort between the CSRP and CW&SD that would represent a win-win situation for both parties and result in less impact on the environment.

The relation with the Plum Creek restoration work was also discussed with respect to the force main. Currently, the restoration work will include several riffle structures to control stream bed profile. The constructed riffle-pool structures could be placed to also protect the force main from being exposed or damaged. In addition, the relocated bike/hike trail from the Chatfield State Park Plum Creek picnic area that connects to the east side of the Park across Plum Creek would be located to also provide maintenance access for the force main.

The timing of the CSRP and the CW&SD projects was also discussed at the meeting on June 1, 2016. Currently, the CSRP is planning to construct the force main in the fall of 2017 so that it will be in place to serve the relocated Marina and the other connections by the fall of 2018. Shea Homes indicated their current plan is to start site work in 2017 and home construction in 2018, so they would want to see the force main in place by early 2018. The CW&SD representatives indicated that they would be willing and able to begin installation in early 2017. Thus, the schedules for the two projects appear to be compatible.

Cost sharing was discussed briefly at the June 1, 2016 meeting. The general feeling was that as the CSRP would be contributing a portion of the flow to the force main then the CSRP would contribute to the capital cost of the force main. Details were not discussed.

The benefits of Option 1 include:

- Fewer force mains crossing Plum Creek (2 instead of 3)
- By combining CSRP wastewater flows with the CW&SD flows in a redundant force main, there would be better service to the Park and a higher level of protection against a wastewater spill to Plum Creek. A redundant system allows the operator to quickly shut down a damaged pipeline and minimize the spill and the amount of potential contaminants impacting wetlands, aquatic habitat and Preble's meadow jumping mice.

Force Main Discussion

July 26, 2016

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- More straightforward permitting process, assuming the CW&SD line that carries the CSRP flow would be covered by the 404(b)(1) analysis in the FR/EIS
- A shorter alignment for the CSRP portion
- A smaller Roxborough Cove lift station as the conveyance distance and head will be reduced
- Cost sharing to the benefit of both parties
- The length of force main (between the Roxborough Cove lift station and the CW&SD's gravity sewer line on the Shea Homes site) owned, operated and maintained by the Park would be significantly reduced.
- Operation and maintenance of the proposed redundant force main under Plum Creek would be the responsibility of the CW&SD rather than the Park.

The participants agreed to prepare a memo describing the force main issue, initially for internal discussion. Once refined, the Option 1 plan would be presented for information only to the Project's Technical Advisory Committee (TAC) on July 28, 2016 as a refinement to the FR/EIS plan and would then be officially presented to the TAC to seek a formal recommendation to consider Option 1 as a refinement at the August 18 TAC meeting.

cc: Brian Murphy, Ted Johnson, PgM Task Leaders

Attachments:

Exhibit 1 – Base Case

Exhibit 2 – Option 1





PLUM CREEK AREA

- Plum Creek Day Use Area is entirely inundated at the proposed water elevation.
- The area would be relocated to the southern edge of the reservoir. The recreational facilities would be replaced at this location and a new restroom would be built.
- The Plum Creek trailhead would be relocated to this area and inundated trail segments replaced. A new trail bridge would be built to span Plum Creek.
- The existing sanitary sewer line will need to be relocated as it is below the 5444'.

The relocation concept for this area is shown in Map 3.7.

Reference Document 3
APPENDIX M - REC
FAC MODS

Reference Document 4
APPENDIX A-1 TO
APPENDIX M

PLUM CREEK PICNIC AREA

ITEM	UNIT	UNIT QTY	UNIT COST	TOTAL COST	NOTES
DEMOLITION					
Clear and Grub	AC	13	\$2,500.00	\$32,500	Strip site and remove grasses and shrubs Remove, store and reinstall at future locations
Remove Gravel parking area	SF	31,000	\$0.15	\$4,650	
Remove Existing Concrete trails	SF	18,000	\$1.00	\$18,000	
Demolish & Remove Existing Restroom	Allow	1	\$5,000.00	\$5,000	
Remove Existing Regulatory Signs	Allow	1	\$200.00	\$200	
Remove & Relocate Post and cable fencing	LF	697	\$10.00	\$6,970	
Remove volleyball court posts and store	EA	2	\$200.00	\$400	
CATEGORY SUBTOTAL				\$67,720	
EARTHWORK					
Bulk Embankment	CY	500	\$2.00	\$1,000	Includes excavation and short haul distance Excavation and hauling for material above 5444' Allowance for unclassified rock removal Assumes 6" depth removal at surfaced areas, stockpile, and spread all new landscape areas Assumes all paved and landscape areas
Excavation	CY	500	\$2.00	\$1,000	
Hauling	CY	100	\$4.00	\$400	
Rock Removal	Allow	1	\$1,000.00	\$1,000	
Topsail - Strip , Stockpile and Spread	CY	185	\$4.00	\$740	
Fine Grading	SF	10,000	\$0.05	\$500	
CATEGORY SUBTOTAL				\$4,640	
ROADS AND PARKING					
Gravel Parking	SF	31,000	\$0.80	\$24,800	
Gravel entry road	SF	14,400	\$0.80	\$11,520	
CATEGORY SUBTOTAL				\$36,320	
TRAILS					
Concrete Trails	SF	15,600	\$3.00	\$46,800	
CATEGORY SUBTOTAL				\$46,800	
STRUCTURES					
Vault Restroom	SF	485	\$125.00	\$60,625	
CATEGORY SUBTOTAL				\$60,625	
FURNISHINGS					
Picnic Tables	EA	11	\$200.00	\$2,200	shelters
Benches	Item	1	\$100.00	\$100	Store and relocate at future location
Dumpsters	Item	1	\$750.00	\$750	Store and reinstall at future locations
Grills	Item	5	\$75.00	\$375	Store and reinstall at future locations
Regulatory Signs	Allow	0	\$200.00	\$0	Cost accounted for in demolition division
CATEGORY SUBTOTAL				\$3,425	
UTILITIES					
Sanitary Sewer Lateral Line	LF	5,500	\$20.00	\$110,000	4" diameter sewer lateral
Sanitary Sewer Manhole	EA	6	\$3,500.00	\$21,000	
CATEGORY SUBTOTAL				\$131,000	
RECREATIONAL FACILITIES					
Beach Volleyball Court	Item	1	\$5,000.00	\$5,000	Includes new sand, reinstalled posts.
CATEGORY SUBTOTAL				\$5,000	
LANDSCAPE					
Seeding Dryland Grasses	SF	5,250	\$0.10	\$525	Allowance. Drilled seeding disturbed areas.
Straw Mulch	SF	5,250	\$0.05	\$263	Crimped over seeded areas
Hydro Mulch	SF	0	\$0.05	\$0	Spray mulch over seeded areas
Deciduous Trees	EA	25	\$375.00	\$9,375	Allowance. 2.5 " Caliper
Evergreen Trees	EA	15	\$350.00	\$5,250	Allowance. 8' Average Height
Shrubs	EA	50	\$25.00	\$1,250	Allowance. 5 Gallon Shrubs
CATEGORY SUBTOTAL				\$16,663	
IRRIGATION					
Point of Connection	EA	1	\$2,000.00	\$2,000	Connection to water main, vacuum breaker, controller
Spray Irrigation	SF	0	\$1.00	\$0	Large Radius Pop Up Heads
Bubbler Irrigation	Per Plant	90	\$75.00	\$6,750	Bubbler at Trees and Shrubs
CATEGORY SUBTOTAL				\$8,750	
GRAND TOTAL (Refer to Summary for Estimate Markups)				\$249,943	

CWA Section 404(b)(1) Analysis Dredge and Fill Compliance Chatfield Reservoir Storage Reallocation FR/EIS

1. INTRODUCTION

In 1986, Congress authorized the USACE to conduct a reallocation study for Chatfield Reservoir for joint flood risk management (flood control)-conservation purposes, including storage for M&I water supply, agriculture, and recreation and fishery habitat protection and enhancement. In 1996, the Colorado Water Conservation Board (CWCB), a division of the State of Colorado's Department of Natural Resources (DNR), requested that the U.S. Army Corps of Engineers (USACE; the Corps) consider reallocating space within Chatfield Reservoir for water supply purposes, on behalf of a group of 15 water providers (Providers) in the Denver metropolitan area. Reallocation is the assignment of the use of existing storage space in a reservoir project to another use. Section 808 of the Water Resources Development Act of 1986 authorizes the Corps to implement a reallocation of existing storage space at Chatfield Reservoir to joint flood control-conservation purposes, including storage for municipal and industrial water supply and other named uses, upon meeting two conditions. First, the DNR must request and coordinate the reallocation. Second, the Chief of Engineers must find the reallocation to be feasible and economically justified. Public Law 99-662. See also River and Harbor Act of 1958 (Title III, Water Supply Act of 1958), as amended (43 U.S.C. 390b).

In 1999, a Feasibility Report and Environmental Impact Statement (FR/EIS) was commissioned under the Section 808 project authorization to develop the plan and conduct the analyses required for the Chief of Engineer's findings (ER1105-2-100, Ch. 4). The FR/EIS evaluates the proposed reallocation, identifies alternatives, evaluates those alternatives, and selects the best alternative for addressing the requested reassignment of existing storage space at Chatfield Reservoir based on solid planning principles. The Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&Gs) (U.S. Water Resources Council 1983) establish the standards and procedures that the Corps and other federal water resources agencies use for planning and evaluating the merits of a proposed water storage reallocation. The FR/EIS has evaluated in detail the environmental, social, and economic effects of the Recommended Alternative, as well as two other alternatives and the No Action alternative. As discussed in the FR/EIS, the impacts associated with each alternative would be fully mitigated and would result in alternatives with minimal net effects, and alternatives that would be relatively equal when considering net environmental effects.

The FR/EIS involved an initial screening process that used the State of Colorado's State Water Supply Initiative (CWCB 2004, 2009) and other recent, relevant planning studies to identify candidate alternatives to reallocation. A total of 37 concepts were evaluated in the initial screening process. The development of alternatives to reallocation and the screening process are described in detail in Chapter 2 of the FR/EIS. The Chatfield Reservoir reallocation alternative with 20,600 acre-feet of reallocated storage (Alternative 3) was selected as the Recommended Plan. This plan is the National Economic Development (NED) plan and is the plan preferred by the Providers.

The proposed reallocation of storage at Chatfield Reservoir requires the Corps to make decisions regarding feasibility and economic justification of the proposed reallocation and appropriate contract terms and conditions if the reallocation is approved. The proposed reallocation of storage and use of the reallocated storage will not require the discharge of dredge or fill material into waters of the U.S. The reallocation of storage space and the subsequent filling of that space will only involve the inundation of environmental and recreational resources. As such, as required in its planning guidance, the Corps must consider modifying the affected recreational facilities to maintain recreation, as well as identify mitigation for affected environmental resources. The proposed reallocation will increase water elevations at Chatfield Reservoir, and the increased water levels will inundate recreation infrastructure and environmental resources. The proposed mitigation of environmental resources and modification of recreation facilities will involve the discharge of dredge or fill material into waters of the U.S.

The Section 404(b)(1) Guidelines (Guidelines) are the substantive criteria used to evaluate discharges of dredge or fill material into waters of the U.S. under Section 404 of the Clean Water Act. This analysis addresses how the activities that involve a discharge of dredge or fill material into waters of the U.S. comply with the Guidelines. As used in this analysis, the discharge of dredge and fill material into waters of the U.S. refers to the following:

- Fill material placed below the existing ordinary high water mark (OHWM) of Chatfield Reservoir of 5,432 feet above mean sea level (msl);
- Dredging (discharge of dredged material) below the existing OHWM; dredging will typically involve the scraping and pushing of soil with earthmoving equipment (dredging is also referred to as “cuts”); and
- The discharge of dredged or fill material into wetlands (above or below the existing OHWM).

2. PROJECT DESCRIPTION

2.1 Location and General Description

Chatfield Reservoir is southwest of Denver at the confluence of the South Platte River and Plum Creek within the South Platte River Basin (Figure 1). The reservoir is owned and operated by the USACE. The reservoir was completed in 1976 for purposes of flood protection for the metropolitan Denver area following the disastrous South Platte River flood of 1965. The U.S. Forest Service (USFS) manages most of the lands along the mainstem of the South Platte River upstream of the reservoir. Plum Creek flows through a mixture of rangelands and suburban areas. The overall EIS 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 Chatfield Reservoir has a maximum depth of about 45 feet and an average depth of 24 feet. Water levels in the reservoir vary in response to climatic conditions and other factors, but in general the reservoir has been managed to maintain water levels within a 9-foot range (elevation 5,425 to 5,434 feet above msl) (USACE 2000). From 1976 to 1996, the change in water level was within this 9-foot range approximately 80 percent of the time. The average range of mean monthly elevations is small, less than 3 feet from low to high reservoir periods. The current OHWM elevation is 5,432 feet above msl.

Plum Creek Day Use Area. The Plum Creek Day Use Area serves as a trailhead and also has a day use area with tables, a restroom, and parking. This area would be entirely inundated at the proposed water elevation.

The area would be relocated to the southern edge of the reservoir. The recreational facilities would be replaced at this location and a new restroom built. The trailhead would be relocated to this area and inundated trail segments replaced. A new trail bridge would be built to span Plum Creek.

Relocation of the Plum Creek Trail would involve the filling of an estimated 0.78 acre of wetlands.

The existing sanitary sewer line at Plum Creek would need to be relocated above 5,444 ft msl. The relocation of this utility would impact 1.1 acres of wetlands. These impacts are considered temporary as they would be addressed through onsite revegetation and restoration that would be performed as part of the recreation facility relocation.

Fill material for the modification of recreation facilities would be derived from five borrow sources within the park boundary. These areas are discussed in Section 2.3. Impacts to borrow areas above 5,444 feet msl and to fill areas would be mitigated in-place by restoring the areas to conditions similar to those present prior to disturbance. The two borrow areas below 5,444 feet msl would be used as compensatory mitigation areas. These areas would be converted to wetlands using a limited amount of grading.

2.2.2 Dredge and Fill Activities Associated with Environmental Mitigation

On-site environmental mitigation will involve the creation, enhancement, and protection of wetlands, riparian habitat, Preble's habitat, and bird habitat as presented in the Compensatory Mitigation Plan (CMP) (FR/EIS, Appendix K). The creation of wetlands and riparian and Preble's habitat will focus on the conversion of uplands to wetter habitats by driving sheet pile to "mound" ground water and/or redirected surface water. The majority of the on-site mitigation will occur in uplands and will involve the use of sheet pile, and will not involve the discharge of fill material into waters of the U.S. The redirection of surface water to mitigation areas may require minor discharges of fill material into waters of the U.S. The amount and location of these minor discharges would be determined as part of final design, and would typically involve a small diversion structure. The CMP identified areas where habitat conversion would occur on-site to change upland grasslands to wetlands (Figure 3, based on Figure 7 of the CMP; see Figures 8-15 of the CMP for additional detailed figures of each mitigation area). This type of conversion is generally accomplished by manipulating ground surface elevations, and surface water and groundwater, to provide hydrology adequate to support mesic riparian and wetland habitats. In most cases, the habitat conversion activities would require heavy equipment and earthwork, including the installation of sheet pile cutoff structures to raise the ground water table closer to the surface, the creation of new secondary channels, ditches, or backwaters to bring surface water to mitigation areas, and the modification of surface topography to lower the ground surface closer to ground water or to better retain surface water. These activities entail localized in-place excavation and grading and would not impact long-term water quality or the aquatic ecosystem. In many locations, the proposed activities would provide a beneficial effect on sediment erosion control and riparian habitat preservation.

Off-site environmental mitigation for impacts to wetlands, Preble's and bird habitat will focus on the protection, restoration, and enhancement of habitat in the Chatfield Reservoir watershed. These mitigation activities will be designed to meet the opportunities for mitigation for each protected

Table 3. Effects to Recreation Facilities for the No Discharge of Fill into Waters of the U.S. Alternative

Recreation Facility	Effects Relative to Proposed Relocation Plan
North Boat Ramp	<ul style="list-style-type: none"> • None of the existing amenities would be salvaged • The existing size of the parking lot would have to be smaller • The total area of disturbance would increase since none of the existing amenities could be used or salvaged • Costs would substantially increase
Massey Draw	No effects.
Swim Beach and Eagle Cove	<ul style="list-style-type: none"> • The existing causeway across Deer Creek would remain. At high flows and reservoir levels, the causeway would create a dam on Deer Creek. • The Balloon Launch Area would need to be relocated, which is less desirable due to microclimate conditions. • The existing parking lot, beach, and associated facilities would be moved to the west about 900 feet and would reduce the parking area and beach.
Jamison	<ul style="list-style-type: none"> • Reduced parking area.
Catfish Flats and Fox Run	No effects.
Gravel Pond Area	<ul style="list-style-type: none"> • A much longer bridge would need to be constructed, resulting in increased costs.
Platte River Trailhead	No effects.
Marina Area	<ul style="list-style-type: none"> • The parking lot and restrooms would need to be moved substantially farther to the south and would encroach on the existing campground. • The marina would remain in its current location, but the parking would be three times farther from the marina. • The access road to the marina would need to be moved farther to the south and would impact the existing campground south of the marina. • In order to avoid the discharge of fill material into the reservoir, the breakwaters would need to be a vertical structure. A wall would be less aesthetically pleasing. • The total area of disturbance above the OHWM would be greater. • The beach would be smaller.
Plum Creek	<ul style="list-style-type: none"> • No effects.

Providing recreation facilities that would maintain the existing recreational experience is an important goal for Colorado State Parks. To help provide the functional equivalency of the relocated recreation facilities, the State of Colorado and the Providers requested from the Corps a waiver of the Corps Land Use Development Policy (LUDP) given the unique and challenging conditions associated with Chatfield Reservoir in preserving “in-kind” recreation facilities and experiences. In January 2009, the Corps granted a waiver for the placement of closed floodable wet floodproofed relocated recreation structures in the upper range of the reallocated Zone 1 of Chatfield Reservoir (elevation 5,447.0 feet msl to 5,453.7 feet msl). This waiver was an important step in providing recreation facilities close enough to the reallocated reservoir elevations to provide in-kind recreational experiences.

Development of the proposed Recreation Facilities Modification Plan required consideration of the following constraints: