Appendix E

Floodplain/Wetlands Assessment for the Surface Water Configuration Project at the Rocky Flats Site

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Technical Report

E1.0 Introduction

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 the U.S. Department of Energy (DOE) was completed in 2005. The DOE Office of Legacy Management (LM) has jurisdiction and control of the Central Operable Unit (COU) at Rocky Flats.

Twelve dams were constructed on the RFS during operation of the facility. The dams were constructed for stormwater control and to retain surface water so it could be monitored and managed, if necessary, prior to release to downstream. The purpose of the Proposed Action is to reduce or eliminate the retention of surface water and 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 should require less active management and maintenance than the current system and should preserve existing wetlands and habitat as available water allows. Returning flows to approximate pre-retention conditions would provide ecological benefits by improving riparian habitat and promoting wetland formation. This would also 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.

Seven dams at RFS were breached previously by constructing notches in the dam embankments. The Proposed Action would breach the remaining five dams and would be implemented in two timeframes, with the Present Landfill Dam (PLF) and A-3 breaching to occur in 2011, and breaching of dams A-4, B5, and C-2 would be completed between 2018 and 2020.

Figure E−1 shows the location of the affected dams at RFS. The dams proposed for breaching 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 upstream on the South Interceptor Ditch. Dams A-4, B-5, and the PLF 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.

The dams are not required to maintain adequate protection of human health and the environment under the final Corrective Action Decision/Record of Decision (CAD/ROD) remedy. The activities proposed in this EA do not fall within the scope of CAD/ROD or Finding of No Significant Impact (FONSI) under the *Environmental Assessment Comment Response and Finding of No Significant Impact, Pond and Land Configuration* (DOE 2004). The 2004 EA addressed the possibility that all 12 dams could ultimately be breached, but breaching all of the dams was not originally anticipated when the 2004 EA was prepared, so they were not included as a connected action.

Executive Order 11988, *Floodplain Management* (1977), and Executive Order 11990, *Protection of Wetlands* (1977), requires that all federal agencies evaluate the potential impacts of actions within floodplains or wetlands and minimize adverse effects. This Floodplain and Wetland Assessment has been prepared in accordance with these executive orders as specified in Title 10 *Code of Federal Regulations* Part 1022. The Floodplain and Wetland Assessment will be included as an appendix to the *Rocky Flats Surface Water Configuration Environmental Assessment*.

E1.1 Proposed Action

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 on the South Interceptor Ditch are being assessed for breaching. A "breach" or "channel" would be cut into each dam to reduce its jurisdictional height, thus creating a lower profile, and reestablish a natural flow through the pond. Construction is proposed to start in 2011 and be completed for Dams A-3, C-2 and the PLF by the end of fiscal year 2011. Construction for Dams A-4 and B-5 is proposed to be completed by 2018, with the partial design scheduled for completion by the end of fiscal year 2011.

The following sequence of events is similar to all five of dams.

- Dewater the ponds using existing discharge valves, and/or pumping as necessary several months prior to construction work.
- Mobilization: set up staging areas, erosion control, and stockpile areas.
- Install temporary coffer dam upstream for potential storm events (empty downstream of coffer dam and manage water upstream using pumps).
- Excavate soil from the breach area and stockpile in dam area.
- Breach the dam to engineering specifications; would have a drop structure downstream of the notch – approx. 5:1 slope; would use rip rap, erosion control fabric, etc.
- Regrade area upstream of channel to provide positive flow, minimize ponding, and promote establishment of quality habitat.
- Reclaim all disturbed areas.

This Technical Report assesses only the impacts that may occur as a result of the Proposed Action.

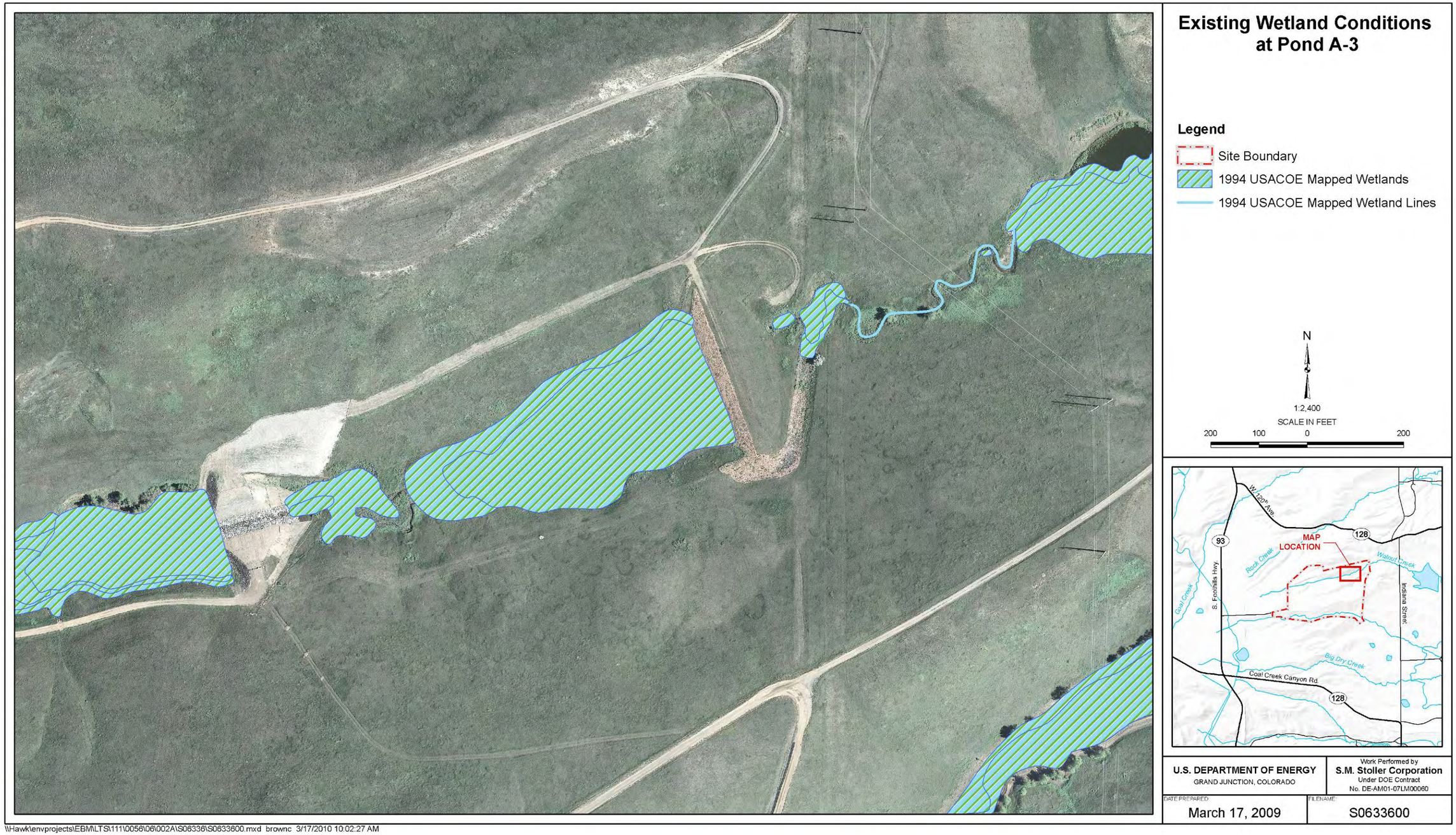

Figure E−1. Rocky Flats Site

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E1.2 Floodplain/Wetland Description

This section describes the existing vegetation communities, wetlands, and floodplains at the RFS and project areas.

E1.2.1 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 (*Bouteloua 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 are dominated by smooth brome (*Bromus inermis*), a non-native grass species. This would include the reclaimed grasslands at the A-3, A-4, B-5, and C-2 ponds. At the PLF pond, the reclaimed grassland is dominated by native species, which include western wheat grass, blue grama, side-oats grama (*Bouteloua curtipendula*), and switchgrass (*Panicum virgatum*).

E1.2.2 Wetlands

The Walnut Creek and Woman Creek drainages are intermittent streams with perennial reaches, which 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 (USACOE) in 1994 (USACOE 1994). Table E−1 summarizes the wetland communities found in the vicinity of each of the ponds. Figure E−2 shows the locations and types of existing wetlands in and around the study area ponds.

Table E−1. Existing Pond Area Wetland Summary Table

Location	Wetland Type	Total Acreage	Total Wetland Acreage
Pond A-3	Palustrine Emergent	0.896	4.187
	Palustrine Shrub	0.488	
	Open Water	2.802	
Pond A-4	Palustrine Emergent	1.547	4.480
	Palustrine Shrub	0.006	
	Open Water	2.927	
Pond B-5	Palustrine Emergent	0.592	3.036
	Open Water	2.445	
Pond C-2	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)	
Grand Total		**20.304 (18.155)**	**18.155 (20.304)**

Acreage amounts are totals in area of each pond based on 1994 USACOE wetland mapping report.
Linear wetland features acreages calculated as: (Length × 2 feet)/43,560 square feet/acre.
PLF pond figures in parenthesis represent 2009 mitigation monitoring report values.

Small differences from the 1994 USACOE 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 USACOE may no longer be accurate.

The PLF pond and wetlands were disturbed as part of site closure activities, and wetland re-establishment is ongoing. Accordingly, the first set of values presented in Table E−1 for the PLF pond are based on what was previously delineated by the 1994 USACOE mapping. 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 habitats are areas that are permanently inundated, and no rooted emergent or woody plant species are present.

E1.2.3 Floodplains

A floodplain is defined as ". . . lowlands adjoining inland and coastal waters and relatively flat areas and flood-prone areas of offshore islands including, at a minimum, that area inundated by a 1 percent or greater chance flood in any given year. The base floodplain is defined as the 100-year (1.0 percent) floodplain. The critical floodplain is defined as the 500-year (0.2 percent) floodplain. . ." (10 CFR 1022 *et seq*.). The Federal Emergency Management Agency (FEMA) defines a 100-year flood event as a flood that has a one 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). Because no critical actions are proposed, the critical action floodplain (500-year floodplain) is not included in this assessment.

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 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 extend into the current RFS boundaries. However, FEMA flood maps 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 where there is a 0.2 percent annual chance flood or areas of 1 percent annual chance flood with average depths of less than 1 foot or having drainage areas less than 1 square mile.

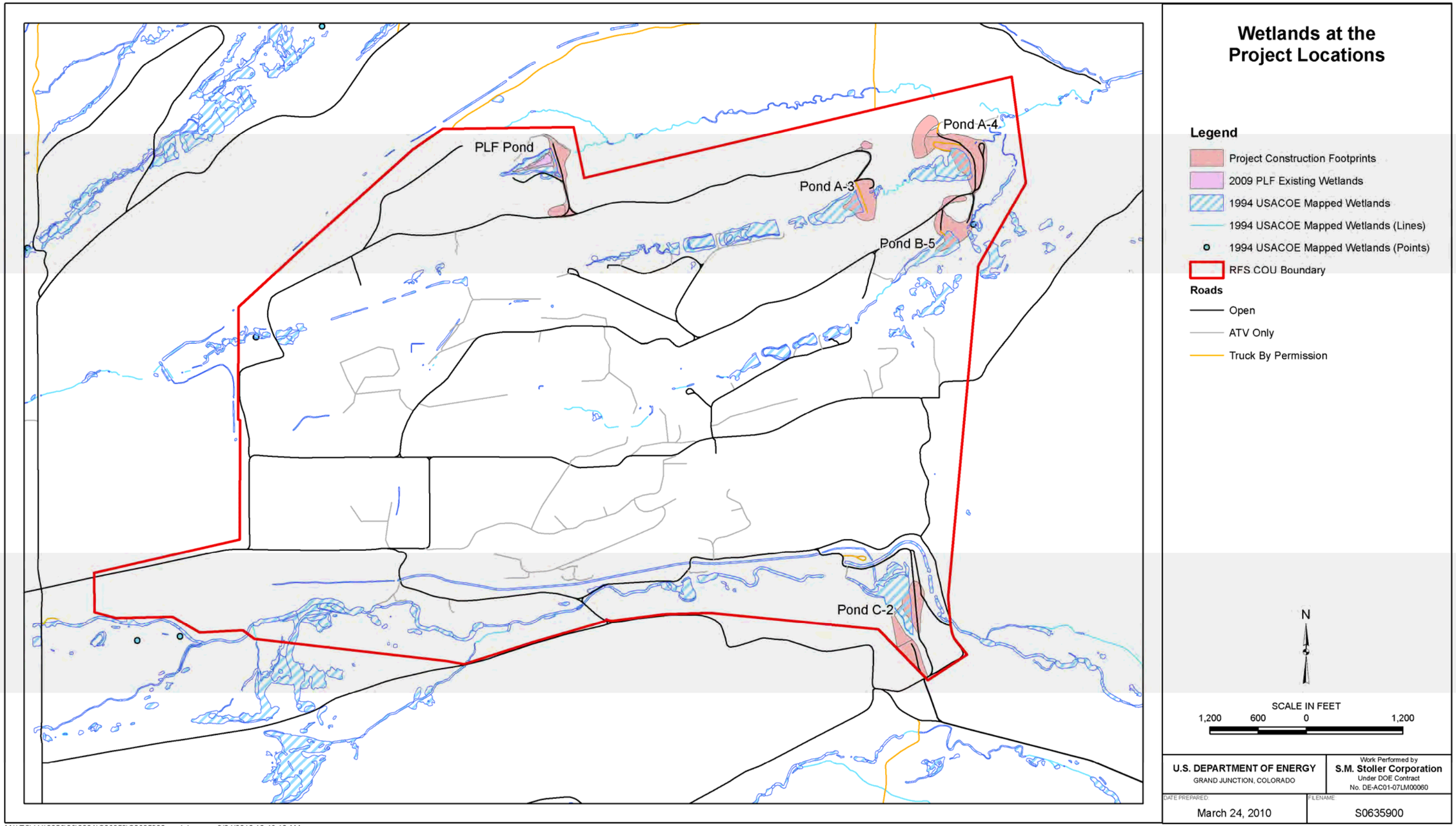

Figure E−2. Wetlands at the Project Locations

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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 may no longer be accurate.

In 2010, the *Determination of Peak Flow Rates and Floodplain Delineation for Dam Breaches at the Rocky Flats Site* (WWE 2010) delineated the current floodplains across the eastern portion of the RFS (Figure E−3). Based on this study, some of the proposed activities will be located in or adjacent to the 100-year floodplain. No high-hazard areas have been identified as part of this work, nor are high-hazard areas present at RFS.

E1.3 Floodplain/Wetland Impacts

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 spillway itself is located. After the original construction of the dams, the disturbed areas were seeded with predominantly non-native vegetation (smooth brome). Revegetation and weed-control efforts after project completion would replace the non-native vegetation with native vegetation, and create an indirect benefit by re-establishing native upland grasslands after the project.

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

Floodplains

Portions of the project construction footprint at each pond are within the 100-year floodplain (Figure 3; 100-year, 24-hour event; WWE 2010). The total disturbance to the floodplain would be approximately 5.7 acres. Table E−2 presents the approximate floodplain impacts at each pond.

Table E−2. Floodplain Impacts at Each Pond

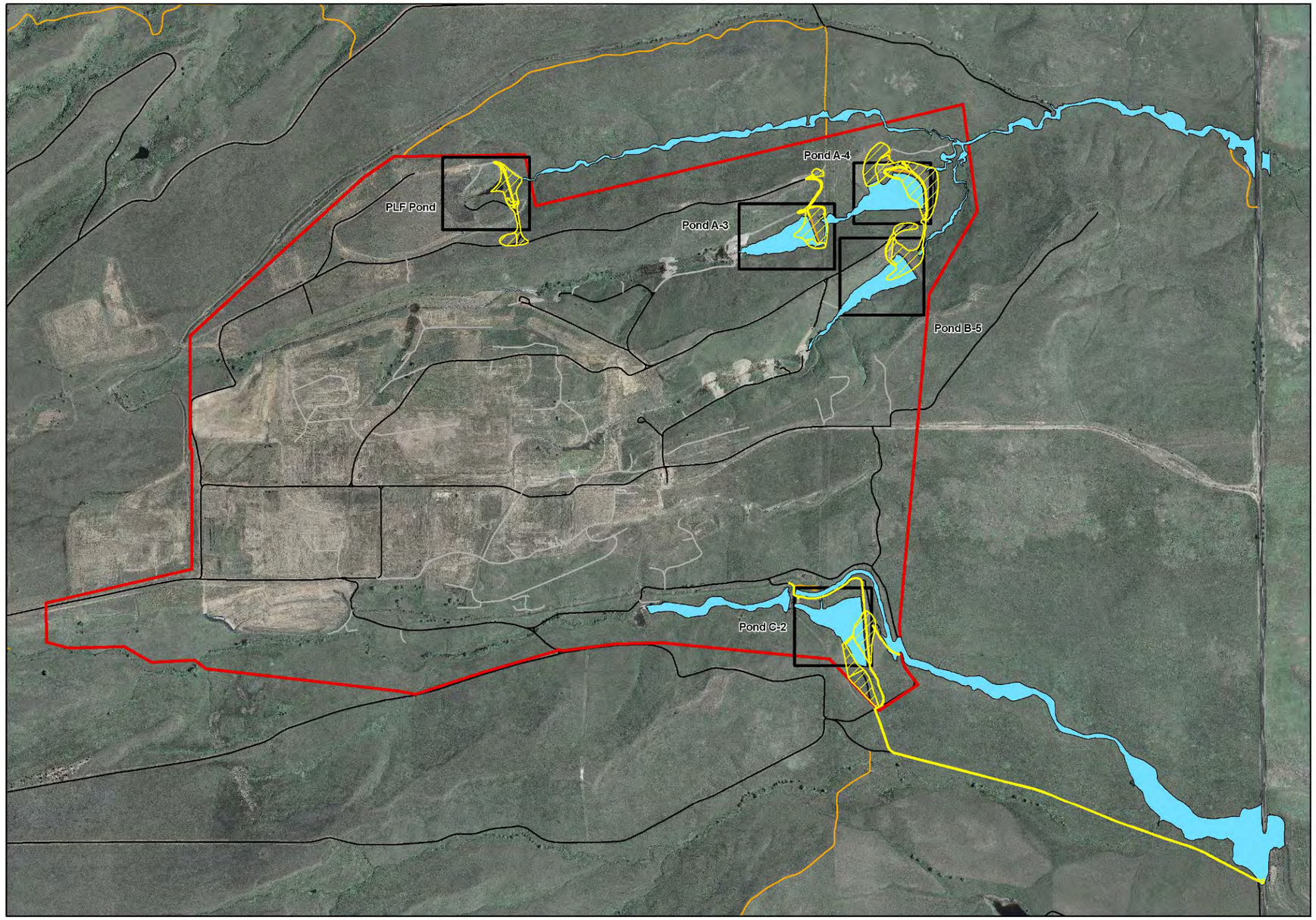
Location	Approximate Floodplain Acres Impacted by Project
PLF Pond	0.02
Pond A-3	1.41
Pond A-4	1.93
Pond B-5	1.20
Pond C-2	1.14
Total Acres	5.71

Direct impacts to floodplains would be minimal, temporary, and mostly limited to the construction footprints at each dam. Indirect impacts would alter the existing floodplains at each of the dams. Currently the floodplain at Pond A-3 goes around the dam through the spillway. Breaching of the dams would re-establish the historic floodplain and stream channel through the pond bottoms.

Minimal changes to floodplain capacity are expected relative to the overall capacity of the floodplain, because other than the breach in the dam, no changes are expected to the floodplain topography downstream of dam breaches. Indirect impacts to peak flows downstream of the breached dams are expected. Modeling results show that 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 (WWE 2010). 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.

During implementation of the Proposed Action, there would be the potential for short-term erosion and sedimentation associated with construction disturbances and exposed areas in former pond bottoms. The dams are not a functional part of the remedy for Rocky Flats and are not designed or operated as sedimentation basins. Long-term erosion control at the site is addressed through ongoing activities such as soil stabilization, erosion control BMPs, and revegetation throughout the drainage basins. The *Erosion Control Plan for Rocky Flats Central Operable Unit* (DOE 2007) will be followed.

The Proposed Action is expected to have minimal direct impacts to storage and evaporative depletions during construction. Since the ponds will be drained prior to construction, small reductions in storage and evaporative depletions are expected. Indirect impacts from the Proposed Action are expected to eliminate evaporative depletions associated with the retention of out-of-priority water upstream of the Rocky Flats dams on Walnut Creek. The proposed action is designed to detain no water upstream of the remaining structures.



Floodplains at the Project Locations

Legend

- Project Construction Footprints
- Floodplain - 100 yr, 24 hr event
- General Project Area
- RFS COU Boundary

Roads

- Open
- ATV Only
- Truck by Permission

N

SCALE IN FEET

1,400 700 0 1,400

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AC01-07LM00060
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Figure E−3. Floodplains at the Project Locations

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Wetlands

Direct impacts to wetlands would be minimal, because the areas upstream of the dams are predominantly open water where the work in the ponds themselves would be done to create the breach. A small amount of downstream wetland impacts are anticipated where the toe of the breach spillway would be placed. Based on preliminary project 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. Most of this would be temporary disturbance.

Indirect impacts to the wetlands and open water habitat are expected as the stream channels are re-established upstream of the dams 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 perhaps the exception of the water flowing in the stream channel. Additionally, some current palustrine emergent/shrubland wetland around the perimeter of the ponds may be permanently lost over time if hydrologic conditions are not sufficient to support them after project completion. A permanent benefit to offset these impacts, however, is that 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, enhance floodwater storage that can reduce flood risks, provide fish and wildlife habitat, and increase biological productivity. These functions are expected at varying levels in the wetlands created by the project. Removal of the dams would potentially benefit the Preble's meadow jumping mouse (*Zapus hudsonius preblei*; a federally listed threatened species at RFS) by increasing the amount of Preble's mouse habitat at RFS and increasing the connectivity of upstream and downstream habitat. This would reduce the fragmentation of Preble's mouse habitat that currently exists in the drainages.

E1.4 Mitigation

The following potential adverse effects in the floodplains and wetlands were identified:

- The potential for erosion and sedimentation during and post-construction.
- Direct and indirect impacts to wetlands.
- Alteration of floodplain due to dam breaching.

The following mitigation measures were identified to avoid and reduce potential impacts:

- Erosion controls will be used to reduce the potential for erosion and sedimentation during and post-construction. The guidance in the *Erosion Control Plan for the Rocky Flats Property Central Operable Unit* (DOE 2007) will be followed,
- Temporarily disturbed areas would be reclaimed following project completion using native plant species,
- Revegetation would occur as soon as possible to establish vegetative cover and habitat for wildlife, while preventing the establishment of weeds,
- Noxious weeds would be controlled using appropriate weed control measures,

- Minimize construction footprints to minimize wetland and floodplain impacts, and
- Wetland impacts would be addressed through appropriate permits from the USACOE. Mitigation for wetland impacts would be conducted in-situ and follow the guidelines and permit requirements provided by the USACOE.

E2.0 References

10 CFR 1022 *et seq*. 1997. Compliance With Floodplain and Wetland Environmental Review Requirements.

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