



Environment

Submitted to:  
Colorado Springs Utilities  
Colorado Springs, CO

Submitted by:  
AECOM  
Greenwood Village, Colorado  
60508951  
October 11, 2016

# Coal Combustion Residuals (CCR) Landfill Closure Plan Clear Spring Ranch El Paso County, Colorado



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## List of Acronyms

CCR	coal combustion residuals
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulations
cm/sec	centimeters per second
CQA	Construction Quality Assurance
CQAP	Construction Quality Assurance Plan
CSR	Clear Spring Ranch
CSU	Colorado Springs Utilities
CYs	cubic yards
EDOR	Engineering Design and Operations Report
H:V	horizontal to vertical
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
Utilities	Colorado Springs Utilities

## 1.0 Introduction

This Closure Plan has been prepared on behalf of Colorado Springs Utilities to meet the Coal Combustion Residuals (CCR) Regulations (CCR Rule) as detailed in 40 Code of Federal Regulations (CFR) 257.102. Closure of the CCR Landfill will be completed by leaving the CCR in place and installing a final cover system as required by the regulations. This section discusses site background, regulatory drivers, and purpose.

### 1.1 Background

Clear Spring Ranch (CSR) is a 4,759-acre property located at the intersection of Interstate 25 and Ray Nixon Road, approximately 17 miles south of Colorado Springs (**Figure 1**). It was acquired in 1972 by the City of Colorado Springs on behalf of its enterprise Colorado Springs Utilities (“Utilities”). The primary land uses on the CSR property are those related to utility services: electric generation & transmission, water / wastewater treatment & delivery, and waste management.

Power generation at Utilities’ Martin Drake and Ray Nixon Power Plants produces CCR. Utilities places these residuals in the CCR Landfill (or “the site”) located in the southern part of CSR. Utilities’ materials currently authorized by the Colorado Department of Public Health and Environment (CDPHE) and El Paso County for placement in the CCR Landfill are listed in the facility’s Engineering Design and Operations Report (EDOR) (CSU, 2012). The location of the CCR Landfill is shown on **Figure 1**.

### 1.2 Regulations

The CCR Landfill is regulated by the CCR Rule promulgated by the United States Environmental Protection Agency (USEPA, 2015) under 40 CFR Part 257, Subtitle D of the Resource Conservation and Recovery Act (RCRA). The CCR Landfill is also regulated by the CDPHE Hazardous Materials and Waste Management Division under the Regulations Pertaining to Solid Waste Sites and Facilities (6 Code of Colorado Regulations 1007-2, Part 1) (Solid Waste Regulations) (CDPHE, 2015) and by the Local Governing Authority (i.e., El Paso County). The disposal area, as shown on **Figure 1**, is located within the boundaries established by the Clear Spring Ranch Certificate of Designation (CD-04-001) and Use Subject to Special Review (AL-05-006), which were approved by the Board of County Commissioners. This Closure Plan was developed to meet the requirements of the CCR Rule, as detailed in 40 CFR 257.102.

### 1.3 Owner/Operator Information

The owner and operator of the CCR Landfill (and the contact throughout closure and during the post-closure period) is:

Colorado Spring Utilities – Energy Services Division  
Attn: Ray Nixon Power Plant Manager  
P.O. Box 1103, Mail Code 40  
Colorado Springs, CO 80947  
Phone: 719-668-4800  
Email: askus@csu.org

### 1.4 Purpose

The purpose of this Closure Plan is as follows.

1. Describe the steps necessary to close the CCR Landfill at any point during the active life of the CCR Landfill consistent with recognized and generally accepted good engineering practices.
2. Provide a narrative description of how the CCR Landfill will be closed in accordance with 40 CFR 257.102.

3. Describe the final cover system and the methods and procedures to be used to install the final cover.
4. Provide a schedule for completing all activities necessary to satisfy the closure criteria in 40 CFR 257.102.

## 2.0 Site Characterization

This section characterizes the site and includes a discussion of the site hydrology, hydrogeology, soil, and current conditions at the CCR Landfill.

### 2.1 Site Hydrology and Hydrogeology

The CCR Landfill is located in Sand Canyon, a small, west-east trending topographic depression that is bounded to the north and south by outcroppings of Pierre Shale. Approximately 50 feet of Quaternary sediments have been deposited in the canyon. These sediments, referred to as the Piney Creek Alluvium, consist of horizontal layers of clay, silty clay, sand, and gravel. Most of the alluvium is poorly-sorted and fine-grained with silt-sized materials predominating. Bedding is poorly defined except for a thin layer of gravel near the base of the deposit. The Piney Creek Alluvium is saturated beneath the CCR Landfill and forms the uppermost water-bearing zone in Sand Canyon. It is underlain by approximately 3,500 to 4,000 feet of Pierre Shale that forms a hydraulic barrier between the alluvium and deeper water-bearing formations, if present. Groundwater within the Piney Creek Alluvium flows to the east-southeast along the top of the alluvium-Pierre Shale contact. Water level measurements indicate that the saturated thickness of the alluvial water-bearing zone is approximately zero to 25 feet.

Approximately one mile east of the CCR Landfill, Sand Canyon intersects the north-south alluvial channel of Fountain Creek. The upgradient portion of Sand Canyon occupied by the CCR Landfill is cut off from Fountain Creek by the Retention Dam installed by Utilities in 1978. The Retention Dam, located approximately 3,000 feet downgradient (east) of the landfill (**Figure 1**), has a bentonite core and is keyed into the Pierre Shale bedrock. It captures surface water run-off from the CCR Landfill and also restricts groundwater flow. To enhance the dam's performance, Utilities installed a bentonite barrier wall through the upgradient toe of the dam in October 1994 and later added a French drain along the southern downgradient side of the dam to collect residual seepage water. The seepage intercepted by the French drain is pumped back to the upgradient side of the dam. The Retention Dam and French drain are intended to prevent any releases that may occur from migrating downgradient to Fountain Creek.

### 2.2 Site Surficial Soil

According to the United States Department of Agriculture (USDA) Web Soil Survey (USDA, 2016), the CCR Landfill was constructed in an area consisting primarily of two soil types: Razor-Midway complex and Limon clay. The Razor-Midway complex is well drained and the surface layer consists of stony/cobbly clay loam and clay to a depth of approximately 15 to 30 inches. Permeability of the soil is estimated to be moderately low to moderately high and the available water storage capacity is low to very low. The Limon clay is well drained and the surface layer consists of clay, silty clay, and silty clay loam to a depth of at least 60 inches. Permeability of the soil is estimated to be moderately low to moderately high and the available water storage capacity is high. A printout showing the locations of each soil type from the Web Soil Survey is provided in **Appendix A**.

### 2.3 Current Conditions

The current CCR Landfill extent is shown on **Figure 2** and includes topography from December 15, 2015. The majority of the CCR Landfill is currently filled to an elevation of approximately 5505 feet (30 to 55 feet above the surrounding ground surface) with a maximum future elevation of 5540 feet (minus the thickness that will be needed for final cover). Side slopes of 3:1 (H:V) are based on the stability analyses presented in the 2009 Ash Landfill Slope Stability Investigation (Kleinfelder, 2009). The current top of the CCR Landfill is relatively flat.

Bottom ash is currently being mined out from the west side of the CCR Landfill (through top-down cutting of slopes). The mined bottom ash is being used for aggregate replacement in the production of cement. Fly ash is currently being placed (through pushing up the slope in lifts of about 4 inches) and compacted within the east expansion area of the CCR Landfill.



Utilities maintains a Coal Combustion Residuals Fugitive Dust Control Plan (CSU, 2015) to aid in ensuring that operations at the CCR Landfill are performed in accordance with the applicable air quality provisions of the CCR Rule, specifically those within 40 CFR Part 257.80 (a) through (d).

The working pad is the area on the landfill on which the trucks delivering ash to the working face travel and maneuver to dump their load as the landfill is built up to its final grade. The working pad portion of the landfill is typically covered with approximately six inches of bottom ash overlain by roughly three inches of gravel. The gravel provides for stability and dust control and also assists in minimizing the tracking of ash outside of the landfill.

All areas other than the active west side and east side have been covered with a minimum one-foot thick temporary soil cap in accordance with the definition of adequate intermediate cover contained in the CDPHE Regulations (6 Code of Colorado Regulations 1007-2, Part 1, Section 1). These areas have also been seeded with Dryland Pasture mix and/or El Paso seed mix in general accordance with the EDOR (CSU, 2012).

As of the December 2015 survey date, the landfill was approximately 75 acres (including the west mining area and the east expansion area) and held approximately 3,563,000 cubic yards (CYs). The west portion of the landfill contained approximately 549,000 CYs of bottom ash and the east portion contained approximately 3,014,000 CYs of fly ash.

As required by 40 CFR 257.102(b), the maximum inventory of CCR ever on-site over the active life of the CCR unit is estimated to be approximately 5,220,600 CYs and the largest area of the CCR unit ever requiring a final cover at any time during the CCR unit's active life is estimated to be approximately 75 acres (CSU, 2012).

## 3.0 Final Cover System Design

Closure of the CCR Landfill will be completed by leaving the CCR in place and installing a final cover system. In accordance with 40 CFR 257.104(d), the final cover will ensure that the CCR Landfill is closed in a manner that will:

- control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere;
- preclude the probability of future impoundment of water, sediment, or slurry;
- Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period;
- minimize the need for further maintenance of the CCR unit; and
- be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.

These performance standards will be met through construction of a final cover (see Section 3.1), proper sloping to preclude impoundment of water and provide stability (see Section 3.3), settlement monitoring (see Section 3.4), quality control during installation (see Section 4.4), and scheduling (see Section 5.0).

### 3.1 Conventional Cover Design

Conventional final cover designs for solid waste sites rely on hydraulic barrier layers. The following conventional cover components are consistent with the CCR Rule:

- Infiltration Layer - The infiltration of liquids through the closed CCR Landfill will be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material. The earthen material will have a permeability that is less than or equal to the permeability of the bottom liner system or natural subsoils present, or a permeability no greater than  $1 \times 10^{-5}$  centimeters per second (cm/sec), whichever is less. The CCR Landfill does not have a bottom liner as Utilities requested a waiver from this requirement, which was approved in a letter from CDPHE dated November 6, 2008 (CDPHE, 2008). To ensure permeability requirements are met, formal geotechnical evaluations of the natural subsoils and of the earthen material(s) to be used for the infiltration layer will be performed.
- Erosion Layer - Erosion of the final cover system will be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth.

A conceptual cross-section of the conventional final cover is shown within **Figure 3**.

### 3.2 Borrow Soil

Per the EDOR (CSU, 2012), the currently identified on-site borrow area for final cover soil is 120 acres located in Crooked Canyon within the CSR. The Crooked Canyon borrow area map from the EDOR is provided within **Appendix B**.

According to the Web Soil Survey (USDA, 2016), the soil within the Crooked Canyon borrow area consists of Limon clay. The Limon clay is well drained and the surface layer consists of clay, silty clay, and silty clay loam to a depth of at least 60 inches. Permeability of the soil is estimated to be moderately low to moderately high and the available water storage capacity is high. A printout from the Web Soil Survey showing the Limon clay in the Crooked Canyon area is Soil Survey is provided in **Appendix A**.

A volume of approximately 242,000 CYs would be needed for a final cover thickness of 24 inches (18 inches infiltration layer plus 6 inches erosion layer). There is adequate soil available for the final cover in the proposed 120 acres of Crooked Canyon using only the top 1 to 2 feet of the borrow area (where most of the natural nutrients reside). Per the EDOR (CSU, 2012), future borrow areas may also include removing soil from nearby hills where future operations (e.g. land disposal of digested biosolids) are planned.

Additional sampling and geotechnical analysis will be required prior to borrow soil use to ensure permeability requirements are met. In addition, all borrow sources will be appropriately permitted prior to use and revegetated following use.

### **3.3 Final Contours / Stability**

The estimated final contours at closure are shown on **Figure 3**. The final grades on the side slopes of the CCR Landfill will be no greater than 3:1 (horizontal to vertical [H:V]) and the final grades on the top of the CCR Landfill will be crowned with a slope of no less than 20:1 (H:V). These grades will promote surface water run-off, preclude the future impoundment of water, and minimize erosion. The final contours, including the final cover, will reach an elevation no greater than 5,540 feet at the highest grade.

According to Utilities, the 3:1 (H:V) grade was approved as part of the approval of the 2004 Certificate of Designation for Clear Spring Ranch (CDPHE, 2004). In 2009, Utilities hired a third party geotechnical engineering firm (Kleinfelder) to assess the global stability of the landfill's then current configuration and its anticipated configuration with various cover thicknesses at closure. Kleinfelder's slope stability analysis concluded that there was a very low risk of slope instability under any of the analyzed closure configurations (Kleinfelder, 2009).

### **3.4 Settling / Subsidence**

The disruption of the integrity of the final cover system will be minimized through a design that accommodates settling and subsidence. As the landfill contains relatively homogenous soil-like waste, and does not contain putrescible materials, settling and subsidence is anticipated to be minimal. A baseline survey of the landfill's contours will be conducted upon completion of the final cover. If merited at any time following placement of the final cover, a new survey of the landfill will be conducted and compared to the initial survey to evaluate if subsidence is of concern.

### **3.5 Revegetation**

The final cover will be seeded according to the Soil Conservation Service guidelines and techniques outlined in the EDOR (CSU, 2012). The specific seed mix that will be used on the final cover will consist of grasses native to Colorado, or otherwise considered appropriate by overseeing regulatory agencies, and will be chosen based on results of test plots and/or prior experience with the seed mix at the facility. The goal will be to obtain a good stand of grass with a dense root structure.

A temporary cover crop, such as annual spring oats, wheat, triticale, or sorghum, may be planted for rapid germination to control erosion in the Spring and Summer. These are annual plants and will not compete with the native grass that will be planted in late Fall since the annual crop dies in the Winter and does not re-establish the following Spring.

If necessary to support the final cover, commercial fertilizer (or other soil amendments) can be incorporated into the seedbed prior to seeding of permanent species. The permanent perennial seeding should consist of both cool- and warm-season native grasses that are tolerant to drought and adaptable to fine-textured clay soils.

Straw mulch will be applied and anchored with a straw crimper to promote plant germination and growth by decreasing soil surface temperature, conserving soil moisture, and controlling erosion from wind and water run-off.

## **4.0 Final Cover System Installation Methods/Procedures**

Detailed design drawings and construction specifications will be developed prior to closure. However, some of the methods/procedures during installation are discussed in this section.

### **4.1 Temporary Erosion / Sediment Control**

Measures will be implemented to control erosion and sediment during closure. Temporary perimeter sediment controls may include silt fence, berms, diversion channels, and/or sediment traps. Temporary erosion controls on the 3:1 (H:V) side slopes may include erosion control blankets and/or rows of wattles placed perpendicular to the slope. Temporary controls will be removed upon establishment of vegetation.

### **4.2 Permanent Run-on / Run-off Control**

Permanent run-on / run-off controls during closure and continuing into post-closure will be in accordance with the most recently updated version of the Run-on and Run-off Control System Plan (AECOM, 2016a). Run-on and run-off control features will ensure the long-term integrity of the final cover system.

### **4.3 Dust Control**

To minimize fugitive dust due to vehicle travel or winds, a water truck is used at the facility to wet down the disposal area, unpaved roads, stockpiles, and traveled areas. Dust control measures shall comply with the Nixon Title V Operating Permit (permit #95OPEP106) as stated in the EDOR (CSU, 2012) and the Coal Combustion Residuals Fugitive Dust Control Plan (CSU, 2015).

### **4.4 Quality Control**

Construction Quality Assurance (CQA) is the process by which the engineer and owner ensure conformity with project drawings and specifications. As part of the CQA program, a Construction Quality Assurance Plan (CQAP) will be prepared (prior to start of construction) to outline the quality assurance/quality control (QA/QC) process. The CQAP will include:

- Roles and responsibilities of the project team and contractors during project construction
- Description of the detail required for project documentation
- A discussion of the QA/QC methods for soils and all imported materials

Inspections and testing will be performed throughout the construction process and initial grades and thickness of each layer will be verified with survey elevations taken before and after placement.

## 5.0 Closure Schedule

As required by 40 CFR 257.102(b), the following is an estimated/draft schedule for completion of all activities related to design and construction of a final cover at the CCR Landfill. The schedule will be refined and details added prior to closure.

Closure Task	Approximate Month/Year/Schedule
Prepare initial written closure plan	October 17, 2016
Perform additional modeling (if needed), permeability testing of natural subsoils and of the earthen material(s) to be used for the infiltration layer, and prepare detailed closure plan (with revised schedule)	Between 270 and 180 days prior to beginning closure activities
Prepare notification of intent to close	Prior to beginning closure activities
Coordinate with agencies and obtain necessary approvals and permits	Prior to beginning closure activities
Installation of the final cover system	Approximately 2035 (according to EDOR) when CCR Landfill reaches capacity (to commence according to schedule below)
Preparation of foundation	Estimated to take approximately 2 weeks
Placement of infiltration layer	Estimated to take approximately 4 months
Placement of erosion layer	Estimated to take approximately 1 month
Final cover seeding	Estimated to take approximately 2 weeks
All closure activities for the CCR Landfill are completed	Within 6 months of commencing closure activities
Prepare a notification of closure	Within 30 days of completing closure activities

Closure of the CCR Landfill will occur when the facility has reached capacity, or when operations at the CSR no longer warrant on-site disposal of the waste materials as detailed in Section 1.1, above. In accordance with 40 CFR 257.102(e), closure of the CCR Landfill will commence within 2 years of the last receipt of CCR (or last removal of CCR for beneficial use) or no later than 30 days after the date on which the CCR Landfill receives the known final receipt of CCR (or removes the known final volume of CCR for beneficial use). Utilities may obtain two-year extensions provided that they continue to be able to demonstrate that there is reasonable likelihood that the CCR Landfill will accept wastes in the foreseeable future or will remove CCR from the Landfill for the purpose of beneficial use.

In accordance with 40 CFR 257.102(f), Utilities will complete closure of the CCR Landfill within six months of commencing closure activities. This timeframe may be extended, however, if Utilities can demonstrate that it is not feasible to complete closure of the CCR Landfill within the required timeframe due to factors beyond the facility's control. If Utilities seeks a time extension, a demonstration, including a narrative discussion providing the basis for additional time, will be completed.

## **6.0 Post-Closure Care**

Once closure of the CCR Landfill has been completed in accordance with this plan and closure has been deemed adequate, the post-closure period begins. During post-closure, the CCR Landfill will be inspected and maintained to ensure that vegetation is properly established and erosion and settlement do not compromise the final cover system. As-needed maintenance may include such items as repair of areas damaged by erosion, reseeding, removal of any invasive or woody plants, etc. Post-closure activities may also include long-term groundwater monitoring to verify groundwater quality has not been impacted. Post-closure care will be as described in the CCR Landfill Post-Closure Plan (AECOM, 2016b).

## **7.0 Amendment, Recordkeeping, and Notification**

### **7.1 Amendment of the Plan**

As required by 40 CFR 257.102(b)(3), Utilities may amend this Closure Plan at any time provided the revised plan is placed in the facility's operating record. Utilities will amend this plan whenever there is a change in operation of the CCR Landfill that would substantially affect the plan and if unanticipated events necessitate a revision of this plan (either before or after closure activities have commenced). Utilities will amend this plan at least 60 days prior to a planned change in the operation of the CCR Landfill, or no later than 60 days after an unanticipated event requires the need to revise this existing plan. If this plan is revised after closure activities have commenced for the CCR Landfill, Utilities will amend the plan no later than 30 days following the triggering event. Any amendment of this plan will be certified by a qualified professional engineer.

### **7.2 Recordkeeping**

Utilities will maintain their files with this Closure Plan, any subsequent revisions/amendments of this Closure Plan, inspection reports, documentation of maintenance, and other pertinent documents within the facility's operating record for a period of at least five years in accordance with 40 CFR 257.105.

### **7.3 Notification**

Utilities will notify CDPHE whenever the Closure Plan (along with any subsequent updates) has been placed in the operating record in accordance with the notification requirements specified in 40 CFR 257.106. Prior to initiation of closure, Utilities will prepare a notification of intent to close the CCR Landfill. The notification must include a written certification from a qualified professional engineer stating that the design of the final cover system meets the requirements of this plan. Within 30 days of completion of closure of the CCR Landfill, Utilities will prepare a notification of closure for the CCR Landfill. The notification must include a written certification from a qualified professional engineer verifying that closure has been completed in accordance with this closure plan.

#### **7.3.1 Deed Notations**

Following closure of the CCR Landfill and in accordance with 40 CFR 257.102(i), Utilities will record a notation on the deed to the property, or some other instrument that is normally examined during title search. The notation on the deed must in perpetuity notify any potential purchaser of the property that the land has been used as a CCR Landfill and its use is restricted. Within 30 days of recording a notation on the deed to the property, Utilities will prepare a notification stating that the notation has been recorded.

## 8.0 Certification

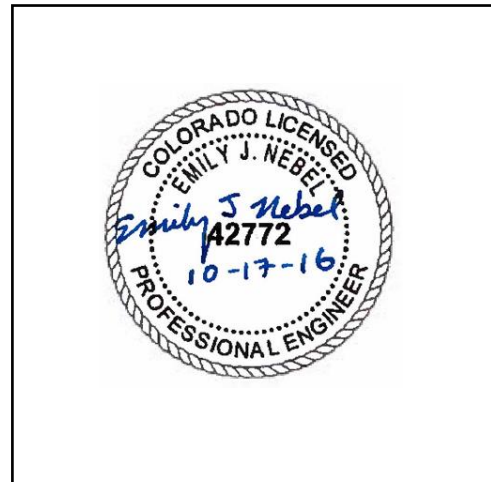
**Certification Statement 40 CFR § 257.102(d)(3)(iii)** – Design of the Final Cover System for Closure of the Coal Combustion Residuals (CCR) Landfill, Clear Spring Ranch, El Paso County, Colorado

**CCR Unit** – Colorado Springs Utilities, Clear Spring Ranch, CCR Landfill

I, Emily J. Nebel, being a Registered Professional Engineer in good standing in the State of Colorado, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the design of the final cover system as included in the CCR Landfill Closure Plan dated October 17, 2016 meets the requirements of 40 CFR § 257.102.

Emily J. Nebel  
*Printed Name*

October 17, 2016  
*Date*



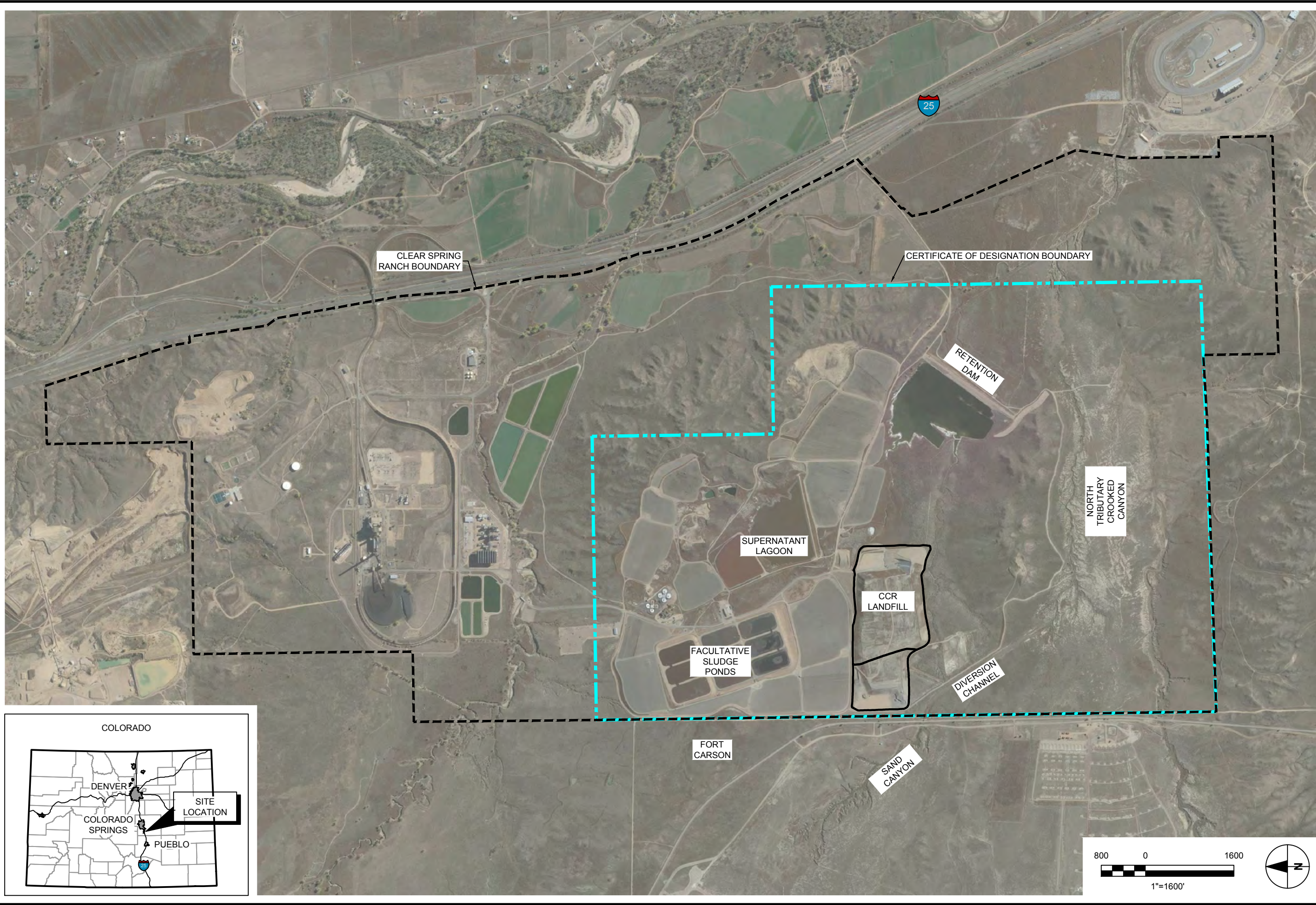


## 9.0 References

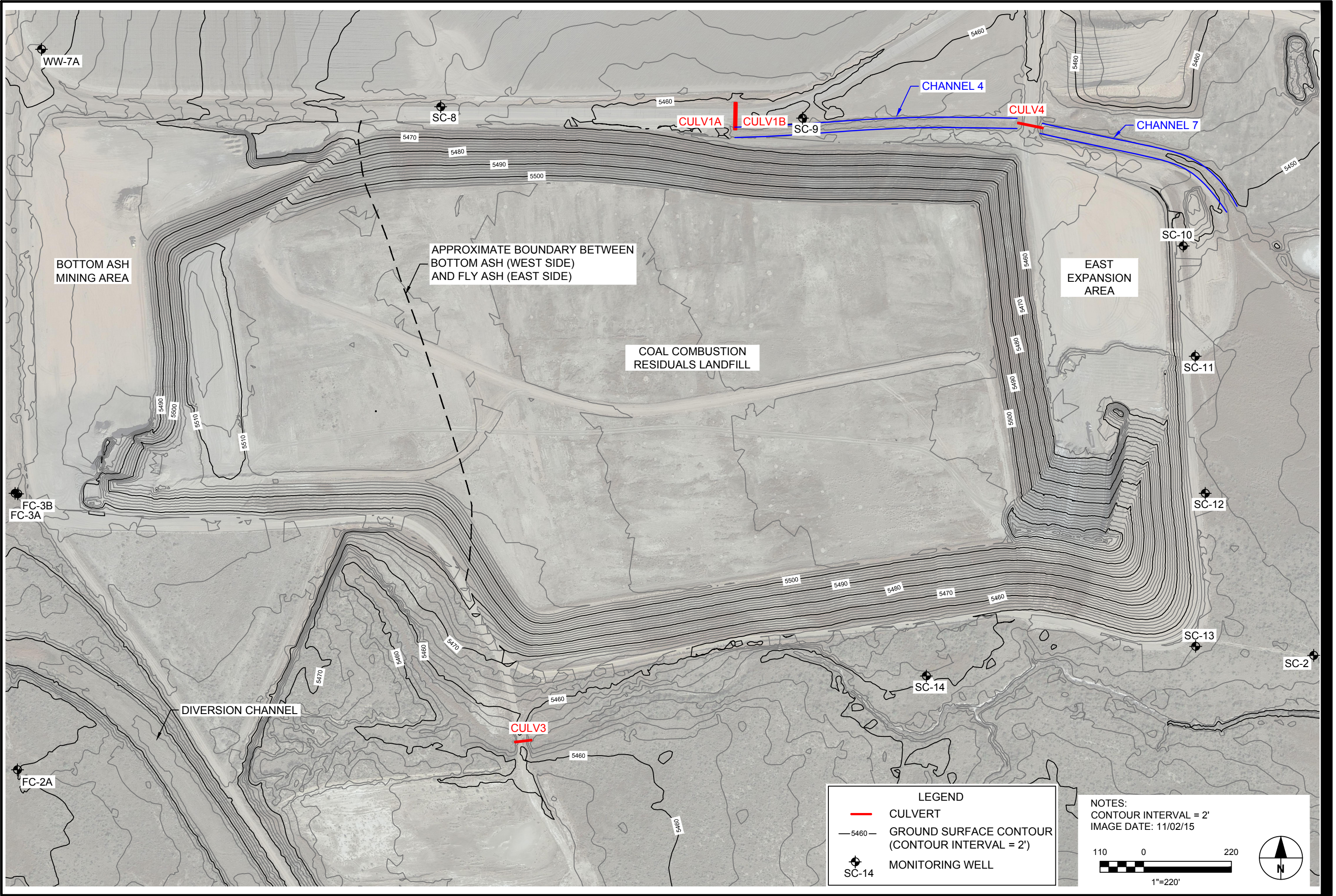
- AECOM. 2016a. Coal Combustion Residuals (CCR) Landfill Run-on and Run-off Control System Plan, Clear Spring Ranch, El Paso County, Colorado, October, 2016.
- AECOM. 2016b. Coal Combustion Residuals (CCR) Landfill Post-Closure Plan, Clear Spring Ranch, El Paso County, Colorado. October, 2016.
- Colorado Department of Health and Environment (CDPHE). 2004. Letter from Glenn Mallory and Jerry Henderson/ CDPHE to Carl Schueler/El Paso County, Re: Amendment to Consolidate Prior Approvals, Clear Spring Ranch. June 28, 2004.
- CDPHE. 2008. Letter from Lawrence Bruskin/CDPHE to Mike Brady and Patti Zietlow/Colorado Springs Utilities, Re: Conditional Approval of the Engineering Design and Operations Report for the 11 Acre Expansion of the Ash Disposal Area Clear Spring Ranch. November 6, 2008.
- CDPHE. 2015. Hazardous Materials and Waste Management Division. 6 Code of Colorado Regulations 1007-2, Part 1, Regulations Pertaining to Solid Waste Sites and Facilities, Effective June 30, 2015.
- Colorado Springs Utilities (CSU). 2012. Engineering Design and Operations Report, Appendix A Coal Combustion Products Disposal Operations. Colorado Springs Utilities. Updated June 25, 2012.
- CSU. 2015. Coal Combustion Residuals Fugitive Dust Control Plan. Colorado Springs Utilities. October 2015.
- Kleinfelder. 2009. Geotechnical Engineering Services, Ash Landfill Slope Stability Investigation, Clear Spring Ranch Facility, Southwest of Interstate 25 and Ray Nixon Road, Southwest of Fountain, CO. Prepared by Kleinfelder. November 17, 2009.
- U.S. Department of Agriculture (USDA). 2016. Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at <http://websoilsurvey.nrcs.usda.gov/>. Accessed August 9, 2016.
- U.S. Environmental Protection Agency (USEPA). 2015. 40 CFR Parts 257 and 261 Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. Federal Register, v.80, no. 74, April 17, 2015, 201 pp.

# Figures









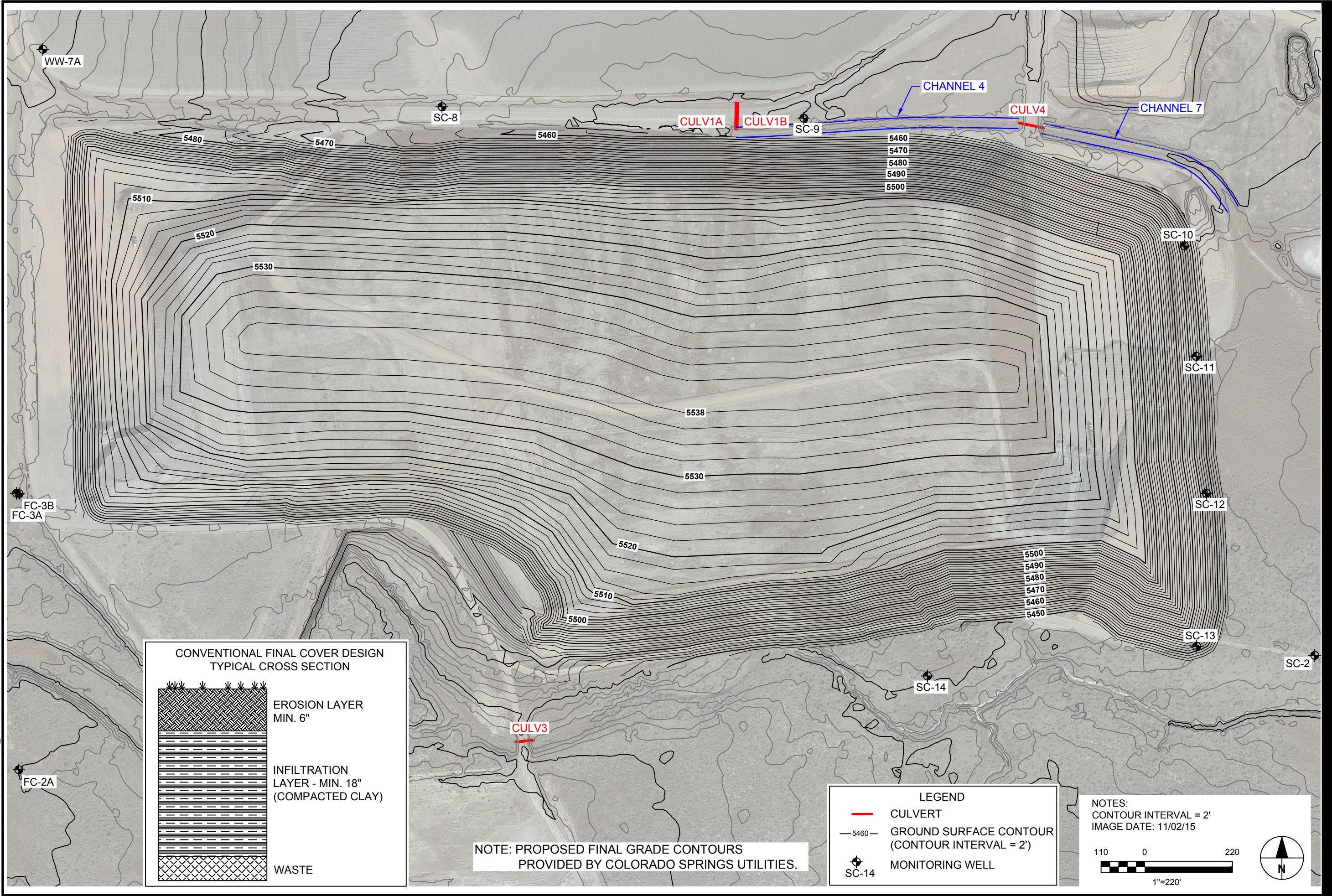
**LEGEND**

- CULVERT
- 5460 — GROUND SURFACE CONTOUR (CONTOUR INTERVAL = 2')
- ◆ SC-14 MONITORING WELL

**NOTES:**  
 CONTOUR INTERVAL = 2'  
 IMAGE DATE: 11/02/15

110 0 220  
 1"=220'







**Appendix A  
Web Soil Survey  
Information**







## El Paso County Area, Colorado

### 47—Limon clay, 0 to 3 percent slopes

#### Map Unit Setting

*National map unit symbol:* 368p  
*Elevation:* 5,200 to 6,200 feet  
*Mean annual precipitation:* 12 to 14 inches  
*Mean annual air temperature:* 48 to 52 degrees F  
*Frost-free period:* 135 to 155 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Limon, occasionally flooded, and similar soils:* 85 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Limon, Occasionally Flooded

##### Setting

*Landform:* Alluvial fans, flood plains  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Clayey alluvium derived from shale

##### Typical profile

*A - 0 to 4 inches:* clay  
*AC - 4 to 12 inches:* silty clay  
*C - 12 to 60 inches:* silty clay loam

##### Properties and qualities

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Well drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):*  
Moderately low to moderately high (0.06 to 0.20 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* Occasional  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 10 percent  
*Gypsum, maximum in profile:* 2 percent  
*Salinity, maximum in profile:* Very slightly saline to moderately saline  
(2.0 to 8.0 mmhos/cm)  
*Sodium adsorption ratio, maximum in profile:* 10.0  
*Available water storage in profile:* High (about 9.9 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 3e  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* C  
*Ecological site:* Salt Flat (R069XY033CO)

*Hydric soil rating:* No

**Minor Components**

**Other soils**

*Percent of map unit:*

*Hydric soil rating:* No

**Pleasant**

*Percent of map unit:*

*Landform:* Depressions

*Hydric soil rating:* Yes

**Data Source Information**

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 13, Sep 22, 2015

## El Paso County Area, Colorado

### 75—Razor-Midway complex

#### Map Unit Setting

*National map unit symbol:* 369p  
*Elevation:* 5,300 to 6,100 feet  
*Mean annual precipitation:* 12 to 14 inches  
*Mean annual air temperature:* 48 to 52 degrees F  
*Frost-free period:* 135 to 155 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Razor and similar soils:* 50 percent  
*Midway and similar soils:* 30 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Razor

##### Setting

*Landform:* Hills  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Concave, linear  
*Across-slope shape:* Linear  
*Parent material:* Clayey slope alluvium over residuum weathered from shale

##### Typical profile

*A - 0 to 4 inches:* stony clay loam  
*Bw - 4 to 22 inches:* cobbly clay loam  
*Bk - 22 to 29 inches:* cobbly clay  
*Cr - 29 to 33 inches:* weathered bedrock

##### Properties and qualities

*Slope:* 3 to 15 percent  
*Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock  
*Natural drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):*  
Moderately low to moderately high (0.06 to 0.20 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 15 percent  
*Gypsum, maximum in profile:* 5 percent  
*Salinity, maximum in profile:* Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)  
*Sodium adsorption ratio, maximum in profile:* 15.0  
*Available water storage in profile:* Low (about 4.7 inches)

### Interpretive groups

*Land capability classification (irrigated):* 6e  
*Land capability classification (nonirrigated):* 6e  
*Hydrologic Soil Group:* D  
*Ecological site:* Alkaline Plains (R069XY047CO)  
*Other vegetative classification:* ALKALINE PLAINS (069AY047CO)  
*Hydric soil rating:* No

### Description of Midway

#### Setting

*Landform:* Hills  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Slope alluvium over residuum weathered from shale

#### Typical profile

*A - 0 to 4 inches:* clay loam  
*C - 4 to 13 inches:* clay  
*Cr - 13 to 17 inches:* weathered bedrock

#### Properties and qualities

*Slope:* 3 to 25 percent  
*Depth to restrictive feature:* 6 to 20 inches to paralithic bedrock  
*Natural drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):*  
Moderately low to moderately high (0.06 to 0.20 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 15 percent  
*Gypsum, maximum in profile:* 15 percent  
*Salinity, maximum in profile:* Very slightly saline to moderately saline  
(2.0 to 8.0 mmhos/cm)  
*Sodium adsorption ratio, maximum in profile:* 15.0  
*Available water storage in profile:* Very low (about 2.2 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 7e  
*Hydrologic Soil Group:* D  
*Ecological site:* Shaly Plains (R069XY046CO)  
*Other vegetative classification:* SHALY PLAINS (069AY045CO)  
*Hydric soil rating:* No

### Minor Components

#### Other soils

*Percent of map unit:*  
*Hydric soil rating:* No

**Pleasant**

*Percent of map unit:*

*Landform:* Depressions

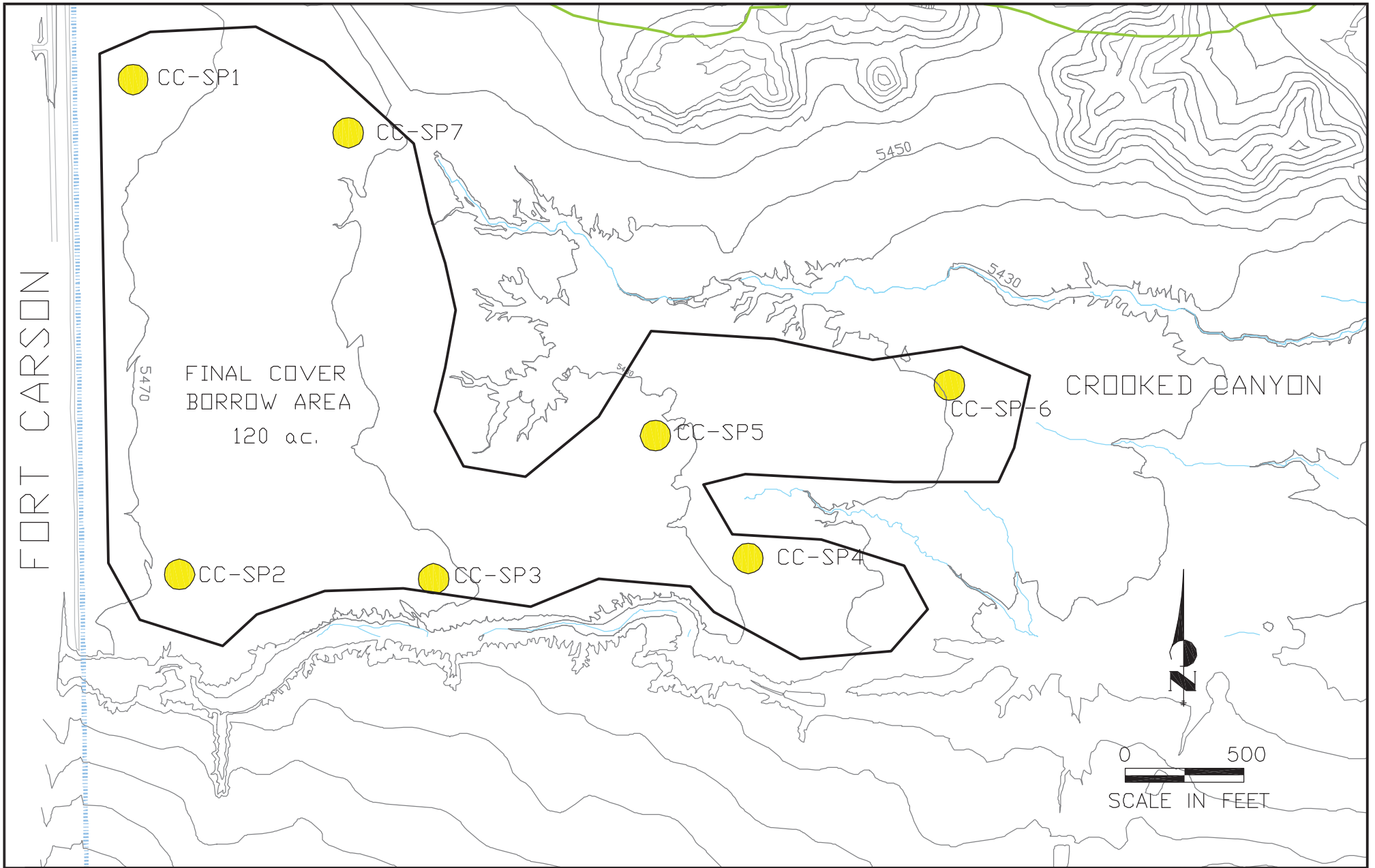
*Hydric soil rating:* Yes

**Data Source Information**




Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 13, Sep 22, 2015

**Appendix B  
Crooked Canyon Borrow  
Area Map (from EDOR)**



DATE: 4 September 2002  
 PROJECT NUMBER: 1076039  
 REVIEWED BY: CMB  
 DRAWN BY: RAD  
 FILE NAME: Borrow Area.dwg

LEGEND	 10' Surface Contours
	 Ash Disposal CD Boundary
	 Sample Points



Ash Disposal  
 CC Borrow Area  
 Final Cover