

2014 Wetland Monitoring Report

Introduction

This report summarizes the wetland mitigation monitoring conducted during 2014 at the Rocky Flats, Colorado, Site (Site), a U.S. Department of Energy (DOE) facility near Denver, Colorado (Figure 1).

Monitoring of mitigation wetlands begins as each project is completed, and for the first several years after initial wetland establishment, interim monitoring—consisting of qualitative and semiquantitative assessments of each of the wetland mitigation sites—is conducted. In addition, the wetlands are mapped annually, and noxious weeds are monitored and managed if necessary. About the fifth year after project completion, the mitigation wetlands are mapped and delineated following the current U.S. Army Corps of Engineers (USACE) wetland delineation procedure.

Background

Final wetland delineations and interim monitoring were conducted at several locations onsite in 2014. The general locations are described briefly below and shown in Figure 2. Figures 3 through 8 show close-up views of the areas. The figures show only wetlands monitored in 2014 and whether or not they met wetland criteria in 2014. The Geographic Information System (GIS) numbers (e.g., GIS #100) correlate with the numbers in the data summary tables that are discussed later in the report. Table 1 shows the seed mixes that were used at the various wetland areas.

A-2 Wetland

During winter 2008–2009, the dam at pond A-2 was breached to create a more natural flow-through system through the wetlands. Final wetland delineations were made at pond A-2 in 2012; however, delineation was inadvertently omitted at one location (Figure 3; GIS #5). A final delineation was made of this area in 2014.

Functional Channel 1

Functional Channel 1 (FC1) was a borrow area that was originally seeded with the FC1 wetland seed mix (Table 1) in early fall 2005. Additional borrow material was removed from the eastern part of the bottom of FC1 in fall 2007 and used for fill at another project. This latter area was recontoured and seeded with both the wetland seed mix and an upland/riparian mix (Table 1) in January 2008. In spring 2008, 36 bare-root coyote willow (*Salix exigua*) plants were installed on the south end of the new wetland area and on an adjacent wet hillside where additional borrow material had been removed. In spring 2010, approximately 50 coyote willow, 30 peachleaf willow (*Salix amygdaloides*), 20 golden currant (*Ribes aureum*), 10 sandcherry (*Prunus pumila* var. *besseyi*), and 10 American plum (*Prunus americana*) plants were installed along the east side of this wetland area. In 2014, final wetland delineations were conducted at one location in the original borrow area (GIS #41) and the area that was redisturbed in 2007 (GIS #42a, 42b, 42c) (Figure 4).

A-3 and Present Landfill (PLF) Wetlands

In 2012, the pond A-3 and PLF dams were breached and recontoured to create wetlands and a more natural flow-through system and to reduce management and maintenance costs. Most of the disturbance during the breaching activities impacted upland or open water areas. Only 0.17 acre of emergent wetlands that surrounded the open water area was disturbed. Before the dams were breached, the perimeter wetlands were dominated by cattails (*Typha* spp.), hardstem bulrush (*Schoenoplectus acutus*), arctic rush (*Juncus balticus*), and a few coyote willow at the PLF, and barnyard grass (*Echinochloa crus-galli*), dock (*Rumex* spp.), and redtop (*Agrostis stolonifera*) at A-3 (USACE 1994). Spoil from the dams was placed in the open water areas to reduce the depth of water and create emergent wetlands across the former pond bottoms. The potential wetland areas were seeded with the Site's wetland seed mix (Table 1), and permanent turf reinforcement matting (TRM) was placed on top as an erosion control measure and to help hold the seed in place. At the A-3 wetland, approximately 310 coyote willow stakes, 49 peachleaf willow stakes, and 7 plains cottonwood (*Populus deltoides*) poles were installed around the perimeter of the wetland after the TRM was installed and final water levels were reached. Woody plant stakes were installed at the PLF wetland in spring 2013 because they had already broken bud by the time the project was completed in 2012. Interim monitoring was conducted at the A-3 and PLF wetland locations (GIS #98, 99, 100, 101, 102) (Figures 5 and 6) in 2014.

Point of Compliance (POC) Flume Wetlands

In late summer 2011, two new point of compliance flumes were installed at the Site in accordance with regulatory requirements in the *Rocky Flats Legacy Management Agreement* (DOE et al. 2007). One was installed in Walnut Creek (WALPOC) and the other in Woman Creek (WOMPOC) (Figure 7). Small areas of wetland were disturbed along the stream where each flume was installed (Figure 7, GIS #94, 95, 96, and 97). Prior to construction, the wetland at WALPOC was dominated by coyote willow, arctic rush, spikerush (*Eleocharis* spp.), and Nebraska sedge (*Carex nebrascensis*), and at WOMPOC by cattails, coyote willow, and arctic rush (USACE 1994). The total wetland impact was approximately 0.13 acre at both WALPOC and WOMPOC combined. At project completion, the potential wetland mitigation areas were seeded with the Site's wetland seed mix (Table 1), and TRM was placed on top as an erosion control measure and to help hold the seed in place. Interim monitoring was conducted at both wetland areas in 2014.

GS10 Project Area

In late summer 2013, the surface water monitoring flume at GS10 was replaced because the old flume had reached the end of its expected life (Figure 8, GIS #103 and 104). Approximately 0.04 acre of wetland was impacted by the project. The pre-existing wetlands at GS10 were dominated by coyote willow, cattails, and common three-square (*Schoenoplectus pungens*) (USACE 1994). The project was completed on September 9, 2013, and completion activities included reseeding and installation of erosion controls. Interim monitoring was conducted in 2014.

Methods

Wetland Delineations/Interim Monitoring

Final wetland delineations were conducted in late summer 2014 in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0)* (USACE 2010) and the *1987 Corps of Engineers Wetland Delineation Manual* (USACE 1987), using the Wetland Determination Data Form for the Great Plains Region. For those areas where final wetland delineations were not conducted, a Wetland Qualitative Revegetation Evaluation Form and a Wetland Determination Data Form were completed for each wetland. Sample forms are found on the DVD under the “Example Wetland Determination Data Forms” link.

Based on the USACE definition, an area is considered to be a wetland when the three indicators—hydric soils, hydrophytic vegetation, and wetland hydrology—are present. Part IV, Section F (b, c) of the *1987 Corps of Engineers Wetland Delineation Manual* (USACE 1987) discusses atypical situations where natural or man-induced changes have resulted in new “normal circumstances” for an area. Because the areas that are being evaluated are mitigation areas where changes in land configuration, hydrologic conditions, soil conditions, and other factors have occurred, new “normal circumstances or conditions” are considered to be present at all of the locations.

Soil pits were dug at representative locations at selected delineated wetlands (Figure 9) and evaluated by a soil scientist. Photographs of the soil pits can be found on the DVD under the “2014 Soil Pit Photos” link. Where soils were inundated, no soils data were collected. Additionally, because the locations are mitigation wetlands, hydric soil indicators may not have had time to develop. Therefore, in accordance with the guidance on problematic soils in the *Regional Supplement* (USACE 2010) for mitigation wetlands, the soils were considered to be hydric when both hydrophytic vegetation and wetland hydrology were present.

Vegetation was monitored by creating a species list and foliar cover summary for each wetland area as a whole or for each designated wetland unit within a larger wetland. For each species, cover was estimated and recorded to the nearest percentage on the Wetland Determination Data Form. The percent absolute foliar cover was the estimated actual cover value for each species (percentage of ground surface covered by the leaves and stems) in a wetland area. For species that were estimated to have less than 1 percent cover, a value of 0.25 percent was used for analyses. Species were listed by species code (speccode) on the Wetland Determination Data Form. The scientific names for the speccodes can be found in the foliar cover summary tables or in the list of the Rocky Flats flora on the DVD (on the “Rocky Flats Site Flora” webpage).

In June 2012, USACE updated the nationwide wetland species indicator status classifications (USACE 2012). The new indicators are to be used for all wetland delineations from June 1, 2012, forward. In addition, the U.S. Department of Agriculture’s (USDA) Plants Database names are to be used for delineations (USDA 2012). In order to comply with these requirements, the electronic dictionary used for vegetation data analyses at the Site was updated with the new plant names and wetland indicator status. Per the *Regional Supplement* (USACE 2010), the indicator status for the Site flora was based on the Great Plains region. If a species did not have an indicator status in the Great Plains list, an adjacent region (the Western Mountains, Valleys, and Coast region) was used. If no status was found for a species within either region, the species was considered to be an upland species. The USDA Plants Database

scientific names were only used for those species with a wetland indicator status of obligate wetland plants (OBL), facultative wetland plants (FACW), facultative plants (FAC), or facultative upland plants (FACU).

Data from the “Vegetation” section of the Wetland Determination Data Forms were entered into an electronic database for analysis and summarized in tables. The foliar cover calculations, dominant species, the indicator status of each species, and worksheets were then transferred to the Wetland Determination Data Forms. The 50/20 rule was used to determine species dominance for hydrophytic vegetation, following the method provided in the Regional Supplement (USACE 2010). If the plant community fails the dominance test using the 50/20 rule, a score of 3.0 or less on the prevalence index indicates that hydrophytic vegetation is present.

Wetland hydrology was evaluated on the basis of water levels in soil pits, surface observations at the time of monitoring in late summer, and weekly visual observations at the various wetlands from April 21 through June 24, 2014.

The latitude and longitude on the Wetland Determination Data Forms was calculated from the GIS as the center point of the wetland polygon. The coordinate system used is the NAD 1927 StatePlane Colorado Central FIPS 0502. The areal extent of wetlands in 2014 was mapped using a Trimble GPS unit and downloaded into ArcGIS (ESRI 2012). Acreages were calculated and summarized for each area surveyed. Maps were produced in ArcGIS. The maps generated for the various locations distinguish between areas that met wetland criteria after final delineations were made and those that were found to meet the criteria during interim monitoring (Figures 3 through 8). Completed Wetland Determination Data Forms along with the Wetland Qualitative Revegetation Evaluation Forms for each wetland are found on the DVD. Click on the “2014 Forms” link next to the wetland name or GIS # for the forms for that wetland.

Additional Wetland Monitoring

Noxious weed surveys were conducted monthly for most wetland sites during the height of the growing season from June through August 2014 (refer to the “Weed Survey Form” link for each wetland on the DVD). State-listed noxious weeds, as listed in 8 *Code of Colorado Regulations* 1206-2 (8 CCR 1206-2), and other problematic species at the Site were listed on these forms, along with a percent cover estimate.

In the past, counts were made to assess the survival of planted woody species. However, over time, accurate counts have become impossible because the plants have all grown together and new “volunteers” have come in. Thus, survival counts of planted individuals are no longer made. Instead, live woody plants (planted and volunteer) growing at each wetland mitigation location are counted when feasible.

Photo monitoring was conducted at each of the mitigation wetland sites. Photos were taken from established photopoints for each wetland. For new wetland areas monitored in 2014, new photopoints were established. These photo series show the development of the wetlands over time (refer to the “2014 Photopoint Monitoring Photos” link for each wetland on the DVD).

Results and Discussion

Woody Plant Species

Table 2 lists the number of woody plants of different species found at each monitored location in 2014. At most locations where the originally installed plants survived the first year, plants have begun to spread and fill in the surrounding areas. Where clumps of willows had intact root systems after project disturbance, plants have come up and continued to spread. At many locations, volunteers of false indigo (*Amorpha fruticosa*), coyote willow, peachleaf willow, plains cottonwood, snowberry (*Symphoricarpos occidentalis*), and tamarisk (salt cedar, *Tamarix ramosissima*) seedlings have come in on their own. The seed source was most likely nearby established plants or seed brought in by wildlife. Plains cottonwoods and willows require an open, scoured area for seedlings to germinate and survive; areas of open, bare ground that were available after wetland projects were completed created ideal germination conditions for these species. While most of the volunteers are desirable, tamarisk is a noxious weed in Colorado. Therefore, attempts are made to control it so it does not proliferate at the wetland locations.

Noxious Weed Species

Weed species recorded in 2014 at the various mitigation wetlands included Canada thistle (*Cirsium arvense*), common mullein (*Verbascum thapsus*), houndstongue (*Cynoglossum officinale*), tamarisk, sowthistle (*Sonchus arvensis* ssp. *uliginosus*), musk thistle (*Carduus nutans*), and Russian olive (*Elaeagnus angustifolia*). These species are listed on the Colorado Noxious Weed list (8 CCR 1206-2). The weed surveys for each wetland are available on the DVD under the appropriate wetland link. Weed control activities in the mitigation wetlands are conducted as part of the normal natural resource management operations at the Site.

Climate Information

The average yearly precipitation received at the Site from 1992 to 2011 is 15.67 inches (based on data from the National Renewable Energy Laboratory [NREL] NWTC M2 Tower and former Rocky Flats Meteorological Tower). In 2012, the precipitation data from the NREL facility became inconsistent and were no longer found to be accurate due to missing data after storm events. Data from Boulder, Colorado, north of the Rocky Flats Site, will now be used as an approximate measure of Site precipitation (USDC 2014). Table 3 shows a comparison of precipitation data from the Rocky Flats Site and Boulder locations from 1992 through 2011. Over this time period, the Site received an average of approximately 5 inches of rainfall per year less than Boulder, but rainfall patterns are generally the same. In 2014, Boulder received 23.67 inches of precipitation with the largest amounts coming in May and July (over 4 inches each month). The average annual precipitation in Boulder from 1894 through 2014 is 19.11 inches. Thus Boulder and presumably the site received above normal precipitation for 2014.

Wetland monitoring has been conducted at the site for the past 9 years. For five of these years, the Site has received below-average precipitation. While this has somewhat hindered the establishment of the wetland mitigation areas, it also indicates that those areas that have established as wetlands should do very well during years with normal or above-average precipitation.

Wetland Monitoring Data

Table 4 summarizes early-growing-season water-level observations at the various wetlands for 2014. These data were collected from April 21 through June 24, 2014. In general, hydrologic conditions have been suitable for continued wetland establishment at each of the wetlands monitored in 2014. The specific hydrologic data for each wetland monitored in 2014 can be found on each wetland's Wetland Determination Data Form on the DVD.

Table 5 summarizes the species richness and cover data collected in 2014 that were used to determine whether hydrophytic vegetation was present at each wetland. The yellow cells in the table represent the dominant species as determined by the 50/20 rule at each location. The orange cells represent locations where the total herbaceous, shrub, or tree cover, within each respective vegetation layer, was less than 5 percent and, therefore, below the threshold to be considered a separate vegetated layer.

The bottom of Table 5 summarizes the hydrophytic vegetation, hydric soils, and wetland hydrology results at the 16 locations monitored in 2014. Green cells represent locations where all wetland indicator criteria (hydrophytic vegetation, wetland hydrology, and hydric soils) were met, and pink cells represent locations where one or more wetland indicator criteria were not met. Final wetland delineations were conducted at the A2-D wetland (GIS #5) and FC-1 wetlands (GIS #41, 42a, 42b, and 42c) locations, each of which met all three wetland criteria. At the remaining 11 locations where interim monitoring was conducted, all but one location (WALPOC-B; GIS #95) met all three wetland criteria. Table 6 summarizes the areal extent (in acres) of each of the interim monitored wetlands in 2014. The total potential wetland acreage is approximately 0.68 acres. Wetland Determination Data Forms, Wetland Qualitative Revegetation Evaluation Forms, and weed surveys for each monitored wetland area are available through links on the DVD. Time-series photo monitoring for the wetlands is also available through the "2014 Photopoint Monitoring Photos" link on the DVD.

Wetland Delineations

Wetland mitigation at the Site is being done on a sitewide basis, rather than project by project, unless it can be completely done in-situ (such as at the PLF and A-3 project areas), due to the difficulty of reestablishing wetlands where specific project activities have often highly altered the vegetation, hydrology, and soils. The overall goal is no net loss of wetlands at the Site. The mitigation ratio at the Site is conducted at a 1:1 ratio for comparable plant communities (Claggett 2005). A mitigation ratio of no greater than 1:1 is also important to satisfy the Colorado Division of Water Resources requirements, which require water rights for in-situ mitigation greater than 1:1.

The *Annual Report of Site Surveillance and Maintenance Activities at the Rocky Flats, Colorado, Site, Calendar Year 2013* (DOE 2014) closed out the preclosure and selected postclosure wetland impacts and mitigation monitoring, along with the *Rocky Flats Wetland Mitigation Monitoring and Management Plan* (DOE 2006). That report included an accounting for the impacted and compensatory mitigation acreages.

Impacts to wetlands at the Site, during and since Site closure, have been classified as either Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) related or non-CERCLA related and tracked separately. Table 7 lists the wetland impacts from recent CERCLA-related or non-CERCLA-related projects for which mitigation monitoring is ongoing.

CERCLA-related projects that impact wetlands will have their compensatory wetlands delineated in the fifth year and closed out. Non-CERCLA-related projects that impact wetlands subject to the USACE Clean Water Act 404 permitting process will be closed out as required by the permit issued for the project or in the fifth year unless further monitoring is required by USACE. Based on Table 7, the Point of Compliance Flume Project wetland mitigation will have final delineations done in 2015, with the other project impacts delineated over the next few years.

Final wetland delineations were made in 2014 for the A2-D wetland (GIS #5) and FC-1 wetlands (GIS #41, 42a, 42b, and 42c) locations, each of which met all three wetland criteria. Table 8 lists the mitigation credit acreage for both the Non-CERCLA (A2-D wetland) and CERCLA (FC-1 wetlands) impacts from 2014.

Summary

Mitigation wetlands at the site continue to establish. Final delineations were made at two locations in 2014. Remaining areas will continue to be monitored in 2015.

References

8 CCR 1206-2. "Rules Pertaining to the Administration and Enforcement of the Colorado Noxious Weed Act," *Code of Colorado Regulations*.

Claggett, 2005. Richard Claggett, Tribal and Wetlands Unit, Ecosystem Protection Program, U.S. Environmental Protection Agency, letter (about Status of Rocky Flats Wetland Mitigation Requirements) to Cliff Franklin, Rocky Flats Project Office, U.S. Department of Energy, September 29.

DOE (U.S. Department of Energy), 2006. *Rocky Flats, Colorado, Site Wetland Mitigation Monitoring and Management Plan*, DOE-LM/GJ1207-2006, Office of Legacy Management, June.

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DOE, EPA, and CDPHE (U.S. Department of Energy, U.S. Environmental Protection Agency, and Colorado Department of Public Health and Environment), 2007. *Rocky Flats Legacy Management Agreement*, March 14.

ESRI (Environmental Systems Research Institute), 2012. ArcGIS version 10.1, Environmental Systems Research Institute, Inc., Redlands, California.

USACE (U.S. Army Corps of Engineers), 1987. *Corps of Engineers Wetlands Delineation Manual*.

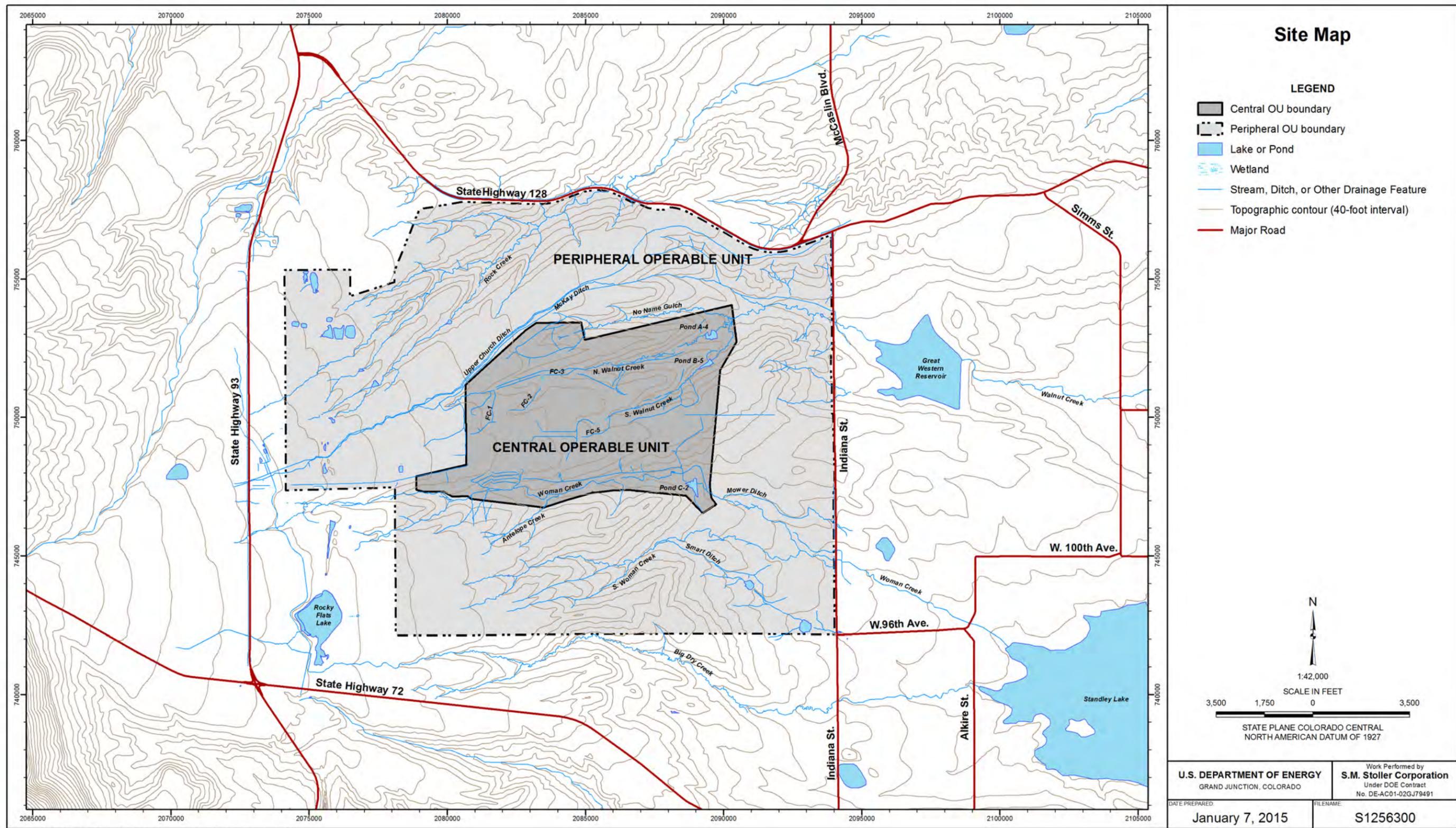
USACE (U.S. Army Corps of Engineers), 1994. *Rocky Flats Plant Wetlands Mapping and Resource Study*.

USACE (U.S. Army Corps of Engineers), 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0)*.

USACE (U.S. Army Corps of Engineers), 2012. "North American Digital Flora: National Wetland Plant List, version 3.0," http://wetland_plants.usace.army.mil, accessed October 23, 2012.

USDA (U.S. Department of Agriculture), 2012. "The PLANTS Database," <http://plants.usda.gov>, accessed October 31, 2012.

USDC (U.S. Department of Commerce), 2015. "Boulder Monthly Climate Data: Precipitation," <http://www.esrl.noaa.gov/psd/boulder/Boulder.mm.precip.html#Latest>, accessed February 19, 2015.



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Figure 1. Site Map

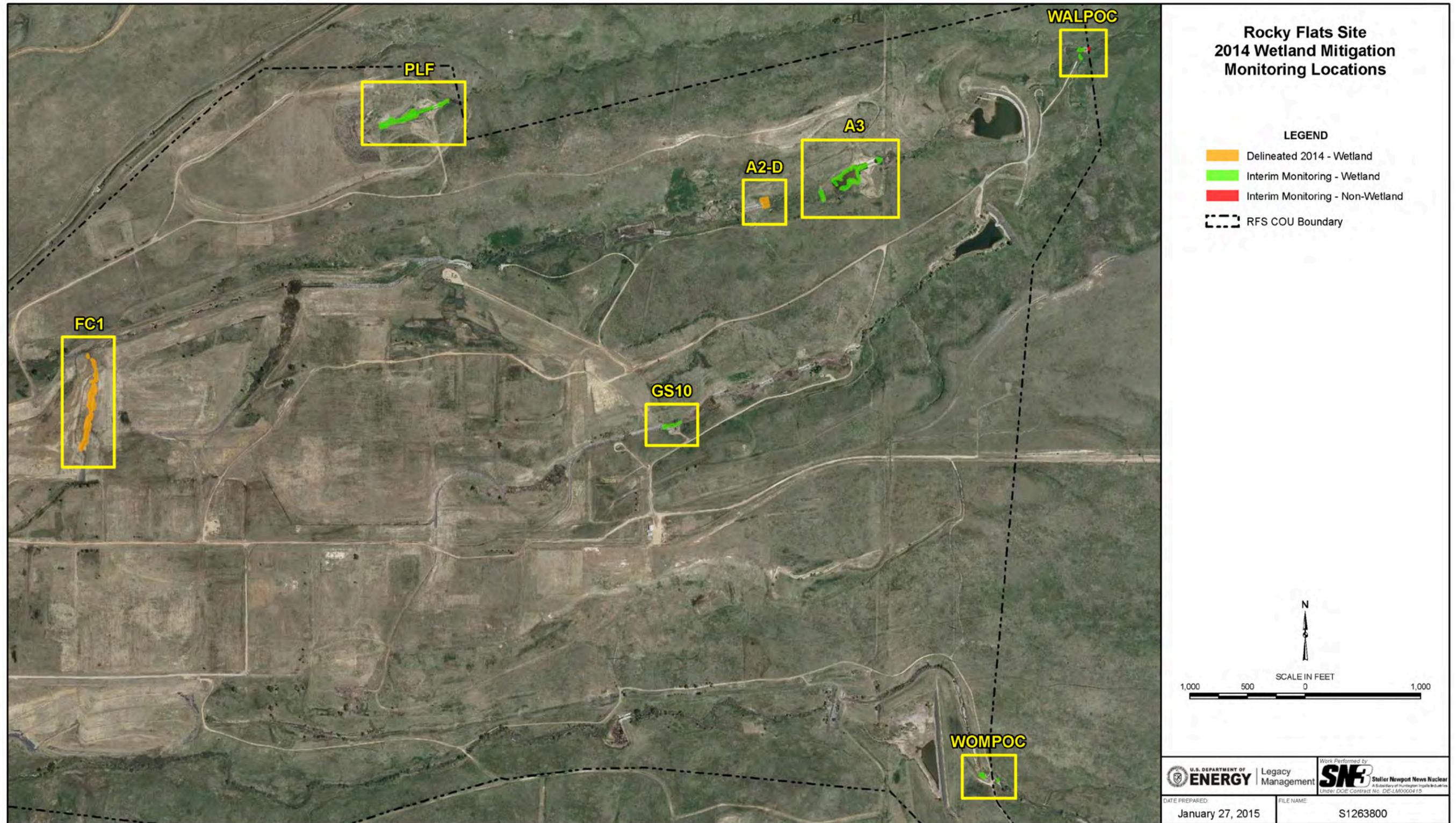
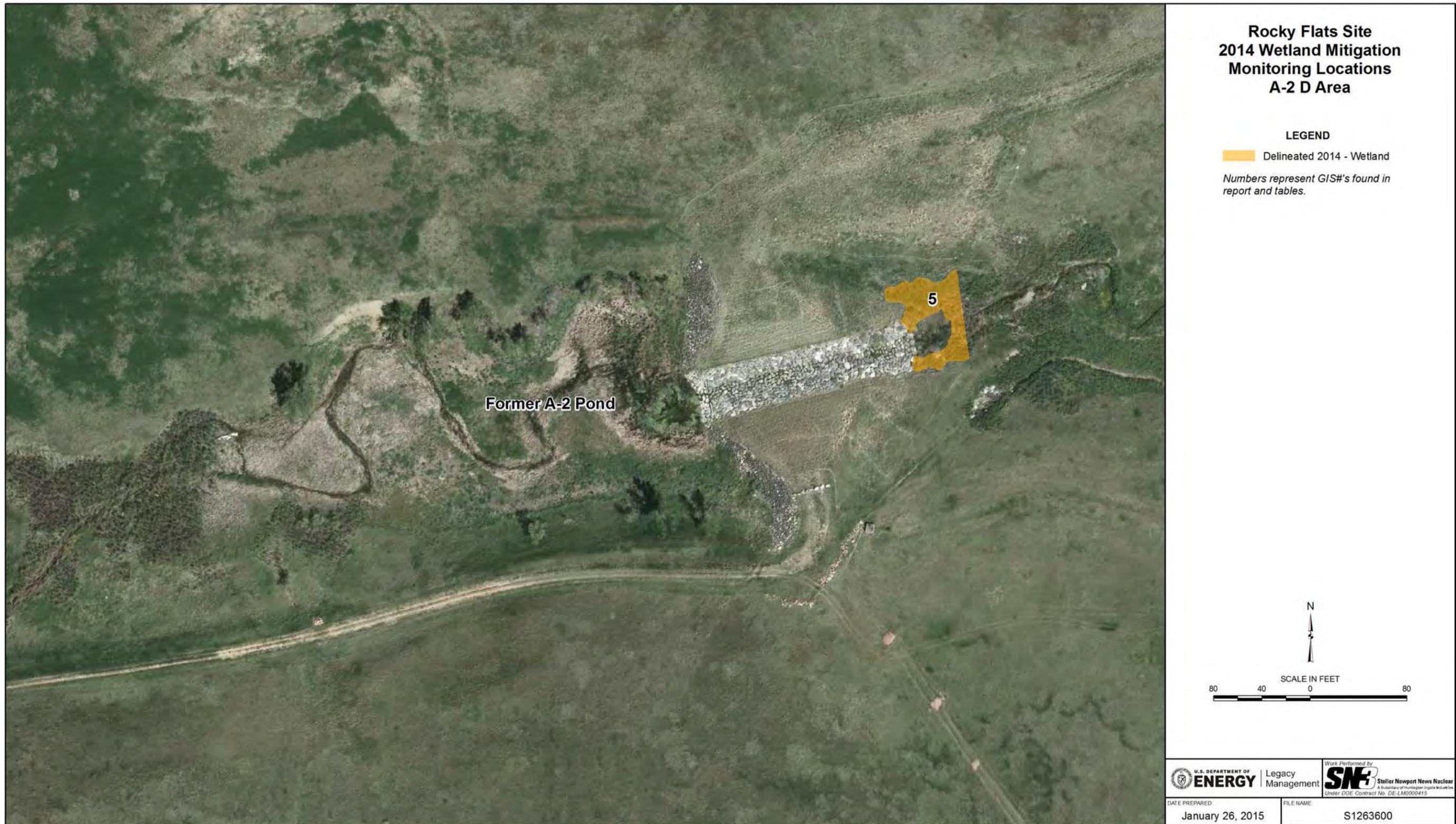


Figure 2. Rocky Flats Site 2014 Wetland Mitigation Monitoring Locations



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Figure 3. Rocky Flats Site 2014 Wetland Mitigation Monitoring Locations A-2 D Area



Figure 4. Rocky Flats Site 2014 Wetland Mitigation Monitoring Locations FC-1 Area



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Figure 5. Rocky Flats Site 2014 Wetland Mitigation Monitoring Locations A-3 Area



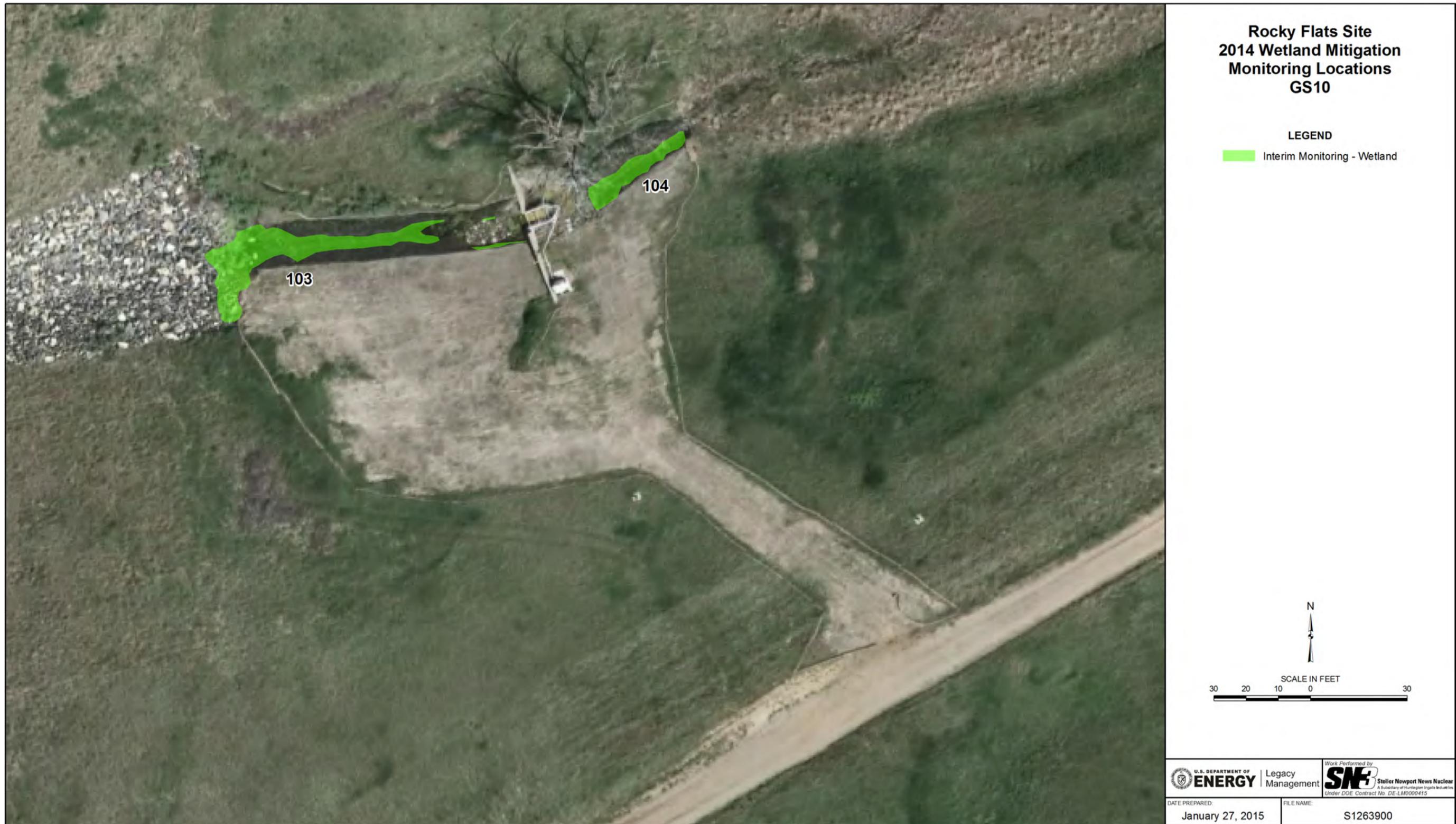
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Figure 6. Present Landfill (PLF) Dam Breach Mitigation Wetland Areas 2014 Monitoring



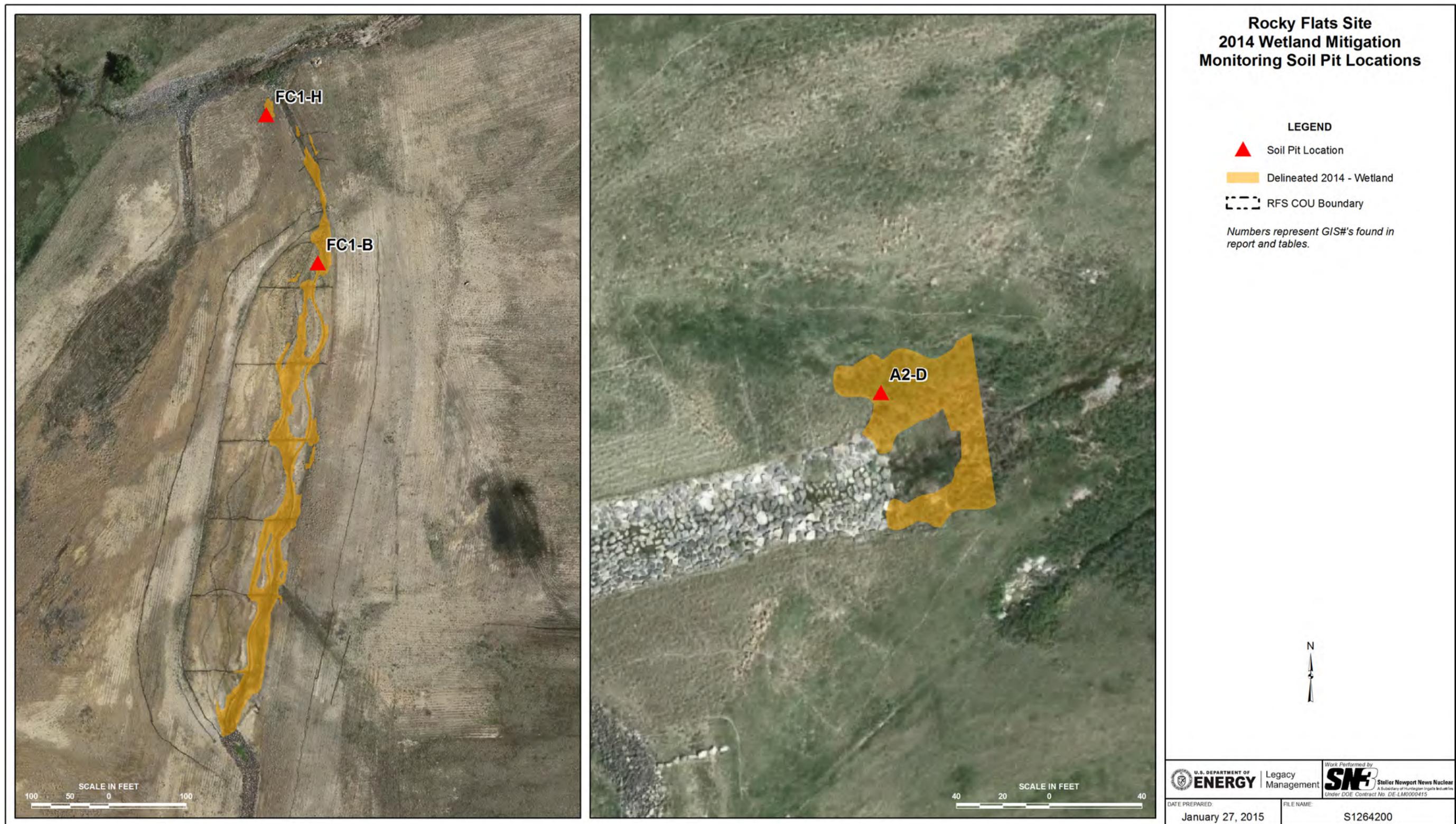
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Figure 7. Rocky Flats Site 2014 Wetland Mitigation Monitoring Locations POC Flumes



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Figure 8. Rocky Flats Site 2014 Wetland Mitigation Monitoring Locations GS10



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Figure 9. Rocky Flats Site 2014 Wetland Mitigation Monitoring Soil Pit Location

Table 1. Seed Mixes Used At Various Wetland Mitigation Areas

Functional Channel 1 Wetland Seed Mix

Scientific Name	Common Name	Wetland Designation	% of Mix (# Seeds)
Graminoids			
Agrostis scabra	Hair Grass	FAC	10
Carex lanuginosa	Wooly Sedge	OBL	0
Carex nebrascensis	Nebraska Sedge	OBL	5
Carex utriculata	Beaked Sedge	OBL	0
Eleocharis palustris	Longstem Spike Rush	OBL	15
Juncus balticus	Arctic Rush	FACW	10
Juncus torreyi	Torrey's Rush	FACW	15
Scirpus acutus	Hard-stem Bulrush	OBL	7
Scirpus americana	Three-Square	OBL	5
Scirpus validus	Softstem Bulrush	OBL	13
Spartina pectinata	Prairie Cordgrass	FACW	20

Wetland Seed Mix

Scientific Name	Common Name	Wetland Designation	% of Mix (# Seeds)
Graminoids			
Agrostis scabra	Hair Grass	FAC	10
Carex nebrascensis	Nebraska Sedge	OBL	5
Eleocharis palustris	Longstem Spike Rush	OBL	15
Juncus balticus	Arctic Rush	FACW	10
Juncus torreyi	Torrey's Rush	FACW	15
Scirpus acutus	Hard-stem Bulrush	OBL	7
Scirpus americana	Three-Square	OBL	5
Scirpus validus	Softstem Bulrush	OBL	13
Spartina pectinata	Prairie Cordgrass	FACW	20

Upland/Riparian Seed Mix

Scientific Name	Common Name	Wetland Designation	% of Mix (# Seeds)
Graminoids			
Agropyron smithii	Western Wheatgrass	FACU	15
Agropyron trachycaulum	Slender Wheatgrass	FACU	20
Andropogon gerardii	Big Bluestem	FACU	15
Bouteloua gracilis	Blue Grama		10
Elymus canadensis	Canada Wildrye	FACU	20
Panicum virgatum	Switchgrass	FAC	20

Table 2. 2014 Woody Plant Summary at Wetland Mitigation Locations

Location	GIS #	Woody Species							
		Coyote Willow (SAEX1)	Peach Leaf Willow (SAAM1)	False Indigo (Lead Plant) (AMFR1)	Snowberry (SYOC1)	Arkansas Rose (ROAR1)	Tamarisk (TARA1)	Narrowleaf Cottonwood (POAN1)	Cottonwood (PODE1)
A-2 Wetland - D	5	TN			TN				
FC-1 Wetland - H	41	TN							13
FC-1 Wetland - I A	42a	TN	6				1		4
FC-1 Wetland - I B	42b	TN	7				2		2
FC-1 Wetland - I C	42c	TN							4
WALPOC Wetland - A	94	35				2			
WALPOC Wetland - B	95					4			
WOMPOC Wetland - A	96	5	TN	4					TN
WOMPOC Wetland - B	97			6				6	
A-3 Wetland - A	98	TN							
A-3 Wetland - B	99	TN							
A-3 Wetland - C	100	TN							
PLF Wetland - A	101	TN	3	1					TN
PLF Wetland - B	102	5	1						8
GS10-A	103	21							
GS10-B	104	18							

TN = Too numerous to count.

Table 3. RFS and Boulder, CO annual precipitation summary (1992 – 2011).

Year	Boulder Data	RFS Data	Difference*
1992	17.38	14.49	-2.89
1993	21.87	12.07	-9.80
1994	16.79	12.00	-4.79
1995	29.93	21.41	-8.52
1996	21.38	14.36	-7.02
1997	28.49	18.32	-10.17
1998	22.29	14.41	-7.88
1999	25.88	17.81	-8.07
2000	15.96	13.02	-2.94
2001	18.28	16.00	-2.28
2002	13.88	11.12	-2.76
2003	22.02	13.85	-8.17
2004	27.17	23.49	-3.68
2005	17.52	18.15	0.63
2006	19.31	12.62	-6.69
2007	17.13	14.59	-2.54
2008	17.02	12.26	-4.76
2009	22.19	19.83	-2.36
2010	20.32	14.13	-6.19
2011	22.29	19.45	-2.84
Mean (1992-2011)	20.86	15.67	-5.19

*The negative numbers in the difference column indicate how much less precipitation RFS received than Boulder. If RFS received more precipitation than Boulder it is a positive number.

Table 4. 2014 Wetland Water Levels Data Summary

Location	GIS #	4/21/2014		4/29/2014		5/5/2014		5/15/2014		5/19/2014	
		Water Depth (in.)	Saturated at Surface								
A-2 Wetland - D	5	0-2	Y/N	0-2	Y/N	0-2	Y/N	0-2	Y/N	0-1	Y/N
FC-1 Wetland - H	41	-	Y	-	N	-	N	-	Y	-	Y
FC-1 Wetland - I (A, B, C)	42 (a, b, & c)	0-4	Y	0-3	Y/N	0-3	Y/N	0-4	Y	0-4	Y
WALPOC Wetland - A	94	0-6	Y	0-6	Y	0-6	Y	0-7	Y	0-6	Y
WALPOC Wetland - B	95	0-7	Y	0-7	Y	0-7	Y	0-8	Y	0-7	Y
WOMPOC Wetland - A	96	0-4	Y	0-4	Y	0-3	Y	0-7	Y	0-4	Y
WOMPOC Wetland - B	97	0-18	Y	0-18	Y	0-18	Y	0-20	Y	0-18	Y
A-3 Wetland - A	98	0-6	Y	0-6	Y	0-6	Y	0-8	Y	0-7	Y
A-3 Wetland - B	99	0-36	Y	0-36	Y	0-36	Y	0-38	Y	0-37	Y
A-3 Wetland - C	100	0-5	Y	0-4	Y	0-4	Y	0-5	Y	0-2	Y
PLF Wetland - A	101	0-6	Y								
PLF Wetland - B	102	0-24	Y								
GS10-A	103	0-5	Y	0-6	Y	0-6	Y	0-6	Y	0-6	Y
GS10-B	104	0-5	Y	0-6	Y	0-6	Y	0-6	Y	0-6	Y

— = No surface water observed.

Location	GIS #	5/29/2014		6/3/2014		6/9/2014		6/16/2014		6/24/2014	
		Water Depth (in.)	Saturated at Surface								
A-2 Wetland - D	5	0-1	Y/N	0-1	Y/N	0-1	Y	0-1	Y/N	-	Y/N
FC-1 Wetland - H	41	-	Y	-	N	-	N	-	N	-	N
FC-1 Wetland - I (A, B, C)	42 (a, b, & c)	0-3	Y	0-4	Y	0-4	Y	0-2	Y/N	0-2	Y/N
WALPOC Wetland - A	94	0-6	Y	0-5	Y	0-4	Y	-	Y	-	N
WALPOC Wetland - B	95	0-7	Y	0-5	Y	0-4	Y	0-4	Y	-	Y/N
WOMPOC Wetland - A	96	0-3	Y	0-3	Y	0-4	Y	0-2	Y	-	N
WOMPOC Wetland - B	97	0-18	Y	0-18	Y	0-18	Y	0-18	Y	0-4	Y/N
A-3 Wetland - A	98	0-7	Y	0-6	Y	0-6	Y	0-6	Y	0-6	Y
A-3 Wetland - B	99	0-37	Y	0-36	Y	0-36	Y	0-36	Y	0-33	Y
A-3 Wetland - C	100	0-2	Y	0-3	Y	0-3	Y	-	Y/N	-	N
PLF Wetland - A	101	0-6	Y								
PLF Wetland - B	102	0-24	Y								
GS10-A	103	0-6	Y	0-6	Y	0-6	Y	0-5	Y	0-7	Y
GS10-B	104	0-6	Y	0-6	Y	0-6	Y	0-5	Y	0-7	Y

— = No surface water observed.

Table 5. 2014 Wetland Vegetation Data Summary

Herbaceous Cover	Scientific Name	Speccode	Growth Form	Noxious Weed	GIS # Wetland Indicator	A-Wetlands				FC-1				GS10		PLF		WALPOC		WOMPOC		
						5	98	99	100	41	42a	42b	42c	103	104	101	102	94	95	96	97	
						A2-D	A3-A	A3-B	A3-C	FC1-H	FC1-IA	FC1-IB	FC1-IC	GS10-A	GS10-B	PLF-A	PLF-B	WALPOC-A	WALPOC-B	WOMPOC-A	WOMPOC-B	
Unknown species	UNKN																0.25	0.25			0.25	
Alisma triviale Pursh	ALTR1		F		OBL																0.25	
Amaranthus retroflexus L.	AMRE1		F		FACU																0.25	
Ambrosia artemisiifolia L.	AMAR1		F		FACU		0.25						0.25					0.25			0.25	
Ambrosia psilostachya DC.	AMPS1		F		FACU	1	0.25														0.25	
Asclepias speciosa Torr.	ASSP1		F		FACU								0.25					0.25				
Barbarea vulgaris W.T. Aiton	BAVU1		F		FACU			3													0.25	
Bassia scoparia (L.) A.J. Scott	KOSC1		F		FACU				0.25						0.25							
Carduus nutans L.	CANU1		F	X	FACU	0.25																
Chenopodium glaucum L.	CHGL1		F		FACU		0.25	0.25										15			3	
Cirsium arvense (L.) Scop.	CIAR1		F	X	FACU	12	1	3								3	0.25			3	0.25	
Conyza canadensis (L.) Cronq.	COCA1		F		FACU				0.25							0.25						
Cynoglossum officinale L.	CYOF1		F	X	FACU	11																
Dalea candida Michx. ex Willd. var. oligophylla (Torr.) Shinn.	DACA1		F		xx																	
Dipsacus fullonum L.	DIFU1		F	X	FACU																0.25	
Epilobium ciliatum Raf. ssp. glandulosum (Lehm.) Hoch & P.H. Raven	EPC11		F		OBL												0.25					
Euphorbia marginata Pursh.	EUMA1		F		FACU			0.25														
Glycyrrhiza lepidota Pursh.	GLLE1		F		FACU	0.25													0.25			
Grindelia squarrosa (Pursh) Dunal	GRSQ1		F		FACU					0.25	0.25	0.25	0.25									
Helianthus annuus L.	HEAN1		F		FACU				0.25									0.25			0.25	
Hypericum perforatum L.	HYPE1		F	X	FACU	0.25											0.25					
Lactuca scariola L.	LASE1		F		FACU		0.25	0.25					0.25							0.25		0.25
Lemna minor L.	LEMI1		F		OBL									0.25								
Lepidium campestre (L.) R. Br.	LECA1		F		xx												0.25					
Lycopus americanus Muhl. ex W. Bartram	LYAM1		F		OBL												0.25	1				
Melilotus officinalis (L.) Lam.	MEAL1		F		FACU					0.25	0.25											
Melilotus officinalis (L.) Lam.	MEOF1		F		FACU		0.25		0.25	0.25					0.25							
Mentha arvensis L.	MEAR1		F		FACW											0.25	0.25			1	0.25	
Nepeta cataria L.	NECA1		F		FACU	3																
Oenothera villosa Thunb. ssp. strigosa (Rydb.) W. Dietr. & P.H. Raven	OEVI1		F		FACU												0.25	0.25		1		
Onosmodium molle Michx. var. occidentale (Mack.) Johnston	ONMO1		F		xx												0.25					
Persicaria maculosa S.F. Gray	POPE2		F		FACW		0.25	2	0.25								0.25		0.25		0.25	
Plantago lanceolata L.	PLLA1		F		FACU					0.25												
Plantago major L.	PLMA1		F		FACU		0.25											0.25	0.25		0.25	0.25
Polygonum ramosissimum Michx.	PORA1		F		FACW									0.25					1			
Potamogeton natans L.	PONA1		F		OBL											1	0.25					
Rumex crispus L.	RUCR1		F		FACU		0.25	0.25	0.25								0.25	0.25			0.25	
Rumex fuscus Phil.	RUMA1		F		FACW													0.25	0.25		0.25	
Salsola tragus L.	SAIB1		F		FACU			0.25														
Sisymbrium altissimum L.	SIAL1		F		FACU																0.25	
Solanum rostratum Dun.	SORO1		F		xx																0.25	
Sonchus arvensis L.	SOAR1		F	X	FACU			0.25								0.25					0.25	
Spergularia maritima (All.) Chiov.	SPME1		F		FACU						0.25											
Symphotrichum falcatum (Lindl.) G.L. Nesom var. falcatum	ASFA1		F		FACU		0.25				0.25	0.25										
Symphotrichum laeve (L.) A. Löve & D. Löve var. geveri (A. Gray) G.L. Nesom	ASLA1		F		FACU						2	0.25										
Symphotrichum porteri (A. Gray) G.L. Nesom	ASPO1		F		FACU					0.25	1	1	0.25									
Taraxacum officinale F.H. Wigg.	TAOF1		F		FACU					0.25												
Verbascum blattaria L.	VEBL1		F	X	xx		0.25															0.25
Verbascum thapsus L.	VEBH1		F	X	FACU			0.25	0.25													
Verbena bracteata Cav. ex Lag. & Rodr.	VEBR1		F		FACU				0.25											0.25		
Veronica anagallis-aquatica L.	VEAN1		F		OBL									2	0.25				0.25	0.25	0.25	0.25
Xanthium strumarium L.	XAST1		F		FACU		2	0.25	45								0.25	0.25		5		
Agrostis scabra Willd.	AGSC1		G		FACU						1	1		0.25	0.25				0.25	0.25		
Agrostis stolonifera L.	AGST1		G		FACW						3	8	0.25	0.25	0.25		1		0.25	0.25	3	1
Andropogon gerardii Vitman	ANGE1		G		FACU	0.25							0.25				0.25					
Bouteloua curtipendula (Michx.) Torr.	BOCU1		G		xx				0.25													
Bouteloua dactyloides (Nutt.) J.T. Columbus	BUDA1		G		FACU			0.25	0.25													
Bouteloua gracilis (H. B. K.) Lag. ex Griffiths	BOGR1		G		xx			0.25														
Bromus arvensis L.	BRJA1		G		FACU				0.25					0.25	0.25					0.25	0.25	0.25
Bromus inermis Leys. ssp. inermis	BRIN1		G		FACU	2				5												
Carex nebrascensis Dew.	CANE1		G		OBL											2	1	0.25				
Carex praegracilis W. Boott.	CAPR1		G		FACW	1																
Echinochloa crus-galli (L.) Beauv.	ECCR1		G		FACU		4	0.25			0.25	0.25				1	0.25		15		1	
Eleocharis palustris (L.) Roem. & Schult.	ELMA1		G		OBL		5				15	4	3			2	2		18		6	
Elymus trachycalyx (Link) Gould ex Shinn.	AGCA1		G		FACU	0.25	2	2	1	1	6	0.25	2	2	4	0.25			3	0.25	0.25	
Festuca pratensis Huds.	FEPR1		G		FACU				0.25	0.25			1						2	10		
Hordeum jubatum L.	HOUJ1		G		FACW		20	1	30		1	6	3						2		0.25	
Juncus arcticus Willd. ssp. littoralis (Engelm.) Hultén	JUBA1		G		FACW	2				0.25	1	3	1			0.25	1			1		
Juncus dudleyi Wiegand	JUDU1		G		FACW	0.25																
Juncus torreyi Coville	JUTO1		G		FACW						50	35	55	1		8	2				0.25	
Panicum capillare L.	PACA1		G		FACU										0.25						7	
Panicum virgatum L.	PAVI1		G		FACU		2	0.25		1	0.25	12	1			0.25	0.25					
Pascopyrum smithii (Rydb) A. Love	AGSM1		G		FACU	0.25	0.25	0.25	10	0.25	0.25	15				0.25	0.25				0.25	
Phleum pratense L.	PHPR1		G		FACU						0.25	6										
Poa compressa L.	POCO1		G		FACU				0.25													1
Poa pratensis L.	POPR1		G		FACU								0.25									
Polygonum monspeliensis (L.) Desf.	POMO1		G		FACW	8	20	10			8	0.25		35	12	1	0.25	0.25			0.25	0.25
Schizachyrium scoparium (Michx.) Nash var. scoparium	ANSC1		G		FACU					0.25												
Schoenoplectus acutus (Muhl. ex Bigelow) A. Löve & D. Löve var. acutus	SCAC1		G		OBL	1	1				0.25	0.25		0.25		45	30				0.25	
Schoenoplectus maritimus (L.) Lye	SCMA1		G		OBL		18		0.25			0.25					25	2				
Schoenoplectus pungens (Vahl) Palla var. pungens	SCPU1		G		OBL											1					0.25	
Scirpus pallidus (Britt.) Fernald	SCPA1		G		OBL		0.25										0.25				0.25	
Sorghastrum nutans (L.) Nash	SONU1		G		FACU						0.25	0.25										
Spartina pectinata Bosc ex Link	SPPE1		G		FACW	2																
Stipa viridula Trin.	STVI1		G		xx	0.25																
Typha angustifolia L.	TYAN1		G		OBL	1	20	0.25						0.25	10	20	40	0.25			25	
Typha latifolia L.	TYLA1		G		OBL											2						
Total Herbaceous Foliar Cover						38.75	84.50	39.25	88.75	20.00	86.50	85.75	80.25	42.00	27.50	91.50	82.75	65.00	17.00	51.00	3.25	
50/20 Rule: 50% of Total Cover						19.38	42.25	19.63	44.38	10.00	43.25	42.88	40.13	21.00	13.75	45.75	41.38	32.50	8.50	25.50	1.63	
50/20 Rule: 20% of Total Cover						7.75	16.90	7.85	17.75	4.00	17.30	17.15	16.05	8.40	5.50	18.30						

Table 6. Areal Extent of Interim Monitored Wetlands in 2014

Location	GIS #	Acres	Wetland Y/N
Non-CERCLA Mitigation			
PLF-A	101	0.2968	Y
PLF-B	102	0.0209	Y
A3-A	98	0.2499	Y
A3-B	99	0.0173	Y
A3-C	100	0.0470	Y
Total Potential Wetland		0.6318	

CERCLA Mitigation			
WALPOC-A	94	0.0158	Y
WALPOC-B	95	0.0012	N
GS10-A	103	0.0138	Y
GS10-B	104	0.0042	Y
WOMPOC-A	96	0.0201	Y
WOMPOC-B	97	0.0025	Y
Total Potential Wetland		0.0564	
Total Non-Wetland		0.0012	

Grand Total Potential Wetland	0.6882
Grand Total Non-Wetland	0.0012

Table 7. Current Wetland Impacts From CERCLA Related and Non-CERCLA Related Projects at Rocky Flats

CERCLA On-going Projects

Project Description	Actual Wetland Acres Disturbed (Debits)	Mitigation Wetland Acres (Credit)
Point of Compliance Flume Project (2011)	-0.1279	In Process
GS10 Flume Project (2014)	-0.0409	In Process
Total Debit	-0.1688	

Ongoing USACE Permitted Projects

Project	NWP #	Permit #	Permit Date	Specified Compensatory Mitigation	Mitigation Acres Required in NWP	Actual Wetland Acres Disturbed (Debits)	Mitigation Credit
PLF/A-3 Dam Breach (2012)	43	NOW-2011-2455-DEN	11/18/2011	Yes	0.24	-0.1703	In Process
				Total	0.24	-0.1703	

Note: Date in parentheses is the year of the first full growing season after the mitigation was installed.

Table 8. 2014 Wetland Mitigation Credit at the Rocky Flats Site

Delineation Year	Location	GIS #	Acres	Wetland Y/N
Non-CERCLA Mitigation Credit				
2014	A2-D	5	0.0624	Y
		Total	0.0624	
CERCLA Mitigation Credit				
2014	FC1-H	41	0.0051	Y
2014	FC1-Ia	42a	0.3239	Y
2014	FC1-Ib	42b	0.0639	Y
2014	FC1-Ic	42c	0.0197	Y
		Total	0.4126	
		Grand Total	0.4750	