

Rocky Flats Site, Colorado, Surface Water Configuration Environmental Assessment

Final

May 2011



U.S. DEPARTMENT OF
ENERGY

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Abbreviations

AADT	average annual daily traffic
Am	Americium
AMP	Adaptive Management Plan
APEN	Air Pollution Emission Notice
BDD	Broomfield Diversion Ditch
BO	Biological Opinion
CAD	Corrective Action Decision
CCR	Code of Colorado Regulations
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
CHWA	Colorado Hazardous Waste Act
COU	Central Operable Unit
CWQCC	Colorado Water Quality Control Commission
DOE	U.S. Department of Energy
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESCO	ESCO and Associates, Inc.
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
ft	foot/feet
GWR	Great Western Reservoir
in.	inches
LM	Office of Legacy Management
m ³	cubic meter
MAP	Mitigation Action Plan
MG	million gallons
NAAQS	National Ambient Air Quality Standards

NEPA	National Environmental Policy Act
NPB	NEPA Planning Board
NREL	National Renewable Energy Laboratory
O ₃	Ozone
OU	Operable Unit
PBA	Programmatic Biological Assessment
PL	Public Law
PLF	Present Landfill
PM ₁₀	Particulate matter less than 10 microns
PM _{2.5}	Particulate matter less than 2.5 microns
POC	Point of Compliance
POE	Point of Evaluation
POU	Peripheral Operable Unit
ppm	parts per million
Pu	Plutonium
RCRA	Resource Conservation and Recovery Act
Refuge	Rocky Flats National Wildlife Refuge
RFLMA	<i>Rocky Flats Legacy Management Agreement</i>
RFS	Rocky Flats Site
RFSC	Rocky Flats Stewardship Council
ROD	Record of Decision
SH	State Highway
SHPO	State Historic Preservation Officer
SID	South Interceptor Ditch
T&E	threatened and endangered
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WCR	Woman Creek Reservoir
WWE	Wright Water Engineers, Inc.

Executive Summary

The following sections provide a summary of the Rocky Flats Site (RFS), the purpose and need for the Proposed Action, the description of the Proposed Action and No Action alternatives, the potential impacts associated with the two alternatives, and mitigation measures associated with the Proposed Action. A detailed analysis and all figures and tables are provided in the body of this environmental assessment and are not recreated for this Summary.

Introduction

The RFS is owned by the United States and is located in northern Jefferson County, Colorado, approximately 16 miles northwest of Denver. The RFS was formerly used to process and manufacture nuclear weapons components, but cleanup and closure of Rocky Flats by the U.S. Department of Energy (DOE) was completed in 2005. The Office of Legacy Management (LM) has jurisdiction and control of portions of Rocky Flats as discussed below.

The cleanup and closure of RFS was completed via a cleanup agreement under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); a Compliance Order on Consent under the Resource Conservation and Recovery Act (RCRA); and the Colorado Hazardous Waste Act (CHWA). RCRA and CHWA are administered by the State of Colorado through the Colorado Department of Public Health and Environment (CDPHE). The final response action for RFS is specified in the final Corrective Action Decision/Record of Decision (CAD/ROD) for Rocky Flats issued on September 29, 2006 (DOE 2006a). Implementation of the final response action is regulated under the *Rocky Flats Legacy Management Agreement* (RFLMA) (DOE 2007a).

The original Rocky Flats property occupied approximately 6,200 acres. Under the CAD/ROD, two Operable Units (OUs) were established within the boundaries of the Rocky Flats property: the Central OU (COU, or the current RFS) and the Peripheral OU (POU). The COU is centrally located within the Rocky Flats boundary and occupies approximately 1,300 acres. The POU surrounds the COU and occupies the remaining acreage. Transfer of jurisdiction and control of most of the land in the POU by DOE to the U.S. Fish and Wildlife Service (USFWS) was completed on July 12, 2007, for use as the Rocky Flats National Wildlife Refuge (Refuge).

Twelve dams were constructed on the RFS during operation of the Rocky Flats Plant. Seven dams were breached by constructing notches in the dam embankments. Five dams remain, but surface water retention is not required at RFS, and the dams are not a functional part of the final CAD/ROD remedy.

The remaining dams include the following:

- Present Landfill (PLF) Dam on No Name Gulch
- Dams A-3 and A-4 on North Walnut Creek
- Dam B-5 on South Walnut Creek
- Dam C-2 near Woman Creek

Surface water points of compliance (POCs) are established under the CAD/ROD immediately downstream of dams A-4, B-5, and C-2. These are called the terminal pond dams, because the

water released from these dams flows off the site. Currently, these ponds are operated in batch-and-release mode and are discharged 0 to 2 times a year. Woman Creek currently flows around Pond C-2 in the Woman Creek Diversion Canal north of the pond and continues unimpeded beyond Pond C-2 to the downstream reaches of Woman Creek. The contribution of water to Woman Creek resulting from the infrequent releases from Pond C-2 is minimal due to the relatively small drainage basin area (South Interceptor Ditch basin) tributary to Pond C-2.

DOE has signed a lease agreement with the City and County of Broomfield to comply with the water law and regulations of the State of Colorado as they apply to the holding ponds at the site. The State of Colorado requires that stream depletions resulting from out-of-priority storage of water be replaced, and Broomfield agreed to lease to DOE a certain amount of Broomfield's reusable Windy Gap effluent (Augmentation Plan) (DOE 2006b). This water is to be released by Broomfield to the Big Dry Creek Basin to replace depletions resulting from out-of-priority storage in ponds at Rocky Flats. The Augmentation Plan is described in detail in the body of this Environmental Assessment (EA).

The dams are not required to maintain adequate protection of human health and the environment under the final CAD/ROD remedy. Activities proposed in this EA do not fall within the scope of the CAD/ROD or the *Environmental Assessment Comment Response and Finding of No Significant Impact, Pond and Land Configuration* (DOE 2004). The 2004 EA only considered alternatives related to breaching the dams in North and South Walnut Creek upstream of ponds A-3, A-4, and B-5. The breaching of remaining dams was not anticipated at that time, and the possible environmental impacts of breaching all remaining dams, including cumulative impacts were not addressed. This EA evaluates the direct, indirect, and cumulative impacts of breaching all remaining dams.

Purpose and Need

The purpose of the Proposed Action is to reduce or eliminate the retention of surface water to return the RFS surface water flow configuration to the approximate conditions existing prior to construction of the dams. The Draft EA described that the Proposed Action would be implemented in two timeframes, with the PLF, A-3, and C-2 breaching to occur in 2011, and A-4 and B-5 breaching to be completed within the 2015 to 2018 timeframe. The regulations for implementing the National Environmental Policy Act (NEPA) allow for modifications between a Draft and Final EA in response to public comments (40 CFR 1503.4 (a)). Based on public concern statements, DOE has postponed breaching dam C-2 to coincide with breaching the two other terminal dams A-4 and B-5. Also, based on public concerns, the Proposed Action for this Final EA changes the schedule for breaching the terminal dams A-4-, B-5, and C-2 to the 2018 to 2020 timeframe throughout this Final EA (Table ES-1). Under the Proposed Action for this EA, dams A-4, B-5, and C-2 would be operated in a flow-through configuration until breached.

Table ES-1. Comparison of Timeframes for Breaching Between Draft EA and Final EA

Dam	Draft EA Timeframe	Final EA Timeframe
PLF	2011	2011
A-3	2011	2011
A-4	2015–2018	2018–2020
B-5	2015–2018	2018–2020
C-2	2011	2018–2020

Although completing the proposed action in 2011 is a valid option, DOE would complete part of the Proposed Action at a later date as suggested by the public. The timing for breaching of all dams was mainly determined based on project management, funding availability, expected costs, and public acceptance for breaching related to each of the individual dams. Therefore, all direct, indirect, and cumulative impacts would not change from impacts reported in the Draft EA, as the Proposed Action impacts have been assessed assuming the breaching of all the dams.

DOE is responsible for the long-term management of the water discharges at the RFS in an environmentally acceptable manner and in compliance with local, state, and federal regulations. To accomplish this long-term responsibility, the drainage system resulting from the Proposed Action should require less active management and maintenance than the current system while preserving existing wetlands and habitat as available water allows. Reestablishing flows to approximate pre-retention conditions would provide ecological benefits by improving riparian habitat and promoting wetland formation.

Breaching the dams would reduce the Rocky Flats management efforts related to the continuous determination of evaporative depletions while also reducing the costs to water rights holders responsible for downstream augmentation replacements. The reduction/elimination of depletions would reduce or eliminate the following:

- Costs incurred by Broomfield,
- Depletion reporting costs, and
- Costs to water rights holders responsible for downstream augmentation.

In addition, the live flows currently retained in the ponds would be available to downstream users.

LM is directed by DOE to ensure protection of human health and the environment through effective long-term stewardship of land, structures, and facilities and to be responsible for the cost-effective management of this directive. Water discharged from the terminal pond dams meets applicable RFLMA surface water quality standards, which are based on the Colorado Water Quality Control Commission (CWQCC) Code of Colorado Regulations (CCR) Regulation No. 31: Basic Standards and Methodologies for Surface Water (5 CCR 1002-31) and on the site-specific standards in the CWQCC Regulations No. 38: Classifications and Numeric Standards South Platte River Basin Laramie River Basin Republican River Basin Smoky Hill River Basin (5 CCR 1002-38). DOE has maintained the dams in accordance with the dam safety requirements of the State of Colorado, Office of the State Engineer.

The State of Colorado Division of Water Resources (State Engineer) has jurisdiction over the RFS dams. The site incurs dam maintenance costs resulting from vegetation control, structure/infrastructure maintenance, inspections, and data collection in order to ensure dam safety in compliance with dam safety regulations. Operational costs are incurred due to the batch-and-release water management protocols. The remaining dams at RFS are more than 30 years old, and maintenance and operation costs are expected to rise as the dams age. Construction costs associated with the actual breaching would also be expected to increase over time. By preserving the proposed breach schedule, maintenance, operational, and construction costs would be nearly eliminated. Accordingly, DOE would reduce and/or eliminate the inspection and reporting costs associated with meeting dam safety requirements and the

management and maintenance costs for operation of the dams, by completing the breaching of the remaining five dams.

The dams are no longer needed for the original purpose, and breaching of the dams would reduce DOE costs (and by association taxpayer costs), and would not change DOE's obligations to monitor surface water and meet standards as required by RFLMA.

Description of Alternatives

Proposed Action

The Proposed Action is divided into two timeframes. Breaching the dams at ponds A-3 and PLF is proposed to start in 2011 and be completed by the end of that fiscal year; breaching the dams at ponds A-4, B-5, and C-2 is proposed to be completed during the 2018 to 2020 timeframe. Dams A-4, B-5, and C-2 would be operated in flow-through configuration until they are breached. The average construction duration for dam breaching at each structure is approximately 11 weeks.

To modify the dam, a "breach" or "channel" would be cut into each dam to reduce its jurisdictional height, thus creating a lower profile. The following design characteristics are similar among the five dams.

- Channel side slopes of 2H:1V (H:V is the ratio of the horizontal length to the vertical height)
- Channel flowline slope of 2 percent with a 5H:1V drop structure slope
- Channel design to accommodate peak flows from at least a 100-year/24-hour storm event with 2 foot (ft) freeboard
- Channel bottom and side slopes to be armored to resist future erosion

The inlet elevation (invert) for the channel would be located to provide positive drainage from the area upstream of the channel inlet. This would ensure a consistent flow of water and prevent ponding. The area upstream of each channel would be designed to preserve and enhance wetlands and habitat to the extent possible, while still providing positive flow.

Dam-specific information is provided in the text of the EA. The following generalized construction sequence is similar for all five dams.

- Dewater the pond using existing discharge valves, and/or pumping as necessary, several months prior to construction work (preceding winter/spring).
- Mobilize for construction: set up staging area, erosion controls, and stockpile area.
- Install a temporary coffer dam upstream for potential storm events (manage retained water upstream using pumps). A coffer dam is a temporary watertight enclosure that is pumped dry to expose the bottom of a body of water so that construction may be undertaken.
- Excavate soil from the breach channel and fill predefined fill areas (i.e., former spillways and roads to be reclaimed).

- Construct breach to engineering specifications (side slopes, flowline, drop structure); armor the channel as necessary for erosion resistance.
- Regrade area upstream of channel to provide positive flow, minimize ponding, and promote establishment of quality habitat.
- Reclaim all disturbed areas.

No Action

The No Action Alternative involves no change to the existing configuration of the remaining five dams at the RFS. Water would be routed according to current configuration and managed using the current operating protocol. Environmental monitoring would continue in accordance with RFLMA. Operation and maintenance of the dams and necessary structures would continue to require maximum resources.

Environmental Consequences and Mitigation Summary

Certain non-resource mitigation efforts are required, which are briefly described in the following section. Table ES–2 provides a comparison of resource impacts between the two alternatives and briefly describes the mitigation measures associated with the Proposed Action. This table also serves as the Mitigation Action Plan (MAP) per DOE Order 451.1B, Section 5(a)(9)(e) and (f). All potential impacts can be mitigated as appropriate to the resource, and no impacts are considered substantial.

As discussed previously, based on public concern statements, DOE has determined that postponing breaching Dam C-2 until the 2018 to 2020 timeframe would best serve to address concerns stated by local governments. Comments to DOE on the Draft EA indicated a desire from the communities adjacent to the RFS to have further input prior to the final decision to breach terminal dams A-4, B-5 and C-2. Accordingly, DOE has committed to working with the concerned communities toward developing an Adaptive Management Plan (AMP) to provide ongoing data prior to the breaching of the terminal dams. The AMP would provide guidance, suggestions, and recommendations developed by the communities and DOE (the AMP Group) to achieve consensus to the extent possible for implementing the Proposed Action. The AMP would not constitute formal policy or other requirements enforceable under RFLMA.

Mitigation Measures Similar to all Five Dams (not resource specific)

Although the dams that are proposed to be breached are not required by the CAD/ROD, certain aspects of the work are subject to institutional controls within the COU and regulated by RFLMA requirements. Also, RFLMA establishes water quality standards and identifies the water monitoring and evaluation requirements applicable to implementation of the remedy. The current operation of ponds A-4, B-5, and C-2 is to retain water until approximately 40 to 50 percent of the capacity is reached, at which point discharge planning is initiated. Under RFLMA operational monitoring, the pond water is sampled prior to release to demonstrate that the discharged water would be expected to meet applicable RFLMA water quality standards. During discharge, the released water is monitored and compliance is determined at a RFLMA POC a short distance downstream of the dam outlet.

In addition, excavation within the COU deeper than 3 ft below the surface is prohibited by the remedy institutional controls unless approved in accordance with RFLMA requirements. Shallower soil disturbance within the COU is also prohibited by the remedy institutional controls unless the work is conducted in accordance with an approved erosion control plan. DOE has requested approval under the RFLMA requirements to perform the dam breach excavation and has documented that an approved erosion control plan would apply to the work. The RFLMA parties are consulting regarding clarification of the soil excavation and soil disturbance prohibitions. The RFLMA parties agree that it is appropriate to make the clarification by issuing an amendment to the CAD/ROD and modifying RFLMA Attachment 2, after consideration of public review comments. The final dam breach would not occur until after the CAD/ROD amendment and RFLMA modification clarifying the soil excavation and soil disturbance prohibitions is approved. DOE would then obtain any required approval to conduct the soil excavation and soil disturbance in accordance with RFLMA.

Following the finalization of this EA, and the associated decision document, DOE would continue to provide open reporting of mitigation/monitoring results to the public. Notification of availability of these documents will be electronically disseminated in the same manner as described in Section 2.2 of this EA. Additionally, prior to the initiation of the breaching of the terminal dams, DOE would schedule a public meeting to discuss monitoring and mitigation results. This meeting is not a NEPA requirement, but rather is being incorporated into the mitigation in the spirit of addressing unresolved conflicts, and providing the public with further assurance that water quality issues related to the flow through configuration would be thoroughly understood prior to any breaching activities.

Once the dams are breached, no pre-discharge sampling will occur, as the batch-and-release mode of operation will stop and the water would be in a constant flow-through configuration. Thus RFLMA operational pre-discharge monitoring will discontinue, but all other RFLMA monitoring will remain.

Resource-Specific Consequences and Mitigation

Table ES–2 presents a brief comparison of resource impacts between the Proposed Action and the No Action alternatives and summarizes mitigation measures under the Proposed Action. Full details of possible impacts are presented in the body of the EA in Sections 5.0 and 6.0.

Table ES-2. Resource-Specific Impacts and Mitigation

Resource	Proposed Action	No Action
Wildlife	<p>Impacts:</p> <ul style="list-style-type: none"> • Restore a more natural, seasonally variable flow system to provide more consistent water for downstream habitat. • Temporary disturbance from construction noise. • Eliminate surface water habitat for species. • Reduced disturbance from human activities for monitoring and maintenance. <p>Mitigation:</p> <ul style="list-style-type: none"> • Water levels in the ponds will be drawn down prior to construction activities to provide the opportunity for species to use nearby habitats. • Vegetation at the construction footprint will be mowed to 6 inches or less to help encourage species to use other habitat locations. 	<p>Walnut Creek:</p> <ul style="list-style-type: none"> • Long-term continuation of batch releases from the ponds, predominantly during the non-growing season, could alter the structure and composition of the downstream habitat. <p>No Name Gulch and Woman Creek:</p> <ul style="list-style-type: none"> • No change from current conditions.
Migratory Birds	<p>Impacts:</p> <ul style="list-style-type: none"> • Noise and construction activities to foraging and nesting activities in the adjacent habitat, but no fatalities are expected because of prescribed mitigation measures. • Reductions in the abundance of waterfowl at the ponds; however, these types of habitats are available within a few miles of the RFS. • Species that forage and nest in emergent and shrub wetland habitat types would potentially increase following reclamation. • Reduced disturbance from human activities for monitoring and maintenance. <p>Mitigation:</p> <p>Activities are planned to occur throughout the primary nesting season for birds (April 1 through August 31), Therefore:</p> <ul style="list-style-type: none"> • A qualified biologist will conduct field nest surveys prior to and regularly throughout construction. • If the survey identifies active nests that cannot be avoided, USFWS will be contacted immediately for guidance. • Results of the surveys and information regarding the qualifications of the biologist(s) will be documented and maintained on file for potential review by USFWS (if requested) until the Proposed Action activities have been completed. • Water levels in the ponds and vegetation clearing will occur as described under wildlife impacts. <p>Based on the results of surveys, and determination from USFWS, additional nesting deterrents may be warranted.</p>	<p>Walnut Creek:</p> <ul style="list-style-type: none"> • Long-term continuation of batch releases from the ponds, predominantly during the non-growing season, could alter the structure and composition of the downstream habitat. <p>No Name Gulch and Woman Creek:</p> <ul style="list-style-type: none"> • No change from current conditions.

Table ES-2 (continued). Resource-Specific Consequences and Mitigation

Resource	Proposed Action	No Action
<p>Threatened & Endangered Plant and Wildlife Species</p>	<p>Impacts:</p> <ul style="list-style-type: none"> • Approximately 1 acre of Preble's mouse habitat would be impacted during construction. • Increase in Preble's habitat expected with conversion from open water to emergent wetland/shrubland. • Possible minimal impacts to individual garter snakes and northern leopard frogs. • Minimal long-term effect is expected because the reestablished stream channels would provide habitat. <p>Mitigation:</p> <ul style="list-style-type: none"> • In compliance with Section 7 of the Endangered Species Act, consultation with USFWS will be conducted via an amendment to the existing Programmatic Biological Assessment. • No earth-moving activities will be started until either the approval letter or Biological Opinion from USFWS has been obtained. • Mitigation for impacts will be conducted in situ and follow guidelines in the Programmatic Biological Assessment. 	<p>Walnut Creek:</p> <ul style="list-style-type: none"> • In Walnut Creek, the Preble's mouse preferred multi-strata riparian woodland/shrubland habitat could change to a single story herbaceous habitat, which would limit the amount of quality habitat for the species. • Continued long-term reduction in creek flows below the dams in Walnut Creek may reduce the amount of existing wetland along this reach of creek, which would reduce available habitat. <p>No Name Gulch and Woman Creek:</p> <ul style="list-style-type: none"> • No change from current conditions. <p>The lower South Platte River species would continue to be impacted by the retention of water upstream of the dams in the No Action Alternative.</p>
Vegetation, Wetlands and Floodplains		
<p>Vegetation</p>	<p>Impacts:</p> <ul style="list-style-type: none"> • Clearing of 26 acres of vegetation (including noxious weeds) due to construction. • Reseeding of native species and ongoing weed control would provide a higher quality ecosystem. <p>Mitigation:</p> <ul style="list-style-type: none"> • Use of appropriate erosion controls throughout and after the project. • The guidance in the <i>Erosion Control Plan for the Rocky Flats Property Central Operable Unit</i> (DOE 2007b) will be followed. • Temporarily disturbed areas will be reclaimed following project completion using native plant species. • Revegetation will occur as soon as possible. • Noxious weeds will be controlled using Colorado appropriate weed control measures. • A qualified ecologist, botanist, or environmental scientist will oversee all mitigation measures. 	<p>Walnut Creek:</p> <ul style="list-style-type: none"> • Retention of the batch-and-release water flow may lead to continued changes in the existing wetlands downstream. <p>No Name Gulch and Woman Creek:</p> <ul style="list-style-type: none"> • No change from current conditions.

Table ES-2 (continued). Resource-Specific Consequences and Mitigation

Resource	Proposed Action	No Action
Wetlands	<p>Impacts:</p> <ul style="list-style-type: none"> • Less than 0.5 acre of palustrine emergent/shrubland wetland and approximately 4 acres of open water habitat. • Five to 6 acres of palustrine emergent/shrubland wetland created in the former open water habitat, which would increase the aquatic resources functions and services. <p>Mitigation:</p> <ul style="list-style-type: none"> • A Section 404 permit in accordance with the Clean Water Act will be required and obtained prior to any earth-disturbing activities. • U.S. Army Corps of Engineers review comments indicated that a Nationwide Permit 27 will be applicable. • Impacts to jurisdictional waters will be mitigated according to USACE requirements. 	<p>Walnut Creek:</p> <ul style="list-style-type: none"> • Retention of the batch-and-release water flow may lead to continued changes in the existing wetlands downstream. <p>No Name Gulch and Woman Creek:</p> <ul style="list-style-type: none"> • No change from current conditions.
Floodplains	<p>Impacts:</p> <ul style="list-style-type: none"> • Minimal and limited to construction areas. • Would approximately reestablish the historic floodplain and stream channel through the pond bottoms (except at Pond C-2). <p>Mitigation:</p> <ul style="list-style-type: none"> • Same as mitigation measures for wetlands. 	<p>Walnut Creek, No Name Gulch, and Woman Creek:</p> <ul style="list-style-type: none"> • No change from current conditions.
Surface Water Resources		
Surface water flow	<p>Impacts:</p> <ul style="list-style-type: none"> • Larger flows and volumes downstream compared to current conditions with return to flood conditions prior to the original construction of the dams. • Short-term erosion associated with construction. • Would eventually eliminate evaporative depletions associated with the retention of out-of-priority water. <p>Mitigation:</p> <ul style="list-style-type: none"> • A construction general permit for stormwater discharge from EPA will be required prior to commencing the work. 	<p>No change to existing conditions of either surface water flow or water quality. However, failure of a dam during a flood event would result in higher flood flows downstream and transport and deposition of large quantities of soil from the embankment structure. The remaining dams at the RFS are more than 30 years old.</p>
Surface water quality	<p>Impacts:</p> <ul style="list-style-type: none"> • No direct impacts on water quality. • Individual sample results downstream are expected to show increased variability. Data indicate that remedy-related soil and infrastructure removal, revegetation, land configuration, and reductions in runoff would continue to result in water quality summary statistics that meet applicable standards. • RFLMA monitoring requirements would remain the same. <p>Mitigation:</p> <ul style="list-style-type: none"> • Monitoring in accordance with RFLMA requirements to continue. • A construction general permit for stormwater discharge from EPA would be required prior to commencing the work. 	

Table ES-2 (continued). Resource-Specific Consequences and Mitigation

Resource	Proposed Action	No Action
Air Quality	<p>Impacts:</p> <ul style="list-style-type: none"> • Releases of particulate matter less than 10 microns (PM₁₀), particulate matter less than 2.5 microns (PM_{2.5}), and Ozone (O₃) are expected to be minimal during construction. <p>Mitigation:</p> <ul style="list-style-type: none"> • Contractor to obtain any required air quality construction permits prior to start of the construction work. • The contractor would provide proof of age of equipment, per CDPHE requirements. • Construction activities will stop during periods of high winds. 	No change from current conditions.

1.0 Introduction

This Environmental Assessment (EA) has been prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 USC 4321-4370d); the Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA (40 CFR 1500-1508); and 10 CFR 1021, U.S. Department of Energy (DOE) regulations for implementing NEPA. The purpose of this EA is to provide DOE with sufficient information to determine whether a Finding of No Significant Impact (FONSI) is supported for the Proposed Action or whether an Environmental Impact Statement (EIS) may be required.

1.1 Background

The Rocky Flats Site (RFS) is owned by the United States and is located in northern Jefferson County, Colorado, approximately 16 miles northwest of Denver. The RFS was formerly used to process and manufacture nuclear weapons components, but cleanup and closure of Rocky Flats by DOE was completed in 2005. The Office of Legacy Management (LM) has jurisdiction and control of portions of Rocky Flats as discussed below.

The cleanup and closure of RFS was completed via a cleanup agreement under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), a Compliance Order on Consent under the Resource Conservation and Recovery Act (RCRA), and the Colorado Hazardous Waste Act (CHWA). RCRA and CHWA are administered by the State of Colorado through the Colorado Department of Public Health and Environment (CDPHE). The final response action for RFS is specified in the Final Corrective Action Decision/Record of Decision (CAD/ROD) for Rocky Flats (EPA, DOE, and CDPHE) issued on September 29, 2006 (DOE 2006a). Implementation of the final response action is regulated under the *Rocky Flats Legacy Management Agreement* (RFLMA) (DOE 2007a).

The original Rocky Flats property occupied approximately 6,200 acres. Under the CAD/ROD, two Operable Units (OUs) were established within the boundaries of the Rocky Flats property: the Central OU (COU) and the Peripheral OU (POU) (Figure 1-1). An OU is a grouping of individual hazardous substance sites into a single administrative unit for purposes of efficiently managing cleanup activities. The COU is centrally located within the Rocky Flats boundary and occupies approximately 1,300 acres. The COU consolidated areas that required additional remedial or corrective actions, and also considered the practicalities of future land management. The CAD/ROD determined that the appropriate response actions for the COU were institutional controls, physical controls, and continued operation of groundwater treatment systems and groundwater and surface water monitoring. The COU is referred to as the RFS.

The POU surrounds the COU and includes the remaining, generally unaffected portions of the Rocky Flats property, approximately 4,900 acres. The final CAD/ROD indicated that conditions in the POU are suitable for unrestricted use, and no response action was required. The U.S. Environmental Protection Agency (EPA) subsequently published a Notice of Partial Deletion from the National Priorities List for the POU on May 25, 2007. Transfer of jurisdiction and control of most of the land in the POU by DOE to the U.S. Fish and Wildlife Service (USFWS) was completed on July 12, 2007, for use as a wildlife refuge pursuant to the Rocky Flats National Wildlife Refuge Act of 2001 (Public Law [PL] 107-107).

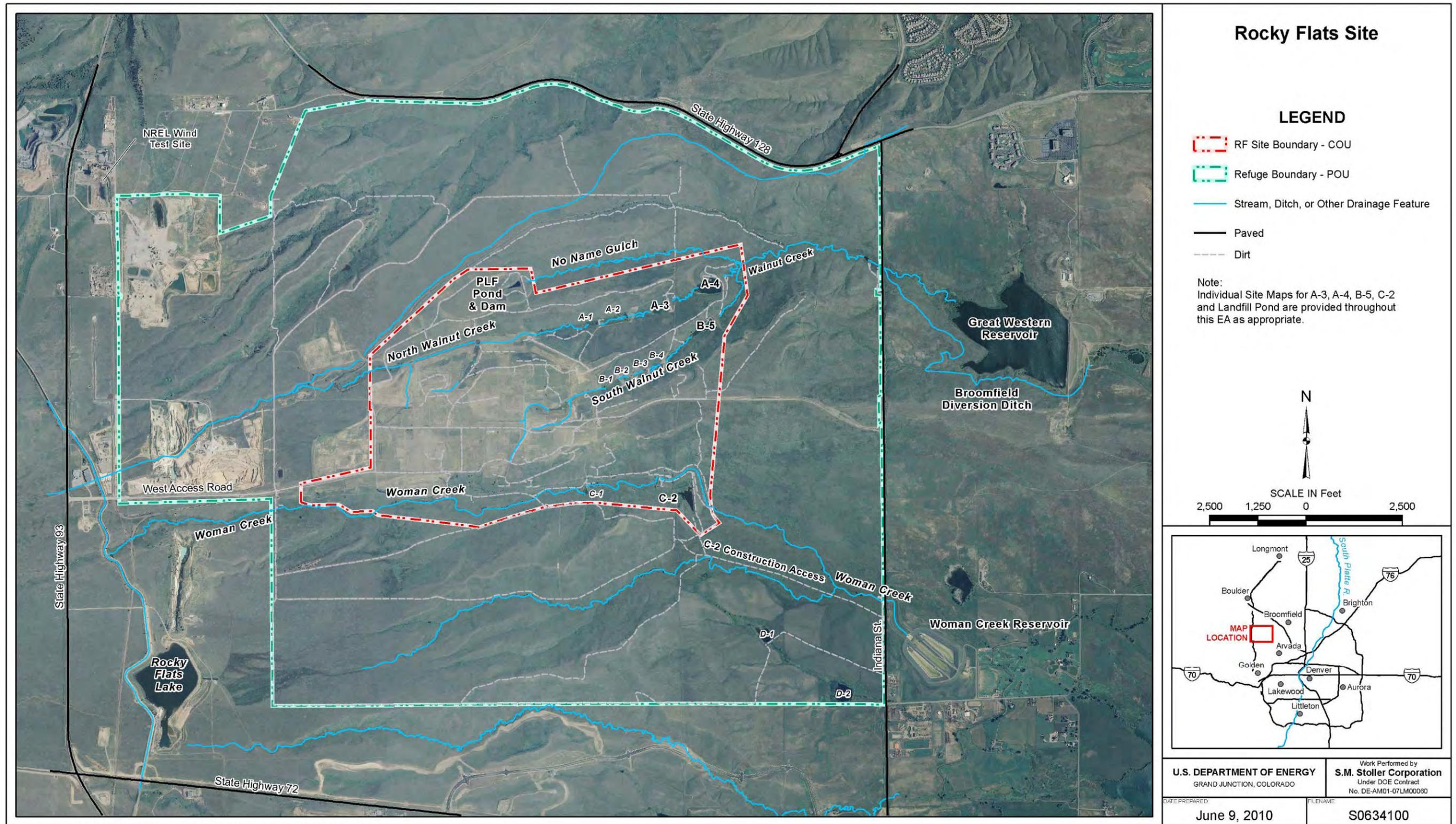
Twelve dams were constructed on the RFS during operation of the Rocky Flats Plant (Figure 1–1). The dams were constructed for stormwater control and to retain surface water so that it could be monitored and managed, if necessary, prior to downstream release. The Present Landfill (PLF) Dam was constructed in No Name Gulch. The A-Series dams (4 dams) were constructed in North Walnut Creek, and the B-Series dams (5 dams) were constructed in South Walnut Creek. These three drainages generally flow west to east and come together to form Walnut Creek just inside the eastern COU boundary. Walnut Creek continues east and passes under Indiana Street in a constructed culvert. At this point, a splitter box can currently direct Walnut Creek flows to Great Western Reservoir (GWR) and/or the Broomfield Diversion Ditch (BDD) (constructed by Broomfield in 1989). Water in GWR is currently used for irrigation and municipal purposes not as a drinking water supply. The BDD flows around GWR back to Walnut Creek to just below the GWR dam. Walnut Creek then flows east to its confluence with Big Dry Creek.

The C-Series dams (2 dams) were constructed within the Woman Creek basin. Dam C-1 is located on Woman Creek, and Dam C-2 is located at the end of the South Interceptor Ditch. When Pond C-2 is discharged, this water flows to Woman Creek just inside the eastern COU boundary. Woman Creek continues east and passes under Indiana Street in a constructed culvert. At this point, Woman Creek flows to the Woman Creek Reservoir (WCR) (constructed in 1996 as part of the Standley Lake Protection Project), which retains Woman Creek water and prevents it from reaching Standley Lake. Water in the WCR is periodically discharged to Walnut Creek to just below the GWR dam.

On September 26, 2006, DOE signed a lease agreement with the City and County of Broomfield to comply with the water law and regulations of the State of Colorado as they apply to the holding ponds at the site (DOE 2006b). Since DOE has implemented a system of holding ponds for the purpose of controlling and testing surface water that collects on the RFS, and the water law and regulations of the State of Colorado require that stream depletions resulting from out-of-priority storage of water be replaced, Broomfield agreed to lease to DOE a certain amount of Broomfield's reusable Windy Gap effluent (Augmentation Plan). This water is to be released by Broomfield to the Big Dry Creek Basin to replace depletions resulting from out-of-priority storage in ponds at Rocky Flats.

Seven dams were breached by constructing notches in the dam embankments. Five dams remain, but surface water retention is not required at RFS, and the dams are not a functional part of the final CAD/ROD remedy. Figure 1–1 shows the location of the dams. Dam C-1, located on Woman Creek, was breached in 2004 to address safety issues that were identified during inspections. That action was evaluated in a Categorical Exclusion (DOE 2003). In 2004, DOE assessed the breaching of dams A-1, A-2, B-1, B-2, B-3, and B-4 located on North and South Walnut Creek in the *Environmental Assessment Comment Response and Finding of No Significant Impact, Pond and Land Configuration* (DOE 2004). The work to breach these dams was begun in 2008 and completed in 2009.

The remaining dams include the PLF Dam on No Name Gulch, dams A-3 and A-4 on North Walnut Creek, Dam B-5 on South Walnut Creek, and Dam C-2 near Woman Creek. These are referred to as the terminal pond dams, because the water released from these dams flows off the site. Currently, these ponds are operated in batch-and-release mode and are discharged 0 to 2 times a year. Woman Creek currently flows around Pond C-2 in the Woman Creek Diversion



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Figure 1-1. Rocky Flats Site

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Canal north of the pond and continues unimpeded beyond Pond C-2 to the downstream reaches of Woman Creek. The contribution of water to Woman Creek resulting from the infrequent releases from Pond C-2 is minimal due to the relatively small drainage basin area (South Interceptor Ditch basin) tributary to Pond C-2. Surface water points of compliance (POCs) are established under the CAD/ROD immediately downstream of dams A-4, B-5, and C-2.

The dams are not required to maintain adequate protection of human health and the environment under the final CAD/ROD remedy. Activities proposed in this EA do not fall within the scope of CAD/ROD or FONSI under the *Environmental Assessment Comment Response and Finding of No Significant Impact, Pond and Land Configuration* (DOE 2004). The 2004 EA only considered alternatives related to breaching the dams in North and South Walnut Creek upstream of ponds A-4 and B-5. The breaching of all remaining dams was not anticipated at that time, and the possible environmental impacts of breaching all remaining dams, including cumulative impacts, were not addressed. This EA evaluates the direct, indirect, and cumulative impacts of breaching all remaining dams.

1.2 Purpose and Need

This EA is being prepared to assess the impacts associated with breaching the remaining five dams and the associated impacts that would occur as a result of the Proposed Action or No Action alternatives. The Draft EA described that the Proposed Action would be implemented in two timeframes, with the PLF, A-3, and C-2 breaching to occur in 2011, and A-4 and B-5 breaching to occur in the 2015 to 2018 timeframe. The regulations for implementing NEPA allow for modifications between a Draft and Final EA in response to public comments (40 CFR 1503.4 (a)). Based on public concern statements, DOE has postponed breaching dam C-2 to coincide with breaching the two other terminal dams A-4 and B-5. Also, based on public concerns, the Proposed Action for this Final EA changes the schedule for breaching the terminal dams A-4 and B-5 has been changed to 2018 to 2020 throughout this Final EA. Table 1–1 provides a comparison between the timeframes. Under the Proposed Action, dams A-4, B-5, and C-2 would be operated in a flow-through configuration until breached.

Table 1–1. Comparison of Timeframes for Breaching Between Draft EA and Final EA

Dam	Draft EA Timeframe	Final EA Timeframe
PLF	2011	2011
A-3	2011	2011
A-4	2015–2018	2018–2020
B-5	2015–2018	2018–2020
C-2	2011	2018–2020

Although completing the proposed action in 2011 is a valid option, DOE would complete part of the Proposed Action at a later date as suggested by the public. The timing for breaching of all dams was mainly determined based on project management, funding availability, expected costs, and public acceptance for breaching related to each of the individual dams. Therefore, all direct, indirect, and cumulative impacts would not change from impacts reported in the Draft EA, as the Proposed Action impacts have been assessed assuming the breaching of all the dams.

The purpose of the Proposed Action is to reduce or eliminate the retention of surface water to return the RFS surface water flow configuration to the approximate conditions existing prior to construction of the dams. It is DOE policy to manage its land and facilities as valuable natural resources, and its stewardship is based on the principle of ecosystem management and sustainable development (DOE 1994). DOE is responsible for the long-term management of the water discharges at the RFS in an environmentally acceptable manner and in compliance with local, state, and federal regulations.

To accomplish this long-term responsibility, the drainage system resulting from the Proposed Action should require less active management and maintenance than the current system while preserving existing wetlands and habitat as available water allows. Returning flows to approximate pre-retention conditions would provide ecological benefits by improving riparian habitat and reestablishing wetland formation.

Breaching the dams would reduce the Rocky Flats management efforts related to the continuous determination of evaporative depletions while also reducing the costs to water rights holders responsible for downstream augmentation replacements. By preserving the proposed breach schedule, the evaporative depletions associated with the Rocky Flats dams would be reduced or eliminated as soon as possible. The reduction/elimination of depletions would reduce or eliminate the costs incurred by Broomfield to replace water in Big Dry Creek according to the associated Augmentation Plan. Senior water rights holders are the appropriators with the oldest water rights and have been allocated by the State of Colorado in a “first in time, first in right” basis. Those with senior rights can require that others stop taking water so that the senior water right holder can obtain their allocated water. In times of water shortage, the senior water rights holder can “call” (or demand) that their water be allowed to flow to the rights holder. Therefore, the live flows formerly detained in the ponds would be available to downstream users in time, place, and amount, precluding any injury to calling senior water rights holders.

LM is directed by DOE to ensure protection of human health and the environment through effective long-term stewardship of land, structures, and facilities and to be responsible for the cost-effective management of this directive. Water discharged from the terminal pond dams meets applicable RFLMA surface water quality standards, which are based on the Colorado Water Quality Control Commission (CWQCC) Code of Colorado Regulations (CCR) Regulation No. 31: Basic Standards and Methodologies for Surface Water (5 CCR 1002-31) and on the site-specific standards in the CWQCC Regulation No. 38: Classifications and Numeric Standards South Platte River Basin Laramie River Basin Republican River Basin Smoky Hill River Basin (5 CCR 1002-38).

DOE has maintained the dams in accordance with the dam safety requirements of the State of Colorado, Office of the State Engineer. The State of Colorado Division of Water Resources (State Engineer) has jurisdiction over the RFS dams, which must be managed according to the Rules and Regulations for Dam Safety and Dam Construction (State of Colorado 2007). The site incurs dam maintenance costs resulting from vegetation control, structure/infrastructure maintenance, inspections, and data collection in order to ensure dam safety in compliance with dam safety regulations. Operational costs are incurred due to the batch-and-release water management protocols. The remaining dams at RFS are more than 30 years old, and maintenance and operation costs are expected to rise as the dams age. Construction costs associated with the actual breaching would also be expected to increase over time. By preserving the proposed

breach schedule, maintenance, operation, and construction costs increases would be nearly eliminated. Accordingly, DOE would reduce and/or eliminate the inspection and reporting costs associated with meeting dam safety requirements and the management and maintenance costs for operation of the dams, by completing the breaching of the remaining five dams as part of DOE's intention to breach all 12 dams.

The dams are no longer needed for the original purpose, and breaching of the dams would reduce DOE costs (and by association taxpayer costs), and would not change DOE's obligations to monitor surface water and meet standards as required by RFLMA.

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2.0 Issues and Concerns

The CEQ regulations require that “agencies shall make diligent efforts to involve the public in preparing and implementing their NEPA procedures” (40 CFR 1506.6). However, public participation concerning an EA is not considered mandatory, and the level of public participation is left to the discretion of the agency. DOE guidance allows individual discretion in public participation (DOE 1988). DOE’s intention for this project has been to openly provide as much information as possible during the planning stages prior to implementation of this EA and to solicit comments from the public. Accordingly, meetings have been held by DOE with interested parties and organizations.

The internal and public meetings are discussed below.

2.1 Issue Identification

The following sections describe the process used to identify issues.

2.1.1 Internal Scoping

The contractor NEPA team conducted an internal scoping meeting on January 7, 2010, to discuss potential issues and concerns that require consideration in the EA. Participants identified the potential cooperating and/or commenting agencies, summarized the NEPA process and documentation, and outlined the roles and responsibilities of the team.

The team identified the following issues to be addressed in the EA:

- Schedule for the proposed construction work
- Potential impacts to wetlands
- Floodplains
- Threatened and endangered (T&E) species
- Engineering approaches to meet State Engineer’s requirements for breaching dams
- Adding fill to existing pond bottoms to raise elevations
- Surface water quality monitoring, including downstream sediment (the team noted that surface water quality is a key known concern for neighboring communities)
- Offline water storage, Colorado water court, and current augmentation plan for depletion of flows to downstream water rights holders
- Transportation during construction
- Compliance with CAD/ROD-required institutional controls (which are also incorporated in RFLMA)

The team discussed referencing the results of the Comprehensive Risk Assessment in the *RCRA Facility Investigation-Remedial Investigation/Corrective Measures Study-Feasibility Study Report for the Rocky Flats Environmental Technology Site* (DOE 2006c) to document the human health and ecological risk evaluation for soil and sediment residual contamination. The relevance

of the risk evaluation for soil excavation to implement the Proposed Action is discussed in Section 3.1.7 of this EA.

The team also discussed the alternatives that would be included in this EA. The identified alternatives were to breach dams A-3, C-2 and PLF, and then operate terminal dams A-4 and B-5 in flow-through configuration until they are breached. The No Action Alternative was also discussed. No other alternatives were identified at this meeting.

2.1.2 NEPA Planning Board Scoping Meeting

The LM NEPA Planning Board (NPB) and the contractor NEPA team conducted a scoping meeting on January 20, 2010, to further discuss potential issues.

The group evaluated whether there were any viable potential alternatives beyond those that had been identified. No additional alternatives were proposed, but it was determined that the public would have the opportunity to suggest additional alternatives during the public scoping period of the EA process.

Additional discussion of the water rights issue focused on the potential to reduce or eliminate evaporative depletion reporting and the need to augment losses to downstream users. The NPB also determined that the public would be given a 30-day public comment period on the draft EA.

2.2 Public Participation Process

The Rocky Flats Stewardship Council (RFSC) is the congressionally chartered Local Stakeholder Organization for the RFS. The council consists of elected officials (or their appointed designees) of the nine communities neighboring Rocky Flats and four at-large members who are either individual members of the public or represent interested community organizations. The Stewardship Council is directed to facilitate communication between DOE and the public on Rocky Flats issues and conducts quarterly public meetings where DOE regularly presents information on quarterly and annual reports and other topics of interest. These meetings are announced in the local media and through various communication outlets within each local government and organization, as well as direct email notifications to a distribution list of stakeholders and individuals interested in Rocky Flats and Stewardship Council activities.

Public involvement was initiated by posting a *Notification of Intent to Prepare an Environmental Assessment (EA) of the Surface Water Configuration Project at the Rocky Flats Site*, and a presentation titled *The Introduction to the Rocky Flats Surface Water Configuration EA* on the Community Involvement page of the Rocky Flats Legacy Management website at http://www.lm.doe.gov/Rocky_Flats/Sites.aspx?view=5. A community notification announcing the postings was distributed electronically by email to the Rocky Flats public distribution list, and a news release was sent to the local media to accompany the posting. This communication was used to invite the public to attend the quarterly public meeting of the RFSC at 9:45 a.m. February 1, 2010, at the Rocky Mountain Metropolitan Airport Terminal Building, 11755 Airport Way, Broomfield, CO, where the proposed EA would be discussed. Emails were distributed to 61 members of the public, consisting of individuals and representatives of organizations that have expressed interest in Rocky Flats issues. In addition, emails were sent to 21 members of local media and national news services.

DOE presented *The Introduction to the Rocky Flats Surface Water Configuration EA* to the public at the Stewardship Council meeting on February 1, 2010. The presentation briefly described the NEPA process and identified the proposed and the no-action alternatives. Following the presentation, the DOE site manager answered questions and invited the public to propose additional alternatives that could be evaluated in the EA. DOE set a 2-week deadline for suggested alternatives to be submitted to DOE for inclusion and evaluation in the draft EA. DOE also announced that DOE would again discuss the Proposed Action and EA process in greater detail, including a technical presentation on the hydrology and surface configuration of the site to be provided at a future Stewardship Council meeting. DOE agreed to provide email notification of this meeting to be distributed to the public and media, and the presentation materials to be posted to the DOE website.

DOE presented the *Rocky Flats Surface Water Configuration EA and RFLMA POC Relocation Brief* to the public at the Stewardship Council quarterly meeting on April 4, 2010. The briefing provided the EA schedule and the results of the request for input from the public on additional alternatives to be addressed in the draft EA. The majority of the presentation addressed proposed relocation of several POCs that will be conducted under RFLMA concurrently with, but not part of, this EA.

Notification of the start of the 30-day comment period and posting of the Draft EA on the DOE website was sent via email as described above on April 30, 2010. Additionally, a notification was published in two local newspapers and a news release distributed regionally to solicit comments and provide the DOE website and email addresses. The 30-day public comment period ended June 1, 2010.

An informational public meeting was held the evening of May 18, 2010, at the Broomfield City and County Building. A newspaper advertisement was published in a local newspaper, and the invitation was posted to the LM website and distributed to the stakeholder distribution list via broadcast email. A second advertisement was published in a second local newspaper on May 13, 2010.

Seventeen members of the public, the majority of whom were employed by local community governments, attended the meeting and asked questions and provided comments during a DOE presentation on the Draft EA.

2.3 Results

Verbal comments received during the February 1, 2010, public meeting included the concern that not enough time has elapsed since completion of cleanup and closure and implementation of the final response action to provide sufficient monitoring data to support the proposed change in the surface water configuration.

- Several council members were concerned that the monitoring regime at the site would change or be reduced as a result of the Proposed Action. Several other council members indicated they would like to see additional information on the criteria that DOE would consider before breaching the dams at terminal ponds A-4 and B-5 (as originally proposed during the 2015 to 2018 timeframe). Another member spoke of concerns that the ongoing

groundwater treatment and current groundwater conditions could adversely affect surface water if the Proposed Action is implemented.

- One council member asked how the City and County of Broomfield augments downstream flows to make up for evaporative loss at the current impoundments and whether the Proposed Action would have an effect on the augmentation requirements.
- The DOE site manager said that prior to breaching the terminal A-4 and B-5 dams, DOE would consider the CAD/ROD requirements regarding compliance with RFLMA water quality standards at the POCs. He added that the change from batch and release to flow-through operation of the terminal pond dams would be discussed in detail in the EA.

DOE received five letters from representatives of downstream local government units in response to its request for input on additional alternatives for this EA. Four letters supported the No Action Alternative for various reasons, primarily because of concern that breaching the dams would negatively impact downstream surface water quality. The fifth letter also supported the No Action Alternative but suggested an additional alternative to evaluate the impact of breaching the dams after 10-, 15-, and 25-year increments from the present.

Verbal comments received during the April 4, 2010, Stewardship Council meeting focused primarily on the POC relocation issue. Several speakers opposed the dam breaches and POC relocations because:

- Not enough data were available
- Future monitoring requirements were not known
- The original site cleanup was insufficient

Verbal comments received during the May 18, 2010, informational meeting were written on flip charts for all to view. Verbal responses were also written on the flip charts. Appendix A provides a transcript of these flip charts.

DOE received 18 letters during the 30-day comment period, which contained 186 comments. All comments have been placed in a Comment Response table (Appendix A). Many of the comments received were similar in nature, and a Common Concern Statement document, with appropriate DOE response has been developed and is also presented in Appendix A.

3.0 Description of the Proposed Actions and Alternatives

This EA assesses the Proposed Action and No Action alternatives only, and a description of each of these alternatives is provided in this section. A discussion of other alternatives that were considered but eliminated from further action is also provided in this section.

3.1 Proposed Action

As stated in Section 1.2, the general purposes of the proposed dam modifications are to:

- Create a pond and drainage system that minimizes or eliminates maintenance and operation of the existing dams,
- Preserve and enhance wetlands and habitat to the extent practicable,
- Modify (breach) the dams such that they can be reclassified from jurisdictional to non-jurisdictional structures under State Engineer's Office regulations, if possible, while achieving the first two objectives, and
- Reduce or eliminate the off-line storage of surface water at the site and the resultant need for a Substitute Water Supply Plan (and subsequent Augmentation Plan) to replace out-of-priority depletions via the Broomfield Water Lease and ultimately, filings with the water court for storage rights.

Presently, ponds A-4 and B-5 are periodically discharged using batch and release, and discharge has been infrequent since closure. In addition to the dam modifications described in more detail in this section, the Proposed Action includes opening the discharge valves for ponds A-4, B-5, and C2 to operate the dams as flow-through structures prior to breaching. The rate of discharge would be controlled by periodically adjusting the discharge valves in response to varying inflow to establish more consistent downstream flow. The discharge rates would be adjusted as necessary to maintain lower pond levels than normally encountered in the previous batch-and-release mode. These lower pond levels would promote revegetation within the former pond bottom areas prior to the regrading and revegetation during the breach construction. This part of the Proposed Action would serve to reestablish continuous creek flows prior to completion of the breaches.

3.1.1 Design Characteristics and Sequence of Events Similar to all Five Dams

The Proposed Action is divided into two timeframes: breaching the dams at ponds A-3 and PLF in 2011 and breaching the dams at ponds A-4, B-5, and C-2 in the 2018 to 2020 timeframe. Dams A-4, B-5, and C-2 would be operated in flow-through configuration until they are breached. In general, pond water levels would be maintained at the elevation of the inlet to the discharge pipes, with outflow rates equaling inflow rates. In the event that high runoff influent volumes exceed the capacity of the discharge pipes, and the pool levels rise correspondingly, the rate of discharge would then be controlled by periodically adjusting the discharge valves such that pool levels would not be drawn down greater than 1 foot per day in order to ensure dam safety.

The average construction duration for dam breaching at each structure would be approximately 11 weeks. The project duration and areas of disturbance for each dam are shown on Table 3-1.

Figure 3–1 presents a typical breach cross section rendering as it is cut through the profile of the dam embankment. Figure 3–2 presents a typical breach profile cut through the cross section of the dam embankment. The channel bottom slope is shown along with a drop structure to reduce the flow line to match in with the existing outlet channel. These figures are not dam specific but provide a conceptual representation of the breach design for each of the dams. Appendix B provides preliminary design drawings specific to each dam with a plan view of the existing dam with the proposed breach location, a cross-section cut through the dam along the breach channel flowline, and a profile cut along the center of the dam showing the cross-section of the breach. The final drawings would be completed prior to construction and may contain site-specific changes due to ground truthing land surveys but would not include any additional disturbance than assessed in this EA.

Table 3–1. Dam Breach—Estimated Summations per Dam

Dam Name	Estimated Total Cubic Yards to be Excavated	Est. Project Duration (wks)	Area of Disturbance Breach Work (acre)	Area of Disturbance - Laydown and Road Area (acre)	Average Supervisory Personnel On Site Daily (inc. sub foreman)	Average Trade Personnel On Site Daily	Average Delivery & Specialty Personnel On Site Daily	Average Qty of Vehicles & Equipment Pcs. on Site Daily
Dam A-3	5,900	9.4	3.0	0.9	3.6	5.0	0.3	14.0
Dam A-4	7,305	11.2	5.9	3.2	3.6	5.0	0.3	14.0
Dam B-5	10,471	15.1	3.0	1.1	3.6	5.0	0.3	14.0
Dam C-2 ^a	7,004	10.7	2.6	4.8	3.6	5.0	0.3	14.0
Present Landfill Dam	5,909	9.4	2.6	0.9	3.6	5.0	0.3	14.0

^a Dam C-2 Area of Disturbance—Lay down and Road Area (acre) value includes the access road from Indiana Street.

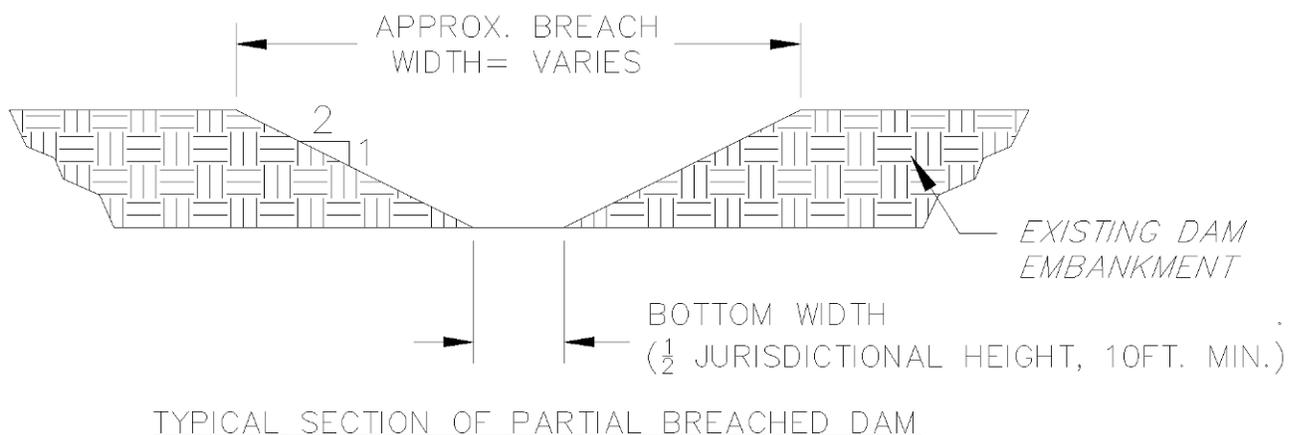


Figure 3–1. Typical Section of Partial Breached Dam

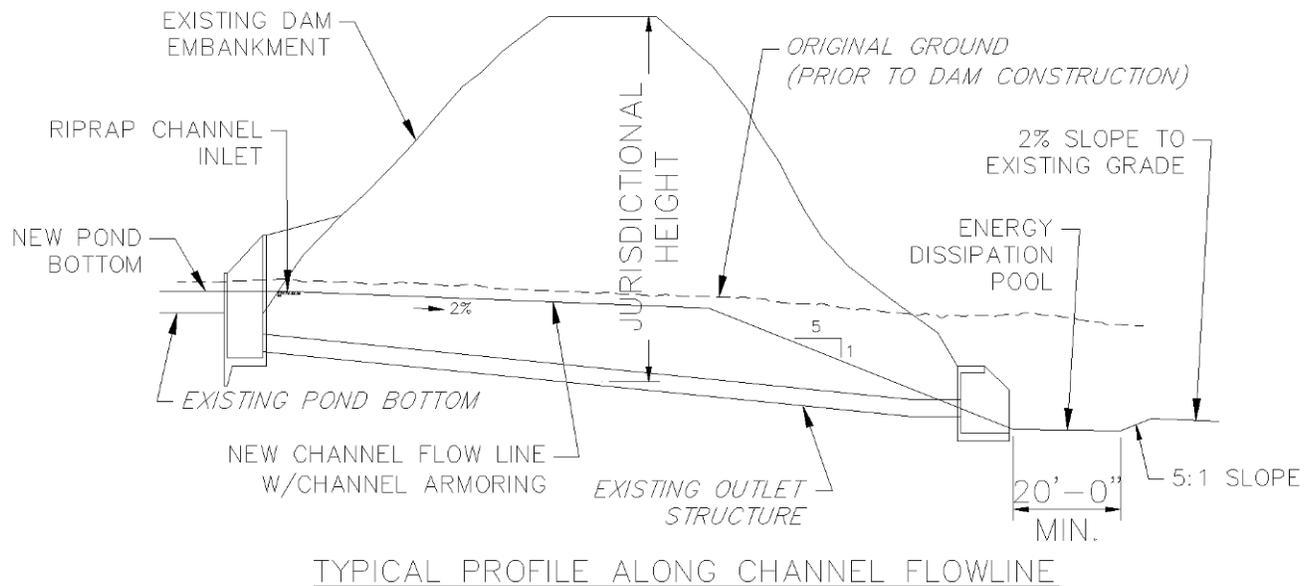


Figure 3–2. Typical Profile Along Channel Flowline

To modify the dam, a “breach” or “channel” would be cut into each dam to reduce its jurisdictional height, thus creating a lower profile. The following design characteristics are similar among the five dams.

- Channel side slopes of 2H:1V (H:V is the ratio of the horizontal length to the vertical height)
- Channel flowline slope of 2 percent with a 5H:1V drop structure slope
- Channel design to accommodate peak flows from at least a 100-year/24-hour storm event with 2 foot (ft) freeboard
- Channel bottom and side slopes to be armored as needed to resist future erosion

The inlet elevation (invert) for the channel would be located to provide positive drainage from the area upstream of the channel inlet. This would ensure a consistent flow of water and prevent ponding. The area upstream of each channel would be designed to preserve and enhance wetlands and habitat to the extent possible, while still providing positive flow. Table 3–1 provides a summary of the estimated disturbance, project duration, and resource requirements for each dam.

The following generalized construction sequence is similar for all five dams.

- Dewater the pond using existing discharge valves and/or pumping as necessary, several months prior to any construction work (preceding winter/spring).
- Mobilize for construction: set up staging area, erosion controls, and stockpile area.
- Install a temporary coffer dam upstream for potential storm events (manage retained water upstream using pumps). A coffer dam is a temporary watertight enclosure that is pumped dry to expose the bottom of a body of water so that construction may be undertaken.

- Excavate soil from the breach channel and fill predefined fill areas (i.e., former spillways and roads to be reclaimed).
- Construct breach to engineering specifications (side slopes, flowline, drop structure); armor the channel for erosion resistance, as needed.
- Regrade area upstream of channel to provide positive flow, minimize ponding, and promote establishment of quality habitat.
- Reclaim all disturbed areas.

3.1.2 A-3 Dam Specific Project Description

North Walnut Creek Pond A-3 currently has an approximate storage capacity of 12.4 million gallons (MG). The operating outlet is a 12-inch (in.)-diameter iron pipe. The jurisdictional dam height is approximately 32.5 ft as measured from the dam crest to the bottom of the outlet pipe at the dam centerline. Access to Dam A-3 would come from the RFS west entrance (Highway 93) and via existing dirt roads west and north of Pond A-3. Other physical characteristics of the dam are as follows:

- Dam crest length = 382 ft
- Emergency spillway description = 55 ft wide × 6 ft depth, 20 ft bottom width

Pond A-3 is periodically discharged to Pond A-4 depending on runoff volumes. In addition to the characteristics similar to all dam breaches, Dam A-3 would have a breach channel width of approximately 17 ft (preliminary design based on the State Engineer Office criteria of one-half the jurisdictional height of the existing dam but not less than 10 ft).

3.1.3 A-4 Dam Specific Project Description

North Walnut Creek Pond A-4 currently has an approximate storage capacity of 32.1 MG. The operating outlet is an 18-in.-diameter concrete pipe. The jurisdictional dam height is approximately 40 ft as measured from the dam crest to the bottom of the outlet pipe at the dam centerline. Access to Pond A-4 would come from the RFS west entrance (Highway 93) and via existing dirt roads west and south of A-4. Other physical characteristics of the dam are as follows:

- Dam crest length = 470 ft
- Emergency spillway description = 162 ft wide × 4 ft depth, 138 ft bottom width

Dam A-4 is operated using the current batch-release protocol to manage terminal pond discharges. Discharges have been infrequent since site closure. In addition to the characteristics similar to all dam breaches, Dam A-4 would have a breach channel width of approximately 20 ft (preliminary design based on the State Engineer Office criteria of one-half the jurisdictional height of the existing dam but not less than 10 ft).

3.1.4 B-5 Dam Specific Project Description

South Walnut Creek Pond B-5 currently has an approximate storage capacity of 23 MG. The operating outlet is an 18-in.-diameter concrete pipe. The jurisdictional dam height is

approximately 49.5 ft as measured from the dam crest to the bottom of the outlet pipe at the dam centerline. Access to Pond B-5 would come from the RFS west entrance (Highway 93) and via existing dirt roads west and north of B-5. Other physical characteristics of the dam are as follows:

- Dam crest length = 470 ft
- Emergency spillway description = 116 ft wide × 6 ft depth, 80 ft bottom width

Dam B-5 is operated using the current batch-release protocol to manage terminal pond discharges. Discharges have been infrequent since site closure. In addition to the characteristics similar to all dam breaches, Dam B-5 would have a breach channel width of approximately 25 ft (preliminary design based on the State Engineer Office criteria of one-half the jurisdictional height of the existing dam but not less than 10 ft).

3.1.5 C-2 Dam Specific Project Description

South Interceptor Ditch Pond C-2 currently has an approximate storage capacity of 23 MG. Pond C-2 currently retains water from the South Interceptor Ditch and does not receive direct Woman Creek inflow. The operating outlet is an 18-in.-diameter concrete pipe. The jurisdictional dam height is approximately 34 ft as measured from the dam crest to the bottom of the outlet pipe at the dam centerline. Access to Pond C-2 would come from the east side of the Refuge (Indiana Street) and via existing dirt roads east and south of C-2. Other physical characteristics of the dam are as follows:

- Dam crest length = 1,213 ft
- Emergency spillway description = 380 ft wide × 12 ft depth, 236 ft bottom width

Dam C-2 is operated using the current batch-release protocol to manage terminal pond discharges. Discharges have been infrequent since site closure. In addition to the characteristics similar to all dam breaches, Dam C-2 would have a breach channel width of approximately 17 ft (preliminary design based on the State Engineers Office criteria of one-half the jurisdictional height of the existing dam but not less than 10 ft).

3.1.6 PLF Dam Specific Project Description

The PLF Pond currently has an approximate storage capacity of 8.7 MG. The operating outlet is a 12-in.-diameter iron pipe. The jurisdictional dam height is approximately 36.5 ft as measured from the dam crest to the original ground at the dam centerline. Access to the PLF would come from the RFS west entrance (Highway 93) and via existing dirt roads west and south of the PLF. Other physical characteristics of the pond and dam are as follows:

- Dam crest length = 461 ft
- Emergency spillway description = 30 ft wide × 2 ft depth, 22 ft bottom width

The PLF Dam is currently operated with the valve open in a flow-through mode. In addition to the characteristics similar to all dam breaches, the PLF Dam would have a breach channel width of approximately 18 ft (preliminary design based on the State Engineer Office criteria of one-half the jurisdictional height of the existing dam but not less than 10 ft).

3.1.7 Institutional Controls Similar to all Five Dams (not resource specific)

Although the dams that are proposed to be breached are not required by the CAD/ROD, certain aspects of the work are subject to institutional controls within the COU and regulated by RFLMA requirements. Also, RFLMA establishes water quality standards and identifies the water monitoring and evaluation requirements applicable to implementation of the remedy. The current management of ponds A-4, B-5, and C-2 is to retain water until approximately 40 to 50 percent of the capacity is reached, at which point discharge planning is initiated, which is referred to as batch-and-release operation. Under RFLMA operational monitoring (pre-discharge sampling), the water in the ponds is sampled prior to release. Pre-discharge sampling is completed to demonstrate that the discharged water would be expected to meet applicable RFLMA water quality standards. If the results suggest RFLMA standards might be exceeded at the downstream POC, the RFLMA parties consult on appropriate pond management actions. However, the dams are operated to maintain dam safety regardless of the status of pre-discharge sampling. During discharge, the released water is monitored at a RFLMA POC a short distance downstream of the dam outlet. Compliance with water quality standards is determined based on sample results at the RFLMA POC. Water quality and monitoring results are discussed in detail in Section 4.3.5.

In addition, excavation within the COU deeper than 3 ft below the surface is prohibited by the remedy institutional controls unless approved in accordance with RFLMA requirements. Shallower soil disturbance within the COU is also prohibited by the remedy institutional controls unless the work is conducted in accordance with an approved erosion control plan. DOE has requested approval under the RFLMA requirements to perform the dam breach excavation and has documented that an approved erosion control plan would apply to the work.

Once the dams are breached, no pre-discharge sampling will occur, as the batch-and-release mode of operation will stop, and the water would be in a flow-through configuration. Thus RFLMA operational pre-discharge monitoring will discontinue, but all other RFLMA monitoring will remain. Information regarding the RFLMA party consultation for the proposed RFLMA modifications, the soil disturbance/excavation work, and the regulatory approval process is contained in RFLMA Regulatory Contact Record 2010-02, which is included in Appendix C. Contact Record 2010-02 includes a summary of the characterization and risk evaluation documentation developed during cleanup and closure of RFS relevant to the soil excavation work to implement the Proposed Action.

Due to comments from local communities that because the proposed excavation was not remedy related, CDPHE withdrew approval of Contact Record 2010-02 on October 15, 2010 to allow the RFLMA parties to consult regarding clarification of the soil excavation and soil disturbance prohibitions. The RFLMA parties agree that it is appropriate to make the clarification by issuing an amendment to the CAD/ROD and modifying RFLMA Attachment 2, after consideration of public review comments. The dam breaching would not occur until the appropriate RFLMA amendment is approved.

DOE is aware that because the terminal ponds have been operated in a batch-and-release mode for many years, the dams are perceived by some in the community as features that may be used to mitigate potential impacts to downstream water quality. Appendix A provides a General Statement Concerning Risk to help the reader understand the relationship between the dams and onsite water quality.

3.2 No Action Alternative

The No Action Alternative involves no change to the existing configuration of the remaining five dams in North and South Walnut Creek, No Name Gulch, and Woman Creek (Figure 1-1). Water would be routed according to current configuration and managed at ponds A-3, A-4, B-5, C-2, and the PLF using the current operating protocol. Environmental monitoring would continue in accordance with RFLMA. Operation and maintenance of the dams (batch operation and predischage sampling would remain), and appurtenant structures would continue to require maximum resources.

3.3 Other Alternatives Considered

One alternative action was suggested as a result of the initial request for public comments. This alternative suggested that DOE delay breaching the remaining dams or terminal dams until some point in the future (10, 25, or 50 years) and conduct further water quality and sediment analysis. Additionally, breaching the dams should require long-term monitoring of downstream flows.

This alternative is essentially the same as the No Action Alternative in that no dams would be breached in the foreseeable future, and environmental monitoring would continue in accordance with RFLMA. Because this suggestion does not provide a new alternative to this EA, it is not considered further.

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4.0 Description of the Affected Environment

This section provides a general description and a regional context of the RFS. Additionally, specific discussion of existing environmental resources is provided as necessary for DOE to reach a reasoned choice between the Proposed Action and the No Action alternatives. Resources that are not present or would not be impacted by the Proposed Action are discussed briefly, with an explanation as to why the resources were not carried forward for further environmental analysis. Environmental resources known to occur, or with the potential to occur, and that may be impacted in the Proposed Action are identified and carried forward for further analysis.

Many of the existing conditions as reported in the *Environmental Assessment Comment Response and Finding of No Significant Impact, Pond and Land Configuration* (DOE 2004) are still applicable, and baseline and monitoring information from the 2004 EA has been used.

4.1 General

As previously described in Section 1.1, the RFS is located in northern Jefferson County, Colorado, approximately 16 miles northwest of Denver, between the cities of Golden and Boulder. The RFS originally occupied approximately 6,200 acres. After site closure, management of the area was split between DOE and USFWS. DOE-retained the 1,300 acre COU, while most of the POU became the Rocky Flats Wildlife Refuge under USFWS management.

The RFS is surrounded by the Refuge. Numerous easements cross the COU and POU for utilities such as power, gas, and telephone. Water conveyance ditches for water rights owned by non-DOE parties cross the POU at various locations (e.g., McKay Ditch, Mower Ditch, and Smart Ditch – D-Series Ponds).

The communities of Arvada, Boulder, Broomfield, Golden, Leyden, Superior, and Westminster are located near the RFS. The land to the south of the Refuge is privately owned and is currently used for cattle grazing with plans to develop portions of these properties as residential subdivisions and business developments. The State of Colorado School Board land located in Section 16 (in the southwest corner of the Refuge) is also primarily rangeland, and gravel mining has occurred on this property in the past. An operating oil and gas well is located in Section 16.

The land between Highway 93 and the foothills to the west is largely comprised of City of Boulder, Boulder County, and Jefferson County open space properties, some of which are used for grazing and recreation activities. No development is currently planned for these areas. Between the Refuge and Highway 93 lies a narrow strip of private property used for grazing and business development.

On the western edge of the Refuge, within the POU boundary (but not part of the Refuge), two gravel mine operations are present, only one of which is active. The National Renewable Energy Laboratory (NREL) wind test site is located directly northwest of the POU (Figure 1–1). North of the Refuge is open space land owned and managed by the City of Boulder and Boulder County. Most of the land east of the Refuge and within the City and County of Broomfield and City of Westminster is open space property. A measure included in the Rocky Flats Wildlife Act

would allow a 300-ft corridor along the eastern edge of the Refuge for transportation improvements along Indiana Street (PL 107-107).

Elevations at the POU and COU range from approximately 5,700 ft in the east to approximately 6,100 ft along the western edge. The topography consists of gently east-sloping flat pediment (mesa) tops that have been dissected by intermittent and ephemeral streams, resulting in moderate to steep hillsides.

According to NREL, the average annual precipitation is approximately 15 in., most of which falls during April and May. The mean monthly temperature ranges from a low of approximately 34 °F in January to a high of approximately 71 °F during July. High winds, sometimes in excess of 90 miles per hour, frequently buffet RFS during the winter months (NREL 2010).

Plant communities range from xeric (dry) grassland communities to more hydric (wet) communities such as wet meadows and marshes. Diverse wildlife occurs at the RFS, and birds occur in all available habitats at RFS.

4.2 Resources Considered but not Present or Impacted by the Proposed Action

4.2.1 Prime and Unique Farmlands

Prime and unique soils are protected under the Farmland Protection Policy Act of 1981. The purpose of the law is to minimize the extent to which federal activities contribute to the irreversible and unnecessary loss of agricultural land to non-agricultural uses. No prime and unique soils or agricultural lands are present on the RFS; therefore, this resource is not considered further in this EA.

4.2.2 Environmental Justice

Executive Order 12898 requires that each federal agency consider and address “disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” The results of individually or collectively breaching dams on the RFS as well as the associated employment and construction activities to breach the dams would not impact downstream minority communities or their environment; therefore, this element is not considered further in this EA.

4.2.3 Wild and Scenic Rivers

The Wild and Scenic Rivers Act (PL 90-542) designates selected rivers of the United States for protection. No designated wild and scenic rivers cross the RFS or would be impacted by this project; therefore, this resource is not considered further in this EA.

4.2.4 Native American Concerns

The proposed dam breach activities are not expected to affect historic tribal use areas or traditional cultural properties on the basis of cultural resource inventory results (Burney et al. 1989; Dames & Moore 1991). In accordance with 36 CFR 800.2 and 800.4,

DOE notified 18 identified tribes of its Proposed Action by letter sent via U.S. mail, dated March 23, 2010, and requested their assistance in identifying properties having religious or cultural significance. No responses were received. Appendix D provides copies of the consultation letters.

4.2.5 Cultural Resources

Class III cultural resource inventories of the RFS were conducted in 1989 and 1991 (Burney et al. 1989; Dames & Moore 1991). All cultural sites and isolated finds that were discovered during the inventories were found to be ineligible for inclusion on the National Register of Historic Places. Since the 1989 and 1991 inventories, the areas adjacent to the retention ponds have been minimally disturbed, with the exception of removing sediment from the bottom of the PLF Pond during construction of the nearby landfill, outlet works upgrades (A-4, B-5, C-2), spillway repair at A-3, and occasional sampling of sediment from the other ponds. With these exceptions, no surface-disturbing activities have occurred during the past 20 years. For this reason, DOE believes that the 1989 and 1991 inventories remain applicable and has recommended to the State Historic Preservation Officer (SHPO) that its proposed work would have “no effect.” SHPO concurred with this determination in a letter to DOE dated March 24, 2010. As a result, this resource is not considered further in this EA. Copies of the letter sent to SHPO, and the SHPO concurrence letter are included in Appendix D.

4.2.6 Groundwater

Breaching the remaining interior and terminal dams and reestablishing approximate original creek configurations on the RFS would not have a meaningful impact on groundwater. The associated ponds are well downstream of contaminant source areas, and concentrations of the pertinent contaminants in groundwater within these drainages are monitored upstream of the ponds that would be affected. Therefore, breaching the dams does not affect groundwater contaminant migration or distribution, and this resource is not considered further in this EA.

4.2.7 Socioeconomic Considerations

Employment needs were evaluated based on the expected average employment needs for breaching each dam. Overlapping of dam breach activities are expected; however, even doubling the employment would not affect the results of the following analysis.

Between eight to nine people would be needed to conduct, supervise, and provide oversight activities associated with breaching activities at each dam. Three to four individuals would be contractor-provided supervisory or professional positions (construction site supervisor, health and safety, environmental compliance, and engineer), and an average of five positions would be local hires in other work categories, such as laborers, truck drivers, and heavy equipment operators. Some of the positions would be part time. Dam breach activities are expected to take between 9 and as much as 15 weeks at each dam, which is related to the actual size of the dam and volume of material that would be removed.

The hiring of an average of five subcontractor labor workers would not influence local unemployment patterns, contribute substantially to local revenues, or affect existing school enrollment levels or utilities. Additionally, a job safety analysis is prepared for all onsite work,

and any contracted workers would be required to attend safety training. For these reasons, this subject is not considered further in this EA.

4.2.8 State or National Parks, Forests, Conservation Areas, or Other Areas of Recreational, Ecological, Scenic, or Aesthetic Importance

No state or national parks, forests, conservation areas, or other areas of recreational, ecological, scenic, or aesthetic importance occur on the RFS. However, DOE transferred most of the land in the POU to USFWS in 2007 (PL 107-107). As of this writing, USFWS has not begun development work in the Refuge. The RFS provides habitat for the federally listed Preble's meadow jumping mouse, which is further described and evaluated in Sections 5.2.3 and 6.3. None of the proposed or related actions described in this EA would affect use or the purposes of the Refuge; therefore, this subject is not considered further.

4.2.9 Transportation

The RFS is accessed daily by LM and contractor staff via State Highway (SH) 93. For work on dams A-3, A-4, B-5, and the PLF, area state highways would continue to be used to access the site. The small additional anticipated workforce of eight to nine individuals and expected miscellaneous delivery trips would not impact highway capacity or existing use patterns. In 2008, the average annual daily traffic (AADT) on SH-93 between SH-72 and SH-128 varied between 16,400 to 15,800 vehicles, which included truck and passenger vehicles. Between 6.1 and 7.4 percent of the vehicles using SH-93 consisted of single or combination trucks (CDOT 2010).

Work on dam C-2 is expected to require access from Indiana Street (County Road 5) either from SH-128 or SH-72. SH-128 at the McCaslin intersection near Indiana Street carried an AADT of 9,200 vehicles in 2008. SH-72 at the Indiana Street intersection north of 82nd Avenue recorded an AADT of 15,000 in 2008. Truck traffic varied at these locations between 3.2 and 4.8 percent (CDOT 2010). The Colorado Department of Transportation (CDOT) interactive maps showed traffic on Indiana Street between 10,500 to over 11,000 AADT; near Woman Creek, the AADT was 10,400. If accessing the site with heavy equipment or special deliveries becomes an issue related to highway safety, LM would consider safety options in conjunction with CDOT and Jefferson County recommendations.

The expected small work force, minor equipment and delivery requirements, and availability of state highways for most access requirements do not indicate that transportation would be an issue of concern. For that reason, this resource is not considered further in this EA.

4.2.10 Intentionally Destructive Acts

In the aftermath of the tragic events of September 11, 2001, DOE is required to consider measures to minimize the risk and consequences of a potential terrorist attack. It is not possible to predict whether sabotage events would occur and, if they did, the nature of such events. Nevertheless, the RFS, and associated dam structures present an unlikely target for an intentionally destructive act and has a low probability of attack. The dams are classified as low hazard or no public hazard by the State of Colorado Office of the State Engineer.

4.3 Resources Considered Further in this EA

Descriptions of the existing environments that could be affected by the Proposed Action are provided in this section.

4.3.1 Wildlife

Considerable wildlife diversity occurs at RFS as well as the Refuge. Wildlife use in North and South Walnut Creek as well as Woman Creek is comparable to that documented in the riparian and grassland areas at RFS. Wildlife surveys were conducted throughout the 1990s and early 2000s across the property that documented the diversity of wildlife (K-H 1998; K-H 1999; K-H 2000; K-H 2001; K-H 2002). The project work would be on the stream bottoms and ponds, and the wildlife associated with those types of habitats and vegetation communities (e.g., riparian woodland/shrubland, wetlands, mesic mixed grassland, and mixed grassland) would be more prevalent.

Mule deer (*Odocoileus hemionus*) are common across the RFS with an occasional white-tailed deer (*O. virginianus*) mixed in the population. Deer population numbers range between 100 to 160 individuals on an annual basis. Elk (*Cervus elaphus*), mountain lion (*Puma concolor*), and black bear (*Ursus americanus*) are observed occasionally. The most commonly observed carnivore is the coyote (*Canis latrans*). Mid- to small-sized animals include desert cottontails (*Sylvilagus audubonii*), white-tailed (*Lepus townsendii*) and black-tailed (*Lepus californicus*) jackrabbits, raccoons (*Procyon lotor*), muskrats (*Ondatra zibethicus*), and black-tailed prairie dogs (*Cynomys ludovicianus*). Common small mammals include deer mice (*Peromyscus maniculatus*), prairie (*Microtus ochrogaster*) and meadow voles (*M. pennsylvanicus*), harvest mice (*Reithrodontomys sp.*), and shrews (*Sorex sp.*). The Preble's meadow jumping mouse (*Zapus hudsonius preblei*), a federally listed threatened species, also occurs at the RFS and is discussed in Section 4.3.3.

Amphibians have been observed across the RFS in the appropriate habitats for each species. Common species include boreal chorus frogs (*Pseudacris triseriatus maculata*), northern leopard frogs (*Rana pipiens*), and bullfrogs (*Rana catesbeiana*). Reptile species include the prairie rattlesnake (*Crotalus viridis*), western painted turtle (*Chrysemys picta*), and occasional observations of the eastern short-horned lizard (*Phrynosoma douglassi*) on the xeric tallgrass prairie. Fish are found in the intermittent streams and most ponds at the RFS. Common species include fathead minnows (*Pimephales promelas*), creek chubs (*Semotilus atromaculatus*), and an occasional small-mouth (*Micropterus dolomieu*) and large-mouth (*M. salmoides*) bass. Past sampling efforts have observed fathead minnows in the project ponds. The fluctuating water levels in the ponds may limit habitat suitability for the other species, which have not been observed there.

4.3.2 Migratory Birds

Most birds are protected by the Migratory Bird Treaty Act of 1918 (16 USC 703-712; Ch. 128 *et seq.*). Birds occur in all available habitats at RFS, including potentially the areas in and around the dams. Song birds such as meadow larks (*Sturnella neglecta*) and vesper sparrows (*Pooecetes gramineus*) are common in the grassland areas of the Rocky Flats property (including the project areas). These birds and other animals living in the grassland areas provide forage for

raptors such as red-tailed hawks (*Buteo jamaicensis*), Swainson’s hawks (*Buteo swainsoni*), northern harriers (*Circus cyaneus*), great horned owls (*Bubo virginianus*), and American kestrels (*Falco sparverius*). All but the Swainson’s hawk are common year-round at RFS. In summer, the most common additional species are Swainson’s hawks, golden eagles (*Aquila chrysaetos*), and turkey vultures (*Cathartes aura*). Other raptors that occasionally visit RFS include the peregrine falcon (*Falco peregrinus*), ferruginous hawk (*Buteo regalis*), bald eagles (*Haliaeetus leucocephalus*), and burrowing owl (*Athene cunicularia*).

The riparian areas, including No-Name Gulch, North and South Walnut Creek, and Woman Creek, along the streams and drainage bottoms at RFS support a variety of song and neo-tropical migrant species of birds. Over 95 neo-tropical migrant species have been recorded at RFS. Some of the more common sightings in the project area include American goldfinch (*Carduelis tristis*), lesser goldfinch (*Carduelis psaltria*), Bullock’s orioles (*Icterus bullockii*), Brewer’s blackbirds (*Euphagus cyanocephalus*), yellow warblers (*Dendroica petechia*), western kingbirds (*Tyrannus verticalis*), common nighthawks (*Chordeiles minor*), and Cooper’s hawks (*Accipiter cooperii*). Other common neo-tropical birds include the Say’s phoebe (*Sayornis saya*), eastern kingbirds (*Tyrannus tyrannus*), cliff and barn swallows, American robins (*Turdus migratorius*), yellow warblers (*Dendroica* spp.), common yellowthroat (*Geothlypis trichas*), grasshopper sparrows (*Ammodramus savannarum*), and red-winged blackbirds (*Agelaius phoeniceus*). Raptors such as red-tailed hawks and great horned owls occasionally use the riparian woodlands for perches or nesting areas.

The ponds located in the project areas are used by waterfowl and shorebirds as breeding habitat or feeding areas. Among more than 45 species of waterfowl and shorebirds at RFS, mallards (*Anas platyrhynchos*), Canada geese (*Branta canadensis*), and great blue herons (*Ardea herodias*) are the most common. Other frequently observed waterfowl species include buffleheads (*Bucephala albeola*), blue-winged teal (*Anas discors*), green-winged teal (*Anas crecca*), common (*Mergus merganser*) and hooded mergansers (*Lophodytes cucullatus*), ring-necked ducks (*Aythya collaris*), redheads (*Aythya americana*), lesser scaups (*Aythya affinis*), black-crowned night herons (*Nycticorax nycticorax*), double crested cormorants (*Phalacrocorax auritus*), American coots (*Fulica americana*), American white pelicans (*Pelecanus erythrorhynchos*), and pied-billed grebes (*Podilymbus podiceps*).

4.3.3 Threatened and Endangered Plant and Wildlife Species

Table 4–1 lists the federally threatened or endangered species of plants that must be evaluated for potential impacts from projects at the RFS based on the species list received from USFWS (USFWS 2010).

Table 4–1. Federally Listed Threatened and Endangered Vegetative Species

Plants	Legal Status
Colorado butterfly plant (<i>Gaura neomexicana coloradensis</i>)	T
Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	T
Western prairie fringed orchid (<i>Platanthera praeclara</i>) ^a	T

^a Lower Platte River species

T = Listed threatened

Ute ladies'-tresses orchid and Colorado butterfly plant are both species listed as threatened but have not been documented on the RFS (ESCO 1993; ESCO 1994; DOE 1996). The western prairie fringed orchid occurs along the South Platte River in Nebraska; however, per USFWS requirements, it must be considered for potential water depletion issues (USFWS 2010).

Based on the species list received from USFWS (USFWS 2010), Table 4–2 lists the federally listed species must be evaluated for potential impacts from projects at the RFS.

Table 4–2. Federally Listed Threatened and Endangered Wildlife Species

Animals	Status
Interior Least tern (<i>Sterna antillarum</i>) ^a	E
Pallid sturgeon (<i>Scaphirhynchus albus</i>) ^a	E
Piping plover (<i>Charadrius melodus</i>) ^a	T
Preble's meadow jumping mouse (<i>Zapus hudsonius preblei</i>)	T
Whooping crane (<i>Grus americana</i>) ^a	E

^a Lower Platte River species

T = Listed threatened

E = Listed endangered

Of these species, only the Preble's mouse occurs at the RFS, generally along the stream channels in areas where multi-strata vegetation exists to provide food, shelter, and cover for the mouse. Other species shown on Table 4–2 are lower Platte River species that are to be considered for water depletion issues (USFWS 2010). The Preble's mouse has been documented and studied extensively in each of the main drainages at RFS. Studies at the RFS have focused on trapping and tagging Preble's mice, including mice in North and South Walnut Creek and Woman Creek drainages, and tracking their movements through the use of telemetry. In addition, habitat characterization has been completed to quantify habitat parameters for the mouse at the RFS. The data from these studies have yielded information on Preble's mouse habitat, areas of occupation, home ranges, and mouse movement at the RFS.

Currently a Programmatic Biological Assessment (PBA) and accompanying Biological Opinion (BO) exist for activities at RFS. On December 15, 2010, the USFWS finalized a ruling that designated critical habitat for the Preble's meadow jumping mouse (Preble's mouse; *Zapus hudsonius preblei*) at Rocky Flats (75 FR 78430). As a result, LM has re-initiated consultation with the USFWS to amend the PBA to address the critical habitat designation, remove completed activities from the PBA, and address ongoing and future DOE activities that may take place at the site.

No federal candidate species are present at the RFS or in the project areas (USFWS 2010).

In addition to the federally listed wildlife species, RFS has been known to support several species with special status designated by the Colorado Division of Wildlife (CDOW) because of their rare or imperiled status (CDOW 2010). Table 4–3 lists the Colorado State Threatened and Special Concern wildlife species that have been observed at RFS or reported to have been observed at RFS.

Table 4–3. Colorado State Threatened, Endangered, and Special Concern Wildlife Species

Animals	Status	Occurrence At RFS (COU) and POU
American Peregrine Falcon (<i>Falco peregrinus anatum</i>)	SC	Observed infrequently
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	ST	Observed infrequently
Black-Tailed Prairie Dog (<i>Cynomys ludovicianus</i>)	SC	Found at selected locations in COU and POU
Burrowing Owl (<i>Athene cunicularia</i>)	ST	Observed infrequently
Common Garter Snake (<i>Thamnophis sirtalis</i>)	SC	Observed infrequently
Common Shiner (<i>Luxilus cornutus</i>)	ST	Released in Rock Creek (POU) (USFWS)
Ferruginous Hawk (<i>Buteo regalis</i>)	SC	Regular visitor
Greater Sandhill Crane (<i>Grus canadensis tabida</i>)	SC	Observed infrequently
Long-Billed Curlew (<i>Numenius americanus</i>)	SC	Observed infrequently
Mountain Plover (<i>Charadrius montanus</i>) ^a	SC	Listed in USFWS CCP for the COU and POU but not in ecology database as observed at RFS
Northern Leopard Frog (<i>Rana pipiens</i>)	SC	Commonly observed around ponds and streams
Northern Redbelly Dace (<i>Phoxinus eos</i>)	SE	Released in Rock Creek (POU) (USFWS)
Plains Sharp-Tailed Grouse (<i>Tympanuchus phasianellus jamesii</i>) ^a	SE	Listed in USFWS CCP for the COU and POU but not in ecology database as observed at RFS
Preble's Meadow Jumping Mouse (<i>Zapus hudsonius preblei</i>)	FT, ST	Known to occur at several locations in COU and POU

^a Listed in USFWS Comprehensive Conservation Plan for the RFNWR – not documented in RFS ecology database

FT = Federally listed threatened

SE = State listed endangered

ST = State listed threatened

SC = State special concern

USFWS published a 90-day finding on a petition to list the northern leopard frog as threatened in the Federal Register on July 1, 2009 (74 FR 31389). No ruling has been made concerning this species at the time of writing.

4.3.4 Vegetation, Wetlands, and Floodplains

This section describes the existing vegetation communities, as well as a description of the wetlands and floodplains, both at the RFS and the study area. Two general types of plant communities exist in the study area: (1) upland grassland communities adjacent to the ponds, and (2) wetland communities within and around the ponds. Appendix E provides an in-depth technical report of the information provided below.

4.3.4.1 Vegetation

The upland grassland areas around the ponds are generally classified as either mesic mixed grasslands or reclaimed grasslands (K-H 1997). Dominant species in the mesic mixed grassland include blue grama (*Boutelou gracilis*), western wheat grass (*Agropyron smithii*), green needle grass (*Stipa viridula*), Kentucky bluegrass (*Poa pratensis*), and Japanese brome (*Bromus*

japonicus). The reclaimed grasslands that were seeded after construction of the ponds is dominated by smooth brome (*Bromus inermis*), a non-native grass species. This includes the reclaimed grasslands at the A-3, A-4, B-5, and C-2 ponds. At the PLF, the reclaimed grassland is dominated by native species, which include western wheat grass, blue grama, side-oats grama (*Bouteloua curtipendula*), and switchgrass (*Panicum virgatum*).

4.3.4.2 Wetlands

The Walnut Creek and Woman Creek drainages are intermittent streams with perennial reaches and have a narrow riparian corridor and limited wetlands. The wetland communities at RFS were delineated, characterized, and mapped by the U.S. Army Corps of Engineers (USACE) in 1994 (USACE 1994). Table 4–4 summarizes the wetland communities found in the vicinity of each of the ponds. Figure 4–1 through Figure 4–5 show the locations and types of existing wetlands in and around the study area ponds.

Table 4–4. Existing Pond Wetlands/Open Water Summary

Location	Wetland Type	Total Acreage	Total Wetland Acreage
A-3 Pond	Palustrine Emergent	0.896	4.187
	Palustrine Shrub	0.488	
	Open Water	2.802	
A-4 Pond	Palustrine Emergent	1.547	4.480
	Palustrine Shrub	0.006	
	Open Water	2.927	
B-5 Pond	Palustrine Emergent	0.592	3.036
	Open Water	2.445	
C-2 Pond	Palustrine Emergent	1.562	5.543
	Palustrine Shrub	0.113	
	Open Water	3.868	
PLF Pond	Palustrine Emergent	0.801 (0.478)	0.909 (3.058)
	Open Water	2.257 (0.431)	
Total		20.304 (18.155)	18.155 (20.304)

Acreage amounts are totals in area of each pond based on 1994 USACE wetland mapping report. Linear wetland features acreages calculated as: (Length x 2 ft)/43,560 square ft/acre.

PLF figures in parenthesis represent 2009 mitigation monitoring report values.

Small differences from the 1994 USACE wetland delineation may currently exist at the A-3, A-4, B-5, and C-2 ponds due to changes in environmental conditions. Therefore, the extent of the wetland mapping as delineated by USACE may no longer be accurate due to changes in the environmental conditions between 1994 and the present.

The PLF and wetlands were disturbed as part of site closure activities, and wetland reestablishment is ongoing. Accordingly, the first set of values under total acreage presented in Table 4–4 for the PLF are based on what was previously delineated by the 1994 USACE mapping. The values in parenthesis are based on the 2009 wetland mitigation monitoring report submitted to EPA.

Palustrine emergent wetlands are those dominated by herbaceous vegetation. Dominant species includes cattails (*Typha* spp.), arctic rush (*Juncus balticus*), sedges (*Carex* spp.), prairie cordgrass (*Spartina pectinata*), spikerushes (*Eleocharis* ssp.), redtop (*Agrostis stolonifera*), and Canada thistle (*Cirsium arvense*). Palustrine shrublands are dominated by shrub species such as wild indigo (or leadplant) (*Amorpha fruticosa*) and coyote willow (*Salix exigua*) with an understory of herbaceous species. Open water habitat is areas that are permanently inundated, and no rooted emergent or woody plant species are present.

4.3.4.3 Floodplains

The Federal Emergency Management Agency (FEMA) defines a 100-year flood event as a flood that has a 1 percent chance of being equaled or exceeded in any given year, and a 500-year floodplain as having a 0.2 percent chance of being equaled or exceeded in any given year (FEMA 2007).

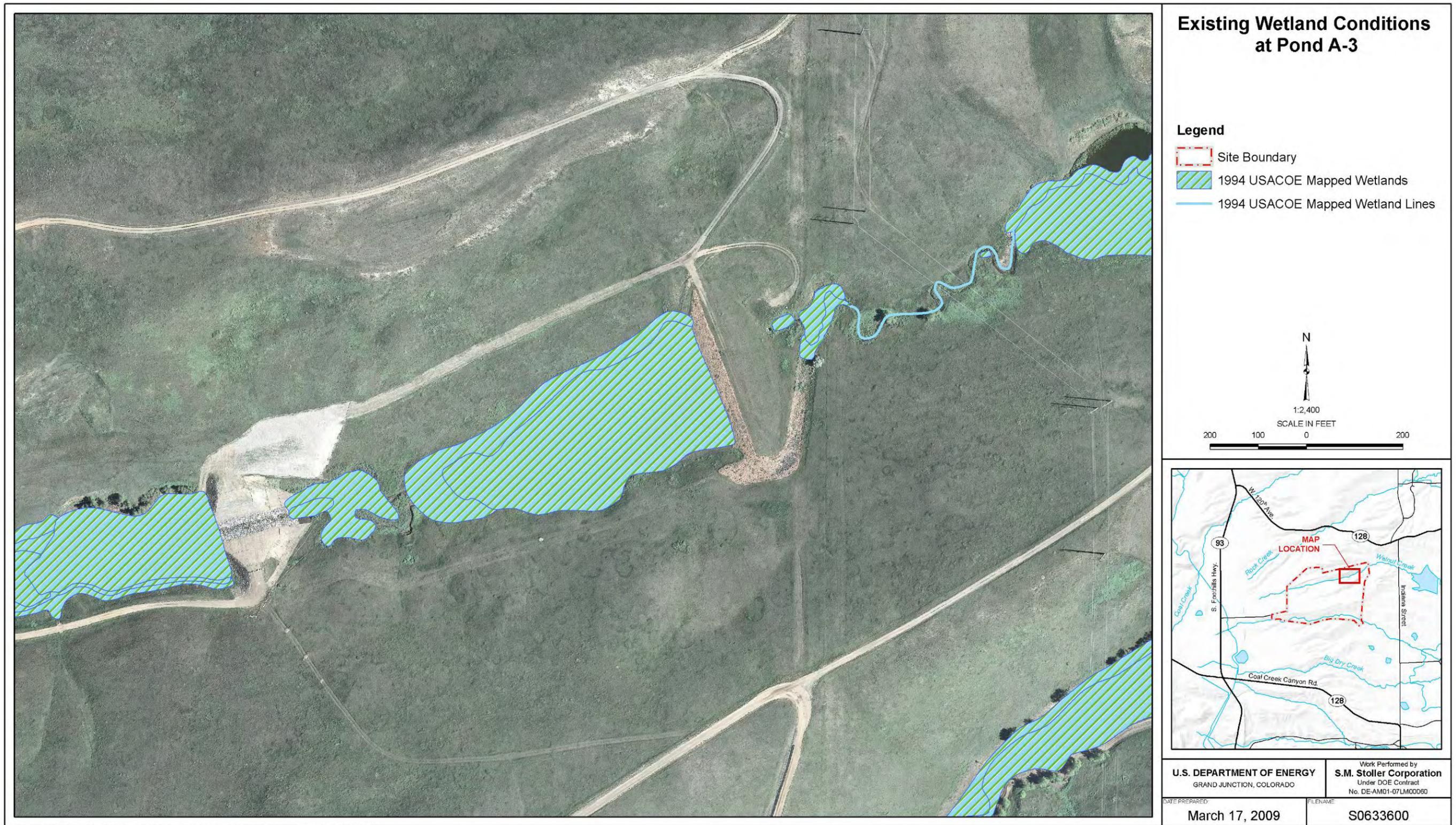
When maintained in a natural state, floodplains provide valuable services by moderating the extent of flooding, thereby (1) reducing the risk of downstream flood loss; (2) minimizing the impacts of floods on human safety, health, and welfare; and (3) providing support to wetlands, fish, and wildlife. For this assessment, the extent of the 100-year floodplains for RFS was derived from the following three sources:

- FEMA flood maps (FEMA 2010)
- *Rocky Flats Plant Drainage and Flood Control Master Plan* (EG&G 1992)
- *Determination of Peak Flow Rates and Floodplain Delineation for Dam Breaches at the Rocky Flats Site* (Wright Water Engineers [WWE] 2010)

Within the RFS, no floodplains are delineated by FEMA, because the extent of FEMA mapping does not extend into the current RFS boundaries. However FEMA flood maps developed for property adjacent to the RFS indicate that the RFS property is located in two flood zone designations—Zone A and Zone X (FEMA 2010). Flood zones are geographic areas that FEMA has defined according to varying levels of flood risk. Zone A locations are within the 100-year floodplain. Zone X locations are those outside the 100-year floodplain.

The *Rocky Flats Plant Drainage and Flood Control Master Plan* identified the 100-year floodplain at RFS based on the existing developed conditions in 1992 (EG&G 1992). Since the EG&G mapping, developed areas have been removed as part of the cleanup and closure activities at RFS, and reconfiguration activities have modified drainage basins at the site. Therefore the extent of the floodplains as delineated by this study is no longer relevant due to the site changes resulting from remediation activities.

The WWE 2010 report delineated the current floodplains across the eastern portion of the RFS. Based on this study, some of the proposed activities would be located in or adjacent to the 100-year floodplain. The final report, including mapping of the floodplain for the study area, is included as Appendix F.



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Figure 4-1. Existing Wetland Conditions at Pond A-3



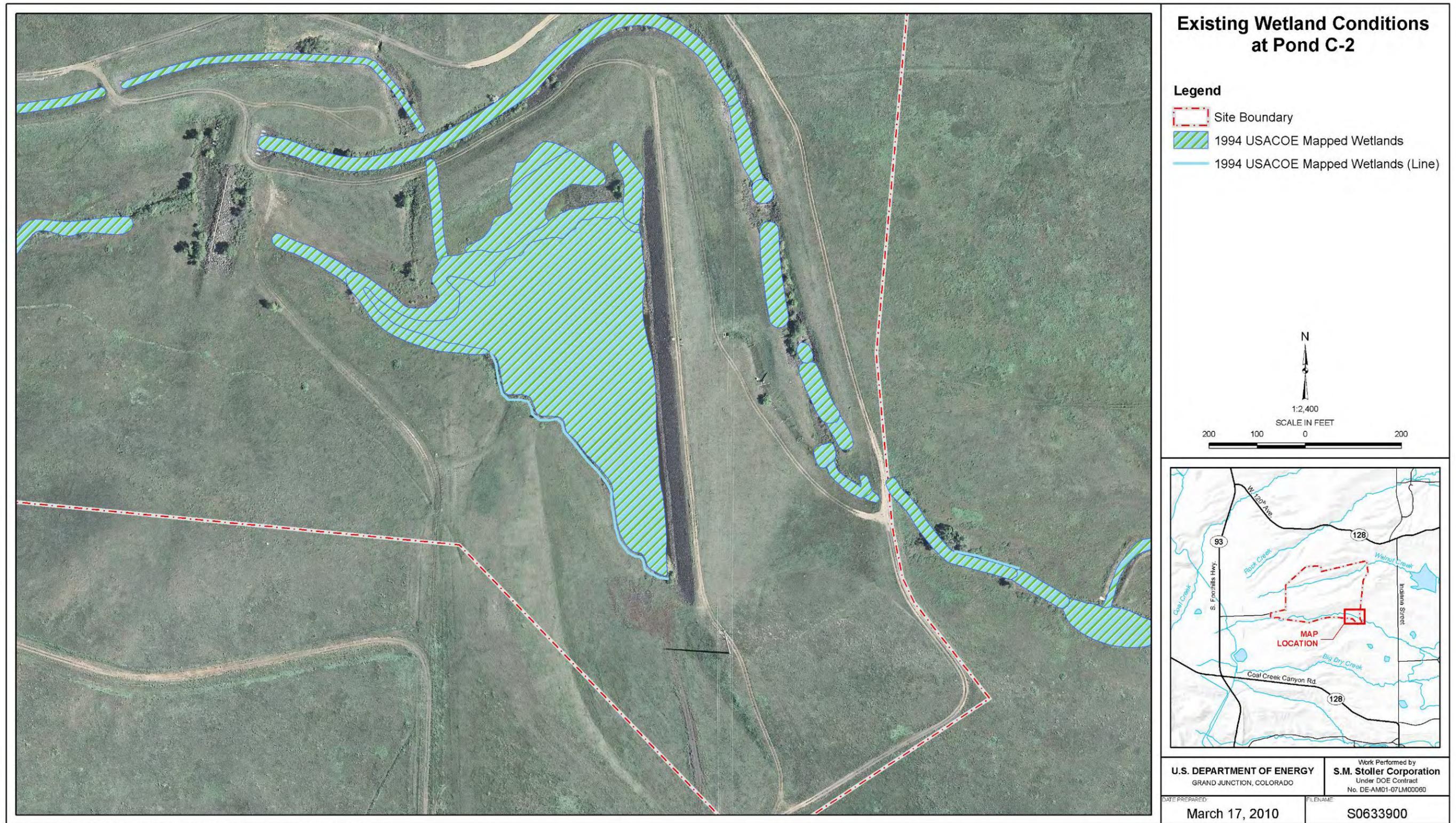
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Figure 4-2. Existing Wetland Conditions at Pond A-4



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Figure 4-3. Existing Wetland Conditions at Pond B-5



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Figure 4-4. Existing Wetland Conditions at Pond C-2



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Figure 4-5. Existing Wetland Conditions at the Present Landfill Pond

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4.3.5 Surface Water Resources

Streams and seeps at the RFS are mostly ephemeral, with stream reaches gaining or losing flow depending on the season and precipitation amounts. Surface water flow across the RFS is primarily from west to east, with two major drainages traversing the site. Within the RFS, 12 retention ponds were constructed during the period of plant operations to collect surface water runoff; the C-1 Dam was breached in 2004, and dams for six other ponds were breached in 2008–2009 with flow-through stoplog structures installed in each breach. The remaining five ponds are maintained by LM. The reconfiguration, RFS drainages, and retention ponds are described below.

The major stream drainages leading off the RFS, from north to south, are Walnut Creek and Woman Creek. North Walnut Creek flows through the A-Series Ponds, and South Walnut Creek flows through the B-Series Ponds; both are tributaries to Walnut Creek. The South Interceptor Ditch flows to Pond C-2, which subsequently flows to Woman Creek when discharged (Figure 1–1).

4.3.5.1 Creeks and Drainages

Walnut Creek

Walnut Creek receives surface water flow from the majority of the RFS. It consists of several tributaries: No Name Gulch, North Walnut Creek, and South Walnut Creek. These tributaries join Walnut Creek upstream of the RFS eastern boundary. Walnut Creek then flows across Refuge lands to Indiana Street. East of Indiana Street, Walnut Creek flows through a diversion structure that can be configured, at the City and County of Broomfield’s discretion, to divert flow to the BDD and around GWR into Big Dry Creek. A description of the Walnut Creek tributaries, from north to south follows.

No Name Gulch

No Name Gulch is located downstream of the PLF, referred to historically as the East Landfill Pond. A surface water diversion ditch is constructed around the perimeter of the PLF to divert surface water runoff around the landfill to No Name Gulch. Effluent from the Present Landfill Treatment System and runoff from the area surrounding the pond are the sole surface water sources to the PLF. The pond is normally operated in a flow-through configuration, although the pool level periodically drops below the outlet works.

North Walnut Creek

Runoff from the northern portion of the RFS flows into North Walnut Creek, which has two retention ponds (ponds A-3 and A-4). Two former dams, A-1 and A-2, were breached in 2008 and now function as flow-through structures. The combined capacity of the two remaining A-Series Ponds is approximately 168,433 cubic meters (m³) (44.5 MG or 136.6 acre-feet). In the normal operational configuration, streamflow passes through former ponds A-1 and A-2 to maintain wetland habitat (water levels in these former ponds are controlled by evaporation or flow-through stoplog structures) and flows to Pond A-3 for retention. North Walnut Creek flow can also be diverted through the North Walnut Creek Bypass Pipeline around former ponds A-1

and A-2 to Pond A-3 for retention. Pond A-3 is discharged to the A-Series “terminal pond,” A-4. Pond A-4 is normally discharged when warranted in accordance with the *Operations and Maintenance Plan for the Rocky Flats Surface Water Control Project, Dams A-3, A-4, B-5, C-2, and the Present Landfill Dam Associated Diversion Structures, Bypass Pipelines, Canals, and Functional Channels* (DOE 2009a). Criteria for emergency discharge are detailed in the *Emergency Response Plan for the Rocky Flats Site Dams* (DOE 2010).

South Walnut Creek

Runoff from the central portion of the RFS flows into South Walnut Creek, which has one retention pond (B-5). Four former dams, B-1, B-2, B-3, and B-4, were breached in 2008–2009 and now function as flow-through structures. The capacity of Pond B-5 is approximately 87,434 m³ (23.1 MG or 71 acre-feet). Streamflow passes through former ponds B-1, B-2, B-3, and B-4 to maintain wetland habitat (water levels in these former ponds are controlled by evaporation or flow-through stoplog structures) and flows to Pond B-5 for retention. South Walnut Creek flow can also be diverted through the South Walnut Creek Bypass Pipeline around former ponds B-1, B-2, and B-3 and into former pond B-4, which flows directly into “terminal pond” B-5. If routine discharge of retained water in Pond B-5 is warranted, discharge is performed in accordance with the *Operations and Maintenance Plan for the Rocky Flats Surface Water Control Project, Dams A-3, A-4, B-5, C-2, and the Present Landfill Dam Associated Diversion Structures, Bypass Pipelines, Canals, and Functional Channels* (DOE 2009a). Criteria for emergency discharge are detailed in the *Emergency Response Plan for the Rocky Flats Site Dams* (DOE 2010).

Woman Creek

Woman Creek is located in the southern portion of the RFS, which flows through former Pond C-1, bypasses Pond C-2, and flows off the RFS onto Refuge lands toward Indiana Street. The Woman Creek drainage basin extends eastward from the base of the foothills, near Coal Creek Canyon, to Standley Lake. In the current configuration, Woman Creek flows into the WCR located east of Indiana Street and upstream of Standley Lake, where the water is held until it is pump-transferred to Big Dry Creek downstream of the GWR by the Woman Creek Reservoir Authority.

South Interceptor Ditch

The South Interceptor Ditch drainage is located in the southern portion of the RFS and is a tributary to Woman Creek after passing through Pond C-2; Pond C-2 is periodically batch discharged to Woman Creek. Surface water runoff from the southern portion of the RFS is routed by the South Interceptor Ditch to Pond C-2. Woman Creek does not flow through Pond C-2. The capacity of Pond C-2 is approximately 85,920 m³ (22.7 MG or 69.6 acre-feet). If routine discharge of retained water in Pond C-2 is warranted, discharge is performed in accordance with the *Operations and Maintenance Plan for the Rocky Flats Surface Water Control Project, Dams A-3, A-4, B-5, C-2, and the Present Landfill Dam Associated Diversion Structures, Bypass Pipelines, Canals, and Functional Channels* (DOE 2009a). Criteria for emergency discharge are detailed in the *Emergency Response Plan for the Rocky Flats Site Dams* (DOE 2010).

4.3.5.2 Water Quantity

The RFS currently operates 15 automated stream gauging locations that collect continuous records of streamflows at 15-minute intervals. Many of these locations have been collecting reliable data since the mid 1990s. The locations applicable to the PLF, A-3, A-4, B-5, and C-2 are described in Table 4–5.

Table 4–5. Automated Stream Gages at Rocky Flats

Location Code	Description	Period of Record
GS01	Woman Creek at Indiana Street	10/1/92 to current
GS03	Walnut Creek at Indiana Street	10/1/92 to current
GS08	Outlet of Pond B-5 (effluent from B-Series Ponds)	10/1/92 to current
GS10	South Walnut Creek above Pond B-1 (influent to B-Series Ponds)	10/1/92 to current
GS11	Outlet of Pond A-4 (effluent from A-Series Ponds)	10/1/92 to current
GS12	Outlet of Pond A-3	10/1/92 to current
GS13	North Walnut Creek above Pond A-1 (influent to A-Series Ponds)	10/1/05 to current
GS31	Outlet of Pond C-2 (effluent from SID/Pond C-2)	10/1/92 to current
GS33	No Name Gulch at confluence with Walnut Creek	10/1/97 to current
SW027	SID above Pond C-2 (influent to Pond C-2)	10/1/94 to current

Site closure included numerous activities such as Functional Channel construction, recontouring, revegetation, removal of impervious surfaces, and elimination of imported water. These changes served to reduce the amount of streamflow as compared to the closure period. Table 4–6 presents the average annual discharge volumes since closure at the Table 4–5 locations.

Table 4–6. Summary of Post-Closure Streamflow Information (CY 2006–2009 Period)

Location Code	Average Annual Discharge Volume (acre feet)	Maximum Measured Flowrate cubic feet per second (cfs)
GS01 (Woman Creek at Indiana St.)	217.1	73.1
GS03 (Walnut Creek at Indiana St.)	70.0	29.1
GS08 (B-5 outflow)	17.8	NA (controlled discharge)
GS10 (B-Series inflow)	26.7	23.7
GS11 (A-4 outflow)	28.3	NA (controlled discharge)
GS12 (A-3 outflow)	44.2	NA (controlled discharge)
GS13 (A Series inflow)	70.8	18.0
GS31 (C-2 outflow)	3.7	NA (controlled discharge)
GS33 (No Name Gulch outflow)	13.4	5.5
SW027 (SID to Pond C-2)	3.7	5.1

In support of this EA, a study was conducted by WWE (WWE 2010) to determine peak flow rates and delineate floodplains for a range of storm events at the RFS. The report is attached to this EA as Appendix E. The study used three computer models, including two models for the hydrologic analysis, and one to delineate floodplains:

- CUHP 2005, Version 1.3.3.6, was used to develop hydrographs for each individual catchment, and
- EPA SWMM, Version 5.0, was used to route the hydrographs developed in the CUHP. CUHP and SWMM were selected for the analysis to be consistent with the approach used for previous studies and to use an approach accepted by UDFCD.
- HEC-RAS Version 4.0 was used to calculate channel hydraulics to determine water surface elevations at various channel cross-sections for the floodplain delineation.

The study evaluated four storm events (Table 4–7) under three configuration scenarios. The details of the configuration scenarios are described in detail in Appendix E. The current surface water configuration, Scenario 1, is given in Table 4–8.

Table 4–7. Storm Events Analyzed for Peak Flow Analysis

Storm Return Frequency	Duration	Depth
2-year	24-hour	2.2 inches
50-year	24-hour	4.4 inches
100-year	6-hour	3.8 inches
100-year	24-hour	5.0 inches

Notes:

- 1) Precipitation depths for the 24-hour storm events were derived from NOAA Atlas II, Volume III (Colorado) (NOAA 1973).
- 2) The precipitation depth for the 100-year, 6-hour event is the as was used for the Drainage and Flood Control Master Plan for the Rocky Flats Plant (EG&G 1992), which was derived from the Urban Drainage and Flood Control District.

Table 4–8. Current Dam Conditions Scenarios

Scenario	Dam Breach Conditions	Initial Condition Assumptions
1 (Current Conditions)	Dams A-1, A-2, B-1, B-2, B-3, B-4, and C-1 are breached. A-3, A-4, B-5, PLF and C-2 intact	Breached dams have stop logs in place and are full. All other ponds have outlet works closed and are filled to maximum normal operating range (40% of capacity for A-3, A-4, B-5, and C-2; PLF is filled to 22%).

The modeled peak flow rates under current conditions, at each of the dams proposed for breaching and for each of the storm events, are presented in Table 4–9 through Table 4–12.

For comparison purposes, peak flows for the 50-yr and 100-yr events at model points comparable to selected automated stream gage locations are given in Table 4–13 through Table 4–15.

Table 4–9. Calculated Peak Flow Rates at North Walnut Creek Dams A-3 and A-4 (Current Conditions)

Scenario	Storm Event	Storm Event Depth (in.)	A-3 Pond Peak Inflow (cfs)	A-3 Spillway Peak Flow (cfs)	A-4 Pond Peak Inflow (cfs)	A-4 Spillway Peak Flow (cfs)
Scenario 1 A-Series Ponds: Breached: A-1 and A-2 Not Breached: A-3, and A-4	2-yr, 24-hr	2.2	3	0	4	0
	50-yr, 24-hr	4.4	257	26	35	0
	100-yr, 24-hr	5.0	366	92	94	0
	100-yr, 6-hr	3.8	527	158	161	0

Table 4–10. Calculated Peak Flow Rates at South Walnut Creek Dam B-5 (Current Conditions)

Scenario	Storm Event	Storm Event Depth (in.)	B-5 Pond Peak Inflow (cfs)	B-5 Spillway Peak Flow (cfs)
Scenario 1 B-Series Ponds: Breached: B-1 through B-4 Not Breached: B-5	2-yr, 24-hr	2.2	3	0
	50-yr, 24-hr	4.4	153	0
	100-yr, 24-hr	5.0	224	0
	100-yr, 6-hr	3.8	373	0

Table 4–11. Calculated Peak Flow Rates at Landfill Pond Dam (No Name Gulch; Current Conditions)

Scenario	Storm Event	Storm Event Depth (in.)	Landfill Dam Peak Inflow (cfs)	Landfill Dam Spillway Peak Flow (cfs)
Scenario 1 Landfill Pond Drainage: Breached: None Not Breached: LF Pond Dam	2-yr, 24-hr	2.2	1	0
	50-yr, 24-hr	4.4	15	0
	100-yr, 24-hr	5.0	19	0
	100-yr, 6-hr	3.8	26	0

Table 4–12. Calculated Peak Flow Rates at Dam C-2 (South Interceptor Ditch; Current Conditions)

Scenario	Storm Event	Storm Event Depth (in.)	Dam C-2 Inflow (cfs)	Dam C-2 Spillway Peak Flow (cfs)
Scenario 1 Woman Creek Drainage: Breached: C-1 Not Breached: C-2	2-yr, 24-hr	2.2	6	0
	50-yr, 24-hr	4.4	146	0
	100-yr, 24-hr	5.0	190	0
	100-yr, 6-hr	3.8	277	0

Table 4–13. Calculated Peak Flow Rates in No Name Gulch (Current Conditions)

Scenario	Storm Event	Storm Event Depth (in.)	GS33 Peak Flow (No Name Outflow) (cfs)
Scenario 1 Landfill Pond Drainage: Breached: None Not Breached: LF Pond Dam	50-yr, 24-hr	4.4	207
	100-yr, 24-hr	5.0	282
	100-yr, 6-hr	3.8	459

Table 4–14. Calculated Peak Flow Rates in Walnut Creek (Current Conditions)

Scenario	Storm Event	Storm Event Depth (in.)	GS13 Peak Flow (North Walnut Inflow) (cfs)	GS10 Peak Flow (South Walnut Inflow) (cfs)	GS03 Peak Flow (Walnut Creek Outflow) (cfs)
Scenario 1 A-Series Ponds: Breached: A-1 and A-2 Not Breached: A-3, and A-4 B-Series Ponds: Breached: B-1 through B-4 Not Breached: B-5 Landfill Pond Drainage: Breached: None Not Breached: LF Pond Dam	50-yr, 24-hr	4.4	214	123	376
	100-yr, 24-hr	5.0	281	166	580
	100-yr, 6-hr	3.8	396	249	919

Table 4–15. Calculated Peak Flow Rates in the SID/Woman Creek (Current Conditions)

Scenario	Storm Event	Storm Event Depth (in.)	SW027 Peak Flow (SID Outflow) (cfs)	GS01 Peak Flow (Woman Creek Outflow) (cfs)
Scenario 1 Woman Creek Drainage: Breached: C-1 Not Breached: C-2	50-yr, 24-hr	4.4	128	605
	100-yr, 24-hr	5.0	166	961
	100-yr, 6-hr	3.8	240	1,443

4.3.5.3 Water Quality

DOE, EPA, and CDPHE have implemented the monitoring and maintenance requirements of the CAD/ROD as described in RFLMA (DOE 2007a). RFLMA Attachment 2 defines the COU remedy surveillance and maintenance requirements. The requirements include environmental monitoring and maintenance of the erosion controls, access controls (signs), landfill covers, groundwater treatment systems, and operation of the groundwater treatment systems.

RFLMA establishes water quality standards and identifies the water monitoring and evaluation requirements applicable to implementation of the remedy. The current best management practice for operation of ponds A-4, B-5, and C-2 is to retain water until approximately 40 to 50 percent of the capacity is reached, at which point the contents are released (DOE 2009b, 2010). Under RFLMA requirements, the pond water is sampled to determine that it meets RFLMA-applicable water quality standards prior to release. The released water is subsequently monitored for compliance with applicable standards at a RFLMA POC a short distance downstream of the dams. POC samples are currently analyzed for Plutonium (Pu) -239/240, Americium (Am)-241, total uranium, and nitrate+nitrite as nitrogen (N). Monitoring is also performed at upstream Points of Evaluation (POEs) and performance locations to provide additional data that are used to evaluate the continued effectiveness of the remedy.

Since physical completion of cleanup and closure activities in October 2005, automated samplers at POCs have collected 140 flow-paced composite samples, and these composite samples consist of more than 7,400 individual grab samples (through 2009). By the time this EA has been completed in 2010, there will be over 200 flow-paced composite samples, and over 10,000 individual grab samples. While analytical results vary according to season, flowrate, and climate, the calculated compliance values at all POCs have remained below the applicable RFLMA standards.

Similarly, automated samplers at POEs and performance locations have collected 237 flow-paced composite samples since physical completion. These composite samples consist of more than 10,500 individual grab samples. Numerous grab samples for nitrate+nitrite as N have also been collected. The post-closure results from POEs and performance locations are summarized in Table 4–16.

Table 4–16. Summary of Analytical Results at POEs and Performance Monitoring Locations (October 2005 through 2009)

Location	Pu-239,240		Am-241		Total Uranium		Nitrate+Nitrite as N	
	Results [N]	Average [pCi/L]	Results [N]	Average [pCi/L]	Results [N]	Average [µg/L]	Results [N]	Average [mg/L]
POEs								
GS10	68	0.016	68	0.014	68	16.9	NA	NA
SW027	4	0.095	4	0.020	4	2.8	NA	NA
SW093	64	0.039	64	0.018	64	8.5	5	1.9
Performance								
GS13	NA	NA	NA	NA	76	26.4	30	42.6
GS59	NA	NA	NA	NA	33	1.5	NA	NA

Data indicate that remedy-related soil and infrastructure removal, revegetation, land configuration, and reductions in runoff have been successful and have resulted in water quality that meets applicable standards. Supporting data and evaluation can be found in the 2006–2009 Annual Reports of Site Surveillance and Maintenance Activities (DOE 2008). The POE location GS10 showed reportable values for total U for a portion of 2009; as of April 30, 2009, total U concentrations at GS10 were no longer reportable. Evaluation has suggested that the reportable values are due to changes in hydrologic conditions, which have caused groundwater with naturally occurring U to make up a larger proportion of streamflow at GS10 (DOE 2009b).

Table 4-17 provides the range of compliance data from three POCs at each terminal pond (A-4, B-5, C-2) and the two POCs at Indiana Street (GS01, GS03) between 2005 and 2009. None of the data from POCs have exceeded compliance standards. Current RFLMA surface water standards are also shown on Table 4–17.

Table 4–17. Range of Compliance Values at POCs (October 2005 through 2009)

Location	Pu-239,240 [pCi/L]	Am-241 [pCi/L]	Total Uranium [µg/L]	Nitrate+Nitrite as N [mg/L]
GS01 (Woman Creek at Indiana Street)	0.0–0.012	0.0–0.046	0.9–10.2	NA
GS03 (Walnut Creek at Indiana Street)	0.0–0.018	0.0–0.025	1.1–8.0	0.19–1.86
GS08 (Pond B-5 Outlet)	0.0–0.045	0.0–0.034	4.3–14.9	0.01–0.43
GS11 (Pond A-4 Outlet)	0.0–0.007	0.0–0.022	2.5–6.6	0.12–5.92
GS31 (Pond C-2 Outlet)	0.011–0.030	0.004–0.012	3.6–6.1	NA
RFLMA Standard	0.15 pCi/L	0.15 pCi/L	16.8 µg/L	10 mg/L

4.3.6 Air Quality

Air monitoring and emissions assessments have been performed at RFS beginning in the early 1950s. Although air monitoring is not required as part of the CERCLA remedy, it was performed for a period of time so that data could be available if needed during the early post-closure period. The air monitoring program at the RFS included ambient (Radioactive Ambient Air Monitoring Program), effluent, and meteorological monitoring activities. As of September 2005, only ambient monitoring was voluntarily performed at two locations along Indiana Street to confirm low emissions. LM ceased ambient air monitoring in September 2008.

EPA established the National Ambient Air Quality Standards (NAAQS) for criteria pollutants that could endanger public health and the environment under Section 108 of the Clean Air Act (1970).

The *Environmental Assessment Comment Response and Finding of No Significant Impact, Pond and Land Configuration* determined that all existing NAAQSs would be in compliance in connection with the breaching of the previous six dams (DOE 2004). The construction activities were found to elevate the PM₁₀ concentrations; however, the amount associated with this rise was considered well below EPA’s NAAQS. Construction activities involved with the breaching of the remaining five dams and the associated low elevation of concentrated PM₁₀ would be similar in nature, and therefore the PM₁₀ analysis is not carried further in this EA.

However, since 2004, EPA has modified the 8-hour standards for ozone (O₃), and in 2007 EPA found the Denver area as being in nonattainment with the 8-hour O₃ standard. The RFS is located within the Denver area. The nonattainment designation will require local and state officials to submit a plan to reduce ground-level O₃ pollution. The formation of O₃ is through a combination of nitrogen oxides and volatile organic compounds reacting with sunlight in the atmosphere, and cars, trucks, power plants, and industrial facilities are the primary sources of O₃.

The 8-hour standard for O₃ was changed from 0.08 parts per million (ppm) to 0.075 ppm. A monitoring station located at the north area of the RFS listed the O₃ 8-hour emission average from 2006 through 2008 as 0.086 ppm, with the highest emissions occurring in 2006–2007 (0.090 ppm). The 2008 average 8-hour emission levels have been reported as 0.079 ppm (CDPHE 2009).

The RFS is currently accessed by less than 20 field trucks and/or all terrain vehicles per day, performing routine monitoring and maintenance activities. More equipment and larger trucks are used sporadically for projects such as road maintenance.

5.0 Environmental Impacts

This section identifies and evaluates the potential direct and indirect impacts of the Proposed Action and the No Action alternatives. The meaning of impacts or effects is the same, and impacts are considered in terms of direct (caused by the action), indirect (occurs later in time but is related to the action), or cumulative (occurs later in time but is related to the action). Direct and indirect impacts are discussed in Section 5.2, and cumulative impacts are discussed in Section 5.4.

An impact is further defined as adverse or beneficial. An impact is considered adverse when the outcome of the action results in undesirable effects. A beneficial impact could result if the current condition is improved or if an existing undesirable situation related to current management direction is changed.

5.1 Impact Assumptions

Evaluating impacts involves relating the affected resource with the area or quantity of an affected resource relative to the currently available area or quantity of that resource. The intensity of an impact is dependent on the following:

- Potential for violation of laws or regulations
- Degree of uncertainty and controversy
- Degree of adverse effect to specific concerns, such as public health and safety uniqueness of the resource
- Threatened or endangered species
- Resilience of the resource

Where possible, impacts have been quantified and are reported in the appropriate resource section.

5.2 Impacts to Resources

Potential impacts have been assessed according to the degree in which impacts may occur in magnitude in relation to the overall environment and associated resources. Some impacts are assessed based on professional judgment. Each section states if information is not available or uncertain.

During implementation of the Proposed Action, there would be the potential for short-term erosion and sedimentation associated with the construction disturbances and exposed areas in former pond bottoms. However, the dams are not a part of the final CAD/ROD remedy for RFS and are not designed or operated as sedimentation basins, but because water is retained in the ponds for long periods of time, some sediment carried into the ponds will tend to settle out. Long-term erosion control at the site is addressed through ongoing activities such as soil stabilization, erosion control best management practices, and revegetation throughout the drainage basins and would not be considered a separate mitigation measure as a result of the Proposed Action.

5.2.1 Wildlife

5.2.1.1 Proposed Action Alternative

The Proposed Action would result in restoring a more natural seasonally variable flow system through the ponds, which would provide more consistent water to the habitat downstream. This return to a more natural stream regime would benefit both the habitat and the wildlife species that rely on it.

Noise from construction activities could impact foraging and breeding/rearing activities in areas adjacent to the project areas. Mobile species such as mule deer, coyotes, or birds would be able to relocate to suitable habitat upstream or downstream of the project areas.

The type and degree of direct impacts would vary by species depending on wildlife populations present and their specific habitat requirements. It is expected that the permanent loss of a specific habitat type as a result of the proposed actions would not jeopardize the existence of any species. For example, adjacent upland grassland habitat is available at all five dams while additional ponds, wetland habitat, and riparian habitat exist within a mile of each of the project locations.

Breaching the dams would result in an estimated 95 percent reduction of available open surface water area at the RFS that is used by a variety of ducks and other avian species. However, as stated above, this type of habitat is readily available in surrounding areas. The open water habitat lost would be replaced by the more ecologically productive emergent/shrub wetlands that would potentially increase available habitat for other species, including the federally listed Preble's mouse (Section 5.2.3).

There would be a reduction in the abundance of fish (mostly minnows) in the remaining areas immediately upstream of the breaches. Aquatic species such as fish, frogs, or turtles, which live in and around the ponds, may not be able to relocate prior to dewatering actions. Fish would be released downstream as the waters are discharged from the dams, and frogs and turtles would likely move up or downstream as the ponds dry out. This draw down and drying out of the ponds would be similar to the conditions in late summer when evaporation naturally draws down many of the ponds at RFS. As a result of the elimination of the ponds related to the dam breaching, it is expected that some mortality would occur to various aquatic populations but would not affect overall population survival of any species; it is expected that over time population levels of given affected species would be restored to levels commensurate with the available resources.

Indirect impacts to wildlife would be beneficial and include reduced disturbance from human activities for monitoring and maintenance of the dams, including the elimination of annual dam safety inspections, inspecting monitoring equipment (piezometers, inclinometers, and other instrumentation), routine maintenance activities, and annual mowing and spraying of vegetation.

The reconfiguration of the creeks would result in additional wetland areas and creekside margins that would be considered more ecologically valuable than the current open surface water ponds. Elimination of fluctuations in water levels caused by routine pond discharges would allow for development of permanent vegetation communities where mudflats previously existed. This would provide nesting and foraging habitat for a variety of species.

Habitats that would be lost as a result of the Proposed Action are present in nearby areas, and species that would move into these areas could challenge existing residents, which could potentially create density issues. The spreading urbanization into rural areas continues to stress wildlife populations as they are forced to accommodate new residents. However, the loss of approximately 14 acres of open water habitat related to the proposed actions is not expected to result in species specific losses due to overcrowding.

5.2.1.2 No Action Alternative

The No Action Alternative would potentially have a greater adverse impact than the Proposed Action in the Walnut Creek drainage. In Walnut Creek, the volume of flowing water has been reduced since RFS closure due to the elimination of imported water and the removal of impervious surfaces that formerly contributed storm runoff. As a result, the number of annual batch-and-release discharges from the ponds A-4 and B-5 has been reduced from approximately 10 annually prior to site closure to approximately less than two annually post-closure. This reduction in the amount and frequency of water flowing from the terminal ponds into Walnut Creek has the long-term potential to reduce the quality of the downstream riparian habitat to the eastern boundary of the Refuge. In addition, the releases are most often made when the water levels are highest in the spring, when the vegetation is dormant and are not able to use the water. If this release pattern continues, the reduced flow of water in the creek during the growing season would likely transform the existing riparian woodland/shrubland habitat below the terminal ponds to a single-story herbaceous riparian habitat.

The change to a single-story herbaceous riparian habitat may affect wildlife that uses Walnut Creek below the terminal ponds to the eastern edge of the Refuge. The existing riparian woodland/shrubland along the creek provides nesting habitat, cover, and foraging areas for a variety of wildlife. The loss of woody vegetation in these areas would potentially change the long-term wildlife composition for mule deer, Preble's mouse, and a variety of migratory birds that inhabit the shrubland/woodland along Walnut Creek.

The PLF dam is currently operated in a flow-through condition, and no impacts or changes to No Name Gulch habitat or wildlife would be expected.

Not breaching Dam C-2 would result in little to no change in impacts to habitat or wildlife along Woman Creek between Pond C-2 and the eastern Refuge boundary. Woman Creek currently flows around Pond C-2 in the Woman Creek Bypass Canal on the north side of the pond and continues unimpeded beyond C-2 to the downstream habitat. The contribution of water resulting from releases from Pond C-2 is minimal because of the small volume and infrequency of releases.

5.2.2 Migratory Birds

5.2.2.1 Proposed Action

Overall impacts to both habitat and migratory birds would be temporary. Noise and construction activities could directly impact foraging and nesting activities in the habitat adjacent to the project areas. Portions of the project areas would be cleared of vegetation, which would temporarily limit wildlife habitat and eliminate foraging opportunities in the immediate project

area. Clearing activities are unlikely to result in injury or death to migratory birds, and implementation of mitigation measures prior to construction would reduce the potential impacts to a negligible level. The amount of disturbance would be a small percentage of the habitat available to birds at the RFS because adjacent upland grassland habitat is available at all five dams. Additional ponds, wetland habitat, and riparian habitat exist within a mile of each of the project locations.

Indirect impacts to migratory birds would vary by species depending on habitat requirements. Potential adverse impacts may include long-term reductions in the abundance of waterfowl that use open water habitat for foraging at the RFS. This would likely occur due to the elimination of open water habitat available after project completion. Shorebirds that currently use the mudflats that are exposed on the perimeter of the ponds due to fluctuating water levels would no longer have this habitat available at these dams. The restored natural stream flows (i.e., flow-through system) and reconfigured land surface upstream of the breaches would reduce the available habitat for these types of species at RFS. However, these types of habitats are available within a few miles of the RFS. Species that forage and nest in emergent and shrub wetland habitat types would potentially increase because of the creation of habitat upstream of the breached dams.

Reduced disturbance from human activities that previously were required for monitoring and maintenance of the dams would represent a beneficial indirect impact. The activities include the elimination of annual dam safety inspections, monitoring of dam equipment (piezometers, inclinometers, and other instrumentation), valve maintenance/exercising, and annual mowing and spraying of vegetation. Elimination of fluctuations in water levels caused by routine pond discharges would allow for development of permanent vegetation communities where mudflats previously existed. This would provide nesting and foraging habitat for a variety of species of migratory birds.

As described in Section 5.2.1, the Proposed Action would potentially allow the riparian woodland/shrubland habitat below the terminal ponds in Walnut Creek to remain by returning the stream flows to a more natural flow-through system. This would allow water from precipitation events to reach the downstream habitats at the time of the events rather than only during batch releases.

In addition, the location of the RFS is near urban and agricultural environments where human disturbance is frequent, and activities continue to encroach up to the boundaries of the Refuge.

5.2.2.2 No Action Alternative Assessment

The No Action Alternative would maintain the current conditions for migratory birds in No Name Gulch and Woman Creek. In Walnut Creek, however, as discussed in Section 5.2.1, long-term continuation of batch releases from the terminal ponds, predominantly during the non-growing season, could alter the structure and composition of the downstream habitat such that habitat requirements for some current bird species would not be met in the future.

5.2.3 Threatened and Endangered Plant and Wildlife Species

5.2.3.1 Proposed Action Alternative

With the exception of the Preble's mouse, no direct impacts to the federally listed species would occur, because none of these species listed in Section 4.3.3 have been documented at RFS. Removal of the dams and return of stream flows to a more natural flow-through regime should benefit the lower South Platte River species, because the water previously being withheld from flowing downstream could reach the lower South Platte River species when they need it, as was the case before the dams were built.

No direct impacts are expected to any of the Colorado-listed threatened, endangered, and special concern species other than the northern leopard frog and common garter snake. The northern leopard frog occurs at the ponds and along the streams at RFS. While pre-construction draw down of pond water levels may force the frog to move elsewhere, some mortalities may occur. Indirectly, little effect is expected long-term because the reestablished stream channels would provide habitat for the frog. The common garter snake occurs in a variety of habitats and could be near the ponds while foraging or drinking water. Individual snakes could be impacted by project activities if unable to leave the area before activities began. The two fish species, the common shiner and northern redbelly dace, occur only in Rock Creek in the Refuge and would not be impacted. Noise and construction activities could indirectly impact other species. However, habitat is available elsewhere at RFS and the Refuge. Black-tailed prairie dogs occur in the eastern portions of the RFS and the Refuge property, and some prairie dog towns are within a few hundred yards of Pond A-4 and Pond C-2. However, no towns are present in the construction footprint of the project. Given the urban nature of prairie dogs in eastern Colorado and their tolerance of human activity in metropolitan areas where they occur along roads, trails, and other high human use areas, it is unlikely they would be adversely impacted.

Approximately 1 acre of critical habitat for the Preble's mouse would be directly impacted by the Proposed Action activities during construction. Figure 5–1 shows the location of Preble's habitat areas within the estimated project boundaries, and DOE is consulting with FWS to accurately map the critical habitat at the RFS. Because the open water on the existing ponds is not considered habitat for the mouse, the conversion of open water to emergent wetland/shrubland would increase the amount of Preble's habitat in the project areas and at RFS. Elimination of fluctuations in water levels caused by routine pond discharges would also allow for development of permanent vegetation communities where mudflats previously existed. This would provide additional habitat for the Preble's mouse. Removal of the dams would also increase the connectivity of upstream and downstream habitat, thus reducing the fragmentation of Preble's mouse habitat that currently exists in the drainages.

5.2.3.2 No Action Alternative Assessment

Most of the Walnut Creek reach from the terminal ponds (A-4 and B-5) to the eastern Refuge boundary is protected habitat for the Preble's mouse. Because the Preble's mouse prefers a multi-strata habitat, the lack of water during the growing season (Section 5.2.3.1) could change the multi-strata riparian woodland/shrubland habitat in Walnut Creek to a single-story herbaceous habitat. The No Action Alternative could continue to negatively impact the population of Preble's mice known to occur along the creek. In addition, the continued long-term

reduction in creek flows below the dams in Walnut Creek may reduce the amount of existing wetland along this reach of creek.

The No Action Alternative would maintain the current conditions for the Preble's mouse in No Name Gulch and Woman Creek.

The lower South Platte River species would continue to be impacted by the retention of water upstream of the dams in the No Action Alternative.

5.2.4 Vegetation, Wetlands, and Floodplains

5.2.4.1 Proposed Action Alternative

Appendix E, *Floodplain/Wetlands Assessment for the Surface Water Configuration Project at the Rocky Flats Site*, provides a detailed description of the anticipated impacts as a result of the Proposed Action Alternative. Following is a synopsis of the technical report.

The Proposed Action would result in disturbance to approximately 26 acres of vegetation, wetlands, and floodplains around the dams. These direct impacts would result from clearing, earthmoving, stockpiling, construction, and staging area activities. These acres are estimates based on the preliminary engineering drawings for the Proposed Action and represent a worst-case scenario. The actual acres of disturbance may vary by dam site but would not exceed a total of 26 acres of disturbance to vegetation, wetlands, and floodplains.

Vegetation

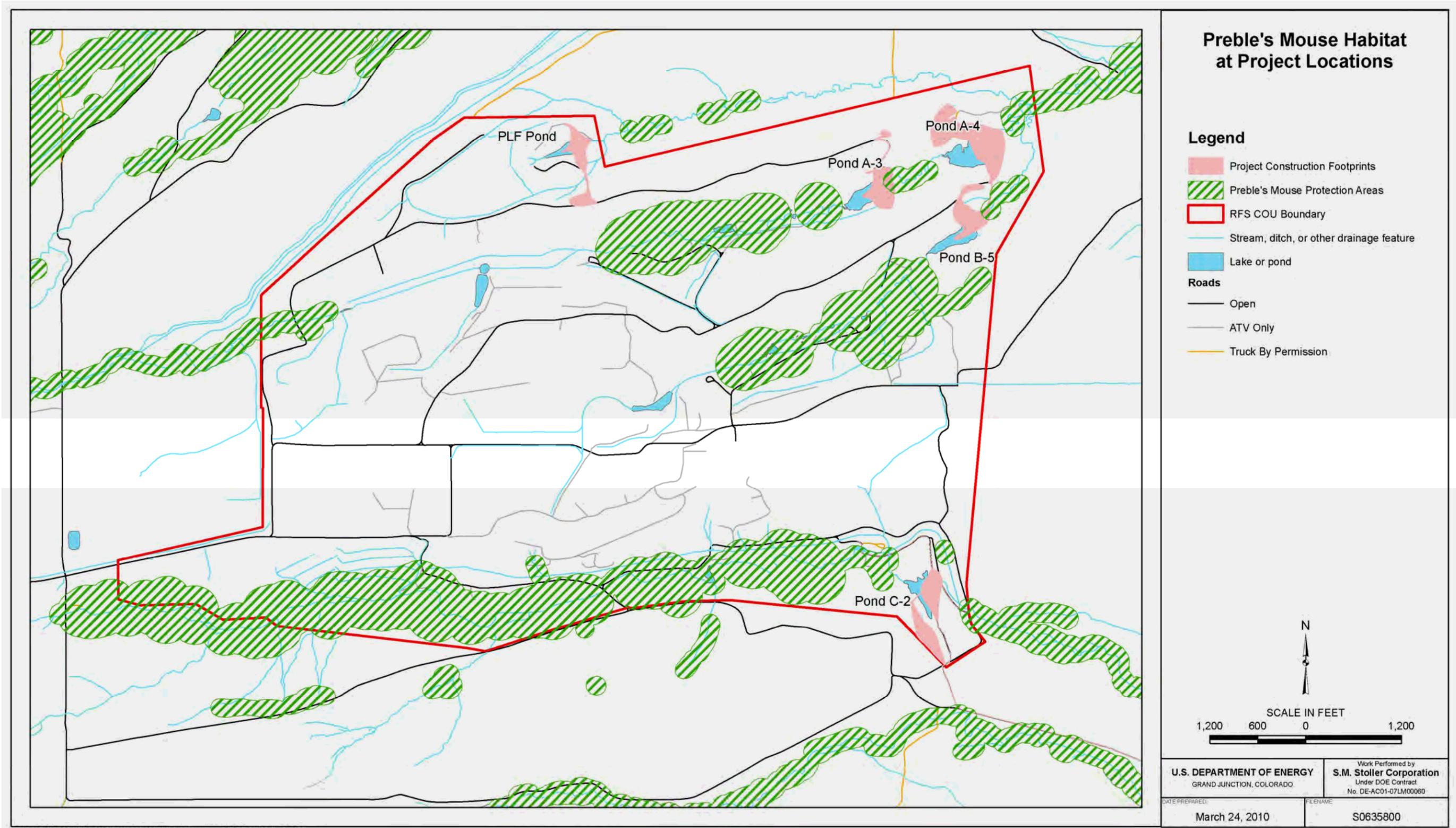
Direct impacts to the upland vegetation would be largely temporary, except where the breach channel itself is located. Existing vegetation was established after the original dam construction and is predominantly composed of non-native species. After completion of all breach-related activities, revegetation with native species and managed weed control would enhance the quality of vegetation in the affected areas and would be considered a beneficial impact related to the Proposed Action.

Most noxious weeds in the project areas would be removed during construction activities, and reseeding with native species and ongoing weed control would be necessary for the establishment of native upland grasslands.

Wetlands

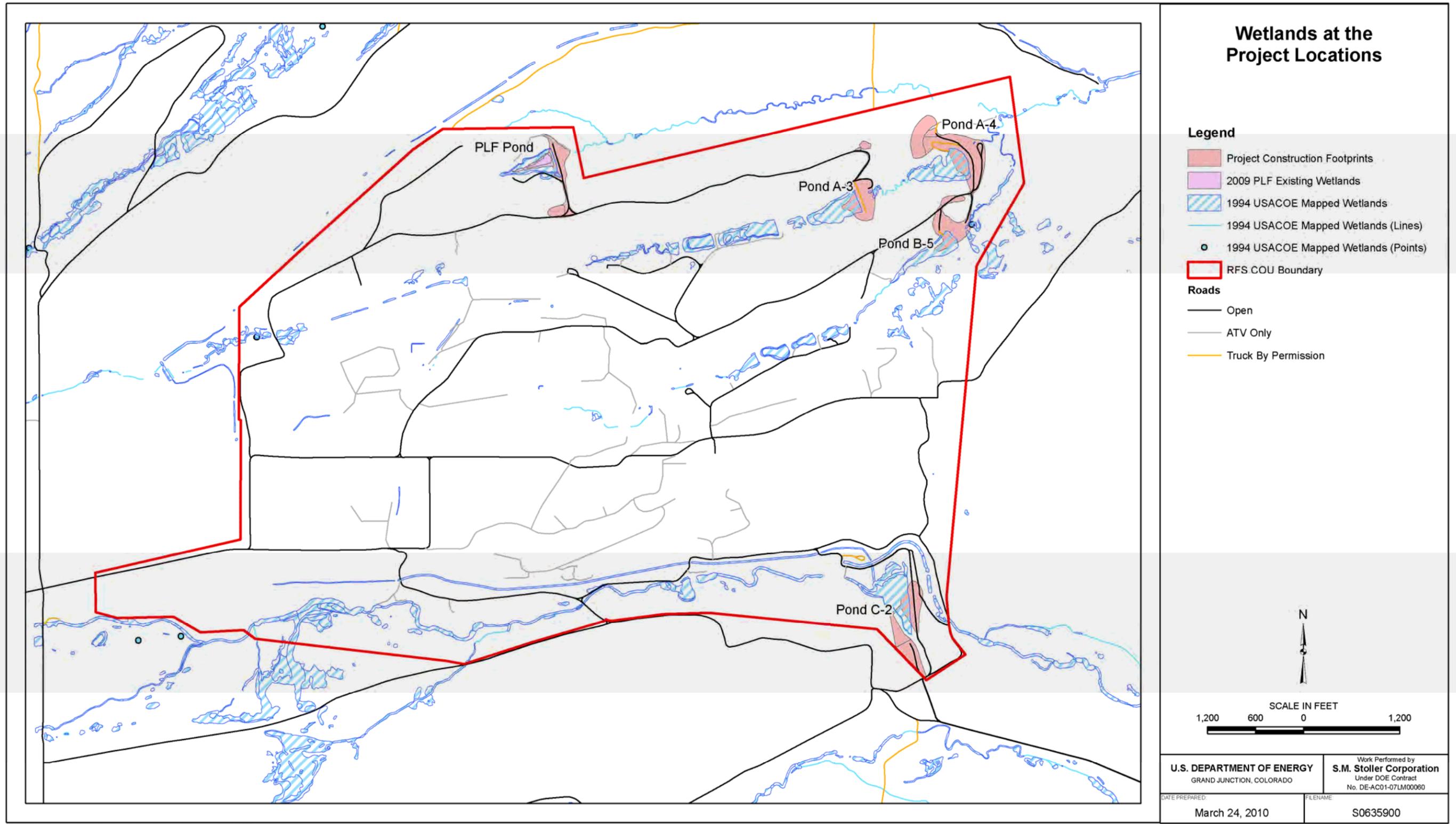
Direct impacts to wetlands would be minimal, because the areas immediately upstream of the dam breaches are predominantly open water. Downstream wetland areas would be impacted where the toe of the breach channel would be placed. Based on preliminary breach designs, less than 0.5 acre of palustrine emergent/shrubland wetland, and approximately 4 acres of open water habitat would be directly impacted by the Proposed Action activities (Figure 5–2).

Indirect impacts to the wetlands and open water habitat are expected as the stream channels are reestablished upstream of the breaches and the open water habitat is replaced with emergent/shrubland wetland types and upland habitat. Open water habitat would be largely eliminated at each pond with the exception of the water flowing in the stream channel.



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Figure 5-1. Preble's Mouse Habitat at Project Locations



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Figure 5-2. Wetlands at the Project Locations

Additionally some current palustrine emergent/shrubland wetland around the perimeter of the ponds may be lost over time if water availability is not sufficient to support them after project completion. Approximately 5 to 6 acres of palustrine emergent/shrubland wetland would be created in the former open water habitat areas, which would exceed the amount directly impacted during construction activities. The conversion of the open water habitat to palustrine emergent/shrubland wetland would increase the aquatic resources functions and services. Wetlands function to improve water quality through wetland filtering, enhancing floodwater storage that can reduce flood risks, providing fish and wildlife habitat, and increasing biological productivity. These functions are expected at varying levels in the wetlands that would be created by the Proposed Action.

Floodplains

Approximately 5.7 acres of floodplain areas would be disturbed, and the majority of the disturbance would be limited to the construction footprints at each dam (Figure 5–3). Indirect impacts would alter the existing floodplains at each of the dams. Currently the floodplain for large storm events at Pond A-3 goes around the dam through the spillway. Breaching of the dams would approximately reestablish the historic floodplain and stream channels through the pond bottoms at each of the ponds with the exception of C-2 where Woman Creek would still flow around C-2 and through the diversion canal.

5.2.4.2 No Action Alternative

The No Action Alternative would maintain the current floodplain configuration and conditions in Walnut Creek. As previously mentioned, however, the retention of the batch-and-release water flow regime in the Walnut Creek drainage may lead to changes in the existing wetlands downstream of the terminal ponds. No estimate is available on how long-term reductions in water in Walnut Creek might change the habitat over time.

The No Action Alternative would maintain the current vegetation, floodplain, and wetland conditions in No Name Gulch and Woman Creek at the RFS.

5.2.5 Surface Water Resources

5.2.5.1 Proposed Action Alternative

Surface Water and Drainage

Flood Hydrology

In support of this EA, a study was conducted by WWE to determine peak flow rates and delineate floodplains for a range of storm events at the RFS (WWE 2010). The report is attached to this EA as Appendix E. The study used three computer models, including two models for the hydrologic analysis (flood flows and duration), and one to delineate floodplains. The study evaluated four storm events (2-year 24-hour, 50-year 24-hour, 100-year 6-hour, and 100-year 24 hour) under three configuration scenarios:

- Current conditions
- Dams A-3, C-2, and PLF breached
- Dams A-4 and B-5 breached (all dams breached)

Indirect impacts to peak flows downstream of the breached dams are expected. With the breached dams no longer able to attenuate peak flows and partially detain runoff volumes during flood events, larger flows and volumes are expected downstream compared to current conditions. However, the potential flood conditions after implementation of the Proposed Action are not expected to be different from flood conditions prior to the original construction of the dams.

Water Storage and Evaporative Depletions

The Proposed Action is expected to have minimal direct impacts to storage and evaporative depletions during construction. The ponds would be drained prior to construction, and small reductions in storage and evaporative depletions are expected.

Indirect impacts from the Proposed Action are expected to eventually eliminate evaporative depletions associated with the retention of out-of-priority water upstream of the Rocky Flats dams on Walnut Creek (A-3, A-4, B-5, and PLF). The Proposed Action would be designed to detain no water upstream of the remaining structures.

Table 5–1 summarizes the out-of-priority storage and estimated evaporative depletions for calendar years 2008 and 2009.

Table 5–1. Water Accounting Summary for Walnut Creek Ponds at Rocky Flats

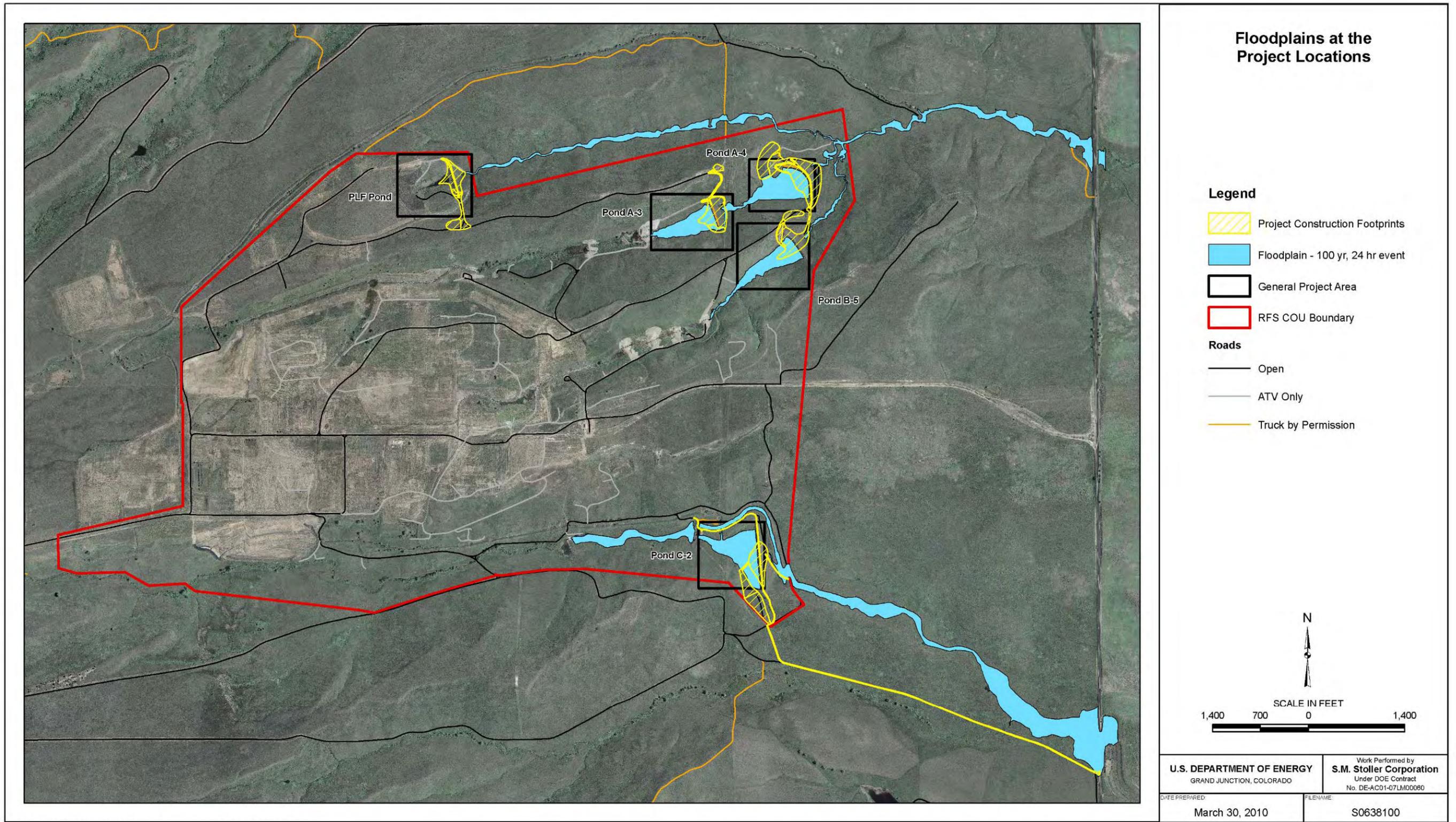
Calendar Year	Evaporative Losses (ac-ft)	Total Detained Inflow (ac-ft)
2008	26.4	16.4
2009	33.9	108.9

The reduction and eventual elimination of depletions would reduce or eliminate the costs incurred by Broomfield to replace water in Big Dry Creek according to the associated Augmentation Plan described in Section 1.1. In addition, the live flows formerly detained in the ponds would be available to downstream users in time, place, and amount, precluding any injury to calling senior water rights holders. As this would be considered a positive impact, associated mitigation measures are not warranted.

Surface Water Quality

Construction during the Proposed Action would have no direct impacts on DOE’s commitment or requirement to meet RFLMA water quality standards at downstream surface water POCs under the final CAD/ROD remedy. POCs and POEs would continue to be operated according to the RFLMA requirements and would not be disturbed by the construction activities.

After completion of the Proposed Action, water quality monitoring would continue according to the RFLMA requirements. The RFLMA water quality standards are based on the State’s basic and site-specific water quality standards. Water quality at any particular monitoring location varies temporally according to climate and hydrologic conditions (i.e., storm event characteristics, runoff, and groundwater seepage). Under the current batch-and-release discharge protocols, inflows to the ponds of varying water quality are effectively mixed prior to discharge.



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Figure 5-3. Floodplains at the Project Locations

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The resulting water quality measurements are essentially a synopsis of the inflow over an extended period. Once the dams are breached, water would pass through the remaining structures in a natural flow pattern. Therefore, individual sample results downstream of the breached dams are expected to show increased variability. However, compliance with water quality standards is based on specific summary statistics that evaluate water quality using multiple sample results over extended periods.

As stated in Section 4.3.5.3, since physical completion of cleanup and closure activities in October 2005, automated samplers at POCs have collected 140 flow-paced composite samples, and these composite samples consist of more than 7,400 individual grab samples (through 2009). By the time this EA has been completed, there will be over 200 flow-paced composite samples, and over 10,000 individual grab samples. While analytical results vary according to season, flowrate, and climate, the calculated compliance values at all POCs have remained below the applicable RFLMA standards.

Therefore, given the extensive sampling, the data indicate that remedy-related soil and infrastructure removal, revegetation, land configuration, and reductions in runoff have been successful and would continue to result in water quality summary statistics that meet applicable standards. Supporting data and evaluation can be found in the Annual Reports of Site Surveillance and Maintenance Activities (DOE 2008, 2009b). The data in the Annual Reports are extensive and the information provided in the above paragraphs is a synopsis of the surface water quality sampling. The URL address for the Annual Reports is provided in Section 8.0 of this EA.

Batch-and-release operation is not a requirement of the RFS remedy. In other words, the remedy is adequately protective of human health and the environment without the continued existence of the remaining dams and ponds. The RFLMA water quality standards are based on the State's water quality standards for all use classifications. These standards are based on the level of risk to human health and the environment using long-term exposure scenarios even though these exposure scenarios do not actually exist at or directly downstream of the RFS. RFLMA monitoring provides information to trigger timely investigation, evaluation, and mitigation under RFLMA requirements for any contamination that may be adversely impacting water quality above RFLMA standards to assure that the remedy remains adequately protective.

5.2.5.2 No Action Alternative

The No Action Alternative is expected to have no impacts related to water storage, evaporative depletions, erosion, and water quality. However, if an existing dam were to fail during a flood event, the addition of pre-existing retained water would result in higher flood flows downstream. Also, failure of an earthen dam would result in the downstream transport and deposition of large quantities of soil from the embankment structure. The remaining dams at the RFS are more than 30 years old. While the expected lifespan of these earthen dams is not known, continued aging, regardless of rigorous maintenance, could necessitate the breach of these structures in the interest of dam safety.

5.2.6 Air Quality

5.2.6.1 Proposed Action

Impacts related to air quality would be considered direct in connection with construction and revegetation activities. Once these activities are completed, no additional impacts to air quality would occur from the Proposed Action.

Activities involved with the breaching of the remaining five dams would be similar in nature to the 2004 EA study for the breaching of dams, and therefore would be considered in compliance with the NAAQS.

Direct temporary construction emissions of particulate matter less than 10 microns (PM₁₀) and particulate matter less than 2.5 microns (PM_{2.5}) would be similar or less than those experienced and analyzed in the 2004 EA, wherein the breaching of six dams in a one-year period was assessed. Because the projected breaching of the remaining five dams would not occur at the same time and would occur over a longer period of time (2011 to as late as 2020), it is within reason to assume that the PM₁₀ and PM_{2.5} emissions would be lower than the increase of 0.3 microgram per cubic meter determined in the 2004 EA (DOE 2004).

As discussed in Section 4.3.6, the Denver Front Range area has been determined to be in noncompliance with the 8-hour O₃ standard. Colorado was required to submit recommendations for activities under nonattainment for O₃ by March 2009, with EPA to review by March 2010. EPA will establish attainment dates between 2013 and 2030 for respective states in nonattainment. Until EPA sets attainment dates, the 1997 8-hour O₃ standard and associated regulatory requirements remain in place (CDPHE 2009). Among many criteria, CDPHE requires a submittal of an Air Pollution Emission Notice (APEN) in O₃ nonattainment areas for volatile organic compound sources emitting less than 100 tons per year, when a change in actual annual emissions of 1 ton or more, or 5 percent, whichever is greater above the level reported on the last APEN submitted to the Department (CDPHE 2008).

Based on estimated time involved, and the associated heavy equipment required for breaching the dams, the amount of O₃ emissions would be well below the threshold level for submitting an APEN.

5.2.6.2 No Action Alternative

There would be no change to air quality as a result of the No Action Alternative, because no construction activities would occur.

5.3 Comparison of Impacts Between Alternatives

Table 5–2 summarizes the potential impacts for all resources studied for this EA and provides a comparison between the Proposed Action and the No Action alternatives. This table is provided as a summary only. The individual resource sections provide a complete discussion of impacts. Cumulative impacts are those impacts that are assessed as a whole, rather than resource specific, and these impacts are discussed in Section 5.4. All potential impacts can be mitigated as appropriate to the resource.

Table 5–2. Summary of Comparison of Environmental Consequences Between the Proposed Action and No Action Alternatives

Resource	Environmental Consequences	
	Proposed Action	No Action
Wildlife	<p>Direct:</p> <ul style="list-style-type: none"> Restore a more natural seasonally variable flow system to provide more consistent water downstream habitat. Construction noise would be a temporary disturbance. Eliminate surface water habitat for species. <p>Indirect:</p> <ul style="list-style-type: none"> Reduced disturbance from human activities for monitoring and maintenance. 	<p>Walnut Creek:</p> <ul style="list-style-type: none"> Long-term continuation of batch releases from the ponds, predominantly during the non-growing season, could alter the structure and composition of the downstream habitat such that requirements for current species would not be met in the future. <p>No Name Gulch and Woman Creek:</p> <ul style="list-style-type: none"> No change from current conditions
Migratory Birds	<p>Direct:</p> <ul style="list-style-type: none"> Noise and construction activities may impact foraging and nesting in the adjacent habitat adjacent, but no fatalities expected because of prescribed mitigation measures. <p>Indirect:</p> <ul style="list-style-type: none"> Reductions in the abundance of waterfowl at the ponds; however, these types of habitats are available within a few miles of the RFS. Species that forage and nest in emergent and shrub wetland habitat types would potentially increase following reclamation. Reduced disturbance from human activities for monitoring and maintenance. 	<p>Walnut Creek:</p> <ul style="list-style-type: none"> Long-term continuation of batch releases from the ponds, predominantly during the non-growing season, could alter the structure and composition of the downstream habitat such that requirements for current species would not be met in the future. <p>No Name Gulch and Woman Creek:</p> <ul style="list-style-type: none"> No change from current conditions.
Threatened & Endangered Plant and Wildlife Species	<p>Direct Impacts:</p> <ul style="list-style-type: none"> Approximately 1.1 acres of Preble's mouse habitat would be impacted. Increase in habitat expected with conversion from open water to emergent wetland/shrubland. Possible impacts to individual garter snakes, and northern leopard frogs. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Minimal effect is expected long-term because the reestablished stream channels would provide habitat. 	<p>Walnut Creek:</p> <ul style="list-style-type: none"> In Walnut Creek, the Preble's mouse multi-strata riparian woodland/shrubland habitat could change to a single story herbaceous habitat, which would limit the amount of quality habitat for the species. Continued long-term reduction in creek flows below the dams in Walnut Creek may reduce the amount of existing wetland along this reach of creek, which would reduce available habitat. <p>No Name Gulch and Woman Creek:</p> <ul style="list-style-type: none"> No change from current conditions. <p>The lower South Platte River species would continue to be impacted by the retention of water upstream of the dams in the No Action Alternative.</p>

Table 5-2 (continued). Summary of Comparison of Environmental Consequences Between the Proposed Action and No Action Alternatives

Resource	Environmental Consequences	
	Proposed Action	No Action
Vegetation, Wetlands and Floodplains		
Vegetation	<p>Direct Impacts:</p> <ul style="list-style-type: none"> Clearing of 26 acres of vegetation (including noxious weeds) due to construction activities. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Reseeding of native species and ongoing weed control would provide a higher quality ecosystem. 	<p>Walnut Creek:</p> <ul style="list-style-type: none"> Retention of the batch-and-release water flow may lead to changes in the existing wetlands downstream (and resultant vegetation changes). <p>No Name Gulch and Woman Creek:</p> <ul style="list-style-type: none"> No change from current conditions.
Wetlands	<p>Direct Impacts:</p> <ul style="list-style-type: none"> Removal of less than 0.5 acre of palustrine emergent/shrubland wetland and approximately 4 acres of open water habitat. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Five to 6 acres of palustrine emergent/shrubland wetland created in the former open water habitat, which would increase the aquatic resources functions and services. 	<p>Walnut Creek:</p> <ul style="list-style-type: none"> Retention of the batch-and-release water flow may lead to changes in the existing wetlands downstream (and resultant vegetation changes). <p>No Name Gulch and Woman Creek:</p> <ul style="list-style-type: none"> No change from current conditions.
Floodplains	<p>Direct Impacts</p> <ul style="list-style-type: none"> Minimal and limited to construction areas <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Would approximately reestablish the historic floodplain and stream channel through the pond bottoms (except at Pond C-2). 	<p>Walnut Creek, No Name Gulch, and Woman Creek:</p> <ul style="list-style-type: none"> No change from current conditions.
Surface Water Resources		
Surface water flow	<p>Direct Impacts</p> <ul style="list-style-type: none"> Larger flows and volumes downstream compared to current conditions with return to flood conditions prior to the original construction of the dams. Short term erosion associated with construction. <p>Indirect Impacts</p> <ul style="list-style-type: none"> Would eventually eliminate evaporative depletions associated with the retention of out-of-priority water. 	<p>No change to existing conditions of either surface water flow, or water quality. However, failure of a dam during a flood event would result in higher flood flows downstream and transport and deposition of large quantities of soil from the embankment structure. The remaining dams at the RFS are over 30 years old.</p>
Surface water quality	<p>Direct Impacts</p> <ul style="list-style-type: none"> No direct impacts on water quality. <p>Indirect Impacts</p> <ul style="list-style-type: none"> Individual sample results downstream are expected to show increased variability. Data indicate that remedy related soil and infrastructure removal, revegetation, land configuration, and reductions in runoff would continue to result in water quality summary statistics that meet applicable standards. RFLMA monitoring requirements would remain unchanged. 	
Air Quality	<p>Direct Impacts:</p> <ul style="list-style-type: none"> Releases of PM₁₀, PM_{2.5}, and O₃ expected to be minimal during construction. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> None. 	<p>No change from current conditions.</p>

5.4 Cumulative Impact Summary

Cumulative impacts represent the incremental impacts of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). Cumulative impacts are most likely to arise when a relationship exists between a proposed alternative and other actions that have, or are expected, to occur in a similar location, time period, or involving similar actions. Projects that are in close proximity to the proposed alternative have more potential for cumulative impacts.

While assessing the cumulative impacts in association with the Proposed Action, the following questions were addressed:

- Does a relationship exist so the impacts from the Proposed Action might affect or be affected by the impacts of the other actions?
- If such a relationship exists, does this assessment reveal any potentially adverse impacts not identified when the Proposed Action is considered alone?

The following activities have been identified to have the potential for contributing to cumulative impacts on resources within the vicinity of the Proposed Action.

5.4.1 Past Actions

Section 1.1 describes the background of the RFS and the subsequent cleanup and successful closure of the site. Successful closure of this site has led to the gradual shift from an industrial processing site, and associated human activities, to an open grassland environment. As a result of this shift, wildlife use of the areas has continued to escalate.

Section 1.1 also describes the C-1 dam, evaluated under a Categorical Exclusion (DOE 2003) and the breaching of dams A-1, A-2, B-1, B-2, B-3, and B-4, which were evaluated in the *Environmental Assessment Comment Response and Finding of No Significant Impact, Pond and Land Configuration* (DOE 2004). Modification of seven ponds at the RFS was completed in 2009. Reconfiguring the ponds was accomplished by constructing a notch in each of the modified dams. Measured water quality was not adversely affected by these actions (Section 4.3.5.3).

The continued urban sprawl in the Denver metropolitan area and creation of the Refuge that surrounds the RFS maintains an area that has generally remained undisturbed since its acquisition by the federal government. Although the intention of retaining the COU was to maintain the COU as an area that requires additional remedial or corrective actions, the transfer and jurisdiction of control of the majority of the POU to USFWS for the Refuge has resulted in an expanded use of the entire area by wildlife and contributes to maintaining the existing natural buffer surrounding the COU.

5.4.2 Present Action

As described in Section 1.1, DOE continues to routinely estimate out-of-priority storage and evaporative depletions under the lease agreement with the City and County of Broomfield (and the associated Substitute Water Supply Plan).

All upstream POEs and downstream POCs are maintained, and automated samples are continuously collected at regular intervals. Since closure of the RFS in 2005, calculated compliance values have not exceeded water quality standards.

Parallel to the completion of this EA, DOE has proposed that the RFLMA be modified to change some of the current RFLMA monitoring points, including POCs downstream of the dams. The proposed RFLMA modification is subject to CDPHE and EPA approval. The RFLMA modification is not considered a part of this EA but is a part of the remedy for the RFS. Appendix C includes the Regulatory Contact Records for the proposed RFLMA modifications.

5.4.3 Reasonably Foreseeable Future Actions

In addition to establishing the Refuge, Subtitle F of PL 107-107 set aside a 300-ft right-of-way along Indiana Street for transportation improvement (PL 107-107). In 2003, the Federal Highway Administration, in cooperation with CDOT, initiated a NEPA process to study the need, merits, and possible impacts of potential transportation improvements in the Northwest Corridor of the Denver metropolitan area (CDOT 2010). Due to declining funding and a lack of consensus, CDOT decided not to complete the Northwest Corridor EIS. Instead, data collected have been used to create a new Northwest Corridor Transportation Planning and Environmental Study that is available to the public and can be used by a governmental agency or the private sector should an entity decide to move forward with a future project that does not involve federal funding (CDOT 2010). This study included the use of Indiana Street for the project. This project has public controversy, and as of the date of completion of this EA, has not been scheduled for construction.

As stated in Section 4.1, land to the south of the Refuge is privately owned and is currently used for cattle grazing with portions of this property under development for residential, commercial, and light industrial uses.

If the RFLMA is modified to change the location of the POCs downstream of the dams, ground disturbance would occur with the closure of the current POCs and development of new monitoring points.

Under current conditions, flows in Woman Creek originating west of Pond C-2 are diverted around Pond C-2 by the Woman Creek Diversion Dam and through the Woman Creek Diversion Canal. DOE has no plans to modify either the Woman Creek Diversion Canal or the dam. However, DOE may choose to maintain, modify, run to failure, or remove these structures in the future. The Woman Diversion Dam, a sheet pile cutoff wall with a concrete cap, is located west of Pond C-2 and designed to adequately divert the 100-year flood. Recent flood hydrology modeling indicates that this structure will divert 100-year flood flows (Appendix E). Although the failure of the Woman Creek Diversion Dam is not anticipated, the breach in the C-2 dam would be engineered to accommodate this possibility.

5.4.4 Cumulative Resource Impacts

5.4.4.1 Wildlife, Migratory Bird, and Threatened and Endangered Species

Past actions of site cleanup has served to enhance habitat for all species at the RFS. No additional impacts to resources have occurred as a result of present operating conditions. Future actions discussed in Section 5.4.3 could potentially further reduce habitat for wildlife, birds, and T&E species.

5.4.4.2 Vegetation, Wetlands, and Floodplains

Recent past actions have served to enhance habitat for vegetation and wetlands. Historic configuration of floodplains is in the process of being reestablished. Current operating conditions present no additional impacts to resources. Although impacts are expected to the vegetation resources, additional ponds, wetland habitat, riparian habitat, and upland vegetation exist adjacent to or within a mile of each of the projected future actions. Therefore, minimal impacts to these habitat types are expected.

5.4.4.3 Surface Water Resources

No cumulative impacts to Walnut Creek are anticipated, because DOE has completed closure and reclamation of the site and has no plans to modify the drainage that would affect flow routing or flood hydrology in this drainage system at the RFS.

Under the Proposed Action, the Dam C-2 breach would be designed to accommodate the entire Woman Creek flood flow under the assumption that the Woman Creek Diversion Dam and the Woman Creek Diversion Canal may not be functional at some future date. While this potential change in flood routing would not be expected to alter downstream flood volume, small changes to peak flows and flood duration (increases or decreases) may occur if the Woman Creek Diversion structures are modified.

5.4.4.4 Air Quality

The Proposed Action would be in compliance with the NAAQS requirements and would not contribute substantially to the cumulative air quality in the western Front Range area.

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6.0 Mitigation Measures and Resource Protection Activities

All potential impacts from the Proposed Action can be mitigated, as appropriate to the resource, and no impacts are considered substantial. Mitigation measures may be imposed by regulation or through the final CAD/ROD for Rocky Flats (DOE 2006a).

Section 3.1.7 of this EA describes mitigation measures (institutional controls) that are specific to all dam breaching activities, and these mitigation measures will be followed. The Executive Summary Environmental Consequences and Mitigation Summary section, and Table ES-1 provides activity and resource specific mitigation measures, and serves as the Mitigation Action Plan (MAP) per DOE Order 451.1B, Section 5 (a)(9)(e) and (f). The MAP for this EA does not serve to render the impacts of the proposed action as not significant because, based on the extensive monitoring data, breaching of all dams could safely be completed in 2011.

As discussed previously, based on public concern statements, DOE has determined that postponing breaching Dam C-2 until the 2018 to 2020 timeframe would best serve to address concerns stated by local governments. The terminal dams would be operated in a flow-through configuration from 2011 until the final breaching. Comments to DOE on the Draft EA indicated a desire from the communities adjacent to the RFS to have further input prior to the final decision to breach terminal dams A-4, B-5 and C-2. The concerns that the communities have expressed are addressed in Appendix A, Common Concern Statements. Based on these comments, the resource-specific mitigation measures have been further clarified and expanded for this Final EA. Additionally, DOE has committed to working with the concerned communities toward developing an Adaptive Management Plan (AMP) to provide ongoing data prior to the breaching of the terminal dams. The AMP would provide guidance, suggestions, and recommendations developed by the AMP Group for implementing the Proposed Action. The AMP Group would consist of representatives from interested parties. Additionally, CDPHE and EPA would be invited to participate in the development of the AMP, but the AMP would not describe policy or other requirements enforceable under RFLMA.

Development and implementation of the AMP will not in any way negate or change the regulatory requirements under RFLMA. Although the dams are not part of the RFLMA remedy, it is appropriate to address the RFLMA requirements in this section as they would pertain to the terminal dam breaching activities. Because the RFLMA requirements are CERCLA related, these are being described for informative purposes only and are not considered mitigation measures under this NEPA document. Appendix A, Common Concern Statements provides a comprehensive explanation of the RFLMA requirements as they relate to the terminal dam breaching.

Periodic CERCLA reviews are required to be conducted at least every five years, and DOE would have 15 years of post-closure monitoring data prior to the earliest dates for terminal dam breaching. Additionally, RFLMA ensures continuous review of environmental data to confirm protectiveness. Removal of the dams will not eliminate CERCLA-required periodic reviews or RFLMA-required monitoring.

While monitoring data do not indicate that a RFLMA standard would be exceeded at the downstream monitoring points (POCs), it is important to note that RFLMA provides the decision logic for evaluation, reporting, consultation, and mitigation requirements that are based on

meeting the remedy goals for protection of human health and the environment. Mitigation action under RFLMA, if any are warranted, are based on the outcome of RFLMA part consultation, evaluation, and investigation of the possible source(s) that may impact water quality. RFLMA standards at the POCs will continue to be applicable, and the results of water monitoring will continue to be reported in RFLMA quarterly and annual reports.

The following sections provide resource-specific mitigation measures.

6.1 Wildlife

In general, most of the wildlife described in Section 4.3.1 would have the ability to relocate to adjacent areas during project construction. Mitigation measures for terrestrial and aquatic wildlife will not be necessary because of the abundance of nearby alternative habitat. However, for some species that cannot easily relocate, the following mitigation measures will be implemented.

- Water levels in the ponds will be drawn down prior to construction activities. This will move many of the fish from the ponds to downstream areas. Draw down will provide the opportunity for amphibians and reptiles to move elsewhere, while also encouraging other species that use the area as a water source or foraging area to use nearby habitats.
- Vegetation in the project footprint will be mowed to low levels (6 in. or less) to remove cover for wildlife needs. This will encourage species to use habitat at other adjacent locations.

6.2 Migratory Birds

Migratory birds will have the ability to relocate to adjacent areas during project construction. However, the proposed construction activities are planned to occur throughout the primary nesting season for birds (April 1 through August 31). Therefore, to encourage birds that use the pond areas for nesting and forage to use other nearby habitats during the project construction period, the following USFWS directives will be implemented:

- A qualified biologist will conduct field nest surveys at each pond area during the nesting season prior to the project to identify the absence or presence of nesting migratory birds. Nesting surveys will also be conducted on a regular basis throughout the project construction period.
- If a field survey identifies the existence of one or more active nests that cannot be avoided by the planned construction activities, the USFWS Colorado Field Office will be contacted immediately for further guidance.
- Results of the surveys and information regarding the qualifications of the biologist(s) will be documented and maintained on file for potential review by USFWS (if requested) until the Proposed Action activities have been completed.

- Water levels in the ponds will be drawn down prior to construction activities. This will encourage bird species that use the pond areas as nesting habitat, foraging areas, or a water source to use nearby habitats.
- Vegetation in the project footprint (and perhaps outside the footprint) will be mowed to low levels (6 in. or less) to encourage wildlife to seek cover at adjacent locations. Mowing will begin before the nesting season for the birds and continue until project completion.

Based on the results of surveys, and determination from USFWS, additional nesting deterrents may be warranted.

6.3 Threatened and Endangered Plant and Wildlife Species

The RFS has a PBA in place with USFWS to address impacts to T&E species, specifically with respect to the Preble's mouse. The PBA addresses various generic site activities and includes best management practices and mitigation measures. In compliance with Section 7 of the Endangered Species Act, consultation with USFWS was initiated in January 2011 because of the new designation of critical habitat. Depending on timing of completing the amended PBA referred to in Section 4.3.3, according to discussions with USFWS, either an amendment to the current PBA would be written, or the Amended PBA would address impacts from this project. USFWS would then respond with either a BO or letter for the amendment so that the project may proceed. At that time, USFWS will determine if additional species surveys would be required, and all terms and conditions included in the USFWS letter or BO will be followed during project construction.

No earth-moving activities will be started until either an approval letter or BO from USFWS has been obtained.

Mitigation for impacts will be conducted in situ and follow guidelines in the PBA.

Based on the abundance of available habitat, no other mitigation measures are required for other species.

6.4 Vegetation, Wetlands, and Floodplain

6.4.1 Vegetation

The potential adverse affects of erosion and sedimentation will be minimized through the use of appropriate erosion controls (erosion blankets, wattles, straw bales, GeoRidges, riprap, etc.) throughout and after the project. The following mitigation measures will be implemented by a qualified ecologist, botanist, or environmental scientist to avoid and reduce impacts to vegetation:

- Erosion controls will be used to reduce the potential for erosion and sedimentation during and after construction. The guidance in the *Erosion Control Plan for the Rocky Flats Property Central Operable Unit* (DOE 2007b) will be followed,
- Temporarily disturbed areas will be reclaimed following project completion using native plant species,

- Revegetation will occur as soon as possible to establish vegetative cover and habitat for wildlife, while preventing the establishment of weeds, and
- Noxious weeds will be controlled using Colorado appropriate weed-control measures.

6.4.2 Wetlands and Floodplains

The Proposed Action will involve excavation and dredging and filling activities in the streams, ponds, and associated wetlands. This work requires a permit in accordance with Section 404 of the Clean Water Act and implementing regulations administered by USACE. A number of nationwide permits for dredge-and-fill activities based on the particular types and goals of the activities are provided by USACE regulations in 33 CFR 330. USACE staff has stated that the project would likely be permitted under a Nationwide Permit 27, Aquatic Habitat Restoration, Establishment, and Enhancement Activities (USACE 2010). This permit applies to activities in waters of the United States associated with the restoration, enhancement, and establishment of tidal and non-tidal wetlands and riparian areas and the restoration and enhancement of nontidal streams and other non-tidal open waters, provided those activities result in net increases in aquatic resource functions and services. The permit includes general and activity-specific conditions to control and mitigate the water quality impacts of the work, including post construction erosion controls and revegetation and requires notification of USACE of the intent to perform work in accordance with the permit prior to commencing the work. The appropriate USACE permit will be obtained prior to any earth-moving activities. Nationwide Permit verification letters are valid for a period of two years. Therefore the Proposed Action would most likely require two separate permits.

Impacts to jurisdictional waters will be mitigated according to USACE requirements. Mitigation for wetland impacts would be conducted in situ and follow the USACE permit requirements applicable to the construction activities.

If all three terminal dams are operated using a flow-through configuration prior to dam breaching, this would result in lower normal operating water levels in the terminal ponds. This may occur for several years prior to the actual breaching. In preparation for dam breaching and to minimize erosion potential from the exposed mud flats (both prior to and after breaching), revegetation of the exposed mudflats may be conducted after the flow-through operations are begun so that the vegetation at these locations has a headstart on establishment prior to breaching. Erosion controls may also be used where deemed necessary. This would minimize the amount of “bare” ground on the pond bottoms and further reduce the potential of soil movement if the dams are breached. Additional seeding of wetland and upland areas along with installation of erosion controls would be conducted after dam breach construction activities were completed. Monitoring of these areas would be conducted as part of the normal wetland and revegetation monitoring activities at RFS. Revegetation monitoring would be conducted following the guidance provided in the RFS Revegetation Plan (DOE 2009c) and would evaluate foliar vegetation cover and ground surface cover. Wetland monitoring would be conducted following the RFS Wetland Mitigation Monitoring and Maintenance Plan (DOE 2006d) and would evaluate hydrophytic vegetation, hydrology, and when the wetlands are delineated, hydric soils. Photomonitoring would also be used for documenting the establishment of the vegetation.

6.5 Surface Water Resources

The Proposed Action will involve construction activities that require a Clean Water Act permit for stormwater discharge. For federal facilities in Colorado, the stormwater permitting is regulated by EPA. A construction general permit for stormwater discharge is provided by EPA regulations in 40 CFR 122. Similar to the nationwide permitting program, the construction general permit includes general and activity-specific conditions to control and mitigate the water quality impacts of stormwater discharges, including post construction erosion controls and revegetation and requires notification of EPA of the intent to perform work in accordance with the permit prior to commencing the work. The construction general permit will be obtained prior to any earth moving activities. Institutional controls under RFLMA as described in Section 3.1.7 would continue to be implemented.

The potential for contaminants to migrate offsite in surface water once these dams are removed is a known concern of downstream cities. Any potential mitigation measure concerning contaminants is predicated by the institutional controls under RFLMA, and Appendix A addresses this concern further.

6.6 Air Quality

Air monitoring is not required as part of the final remedy, because levels of airborne contaminants are below NAAQs and do not pose a risk to humans or the environment. Air quality is not affected as a result of present operating conditions. Emissions of PM₁₀, PM_{2.5}, and O₃ would temporarily add to the overall emissions in the Denver Front Range area.

Based on the final design and construction statement of work, any applicable air quality construction permits will be obtained prior to the start of the construction. Applicable construction measures listed on the CDPHE website:

<http://www.cdphe.state.co.us/ap/down/generalpermGP03.pdf> will be followed.

The contractor performing the earth-moving work would provide proof of age of equipment, per CDPHE requirements.

Because the RFS is located in an area that can experience extreme wind, construction activities will be stopped during periods of high wind.

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7.0 Coordination and Consultation

Appendix D provides copies of correspondence in relation to Coordination and Consultation.

7.1 Coordination

On February 2, 2010, formal invitations to participate as cooperating agencies were mailed to USACE, USFWS, EPA, CDPHE, CDOW, and the Colorado Division of Water Resources.

Three agencies have responded to the invitation to be cooperating agencies. USACE and USFWS accepted the invitation to assist in evaluating alternatives and reviewing the draft EA. All comments received prior to the issuing of this Draft EA have been addressed and responses incorporated where applicable. The Colorado Division of Water Resources declined to be a reviewer; however, it did note that any modifications to the dams at the RFS are required to be reviewed and accepted by the Division's Dam Safety Branch, which administers the dam safety program, and DOE will coordinate with the Dam Safety Program Engineer as required prior to construction.

7.2 Consultation

Letters requesting consultation on T&E species were mailed to USFWS and CDOW.

USFWS provided information on T&E species that potentially could be present on site. USFWS also indicated that DOE could amend the existing PBO to account for impacts to the Preble's meadow jumping mouse from the proposed activities.

CDOW responded to the request for consultation and the invitation to be a cooperating agency in one response letter and provided a review of Preble's mouse habitat and behavior and referred DOE to USFWS for additional consultation.

DOE notified 18 identified tribes of its Proposed Action by letter sent via U.S. mail, dated March 23, 2010, and requested their assistance in identifying properties having religious or cultural significance. DOE did not receive any response letters from the tribes. Appendix D provides copies of the consultation letters and responses.

USFWS and CDPHE provided comments on the Draft EA, and their comments and DOE responses are included in Appendix A.

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