

August 28, 2026

Greg Barnes, Planner
Community & Economic Development Department
4430 South Adams County Parkway, Suite W2000A
Brighton, CO 80601

**RE: EAST REGIONAL LANDFILL EXPANSION
APPLICATION SUBMITTAL-REVISION AUGUST 2026**

Dear Mr. Barnes;

This revised application submittal package includes the information requested by Adams County (ADCO) in a comment request dated August 18, 2026. This resubmittal includes the **addition of the redline EDOP** to the application submittal package for the vertical expansion of the East Regional Landfill. Additionally, the text of the original Doty EDOP is included to make it easier to compare the original EDOP to this expansion document. The submittal information provided is based on the list in the Certificate of Designation application checklist provided by ADCO and has been modified to include information requested by ADCO during the review of the documents. Each category from the checklist has information included in the requisite attachment. All the information is attached as follows with this recent update noted in bold:

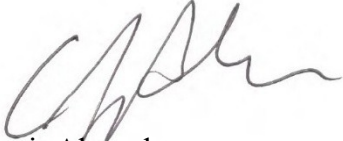
- Attachment 1: Development Application Form
- Attachment 2: Written Explanation
 - 2-1: Grade Survey Showing the Overfill Areas with Change to Original Final Grades and Proposed Final Grades
 - 2-2: Waste Capacity Table with Current and Proposed Designs
 - 2-3: FAA Notice of Construction
 - 2-4: **Redline EDOP, Original Doty EDOP (2006)**, Highlighted Version of EDOP Showing Changes and Updates Since 2006 CD and Written Summary of Changes from 2006 EDOP
 - 2-5: Site Plans (Original, Current, And Proposed)
 - 2-6: Approved Expansion EDOP with CDPHE Approval Letter
 - 2-7: Oil and Gas Well Abandonment Paperwork
 - 2-8: Trip Generation Analysis
- Attachment 3: Site Plan and Plat
- Attachment 4: Proof Of Ownership
- Attachment 5: Proof Of Water And Sewer
- Attachment 6: Proof Of Utilities
- Attachment 7: Legal Description
- Attachment 8: Proof Of Taxes Paid
- Attachment 9: Neighborhood Meeting Summary
- Attachment 10: Level Storm Plan Review
- Attachment 11: Erosion and Sediment Control Plan

The remaining letter provides information based on the most recent comments and requests resulting from the submittal of the application package as outlined below from ADCO.

Thank you.

Respectfully Submitted

AMERICAN ENVIRONMENTAL CONSULTING, LLC

A handwritten signature in black ink, appearing to read 'C. Ahrendsen', is written over the printed name.

Curtis Ahrendsen
Project Manager/Principal

cc: Melissa Montgomery, Five Part Development, Inc.

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- 9. NEIGHBORHOOD MEETING SUMMARY**
- 10. LEVEL 1 STORM PLAN**
- 11. EROSION AND SEDIMENT CONTROL PLAN**

ATTACHMENT 1: DEVELOPMENT APPLICATION FORM



Re-submittal Form

Case Name/ Number: East Regional Landfill / EXG2026-00002

Case Manager: Greg Barnes

Re-submitted Items:

- ☐ Development Plan/ Site Plan
- ☐ Plat
- ☐ Parking/ Landscape Plan
- ☐ Engineering Documents
- ☐ Subdivision Improvements Agreement (Microsoft Word version)
- ☒ Other: Response to Comments, EDOP Draft

*** All re-submittals must have this cover sheet and a cover letter addressing review comments.**

Please note the re-submittal review period is 21 days.

The cover letter must include the following information:

- Restate each comment that requires a response
- Provide a response below the comment with a description of the revisions
- Identify any additional changes made to the original document

For County Use Only:

Date Accepted:

Staff (accepting intake):

Resubmittal Active: Planner; Environmental; Health; Plan Coordination

Planner to refer to CDPHE, as well.



DEVELOPMENT APPLICATION FORM

PROJECT NAME: EAST REGIONAL LANDFILL VERTICAL EXPANSION

APPLICANT

Name(s): FIVE PART DEVELOPMENT, LLC Phone #: 303-371-5115
Address: 8480 TOWER ROAD
City, State, Zip: COMMERCE CITY, CO 80022
2nd Phone #: 720-590-4058 Email: MMontgomery5@republicservices.com

OWNER

Name(s): SAME AS ABOVE Phone #:
Address:
City, State, Zip:
2nd Phone #: Email:

TECHNICAL REPRESENTATIVE (Consultant, Engineer, Surveyor, Architect, etc.)

Name: AMERICAN ENVIRONMENTAL CONSULTING, LLC Phone #: 303-948-7733
Address: 8191 SOUTHPARK LANE, SUITE 107
City, State, Zip: LITTLETON, CO 80120
2nd Phone #: 303-910-1017 Email: cahrendsen@aecdenvr.com

DESCRIPTION OF SITE

Address: 8201 SCHUMAKER ROAD

City, State, Zip: BENNETT, CO 80102

Area (acres or square feet): 164.17 ACRES

Tax Assessor
Parcel Number Parcels 0172725400001-0172725400004

Existing
Zoning: A-3

Existing Land
Use: SOLID WASTE LANDFILL

Proposed Land
Use: SOLID WASTE LANDFILL

Have you attended a Conceptual Review? YES ☐ NO ☒

If Yes, please list PRE#:

Name:

Date:

Applicant's Printed Name

Name:

Owner's Signature

ATTACHMENT 2: WRITTEN EXPLANATION

- 2-1 Grade Survey Showing the Overfill Areas with Change to Original Final Grades and Proposed Final Grades**
- 2-2 Waste Capacity Table with Current and Proposed Designs**
- 2-3 FAA Notice of Construction**
- 2-4 Redline EDOP, Original Doty EDOP (2006), Highlighted Version of EDOP Showing Changes and Updates Since 2006 CD and Written Summary of Changes from 2006 EDOP**
- 2-5 Site Plans (Original, Current, And Proposed)**
- 2-6 Approved Expansion EDOP with CDPHE Approval Letter**
- 2-7 Oil and Gas Well Abandonment Paperwork**
- 2-8 Trip Generation Analysis**

Attachment 2: Written Explanation Of Purpose And Improvements

Five Part Development, Inc. (FPD) is submitting this explanation of the proposal to vertically expand the East Regional Landfill (ERL). The Engineering Design and Operations Plan (EDOP) and supporting appendices have been approved by the Colorado Department of Public Health and Environment (CDPHE) and presents the updated design, monitoring, operating, closure, and post-closure plans for the East Regional Landfill (ERL) facility, located in Adams County near Bennett, Colorado. The ERL, originally called the Five Part Development Landfill and referred to as such in earlier documents, is owned and operated by FPD.

This is only a vertical expansion and does not include a lateral increase in the filling footprint or landfill property size. The acreage of the landfill footprint is 164.17 as currently permitted. As such, many originally permitted portions of the landfill remain unchanged. The intention of this expansion EDOP is to update the entire EDOP and include both the unchanged portions of the current permit, the modifications made since 2006, and the changes as a result of this vertical expansion.

Since the original 2006 EDOP, a number of revisions to the facility design and operations have been approved as a result of conditions in the CD, changing regulations, and changes requested by ERL. The revised EDOP is a complete, stand-alone EDOP meeting the requirements in the regulations and incorporates changes since the 2006 EDOP to the disposal cell designs, liner systems, facility configuration, surface water control, waste types, financial assurance, inspections and maintenance, ground-water monitoring, explosive gas monitoring, facility operations, environmental monitoring and closure/post-closure care, as well as operations that have been updated to meet the current Colorado Department of Public Health and Environment (CDPHE) standards, regulations, and ERL operating practices.

The expansion EDOP is included with the written explanation as are the explanation of the changes and the EDOP text highlighting the items that are a result of changes to the EDOP since 2009.

CONCEPTUAL SITE PLAN INFORMATION

The conceptual plan information discusses the EDOP changes developed to incorporate the proposed vertical expansion design changes. Since portions of the EDOP and its appendices have been modified many times but never compiled in one document before this expansion EDOP was prepared, this section discusses the changes as a result of the expansion only. This expansion has been approved by the CDPHE.

- 1) Vertical expansion design. The revised final cover design modifies the cover slopes from a compound slope consisting of a 4:1 side slope with a grade break at 5,350 feet amsl to a 20:1 top slope to an apex at 5,392.37 ft amsl to a compound slope consisting of 3.5:1 side slopes from the cover toe to a higher grade break at 5,484 feet amsl where the slope changes to a 20:1 top slope with two apex points at 5,495.66 and 5,499.25 feet amsl. This design change increases the cover height by approximately 107 feet at the highest point. A cross-section

rendering of the currently approved final cover versus the proposed expansion is included with this explanation. (Figure 1)

- 2) Final cover system redesign. The revised final cover system changes the final cover design from an Alternative Cover with 4-8 feet of loosely compacted soil to two possible options, a 3.5 foot-thick Alternative Final Cover System designed in accordance with the March 2013 Final Guidance Document Water Balance Covers in Colorado or a linear low-density polyethylene (LLDPE) synthetic cover with drainage system and protective soil. Additionally, construction requirements for both final cover options are presented in a revised CQA Plan. Stormwater management requirements that change as a result of the revised final cover are also included.

The property consists of four parcels designated Parcel A (0172725400001) through Parcel D (0172725400004) (Figure 2). As a condition of the CD, Five Part Development granted Adams County an additional 10-feet of Right-of-Way (ROW), extending the County ROW to a total of 40-feet along Schumaker Road. The additional 10-foot ROW was deeded to Adams County, resulting in a property of 164.17 acres more or less. The ERL property is zoned A-3/Agricultural and has a Certificate of Designation for MSW disposal from Adams County as well as a Class II compost operation. Adams County has deemed these uses compatible with the zoning and surrounding land uses following review of the application and the public hearing process.

Disposal will occur on approximately 132 acres within the 164-acre permit boundary, with the remainder of the property used for surface water control, setbacks, easements, access roads and facility structures. Municipal solid waste is delivered to the facility by commercial solid waste collection operators and the general public. The majority of the solid waste is from local collection operations and the general public in the area.

The total capacity of the landfill from the top of liner to the top of final cover is 22,566,116 cubic yards (CY). This includes all waste, operational cover, and final cover. Table 1 in the EDOP includes all the capacity information and is included as Table 1 in this document also.

APPLICATION INFORMATION: The following application information is included in the written explanation and includes additional attachments.

This explanation also includes attached information as follows:

- 2-1 Grade Survey Showing The Overfill Areas With Change To Proposed Final Grades
- 2-2 Waste Capacity Table With Current And Proposed Designs.
- 2-3 FAA Notice Of Construction
- 2-4 Highlighted Version Of EDOP Showing Changes And Updates Since 2009 CD With Written Summary.
- 2-5 Site Plans (original, current, and proposed with the abandoned oil and gas well indicated)
- 2-6 Approved Expansion EDOP with CDPHE approval letter
- 2-7 Oil and Gas Well Abandonment Paperwork
- 2-8 Traffic Trip Generation Analysis

1. Grade survey showing the overfill areas with change to proposed final grades:

Attachment 2-1 includes a drawing showing the overfill on a plan view. Additionally, two cross-section drawings are included showing the permitted final cover and the proposed final cover views.

2. Justify change as for overfill remediation

The landfill was overfilled over an area of approximately 7.3 acres and up to 14 feet over the permitted top of waste. The vertical expansion of the landfill will remedy the overfill and add much needed capacity to this landfill. The additional capacity is a benefit to the community helping to keep disposal costs reasonable, offering capacity in the event other landfills close temporarily or permanently, and minimizing the need to permit new landfills that likely will be farther away and more expensive for disposal.

3. Assess the impacts to the effectiveness of the approved landscape buffer

The landscape buffer is at the ground level and around the outside of the landfill. Since the landfill acreage will not expand, the buffer will remain unchanged and the plan will remain in effect. This could change if Adams County changes the easements and setbacks to include portions of the landscape buffer.

4. Assess the visual impacts and nuisance impacts

The landfill final elevation will be approximately 107 feet higher than the permitted height. The landfill is located on a property surrounded by agricultural property and an industrial landfill. Therefore, even with higher final profile, the visual impacts are not significantly different from the current landfill. Additionally, during the neighborhood meeting, the local residents did not discuss the height of the landfill as being an issue.

The nuisance impacts are the same as the current landfill (traffic, odors, blowing litter, dust, birds and pests). The EDOP outlines operational controls for each of these conditions and these are the same as used at the landfill now. It is not anticipated that significantly more waste and traffic will come to the landfill so the nuisance conditions will be similar to those managed at the landfill now. The landfill also has a bird mitigation plan it follows and will continue to follow. A trip generation analysis is included in Attachment 2-8.

5. Prepare waste capacity table with current and proposed designs.

Attachment 2-2

6. FAA Notice of Construction

Attachment 2-3

The FAA Form 7460-2 is included in this section. The screening tool results determine there is no need to contact the FAA regarding this permit change. Denver International Airport was also contacted to discuss the vertical expansion and would like to be a referral agency but had no specific comment at this time.

7. Prepare redlined version of EDOP showing changes and add all updates since 2009 CD.

The changes to the EDOP are outlined in a document included in Attachment 2-4. Additionally the attachment includes the EDOP text with the portions that have changed since the 2009 original EDOP highlighted.

ENVIRONMENTAL ANALYSTS REVIEW

1. Prepare a description of all changes to the EDOP to accompany the redline version.

See Response 7 above-Attachment 2-4

2. Need to submit the original site plan, current site plan, and proposed site plan. Include all waste volumes through time and disposal cell operations

Attachment 2-5 includes 3 drawings:

The original final cover site plan

The existing contour site plan

The proposed final cover site plan.

Attachment 2-6 includes the expansion EDOP with the CDPHE approval letter.

3. Airport Proximity:

Attachment 2-4 includes the FAA information.

4. Water Well And Septic Information

The water well and septic information is included in the main body of this submittal in Attachment 5.

5. Oil and Gas Information

The abandoned oil and gas well is shown on the site plan. It was abandoned in 1984, nearly ten years before the site was originally permitted for fly ash disposal and 25 years before the MSW landfill was permitted. The well is within the fill area and located in an area where waste has been placed. There are no known existing flow lines and, to my knowledge, none were found during any excavation activities. Given the location of the abandoned well, it is not practical to apply the easement to this former well. Attachment 2-7 includes the abandonment paperwork.

DEVELOPMENT ENGINEERING REVIEW

1. Level 1 Stormwater Plan

The Level 1 Stormwater Plan and checklist are included in Attachment 9.

2. Vehicle Trip Generation Analysis

The expansion is anticipated to cause an increase in vehicle traffic to the landfill. The following is a table showing passenger versus commercial vehicles to the landfill in 2024 and 2025. The full analysis is included in Attachment 2-8.

<u>Year</u>	<u>Passenger Vehicles</u>	<u>Commercial Vehicles</u>	<u>Total Vehicles</u>	<u>Total Tons</u>
2024	489	16,060	16,549	123,041
2025	396	14,922	15,318	104,153

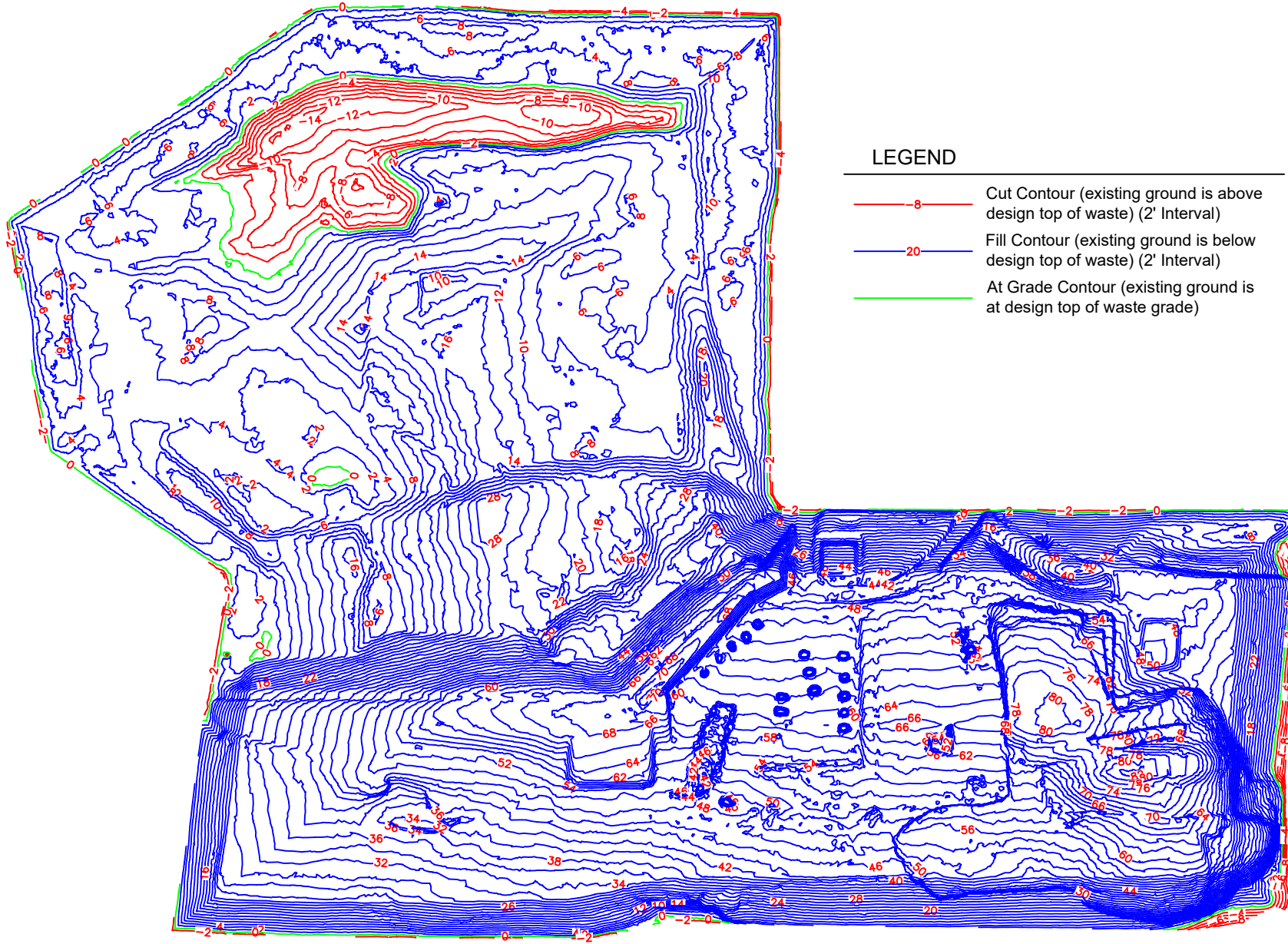
OTHER

1. Erosion and Sediment Control Plan

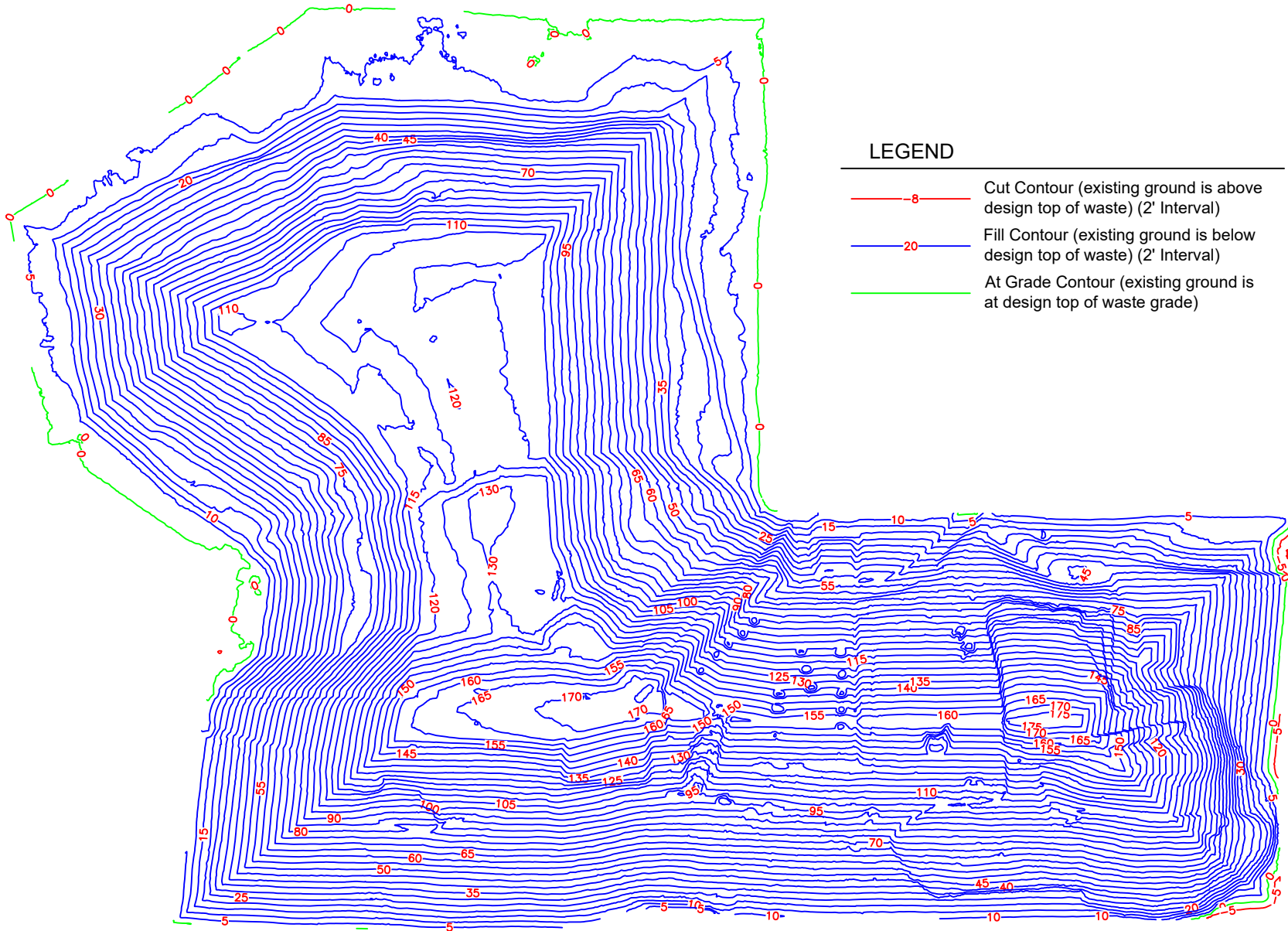
The site specific erosion and sediment control information for the landfill is included in the stormwater management plan for the landfill, which is included as Attachment 11.

Attachment 2-1

**Grade Survey Showing the Overfill Areas with Change To
Original Final Grades and Proposed Final Grades**



Cut-Fill Contours From April 2024 Topo to Permitted Top o Final Cover		PROJECT NO: --
ERL Vertical Expansion		DESIGNED BY: MBT
Adams County, Colorado		DRAWN BY: MBT
ERL 2024 EG to 2015 TOC lsapach.dwg		APPROVED BY: CJA
		DATE: 2026/01/06
FIGURE 1 OF 2		



LEGEND

- 8— Cut Contour (existing ground is above design top of waste) (2' Interval)
- 20— Fill Contour (existing ground is below design top of waste) (2' Interval)
- At Grade Contour (existing ground is at design top of waste grade)



AEC AMERICAN ENVIRONMENTAL CONSULTING, LLC.

8191 Southpark Lane, Suite 107, Littleton, CO 80120
phone 303-948-7733 fax 303-948-7739

Cut-Fill Contours From April 2024 Topo to Vertical Expansion Final Top of Waste

ERL Vertical Expansion

ERL 2024 EG to 2024 TOC
lsapach.dwg

Adams County, Colorado

PROJECT NO:	--
DESIGNED BY:	MBT
DRAWN BY:	MBT
APPROVED BY:	CJA
DATE:	2026/03/19

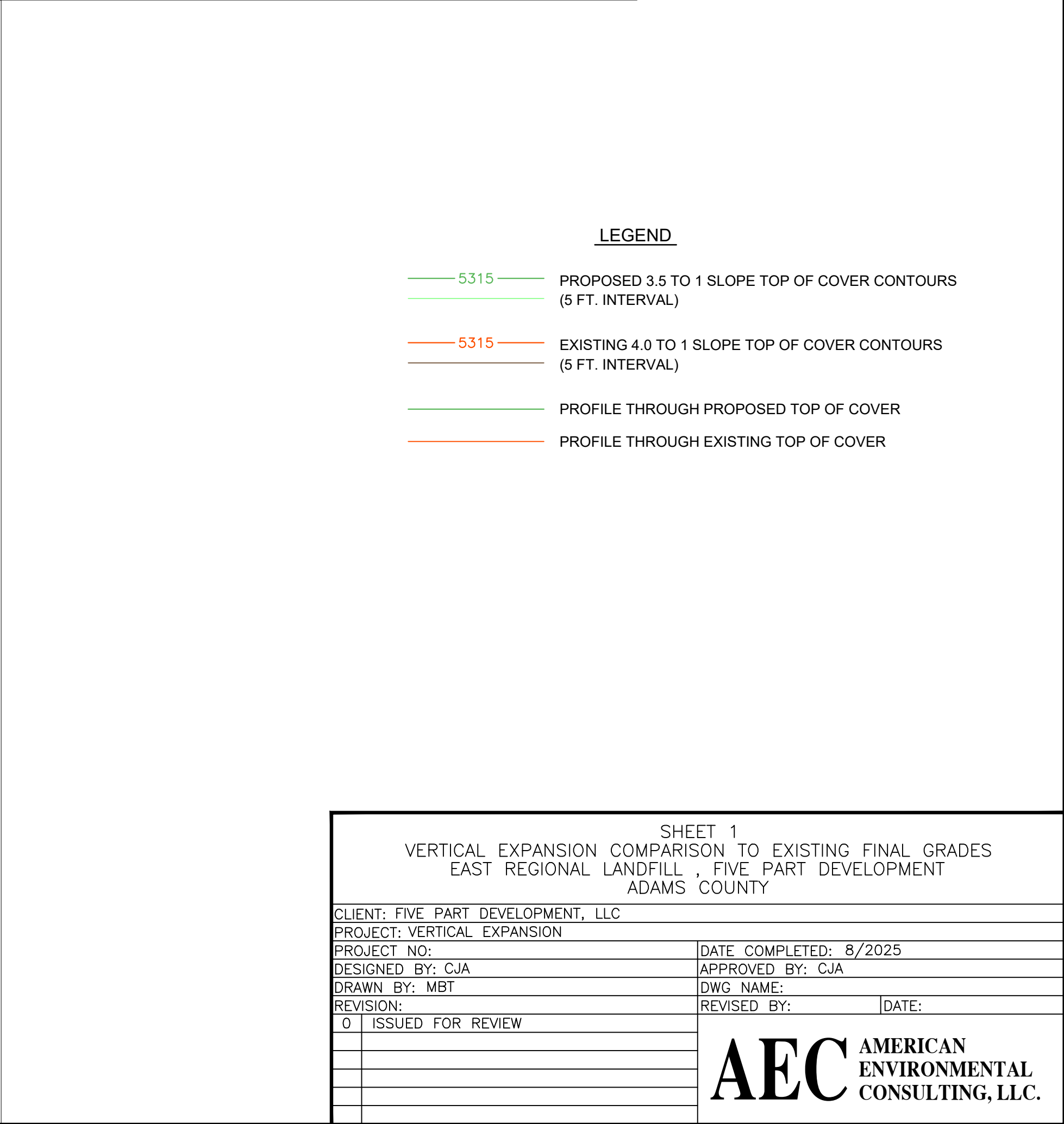
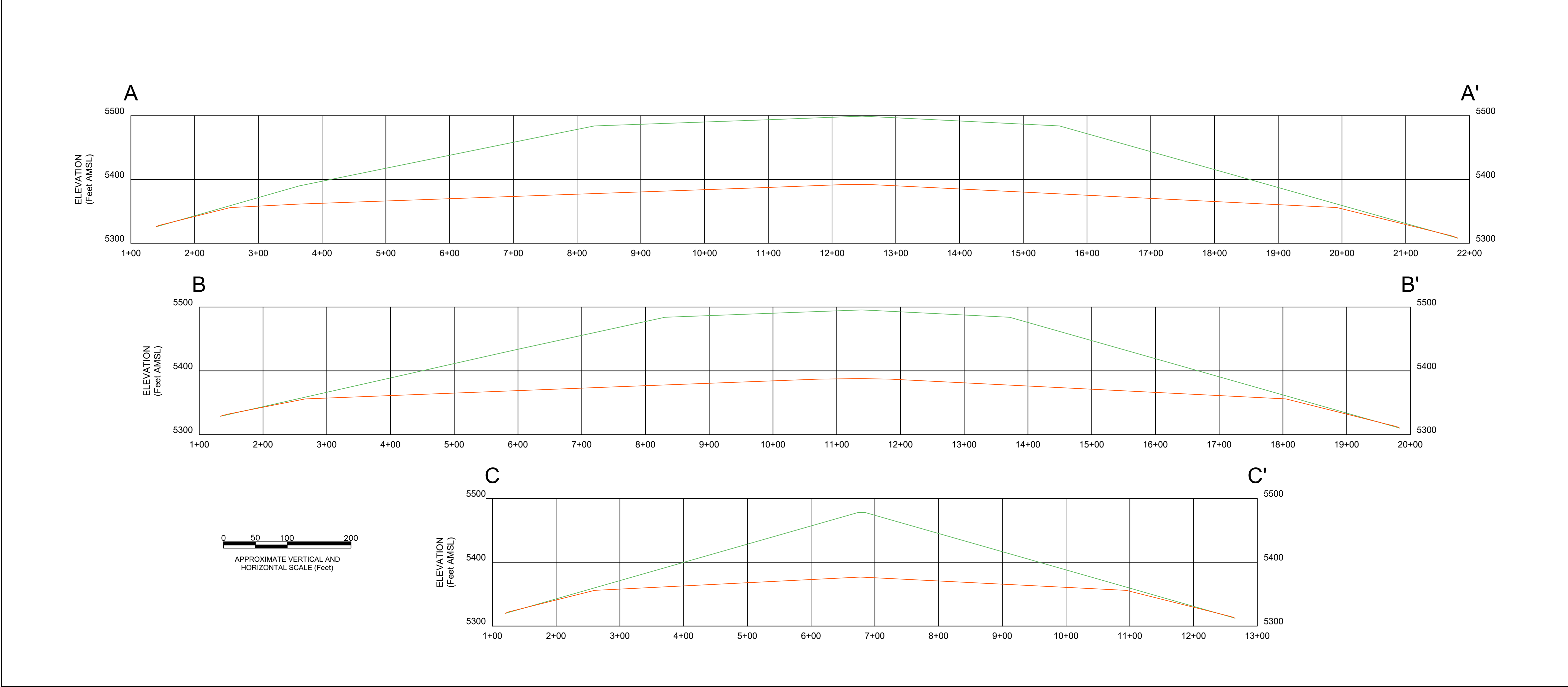
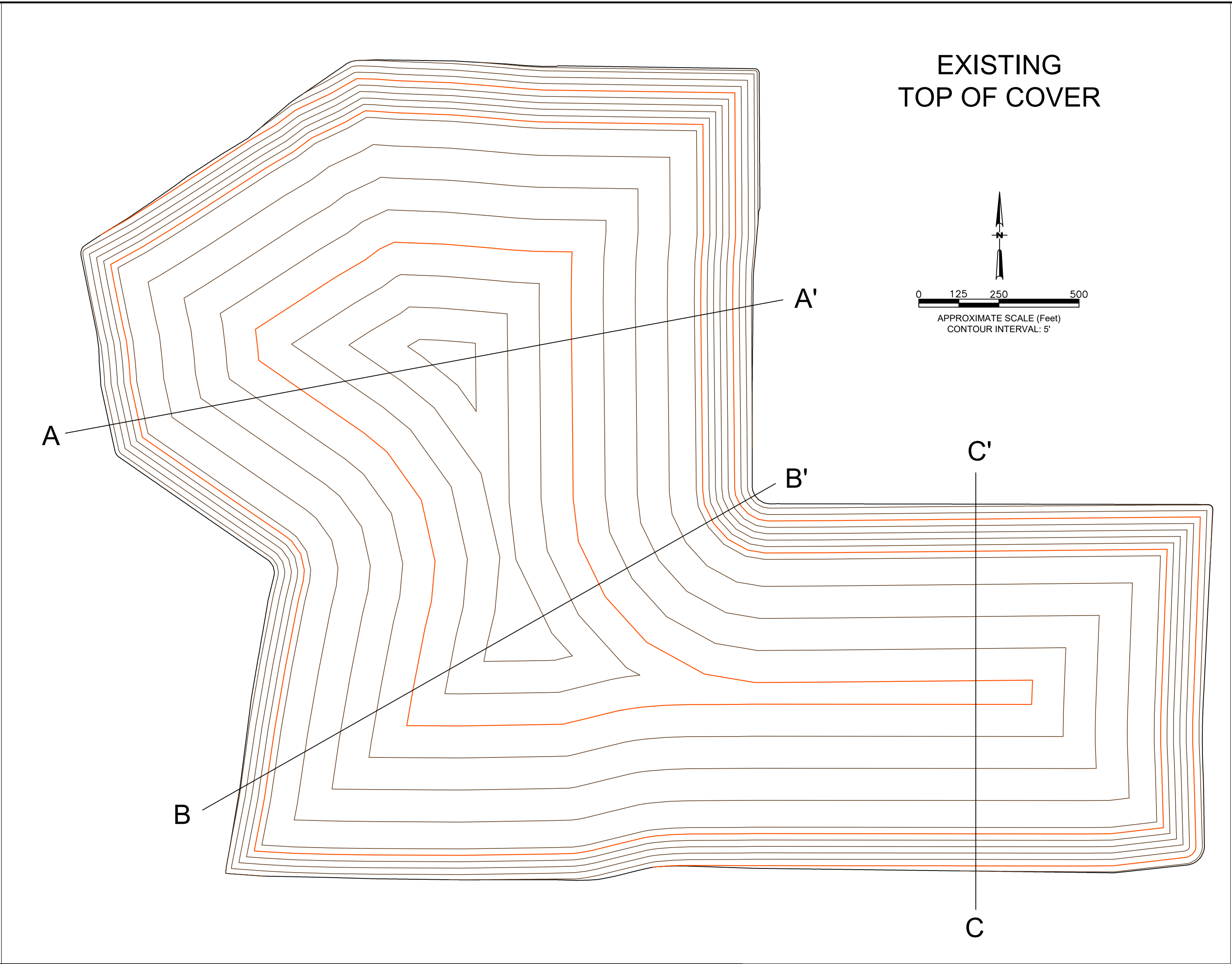
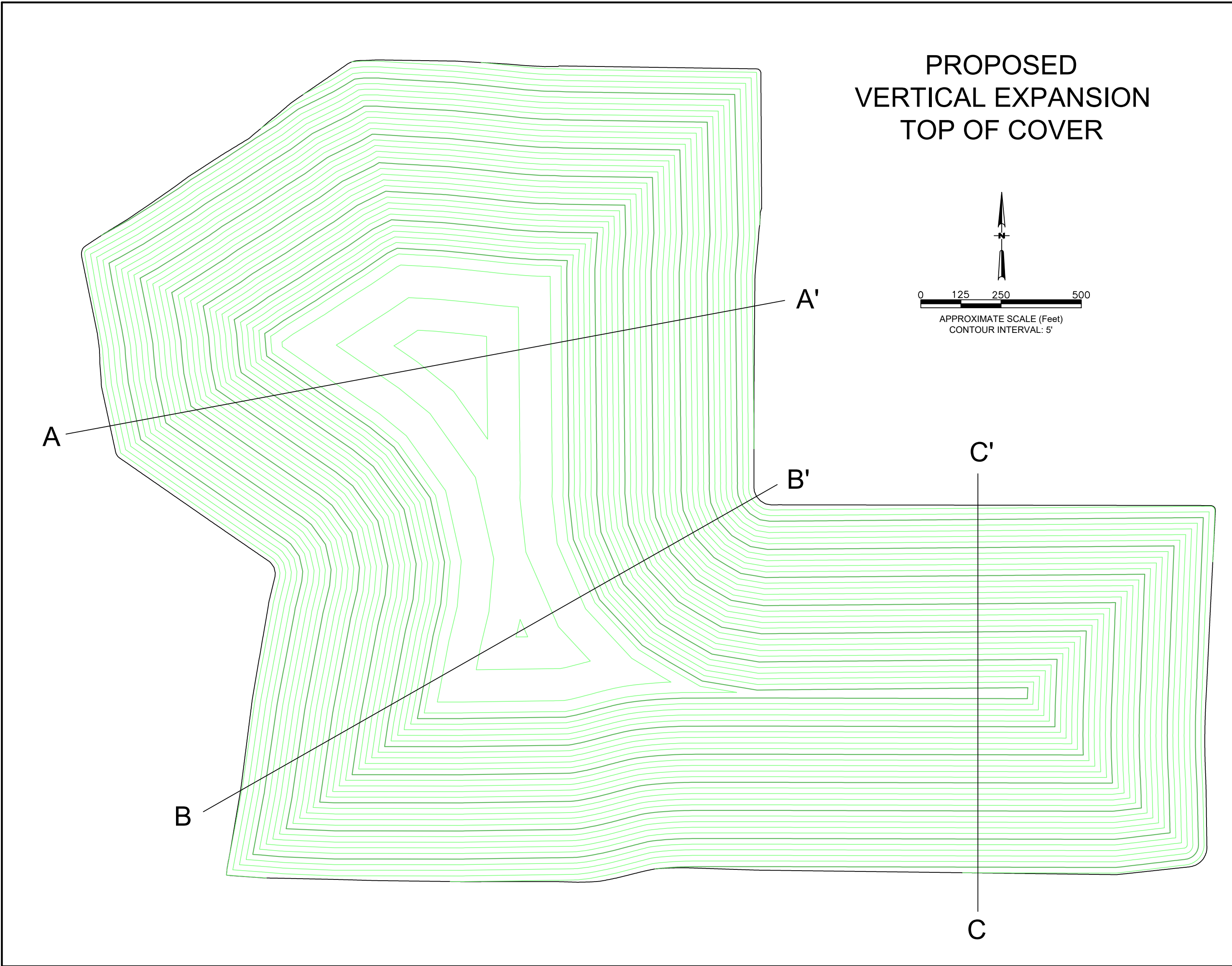
Attachment 2-2

Waste Capacity Table with Current and Proposed Designs

Table 1

ERL Landfill Capacity and Remaining Soil Requirements¹		
Gross Airspace (top of liner to top of final cover) ²	22,566,116	CY
Total Waste Airspace (top of protective soil to bottom of synthetic final cover) ³	22,022,035	CY
Remaining Waste Airspace after Expansion (2024 topo basis) ⁴	16,258,565	CY
Current Waste in Place (total waste airspace minus remaining waste airspace)	5,763,470	CY
Total Area	132.4	Acre
Module 1	61.2	Acre
Module 2	36.1	Acre
Module 3	35.1	Acre
SOIL REQUIREMENTS		
General Fill Soil Required to Bring Subgrade Up in Future Cells ⁵	35,535	CY
General Fill Soil Required to Outside of Cells ⁶	21,852	CY
Protective Cover Soil over Liner Needed for future cells ⁷	94,577	CY
Final Cover Soil Volume Required ⁸		
Water Balance Alternative Final Cover (AFC) (3.5-foot-thick soil)	772,449	CY
Synthetic Geomembrane Final Cover (1.5-foot-thick soil)	353,048	CY
Soil for Tack On Berms ⁹	58,317	CY
Remaining Daily/Int Cover Required (10% of Remaining Airspace)	1,625,856	CY
Remaining Soil Volume Required		
Total Soil Required Using AFC	2,608,586	CY
Using Synthetic Final Cover	2,189,185	CY
Available Soil from future Excavation ¹⁰	1,292,819	CY
Soil Deficit		
Soil Deficit using AFC	-1,315,767	CY
Soil Deficit using Synthetic FC	-896,366	CY

- Notes:**
- 1 All existing conditions calculations are based on the topography from April 22, 2024. All volume units "CY" are bank cubic yards.
 - 2 Gross Airspace includes volume from top of liner to top of final cover (including previously filled areas). Includes the 1-ft protective (operations layer) soils. All future cells will be lined with synthetics, and so they do not require any site soils.
 - 3 Total Waste Airspace is the volume available for solid waste and daily/intermediate cover in the entire landfill (including previously filled areas) without the 1-foot protective (operations layer) soil and without the 1.5-foot final cover soil required for the synthetic final cover option. If the AFC final cover option is used, the total waste airspace volume will be reduced to accommodate the additional two feet of soil used in the final cover construction.
 - 4 Remaining Waste Airspace is the remaining volume available for solid waste and daily/intermediate cover in the landfill. It is the volume from the 2024 existing top of waste in Cells 1-5 (already constructed at this time) and from the top of protective (operations layer) in future cells, to the base of the 1.5-foot-thick synthetic final cover system. If the AFC final cover option is used, the remaining waste airspace volume will be reduced to accommodate the additional two feet of soil used in the final cover construction.
 - 5 Volume of soil required to fill the 2024 existing ground surface to the design excavation grades in the future cells, within the limit of waste.
 - 6 Volume of soil required to fill the 2024 existing ground surface to the design excavation grades in the future cells, outside of the limit of waste. This is primarily the volume of soil required to build perimeter surface water control features and to build the portions of side slopes outside the limits of waste.
 - 7 Volume of soil required to construct the 1-foot protective/operations layer atop the liner in future cells.
 - 8 Volume of soil required to build the final cover system. There are two final cover options in the EDOP: a synthetic geomembrane final cover which requires an additional 1.5 feet of soil, and a water-balanced (alternative) final cover system requiring 3.5 feet of soil. These volumes do not include intermediate cover, which is budgeted separately.
 - 9 Additional soil required to construct the surface water control berms atop the final cover.
 - 10 Soil gained by excavating from the 2024 existing ground surface to the design excavation grades in future cells.



Attachment 2-3
FAA Notice of Construction

January 8, 2026

Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Service, AJR-322
10101 Hillwood Parkway
Fort Worth, Texas 76177

**RE: Form 7460-1
Notification of Proposed Construction or Alteration
Five Part Development, LLC Disposal Facility
Adams County, Colorado**

Five Part Development, LLC (Five Part) is amending its Certificate of Designation (CD) to vertically expand the Municipal Solid Waste (MSW).

Five Part does not believe that the requirements for submittal of this form under 14 CFR §77.13 are applicable to the amendment; however, as requested by the Denver International Airport (DEN) and the FAA, Five Part is submitting the enclosed Form 7460-1 and information regarding the proposed amendment. We also submitted the Pre Screening tool results. DEN requested that FAA be sent notice although it appears unnecessary.

Included in this submittal for reference are the following:

- Attachment 1. The completed Form 7460-1
- Attachment 2. A Vicinity Figure showing the location of the Five Part facility to DEN.
- Attachment 3. The required non-reduced 7.5-minute USGS Quadrangle showing the facility
- Attachment 4. The FAA screening tool results showing that the facility is not required to file notice with the FAA

Please contact me if you have any questions.

Respectfully Submitted on behalf of Five Part Development

AMERICAN ENVIRONMENTAL CONSULTING, LLC



Curtis Ahrendsen
Principal

cc: Ms. Melissa Montgomery, Five Part Development, LLC

ATTACHMENT 1

FORM 7460-1

NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION

§ 77.7 Form and time of notice.

(a) If you are required to file notice under §77.9, you must submit to the FAA a completed FAA Form 7460–1, Notice of Proposed Construction or Alteration. FAA Form 7460–1 is available at FAA regional offices and on the Internet.

(b) You must submit this form at least 45 days before the start date of the proposed construction or alteration or the date an application for a construction permit is filed, whichever is earliest.

(c) If you propose construction or alteration that is also subject to the licensing requirements of the Federal Communications Commission (FCC), you must submit notice to the FAA on or before the date that the application is filed with the FCC.

(d) If you propose construction or alteration to an existing structure that exceeds 2,000 ft. in height above ground level (AGL), the FAA presumes it to be a hazard to air navigation that results in an inefficient use of airspace. You must include details explaining both why the proposal would not constitute a hazard to air navigation and why it would not cause an inefficient use of airspace.

(e) The 45-day advance notice requirement is waived if immediate construction or alteration is required because of an emergency involving essential public services, public health, or public safety. You may provide notice to the FAA by any available, expeditious means. You must file a completed FAA Form 7460–1 within 5 days of the initial notice to the FAA. Outside normal business hours, the nearest flight service station will accept emergency notices.

§ 77.9 Construction or alteration requiring notice.

If requested by the FAA, or if you propose any of the following types of construction or alteration, you must file notice with the FAA of:

(a) Any construction or alteration that is more than 200 ft. AGL at its site.

(b) Any construction or alteration that exceeds an imaginary surface extending outward and upward at any of the following slopes:

(1) 100 to 1 for a horizontal distance of 20,000 ft. from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway more than 3,200 ft. in actual length, excluding heliports.

(2) 50 to 1 for a horizontal distance of 10,000 ft. from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway no more than 3,200 ft. in actual length, excluding heliports.

(3) 25 to 1 for a horizontal distance of 5,000 ft. from the nearest point of the nearest landing and takeoff area of each heliport described in paragraph (d) of this section.

(c) Any highway, railroad, or other traverse way for mobile objects, of a height which, if adjusted upward 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance, 15 feet for any other public roadway, 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road, 23 feet for a railroad, and for a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it, would exceed a standard of paragraph (a) or (b) of this section.

(d) Any construction or alteration on any of the following airports and heliports:

(1) A public use airport listed in the Airport/Facility Directory, Alaska Supplement, or Pacific Chart Supplement of the U.S.

Government Flight Information Publications;

(2) A military airport under construction, or an airport under construction that will be available for public use;

(3) An airport operated by a Federal agency or the DOD.

(4) An airport or heliport with at least one FAA-approved instrument approach procedure.

(e) You do not need to file notice for construction or alteration of:

(1) Any object that will be shielded by existing structures of a permanent and substantial nature or by natural terrain or topographic features of equal or greater height, and will be located in the congested area of a city, town, or settlement where the shielded structure will not adversely affect safety in air navigation;

(2) Any air navigation facility, airport visual approach or landing aid, aircraft arresting device, or meteorological device meeting FAA-approved siting criteria or an appropriate military service siting criteria on military airports, the location and height of which are fixed by its functional purpose;

(3) Any construction or alteration for which notice is required by any other FAA regulation.

(4) Any antenna structure of 20 feet or less in height, except one that would increase the height of another antenna structure.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177
Fax: (817) 222-5920

Website: <https://oeaaa.faa.gov>

INSTRUCTIONS FOR COMPLETING FAA FORM 7460-1

PLEASE TYPE or PRINT

ITEM #1. Please include the name, address and phone number of a personal contact point as well as the company name.

ITEM #2. Please include the name, address and phone number of a personal contact point as well as the company name.

ITEM #3. New Construction would be a structure that has not yet been built.

Alteration is a change to an existing structure such as the addition of a side mounted antenna, a change to the marking and lighting, a change to power and/or frequency, or a change to the height. The nature of the alteration shall be included in ITEM #21 "Complete Description of Proposal".

Existing would be a correction to the latitude and/or longitude, a correction to the height, or if filing on an existing structure which has never been studied by the FAA. The reason for the notice shall be included in ITEM #21 "Complete Description of Proposal".

ITEM #4. If Permanent, so indicate. If Temporary, such as a crane or drilling derrick, enters the estimated length of time the temporary structure will be up.

ITEM #5. Enter the date that construction is expected to start and the date that construction should be completed.

ITEM #6. Please indicate the type of structure. DO NOT LEAVE BLANK.

ITEM #7. In the event that obstruction marking and lighting is required, please indicate type desired. If no preference, check "other" and indicate "no preference" DO NOT LEAVE BLANK. NOTE: High Intensity lighting shall be used only for structures over 500' AGL. In the absence of high intensity lighting for structures over 500' AGL, marking is also required.

ITEM #8. If this is an existing tower that has been registered with the FCC, enter the FCC Antenna Structure Registration number here.

ITEM #9 and #10. Latitude and longitude must be geographic coordinates, accurate to within the nearest second or to the nearest hundredth of a second if known. Latitude and longitude derived solely from a hand-held G P S instrument is NOT acceptable. A hand-held GPS is only accurate to within 100 meters (328 feet) 95 percent of the time. This data, when plotted, should match the site depiction submitted under ITEM #20.

ITEM #11. NAD 83 is preferred; however, latitude and longitude may be submitted in NAD 27. Also, in some geographic areas where NAD 27 and NAD 83 are not available other datum may be used. It is important to know which datum is used. DO NOT LEAVE BLANK.

ITEM #12. Enter the name of the nearest city and state to the site. If the structure is or will be in a city, enter the name of that city and state.

ITEM #13. Enter the full name of the nearest public-use (not private-use) airport or heliport or military airport or heliport to the site.

ITEM #14. Enter the distance from the airport or heliport listed in #13 to the structure.

ITEM #15. Enter the direction from the airport or heliport listed in #13 to the structure.

ITEM #16. Enter the site elevation above mean sea level and expressed in whole feet rounded to the nearest foot (e.g. 17'3" rounds to 17', 17'6" rounds to 18'). This data should match the ground contour elevations for site depiction submitted under ITEM #20.

ITEM #17. Enter the total structure height above ground level in whole feet rounded to the next highest foot (e.g. 17'3" rounds to 18'). The total structure height shall include anything mounted on top of the structure, such as antennas, obstruction lights, lightning rods, etc.

ITEM #18. Enter the overall height above mean sea level and expressed in whole feet. This will be the total of ITEM #16 + ITEM #17.

ITEM #19. If an FAA aeronautical study was previously conducted, enter the previous study number.

ITEM #20. Enter the relationship of the structure to roads, airports, prominent terrain, existing structures, etc. Attach an 8-1/2" x 11" non-reduced copy of the appropriate 7.5 minute U.S. Geological Survey (USGS) Quadrangle Map MARKED WITH A PRECISE INDICATION OF THE SITE LOCATION. To obtain maps, contact USGS at 1-888-275-8747 or via internet at "<http://store.usgs.gov>". If available, attach a copy of a documented site survey with the surveyor's certification stating the amount of vertical and horizontal accuracy in feet.

ITEM #21.

- For transmitting stations, include maximum effective radiated power (ERP) and all frequencies.
- For antennas, include the type of antenna and center of radiation (Attach the antenna pattern, if available).
- For microwave, include azimuth relative to true north.
- For overhead wires or transmission lines, include size and configuration of wires and their supporting structures (Attach depiction).
- For each pole/support, include coordinates, site elevation, and structure height above ground level or water.
- For buildings, include site orientation, coordinates of each corner, dimensions, and construction materials.
- For alterations, explain the alteration thoroughly.
- For existing structures, thoroughly explain the reason for notifying the FAA (e.g. corrections, no record or previous study, etc.).

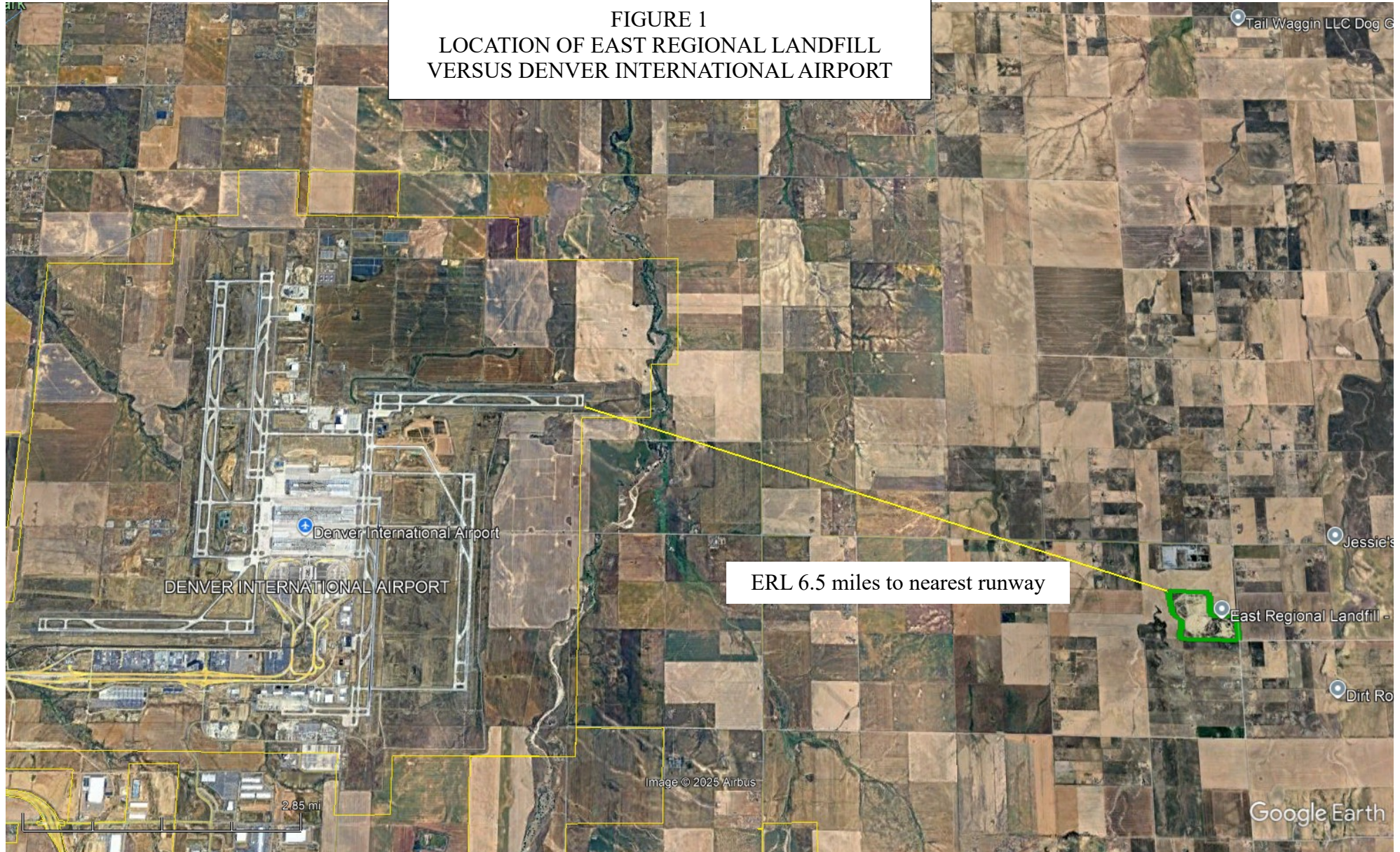
Filing this information with the FAA does not relieve the sponsor of this construction or alteration from complying with any other federal, state or local rules or regulations. If you are not sure what other rules or regulations apply to your proposal, contact local/state aviation's and zoning authorities.

Paperwork Reduction Work Act Statement: A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection displays a currently valid OMB Control Number. The OMB control number for this information collection is 2120-0001. Public reporting for this collection of information is estimated to be approximately 19 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, completing and reviewing the collection of information. All responses to this collection of information are mandatory for anyone proposing construction or alteration that meets the criteria contained in 14 CFR 77. This information is collected to evaluate the effect of proposed construction or alteration on air navigation and is not confidential. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to: Information Collection Clearance Officer, Federal Aviation Administration, 10101 Hillwood Parkway, Fort Worth, TX 76177-1524.

ATTACHMENT 2

FIVE PART FACILITY VICINITY FIGURE

FIGURE 1
LOCATION OF EAST REGIONAL LANDFILL
VERSUS DENVER INTERNATIONAL AIRPORT



ATTACHMENT 3

7.5 MINUTE USGS QUADRANGLE

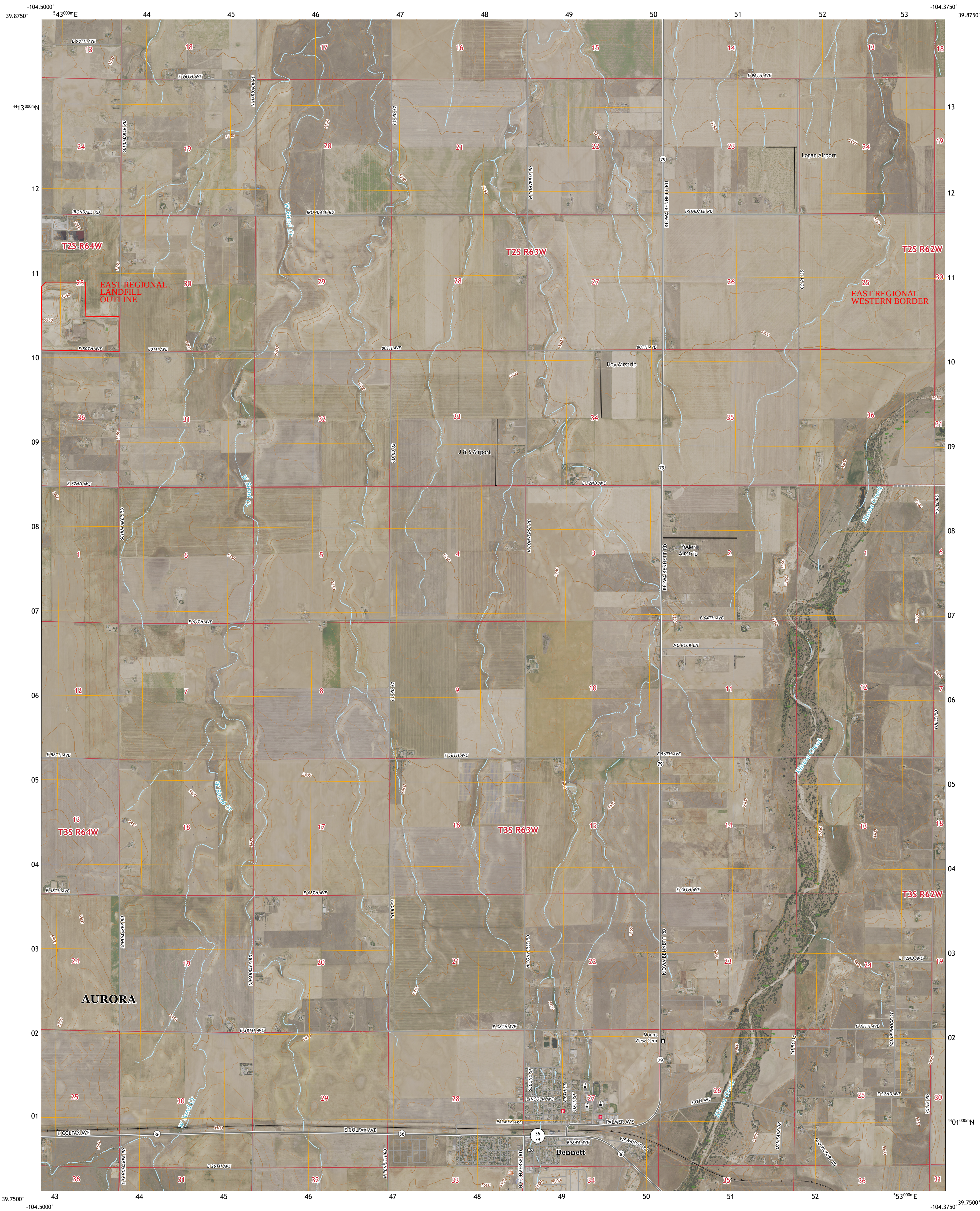
**TWO 7.5 MINUTES ARE INCLUDED SINCE THE FACILITY
SPANS THE MAP BORDER**



U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY



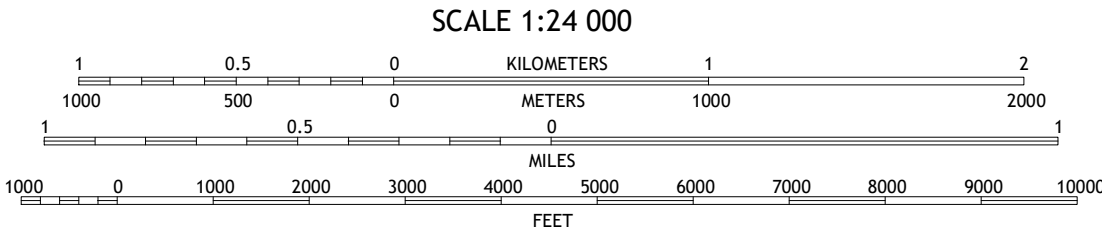
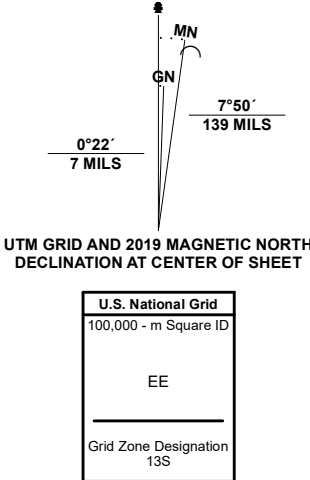
BENNETT QUADRANGLE
COLORADO - ADAMS COUNTY
7.5-MINUTE SERIES



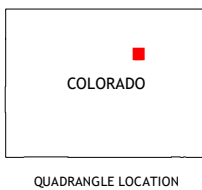
Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid/Universal Transverse Mercator, Zone 13S
This map is not a legal document. Boundaries may be
generalized for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Imagery.....NAIP, September 2017 - October 2017
Roads.....U.S. Census Bureau, 2016
Names.....GNIS, 1994 - 2021
Hydrography.....National Hydrography Dataset, 2002 - 2019
Contours.....National Elevation Dataset, 2020
Boundaries.....Multiple sources: see metadata file 2019-2021
Public Land Survey System.....BLM, 2021
Wetlands.....FWS National Wetlands Inventory, 1975



CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988
This map was produced to conform with the
National Geospatial Program US Topo Product Standard.



1	2	3
4	5	6
7	8	9

ADJOINING QUADRANGLES

1 Horse Creek
2 Sunnydale
3 Living Springs
4 Wamita
5 Roper School
6 Watkins
7 Strasburg NW
8 Strasburg

ROAD CLASSIFICATION	
Expressway	Local Connector
Secondary Hwy	Local Road
Ramp	4WD
Interstate Route	US Route
	State Route

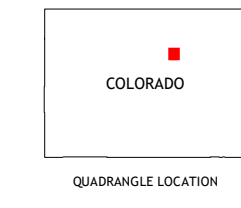
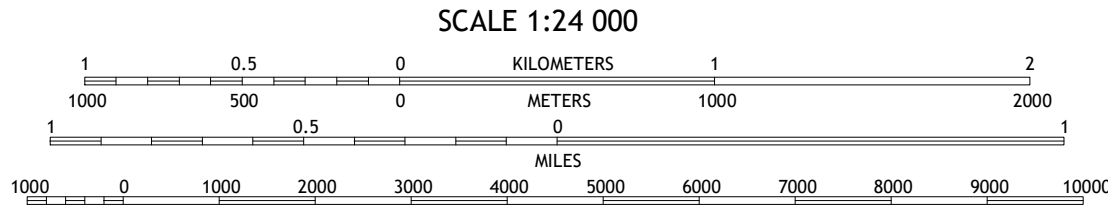
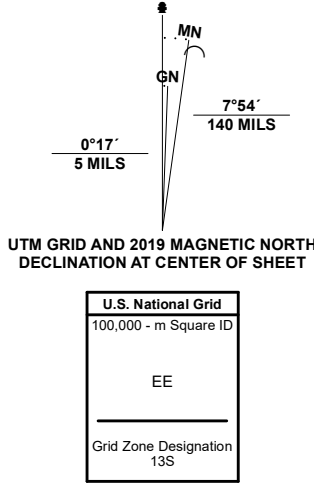
BENNETT, CO
2022





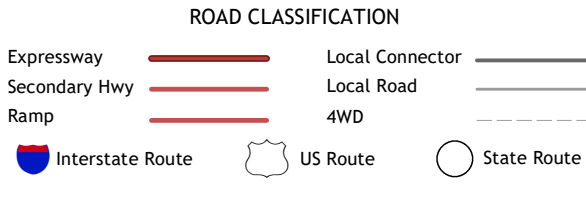
Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid/Universal Transverse Mercator, Zone 13S
This map is not a legal document. Boundaries may be
generalized for this map scale. Private lands within government
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Imagery.....NAIP, September 2017 - October 2017
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Names.....GNIS, 1978 - 2021
Hydrography.....National Hydrography Dataset, 2004 - 2019
Contours.....National Elevation Dataset, 2022
Boundaries.....Multiple sources; see metadata file 2019 - 2021
Public Land Survey System.....BLM, 2021
Wetlands.....FWS National Wetlands Inventory 1975 - 2010



1	2	3
4	5	6
7	8	9

1 Mile High Lakes
2 Horse Creek
3 Sunnyside
4 Denver International Airport
5 Bennett
6 Coal Creek
7 Watkins
8 Strasburg NW



ATTACHMENT 4

FAA PRESCREENING TOOL RESULTS

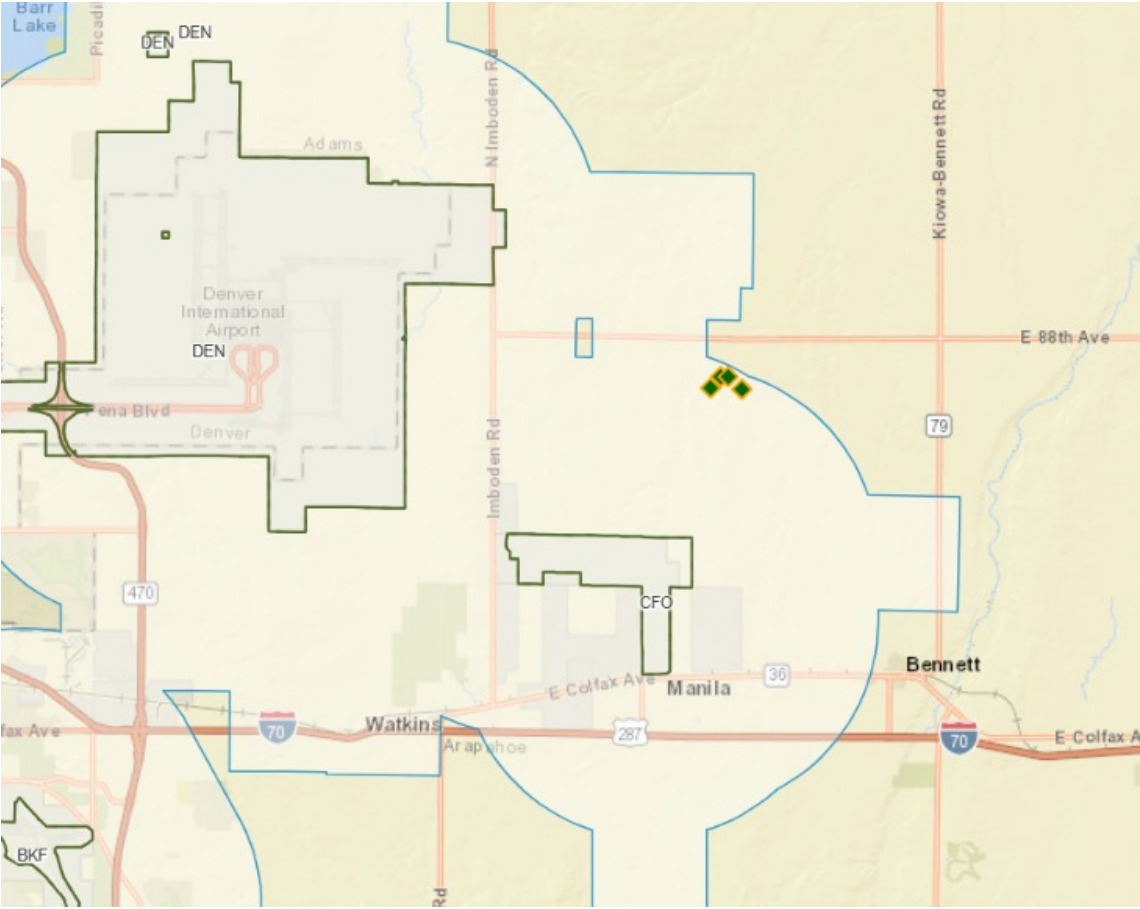
OE/AAA Pre-screening Results

Wed Jan 07 2026 14:14:03 GMT-0700 (Mountain Standard Time)

Structure: Existing Municipal Solid Waste Landfill

Latitude	Longitude	Height	Site Elevation	AMSL
39.843314	-104.4973	182	5324	5506
39.839733	-104.500964	164	5329	5493
39.839511	-104.489307	163	5324	5487
39.843137	-104.494454	182	5313	5495

Based on the information you provided, you are not required to file notice with the FAA.



Attachment 2-4

Redline EDOP, Original Doty EDOP (2006), Highlighted Version of EDOP Showing Changes and Updates Since 2006 CD and Written Summary of Changes from 2006 EDOP

Redline EDOP



Sustainability in Action

EAST REGIONAL LANDFILL ENGINEERING DESIGN AND OPERATIONS PLAN

Prepared for:

Five Part Development, LLC
East Regional Landfill
8201 Schumaker Road
Bennett, Colorado 80102
Adams County, Colorado

Prepared by:

American Environmental Consulting, LLC
8191 Southpark Lane, Suite 107
Littleton, Colorado 80120

February 2025

Original Document prepared by:
Doty & Associates
June 2006

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East Regional Landfill
Engineering Design and Operations Plan

February 2025

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1.0 INTRODUCTION

1.1 Purpose

This Engineering Design and Operations Plan (EDOP) and supporting appendices presents the design, monitoring, operating, closure, and post-closure plans for the East Regional Landfill (ERL) facility, located in Adams County near Bennett, Colorado for a vertical expansion of the facility. The ERL, originally called the Five Part Development Landfill and referred to as such in earlier documents, is owned and operated by Five Part Development, LLC (Five Part). This expansion does not include an increase in the filling footprint or landfill property size and only includes the vertical expansion. As such, many originally permitted portions of the landfill remain unchanged. The intention of this expansion EDOP is to update the entire EDOP and include both the unchanged portions of the current permit and the modifications as a result of this vertical expansion.

This EDOP provides a written overview of the landfill design and the operational methods used by ERL in meeting applicable County and State requirements including the Colorado Regulation Pertaining to Solid Waste Disposal Sites and Facilities 6 CCR 1007-2, hereinafter referred to as the "Regulations" or "State Regulations". The EDOP is a compilation of information and plans including the original permit work for the site proposed as an ash fill, the revisions to the permit to modify it to a Municipal Solid Waste (MSW) disposal facility, and the modifications made since the MSW permit approval.

Pertinent portions of the original EDOP are attached to this document as appendices. This EDOP and other referenced documents supersede all previous plans.

1.2 History

This document makes extensive reference to an EDOP (Industrial Compliance (IC), 1993) completed for a large parcel of property for which a Certificate of Designation (CD) for the disposal of coal combustion ash was originally granted on March 5, 1994 by Adams County

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East Regional Landfill

Engineering Design and Operations Plan

February 2025

Case Number 52-93-CD. This facility was called the Metropolitan Denver Coal Ash Disposal Facility (MDCADF) and was never developed. Conditions at the site were investigated in detail prior to the initial approval of the facility. This work is described in Section 3.0 of the 1993 EDOP, which is attached to this document as Appendix A. Relevant topics covered and approved in that EDOP include location restrictions, climatology, and characterization of the site. Location restrictions are excerpted from the 1993 EDOP and are included as Appendix C. In 2005, Alpine Disposal Services (Alpine) purchased Five Part Development and a portion of the MDCADF property and submitted an application for a new CD from Adams County as a Municipal Solid Waste (MSW) disposal facility, taking the form of a new EDOP called the Engineering Design and Operations Plan, Five Part Disposal Facility (Doty & Associates, November 4, 2005, Volume 1 and June 1, 2006, Volume 2), hereinafter referred to as the 2006 EDOP. Following an extensive public hearing process the Adams County Board of County Commissioners approved Alpine's application by Resolution, Case #EXG2009-00001, dated July 29, 2009. After fulfilling the necessary conditions precedent set forth in the Resolution, Adams County issued a conditional CD on September 1, 2010 to operate as an MSW disposal facility and the ERL began disposal operations on September 2, 2010.

In 2011, ERL applied for and was granted an amended CD to conduct composting operations at the facility, Case #EXG2011-00003. The design plan and requirements for the composting operation are contained within the document called Engineering Design and Operations Plan Compost Operations, East Regional Landfill (American Environmental Consulting, LLC March 10, 2011). Referred to as the 2011 Compost EDOP, this EDOP is not included in this document since it is a standalone document and was permitted separately from the MSW landfill.

Since the 2006 EDOP a number of revisions to the facility design and operations have been approved as a result of conditions in the CD, changing regulations, and changes requested by ERL. This revised EDOP is a complete, stand-alone EDOP meeting the requirements in the regulations and incorporates changes from the 2006 EDOP to the disposal cell designs, liner systems, facility configuration, surface water control, waste types, financial assurance, inspections and maintenance, ground-water monitoring, explosive gas monitoring, facility operations, environmental monitoring and closure/post-closure care, as well as operations that have been updated to meet the current Colorado Department of Public Health and Environment (CDPHE) standards, regulations, and ERL operating practices.

This EDOP was developed to incorporate the following approved design and operational changes:

- 1) Improved construction methods and operations of the facility from a reconfigured landfill footprint and modified base grades that optimized the use of the existing permitted landfill area to:
 - a) maintain a 10-foot separation to ground water,
 - b) provided an additional 10 feet of right-of-way (ROW) along Schumaker Road and deeded the ROW to Adams County,
 - c) prohibited landfilling or permanent structures within 40 feet of the southern property boundary along the south Section line of the facility, and provided at least 25 feet of

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East Regional Landfill

Engineering Design and Operations Plan

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landscaping depth along Schumaker Road and a landscaped buffer along the south side of the site.

The

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1.0 INTRODUCTION

This is a revised Engineering Design & Operations Plan (EDOP) for a portion of the already permitted Five Part Development Company Disposal Facility. This document describes a municipal solid waste disposal facility in the southwestern portion of the original permit area.

- 2) liner system was revised to substitute a Geosynthetic Clay Liner instead of using a 2-foot thickness of compacted clay and the leachate collection system was modified to substitute a geocomposite drainage layer in place of the one-foot layer of aggregate material and piping on the floor of the landfill.
- 3) Minor modifications to the facility final cover extent are incorporated to correspond to the re-configured landfill footprint in accordance with State Regulations.
- 4) A revised Waste Characterization Plan in compliance with the current standards and ERL practices.
- 5) Revisions to the facility operations, including but not limited to, the use of Alternative Daily Cover (ADC) materials and changes to the environmental monitoring network from that shown in the 2006 EDOP.
- 6) Updated site topography and coordinate system. The original site topography was developed in 1993 based on a local coordinate system. The site topography was updated by aerial photography in January 2012 based on a modified state plane system to allow correlation with offsite features and control points. This change in coordinate system resulted in an elevation change of approximately +3.87 feet. This elevation change did not actually change any of the points in space, but only the elevation designation.
- 7) A Landfill Gas Collection and Control System (GCCS) was installed in Module 1 of the ERL in 2022. Details on maintenance, compliance requirements, and monitoring of the of the GCCS are included in the Title V Operating Permit for the facility, Permit No. 10OPAD353.

Additionally, this EDOP was developed to incorporate the following not yet approved design changes.

- 1) Vertical expansion design. The revised final cover design modifies the cover slopes from a compound slope consisting of a 4:1 side slope with a grade break at 5,350 feet amsl to a 20:1 top slope to an apex at 5,392.37 ft amsl to a compound slope consisting of 3.5:1 side slopes from the cover toe to a higher grade break at 5,484 feet amsl where the slope changes to a 20:1 top slope with two apex points at 5,495.66 and 5,499.25 feet amsl. This design change increases the cover height by approximately 107 feet.
- 2) Final cover system redesign. The revised final cover system changes the final cover design from an Alternative Cover with 4-8 feet of loosely compacted soil to two possible options, a 3.5 foot-thick Alternative Final Cover System designed in accordance with the March 2013 Final

East Regional Landfill

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Guidance Document Water Balance Covers in Colorado or an LLDPE lined cover with drainage system and protective soil. Additionally, construction requirements for both of the final cover options are presented in a revised CQA Plan.

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1.3 Site Description

The facility is located west of Schumaker Road approximately one-half mile south of 88th Avenue (Irondale Road) in south central Adams County, Colorado. The site is located in the South 1/2 of Section 25, Township 2 South, Range 64 West, 6th Principal Meridian, Adams County, Colorado, approximately 6.75 miles northwest of the town of Bennett (Figure 1). The site consists of approximately 164.5 acres and its legal description is presented in Appendix P.) with the following physical address:

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Physical and Mailing Address:

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East Regional Landfill

8201 Schumaker Road

Bennett, CO 80102

(303) 685-2700 phone

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The This document makes extensive reference to the EDOP completed for the entire property (IC, 1993), for which a Certificate of Designation was granted in Adams County Case Number 52-93 CD. property consists of four parcels designated Parcel A through Parcel D originally totaling 164.17 acres, a slight reduction from that proposed in the 2006 EDOP. The eastern property boundary originally permitted and shown in the 2006 Plan extended to the 30-foot County Right-of-Way (ROW) along Schumaker Road. As a condition of the CD, Five Part Development granted Adams County an additional 10-feet of Right-of-Way (ROW), extending the County ROW to a total of 40-feet along Schumaker Road. The additional 10-foot ROW was deeded to Adams County, reducing the property by approximately 0.33 acres to 164.17 acres more or less. The original legal description of the property prior to the elimination of the 10-foot ROW and the ROW deeded to Adams County are included in Appendix B.

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The northwest corner of the property is also bisected by four buried gas lines running in a northeast to southwest orientation. Five Part Development granted a 70-foot ROW and a 20-foot access easement to Colorado Interstate Gas (CIG) for these pipelines. The pipelines have been surveyed and are shown along with the ROW and easement on the drawings included with this EDOP. The gas pipeline easements are also included in Appendix H. All disposal operations (the landfill footprint) are designed outside of this ROW and easement. There is some ERL property located across the ROW and easement that the ERL may use to support the landfill operations, such as buildings or equipment/soil storage. If approved by the pipeline company, ERL reserves the right to also use the property for borrow soils or any other potential needs of the landfill.

Pertinent portions of the original EDOP are attached to this document as appendices. This revised EDOP deals with minor changes to the disposal cell designs, facility configuration, surface water control, waste types, financial assurance, inspections and maintenances ground-water monitoring, explosive gas control system operation and monitoring, facility operation, environmental

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~~monitoring and closure/post-closure care.~~

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The EDOP is organized into the following sections:

~~Introduction~~
~~General Information~~
~~Site Description~~
~~Geology/Hydrogeology~~

~~Site Grading~~

~~Facility Details~~
~~Operations Plan~~
~~Environmental Monitoring~~
~~Closure/Post-Closure Plans~~
~~References~~

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2.0 GENERAL INFORMATION

2.1 FACILITY NEED

The facility will accept municipal solid waste for disposal in Cells C and D of the already permitted site. Disposal of municipal solid waste is intended to serve the areas of expected future residential growth in Adams County east of the Denver International Airport. The facility is expected to receive approximately 500 to 1,000 cubic yards (yds) per day in the first 5 years of operation with an increase to over 1,000 yds per day as more development occurs in the area.

2.2 FACILITY DESCRIPTION

The facility is located west of Schumaker Road and south of 88th Avenue (Irondale Road) approximately 6.75 miles north-northwest of Bennett and nine miles north-northeast of Watkins. The parcel to be used as described in this document consists of approximately 164.5 acres within the existing permit area. Disposal will occur on approximately 142.132 acres within the 164-acre permit boundary, with approximately 22.5 acres the remainder of the property used for surface water control, setbacks, easements, access roads and facility structures. The site is located in the South 1/2 of Section 25, Township 2 South, Range 64 West, 6th Principal Meridian, Adams County, Colorado (Figure 1). The property legal description is presented in Appendix P.

Municipal solid waste will be delivered to the facility by commercial solid waste collection operators and the general public. The majority of the solid waste is expected to be from local collection operations and the general public in the area. More information on the composition of the solid waste is found in Section 7.3 of this document.

2.3 ACCESS

The ERL also operates a Class II (by Colorado designation) compost facility under a separate CD dated September 28, 2011 (Case #EXG2011-00003) based on a March 10, 2011 EDOP for the compost operations. The compost operations are not a part of this EDOP.

1.4 Access

Commercial haulers will be allowed to use State Route 79 to reach 88th Avenue (Irondale Road). Haulers will proceed then west on 88th Avenue and then south on Schumaker Road to the site entrance. This route is shown on Figure 2. Alternative routes may be used in the future as the roads in the area are improved; however, the use of alternative routes. They may also use County Road 25 (Imboden Road) from the north or south to 88th Avenue, then east to Schumaker Road to the site entrance. The approved routes are shown on Figure 2. The owner may be required to assist Adams County in construction of a deceleration/right turn lane on 88th Avenue for turning onto Schumaker if warranted based on a traffic study to be conducted by Adams County. In addition, the ERL has an agreement to assist Adams County with paving Schumaker Road from 88th Avenue to the facility entrance when Adams County determines it is feasible.

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is subject to prior approval by the Adams County Director of Planning & Development and the Director of Public Works.

On the order of 25 to 50 average, approximately 70-85 vehicles are expected arrive daily to deliver waste to the facility on a daily basis. This additional use is. This is slightly more than the 25-50 vehicles anticipated in the 2006 Plan prior to operations but is still well within the capacity of the roads, based on the traffic study performed by Leigh, Scott and Cleary for the permitting of the adjacent Conservation Services, Inc., (CSI) Facility. The traffic study demonstrated capacities of 1,000 vehicles per day for Imboden Road and 5,000 vehicles per day for Irondale Road.

2.4 ZONING

1.5 Zoning

The subject ERL property is zoned A-3/Agricultural and has a Certificate of Designation for waste MSW disposal from Adams County-

2.5 FEES

The as well as a Class II compost operation. Adams County has deemed these uses compatible with the zoning and surrounding land uses following review of the application and the public hearing process.

1.6 Fees

The ERL will make payments to the Colorado Hazardous Substance Response Fund (HSRF), as required by the Colorado Department of Public Health & Environment (CDPHE) solid waste regulations. In addition, the operation facility will make payments to the Adams County Solid Waste Management Fund for administrative, monitoring, and inspection costs and expenses as required by the November 8, 1993 July 29, 2009 resolution granting the September 1, 2010 Certificate of Designation.

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2.1 Location Restrictions

ERL meets each of the nine siting criteria described in Section 3.1 "Location Restrictions/Site Standards" of The Colorado State Regulations and the site location was previously approved. Documentation demonstrating compliance with the location restrictions is included in Appendix A and has been placed within the facility operating record.

2.1.1 Seismic Impact Zone

The USGS 2014 Dynamic Seismic Hazard Map for the conterminous United States was used to find the seismic hazards at the East Regional Landfill. There is a 2% or less chance that the peak ground acceleration at ERL will exceed 8.18% of the earth's gravitational pull in 50 years (equivalent to 10% chance in 250 years), so the site is not located in a seismic impact zone. All components of the landfill design are designed to resist the maximum horizontal acceleration in lithified material for the site. Slope stability analyses are included in Appendix N.

2.1.2 Bird Mitigation Plan and Proximity to the Denver International Airport

As a part of the location restriction information requested by the Federal Aviation Administration (FAA), ERL worked closely with the FAA, the Denver International Airport (DIA) and the Front Range Airport (FRA) to prepare a bird mitigation plan for the facility. The control of birds at ERL deserves special consideration because of the potentially dangerous occurrences of bird strikes by aircraft. Federal regulations (40 CFR § 258.10), require owners and operators of municipal solid waste landfills to demonstrate that landfills within 10,000 feet of any airport runway used by turbo-jet aircraft or within 5,000 feet of any airport runway which receives only piston-type aircraft be designed and operated in a manner which does not pose a bird hazard to aircraft, and requires notification if a landfill is outside of these ranges but within five miles of certain airports. The CDPHE regulations mirror those in 40 CFR§ 258.10.

The ERL facility is located approximately four miles north of the Front Range Airport and eight miles east of the Denver International Airport and is in compliance with all of the USEPA and CDPHE requirements. The facility is not within 10,000 feet of any runway at either of the airports, and ERL provided notification to Ms. Linda Bruce, Colorado State Planner with the FAA of the planned development to accept putrescible waste in October 2007. Although not required by regulation, the ERL also submitted a completed Form 7460-1 dated June 1, 2009 at the request of the FAA for informational purposes.

In 2009, ERL prepared a bird mitigation plan for the facility (Appendix D) because of its relative location to the Denver International Airport. ERL met with and worked closely with representatives of the FAA, United States Department of Agriculture (USDA, as wildlife consultant to the FAA), DIA, and the Front Range Airport to explain the planned operations and develop effective bird mitigation procedures. Each entity was provided an opportunity to review the facility development and voice any concerns they may have as part of the permitting process for the ERL to accept putrescible wastes for disposal. The facility did not receive any negative

East Regional Landfill

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responses and received a number of positive responses. This bird mitigation plan provides more specific guidance for the control of birds at the facility in Section 7.5.2, Vector Control of this EDOP.

~~Conditions at the site were investigated in detail prior to the initial approval of the facility. This work is described in Section 3.0 of IC (1993), which is attached to this document as Appendix N. Topics covered there include:~~

~~• Location Restrictions;~~

~~• Existing Topography;~~

2.2 • Surface Water Drainage, and Groundwater

~~• Climatology;~~

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East Regional Landfill

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4.0 — GEOLOGY/HYDROGEOLOGY

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No waste will be placed below or into surface or ground water. The facility disposal areas are specifically designed to remain outside the limits of any surface water and above ground water. Additional precautions to control surface water runoff and runoff have been taken and include berms and ditches as necessary during operations. The permanent surface water control system is redesigned in this EDOP as part of the final cover vertical expansion. Operational and post-closure surface water drainage information and calculations are provided in Appendix E and the permanent stormwater control design is based on containing the 24-hour, 25-year storm event and controlling the 24-hour, 100-year storm event.

2.3 Permitted Wells Within Two Miles of Site

The Division of Water Resources data access page was used to update the water well information within two miles of the site, registered as of February 2024. Records provided by the State Engineers Office generally locate the wells by ¼, ¼ Section. A list of these wells based on the information provided is included in Appendix F.

2.4 Adjacent Land Ownership

The original permit document presents the information regarding landowners adjacent to the ERL Facility, as required by Adams County. This information was updated for this EDOP with records obtained from Adams County, and provides the name and address information and is included in Appendix G.

2.5 Site Characterization

Site geologic and hydrogeologic conditions were investigated in detail prior to the initial approval of the facility. This work is described in Section 4.0 of IC (4-9931993), which is attached to this document as Appendix 0-A. Topics covered there include:

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Regional Geology,

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Hydrogeologic Characterization, and

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Groundwater Flow Paths & Velocities.

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5.0

Specific site characterization work results including boring logs, packer test results, slug tests, etc are included in Appendix A. Some additional characterization work including HELP modeling has been done since the original work and is discussed in Section 3.2 of this document and is included in the base grade redesign in Appendix J.

2.6 Climatology

The climate data was prepared in the original permit document and is included in Appendix I.

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3.0 SITE GRADING & PHASED DEVELOPMENT

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5.1 DESIGN CONCEPTS

3.1 Design Concepts

The facility was redesigned using the basic design concepts of the 1993 approval when it was modified from the ash fill to a solid waste landfill. It was redesigned again in 2011 with a request to have the option of using a Geosynthetic Clay Liner (GCL) in place of the 2 feet of re-compacted clay. Another modification was completed in 2008 to use a geocomposite material in place of the granular collection material for leachate drainage on the floor of the landfill to the sump. A modification to the cover design is included as part of this revised EDOP. This modification includes a vertical expansion of the landfill fill area and a more detailed Alternative Final Cover design than what is presented in the 2006 EDOP as well as an optional final cover design that includes a LLDPE liner, drainage layer, protective soils, and vegetative soils.

3.1.1 Design Concept Summary

Specific design concepts were incorporated in the 2006 EDOP. Some of these concepts were modified subsequent to the issuance of the CD, predominantly as a condition of the CD, and have received approval from the CDPHE and Adams County and are incorporated in this EDOP. A comparison of the design concepts from the approved 2006 design with the designs incorporated herein are summarized below.

1. Disposal Area Footprint. The eastern and southern boundaries of the disposal area footprint have been modified from the 2006 design out of necessity to accommodate Adams County requirements for issuance of the CD and modify the perimeter drainage system to remain on the ERL property (the drainage system for the ERL in the 2006 EDOP extended northward into property not owned by ERL). The southern boundary of the drainage system and footprint was moved northward to comply with Condition Precedent #3 and #5 of the Resolution prohibiting landfill and permanent structures within forty feet of the South Section line and install a landscape buffer on the southern property boundary. The eastern boundary of the drainage system and the landfill footprint was moved westward to accommodate the additional 10-foot ROW dedeed to Adams County and the Condition Precedent #5 of the Resolution requiring at least 25-feet of landscape depth and screening berm along Schumaker Road. These modifications resulted in a slight reduction in size of the landfill disposal area footprint from the 2006 design. The disposal footprint is unchanged for this updated EDOP.

~~The facility was re-designed using the basic design concepts of the 1993 approval. Specific concepts incorporated in the new design are as follows:~~

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- o ~~Setbacks. The 1993 design called for 30 foot setbacks from all property boundaries except along Schumaker Road, where a 100 foot setback would be maintained. The new design complies with these setbacks except that the 30 foot setback was increased to 40 feet to~~

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~~allow for better perimeter access. The 40 foot setback is also maintained along the buried gas pipeline in the northwestern corner of the parcel.~~

- ~~2. e—Excavation Slopes. Consistent with the original 2006 design, all excavation slopes are 3:1 of the disposal area footprint are designed at 3H:1V (horizontal to vertical). The excavation slopes are unchanged for this updated EDOP.~~
- ~~3. e—Separation from Ground Water. The 1993 plan called for a 2006 EDOP maintained the minimum 10-foot separation between waste and the shallowest ground water from the 1993 design, a design requirement that is maintained in the current approved design. We checked the included in this EDOP. The depths to ground water in the wells and piezometers that remain remained accessible on the property in July 2005 and found were checked against the data presented in IC (1993) and were found to adequately represent current conditions. Additional piezometers installed in 2010 and discussed in Section 3.2 also verified the original concept of the site. Water levels from the “Perched Ground Water Zone” defined in IC (1993) were contoured and assumed to continue at a uniform grade to the east where the “Denver Aquifer Zone” has much lower water levels. As a result, this water level contour map is conservative in the eastern portions of the site and, and with the data from the 2010 piezometers was used as the basis for designing the top of liner grades.~~

~~e—In addition the excavation for Cell 10 remained open without maintenance for approximately two years before liner was constructed. This allowed surface water to accumulate in and surrounding the cell that infiltrated into the subsurface, resulting in the presence of temporary shallow groundwater above the designed base of Cell 10. An attempt was made to drain the artificially-induced groundwater so that the cell could be constructed as originally designed, but was unsuccessful. In order to expedite construction, the base grades for Cell 10 were raised a minimum 10-feet above the artificial groundwater, necessitating a redesign of the base grades in the vicinity of Module 3 and minor changes in the rest of the landfill as reflected in the approved March 2, 2011 *East Regional Landfill Revised Excavation Plan and Liner Design* document included in Appendix J.~~
- ~~4. Liner System. This The 2006 design uses the same liner system as presented in the original design. It consists consisted of two feet of compacted clay with a saturated hydraulic conductivity of ~~1 x 10⁻⁷~~ centimeters per second (cm/s) or less, overlain by a 60 mil high density polyethylene (HDPE) geomembrane. Subsequent to construction of the first disposal cell (Cell 10) the ERL was approved to substitute a geosynthetic clay liner (GCL) in place of the two feet of compacted clay as an option for the remaining landfill construction.~~
- ~~5. e—Leachate Collection System. The leachate collection system (overlying design presented in the liner system) 2006 EDOP consists of a one-foot thick drainage layer with leachate collection piping leading to two sumps. The concepts Prior to construction of the leachate collection system first disposal cell the ERL was approved to substitute a geocomposite drainage layer in place of the one-foot aggregate material and piping. The one-foot aggregate drainage layer and piping is no longer an approved option.~~

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6. Landfill Gas Collection and Control System. To meet the requirements of 40 CFR Part 60 Subpart WWW (now subpart Cf with state plan approval) a Landfill Gas Collection and Control System (GCCS) was installed in Module 1 in 2022. The GCCS consists of 31 vertical extraction wells, transmission piping, 3 condensate traps, one condensate sump at the flare skid, a flare, and gas handling skid. Design, operational, and monitoring details for the GCCS are functionally identical to those in the original design included in the approved documents: East Regional Landfill's Gas Collection & Control System Plan, dated August 13, 2021, developed by Smith and Gardener Engineers, and the facility's Title V Operating Permit, Permit No. 10OPAD353.

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o Final Cover Slopes. Consistent with the 1993 plan, all external slopes were designed at 4:1 grades. Grades on the top of the fill were steepened to 5 percent to comply with the Colorado regulations.

o Fill Height. The 1993 design intended that the fill height be on the order of 40 feet. The 4:1 side slope heights in the new design range from 24 to 48 feet and are less than 40 feet on average.

5.2 EXCAVATION PLAN

7. As discussed earlier, the Final Cover Height and Elevation. The 2006 final cover configuration was designed with two "peaks" and a maximum height of approximately 90 feet above the lowest portion of the surrounding ground surface at an elevation of approximately 5,392-feet amsl (above mean sea level) based on the updated state plane coordinate system discussed in Section 1.2. The side slopes in the 2006 Plan were designed at a 4:1 maximum slope up to an elevation of approximately 5,356-feet amsl and five percent up to the final grades. The final sideslope configuration included in this EDOP was designed with a maximum height of approximately 200 feet above the lowest portion of the surrounding ground surface and changes the side slope configuration to be 3.5:1 slopes from the cover toe to a higher grade break at approximately 5,484-feet amsl to the 5% grade at the top to the two peaks resulting in a peak design elevation of approximately 5,499-feet amsl (adjusted for the change in coordinate system).

8. Final Cover Design. The 2006 final cover design proposed an Alternative Final Cover system using a water balance model to limit infiltration into the waste mass. This EDOP continues to propose an AFC using the same water balance model, but provides additional design and construction criteria including a demonstration of the feasibility of this type of AFC and a CQA Plan for its construction. This EDOP also proposes a possible final cover option of using a synthetic-lined cover for the final cover and includes a CQA Plan for its construction.

3.2 Grading and Excavation Plan

The site excavation was designed to continue using the concept that a minimum separation of 4

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10 feet must be maintained between waste and the shallowest ground water. All excavation slopes are 3:1 and the toe of the excavation has a setback of 40 feet from the property boundaries (and the gas pipeline), except The fill area side slopes have 3:1 grades. The base grades of the landfill floor range in slope from a 1 percent grade to a 4.25 percent grade depending on the module and module area. As previously noted, the redesigned landfill excavation plan maintains a 10-foot separation from the top of the liner to the highest groundwater elevation. The ERL submitted a document entitled *East Regional Landfill Revised Excavation Plan and Liner Design* (AEC, March 2, 2011) that reflected the following:

1. Adjustments to the disposal area footprint necessitated by the Adams County ROW and landscape requirements,
2. Raised the original base grades to ensure the minimum separation to groundwater was maintained,
3. Modified the configuration of the base grades to incorporate three separate leachate sumps instead of the two sumps shown in the 2006 EDOP.

A copy of the March 2, 2011 Plan and CDPHE approval is included in Appendix J. Drawings showing the approved plan for each liner system options and final cover are included in this EDOP as Plates 3A, 3B, and 4.

Modifications to the approved grading plan became necessary after changes were made to the disposal area footprint and property boundary during the public hearing process and also by conditions encountered during construction of Cell 10 requiring raising the base grades in some areas. Additionally, supporting documentation was prepared to demonstrate that the plan meets the CDPHE regulatory requirements.

As stated above, the facility has a minimum 10-foot separation requirement between the top of the clay liner surface and underlying groundwater. A number of piezometers were installed at the facility in 1991 and 1992 to characterize the subsurface for the original permitting of the facility as a coal ash disposal facility. The water levels in these piezometers were measured at various times between installation and March 1993 to establish static groundwater elevations. Nearly all of those piezometers have been destroyed, so an additional 18 piezometers were installed in November 2010 through February 2011 to verify the original groundwater characterization data and better define the groundwater surface for purposes of the redesign of the grading plan. The piezometers installed in 1991 and 1992 are noted as "pre-existing" and the piezometers installed in 2010 noted as "new" in the attached drawings in Appendix J. In general, the piezometers installed in 2010 verify that the 1991/1992 groundwater data was accurate. As can be seen on Sheet 4, Appendix J, many piezometers are nested or placed in very close proximity to each other, but they indicate a difference in groundwater elevations. For purposes of designing the base grades for the landfill that ensure the required separation, the highest groundwater elevations, which are shown on Sheet 4, Appendix J, were used in these cases. The resulting redesigned landfill grades demonstrate a minimum 10-foot separation between the top of clay (or GCL liner) and the underlying groundwater.

A few of the piezometers, particularly those completed in February 2011 (PZ-98, PZ-99, and PZ-100) are dry to the total depth completed. For purposes of developing groundwater contours and

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establishing a minimum separation between the top of the liner elevations and the underlying groundwater, groundwater was assumed to be present at the total depth of the dry piezometers. The resulting redesigned landfill grades demonstrate a minimum 10-foot of separation between the top of clay (or GCL liner) and the underlying groundwater. The drawing showing the groundwater contours and the landfill grades on the top of clay surface (or GCL surface) are included in Appendix J. The groundwater contours were developed based on the highest recorded groundwater elevation where conflicting elevations are indicated in nested or nearby piezometers, so the drawings in Appendix J include only the piezometers and groundwater elevations used to develop the groundwater contours.

Additionally, the March 2, 2011 Plan modified the excavation plan to include 3 sumps instead of the originally planned 2 sumps. Updated HELP modeling is included in in Appendix L demonstrating that the modified excavation plan is in compliance with the Regulations.

As discussed in Section 1.2, the site topography was updated with new aerial photography in January 2012. The 2006 EDOP and the March 2, 2011 Plan was designed using the original local coordinate system. In conjunction with the 2012 aerial mapping the coordinate system was converted to a modified state plane system, resulting in an approximately +3.87-foot conversion factor for elevation from the original local coordinate system. Therefore, the elevations shown on the attached design drawings have been updated to reflect an elevation conversion factor of approximately 3.87 feet higher than the local coordinate system (shown in Appendix J) although they represent the same point in space.

3.3 Liner Design Modification

The March 2, 2011 Plan included a request to use an optional Geosynthetic Clay Liner (GCL) instead of 2-feet of clay and that option is reflected in this EDOP. As with the previously approved design, a 60-mil HDPE membrane will remain but be placed on top of the GCL rather than the clay. The grading plan continues meet the requirement of a minimum separation between the top of the liner and the groundwater of 10 feet, as approved in the EDOP prepared by Doty & Associates, LLC (June 2006).

An equivalency determination to compare the option of using a GCL in place of the originally approved 24 inches of clay beneath the High Density Polyethylene (HDPE) liner was prepared as part of the March 2, 2011 Plan. This change was approved by the Division and Adam's County and incorporated into the EDOP. Liner details are shown on Plate 5. A revised Construction Quality Assurance Plan (CQAP) was developed as part of this EDOP to incorporate final cover modifications and includes the requirements for installing a GCL. No other changes are made to the CQAP from previous versions regarding the liner system. The revised CQAP is included in Appendix M.

3.4 Leachate Collection System Modification

The leachate collection system was modified to use a geocomposite drainage material rather than the originally approved aggregate material layer. This modification was revised in 2008 by Terracon, Inc. and approved by the CDPHE in a letter dated July 15, 2008 (Appendix K). The

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COAP (Appendix L) was also modified to include the installation procedures and testing for the material. Transit time calculations to estimate the length of time it would take leachate to travel from the farthest point in each module to that module's sump are included in Appendix J. The transit times were prepared based on the modified landfill base grades and longest flow pathways, including leachate travel down the landfill sideslopes, and are well within the maximum 365-day requirement. Details of the approved leachate collection system are included in Plate 6.

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3.5 Stormwater Control System Redesign

The disposal area boundary and fill limits were revised from the 2006 design to provide additional ROW along Schumaker Road where the setback is 1 00 feet. The setback along Schumaker Road is actually somewhat larger than 1 00 feet in the southern portion of the site because of the need to construct a ditch to and landscaping as a condition of the CD as well as to provide room for design of a permanent perimeter surface water control system. The permanent surface water control system was designed to control the 100-year, 24-hour storm event in compliance with regulations and documented in the *Drainage Report and Plan, Five Part Landfill* dated December 2009. The vertical expansion of the final cover necessitates a redesign to the permanent surface water control system. The redesigned surface water control system is included in Appendix E. This redesigned system is designed to fully contain the runoff from a 25-year, 24-hour Type II storm and control the runoff from a 100-year, 24-hour Type II storm. The system consists of tack on berms on the final cover that route surface water from upstream areas runoff to perimeter drainage ditches around the facility. In addition, room was left for a easier building and other entrance operations on Schumaker Road. The facility shop will be located northwest of the disposal area and to two site outfall locations. The ditch system also incorporates detention weirs to fully contain the 24-hour, 25-year storm volume and assist in limiting off-site sediment transport and is designed between the disposal area footprint and the required landscape areas on the south and east property boundaries. It is designed on the inside (landfill side) of the 20-foot KinderMorgan gas pipeline easement adjacent to the disposal area. The ditch and associated structures will be constructed in phases concurrent with the disposal area phasing and closure to control run-on to the active disposal areas and runoff from the landfill.

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The constraint that the base of excavation (actually top of liner) be 10 feet above shallowest ground water worked well in all portions of the site except along the southern portion of the east boundary. In this area, the separation from ground water constraint resulted in essentially no excavation. In order to provide adequate waste containment, a compacted clay berm was designed in this area. The berm ranges in height from about six to ten feet and has an outside slope of 4:1 and an inside slope of 3:1. The top of the berm has a width of ten feet. The resulting excavation plan is shown on Figure 3 and Sheet 2.

5.3 FINAL GRADES

Final grades were then designed beginning at the toe of the excavation and progressing upward at

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4:1 to elevation 5352 feet. Above elevation 5352, 5 percent slopes were designed, rising toward the center of the site. The resulting final grades (top of cover) are shown on Figure 4 and Sheet 1.

5.4 SOIL/MATERIAL BALANCE

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3.6 Final Grades

The final grades and landfill height are modified in this EDOP. The maximum height at the top of the final cover is at an elevation of approximately 5499-feet (modified state plane system), approximately 107 feet higher than the previously approved cover design (elevation 5392). The final cover topography is shown on Plate 4.

3.7 Final Cover System

The final cover system design is updated in this EDOP from the originally approved water balance cover of 4-8 feet thickness of monolithic lightly compacted soils to two options. The first option is a water balance cover with 3.5 feet of thickness of monolithic lightly compacted soils. The second option is a final cover consisting of one foot of prepared subbase overlain by a LLDPE membrane covered by 1.5 foot thick vegetative layer. These final cover options are discussed further in Section 4.4.

3.8 Soil/Material Balance

The facility ~~has been~~was originally designed to result in a material quantity balance, considering clay ~~for the liner and toe berm, daily and intermediate cover and final cover requirements. Areas where excavation is expected to be in claystone (and to produce excess clay for use in other areas) are shown on Figure 5. Because a relative thick evapotranspirative final cover will be used at the facility, the design thickness of the final cover was varied to yield a small total. However, due to the base grade redesign, less excavation soil excess for the operation is available than originally anticipated. In the future, the ERL will acquire a borrow source.~~ The various excavation and fill volumes are presented in Table 1.

5.5 PHASING PLAN

~~The first activities to develop the site will be the construction of Cell 1 (Figure 6), together with appropriate facility structures. The cashier building or other appropriate access control facility will certainly be installed at this point; the shop will be constructed as needed by the operation.~~

~~On a preliminary basis, it is envisioned that the cell one higher in number will be under construction while each cell is being filled with waste (e.g., Cell 2 will be under construction while Cell 1 is being filled). Soils excavated from Cells 1 and 2 will be stockpiled on Cells 11 and 12. Each cell will be filled to a convenient interim grade (perhaps elevation 5320). At that point, filling will begin in the next higher numbered cell. Soils excavated from Cells 3 through 12 will be stockpiled on the interim fills in any filled cells existing at that time. Construction of Cell 9 will be delayed to allow use of the natural drainage system as long as possible; the perimeter ditch will be constructed to convey runoff around the fill prior to the start of Cell 9 construction.~~

~~Eventually, fill will be placed above the interim grade to the final refuse grade (final grade less the cover thickness) in the northwestern portion of the site. Soils stockpiled on nearby cells will be~~

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~~used for daily/intermediate and final cover, thereby preparing the nearby cells for additional fill.~~

~~This process will continue back across the site, from northwest to southeast.~~

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3.9 6.0 Phasing Plan

The 2006 EDOP segregates the landfill footprint into pre-established “cells” of a specific size. The designation of specific cells is arbitrary and cumbersome in that only portions of cells may be constructed at any one time in practice, requiring a change in the designation of the area constructed during any one event (e.g., Cell 8-Phase 1) or any construction event includes portions of one or more cells (e.g., Cell 8-Phase 3; Cell 9-Phase 1). To simplify the nomenclature, the landfill footprint in the approved grading plan is segregated into three Modules that are defined by physical design features (i.e., a drainage area). A Module is defined as an excavated disposal area of the landfill that drains to a single leachate collection sump located in that module. Within each Module, individual cells will be constructed as they are needed and the size and timing of cell construction is left to the discretion of the landfill operator and based on such considerations as the volume of airspace desired for a period of time and budgetary constraints. With the exception of Cell 10, which was named based on the nomenclature in the 2006 EDOP, any portion of a disposal area constructed at one time will define a cell and the cells number will be sequential. For example, Cell 1 was constructed in one continue construction event, but has two designations, Cell 1A and Cell 1B because it was necessary to document the construction in two separate construction reports. The next cell to be constructed will be called Cell 2, the following cell name Cell 3, etc.

Development of the disposal area at the site began with Cell 10 of Module 1 located in the northeast corner of the site and contains the sump for Module 1. Cell 1 was constructed in 2011 adjacent to Cell 10 to the west and extends to the western boundary of the fill area footprint. Cell 2 was constructed in 2014 adjacent to Cell 1 to the south and extends to the western boundary of the fill area footprint. Cell 3 was constructed in 2015 adjacent to Cell 2 to the south and extends to the western boundary of the fill area footprint. Cell 3 extends to the southern boundary of the Module 1 fill area footprint. Cell 4 was constructed in 2018 adjacent to Cell 2 and Cell 3 to the east and Cell 10 and Cell 1 to the south. Cell 4 was the final cell in Module 1. Cell 5 was constructed in 2022 as the first cell in Module 2 and contains the sump for Module 2. Cell 5 is in the northern part of Module 2 and is immediately south of Module 1. The currently constructed area includes all of Module 1 and the first cell (Cell 5) of Module 2. Cell construction will generally progress southward in an east-west configuration until the southern boundary of the disposal area footprint is reached, and then cell development will progress eastward to the eastern footprint boundary. Overall, cell development of the site will progress in a northwest to southeast manner.

It is envisioned that the next cell area will be under excavation and/or construction while filling continues in previously constructed cells. Daily and intermediate cover soils may be borrowed from the excavation for the next cell or from existing stockpiles.

4.0 FACILITY DESIGN DETAILS

6.1 LINER

4.1 Liner

The entire excavation will be covered with a composite liner system consisting of ~~two feet of compacted clay overlain by a GCL and 60-mil HDPE geomembrane. In areas of excavation in claystone, the material will be overexcavated two feet, reworked, and compacted into place at a density of at least 95 percent of the Standard Proctor maximum density at a moisture content wet of optimum. Based on data presented in IC (1993), in-place saturated hydraulic conductivities of 1×10^{-7} cm/s, or less can be achieved in this manner. In other areas, the subgrade will also be overexcavated two feet optionally a CCL and claystone material from other portions of the excavation will be used to create the compacted clay 60-mil HDPE geomembrane. Details of liner, as described above, system are shown on Plate 5. The surface of the clay liner will be smoothed using a flat wheel or drum compactor prior to placement of the geomembrane. Construction quality assurance procedures are specified~~ revised CQA Plan is included in Appendix QL.

The 60 mil HDPE geomembrane will be new material, manufactured with first quality high density polyethylene resin. Textured HDPE will be used ~~on all side slopes.~~ The geomembrane will be anchored along the crest of the excavation or the toe berm in a ~~three-two-foot wide and threeby two~~ foot deep anchor trench. Seams will be sealed between the separate geomembrane sheets using either double fusion welds or extrusion welds. Construction quality assurance procedures are specified in Appendix QL.

6.2 LEACHATE COLLECTION SYSTEM

4.2 Leachate Collection System

A leachate collection system ~~will be constructed consisting of a geocomposite drainage layer and three leachate removal sumps (one for each module) is designed~~ on top of the composite liner (above the HDPE membrane) to route any free liquid at the base of the facility to ~~two~~ leachate removal sumps. ~~The leachate collection system consists of the following, located in each Module.~~

4.2.1 Geocomposite Drainage Layer:

The 2006 EDOP incorporated a one-foot thick drainage layer ~~will be 1-2 inches thick and have a minimum hydraulic conductivity of 1×10^{-2} cm/s aggregate materials supplemented by a piping system. The aggregate material and piping has been eliminated as an option for the leachate drainage layer will consist and a geocomposite drainage material was approved in its place in a series of medium design modifications prior to fine, uniformly graded, rounded to subrounded sand the construction of Cell 10. The sand will have no particles larger than 3/8 inches and will have less than 2 percent passing the No. 200 sieve. The drainage layer will cover the bottom of the facility, the excavated geocomposite consists of a polyethylene drainage net with geotextile~~

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~~fabric bonded to each side slopes and the toe berm (i.e., and designed over the entire floor of the landfill (not the side slopes). The material requirements, installation procedures, and CQA procedures are detailed in the drainage layer will extend up all slopes to within one vertical foot CQA Plan in Appendix L. Details of the crest of the anchor trench) leachate collection system are included on Plate 6.~~

~~**Piping.** A piping system consisting of 6-inch diameter perforated Schedule 80 polyvinyl chloride (PVC) will be installed within the drainage layer. Perforations will be 1/2-inch in diameter. Based on the 2-percent slope of the liner system and the specified drainage layer hydraulic conductivity, the pipes can be spaced at 1,500 feet; however, a smaller collection pipe spacing was selected for constructability and for the sake of conservatism. Any leachate will enter the piping system in well under 1-2 months. The leachate collection system piping layout is shown on Figure 7 and Sheet 2. The piping will be wrapped in filter fabric, placed directly on the geomembrane and then buried in the drainage material.~~

~~4.2.2 Two leachate removal sumps. The sumps will consist of an area 6 foot by 6 foot in plan that is depressed one foot below the surrounding liner grade (2:1 side slopes). The thickness of Sumps~~

~~Three sumps, one in each Module, are designed at the landfill to provide for collection and removal of leachate. Each of the sumps are configured slightly different but range from approximately 68 to 85 feet wide at the top and all are approximately four feet deeper than the surround elevations on the floor. The sump is lined identically to the floor and sideslopes of the landfill (a composite liner with the 60-mil HDPE overlaying either the compacted clay beneath the sump area will be increased to three feet and the geomembrane will be continuous through the sump area. A 1-2or GCL).~~

~~An 18-inch diameter perforated SDR 4-717 HDPE pipe will be installed on the floor of the sumpsumps and connected to a similar solid riser pipe running up the composite-lined side slope. Perforations will be 3/8-inch in diameter and the horizontal section will be buried in 1.5 inch rounded gravel to a depth of 1-8 inches. The gravel will be covered with filter fabric and then by 6-inches of drainage material. sump will be filled with aggregate meeting the requirements in the CQA Plan to the level of the surround liner surface on the floor. In Module 1 and planned for Module 3, an 8 Oz/Yard² geotextile covers the sump aggregate and is overlapped/seamed with the upper geotextile layer of the geocomposite drainage. The Module 2 sump was constructed by completely covering the sump aggregate with the geocomposite layer. Submersible pumps will be installed in the sumps and fluid will be removed such that the fluid thickness is less than 24 inches (less than 12 inches on the liner outside the sumps). Fluid removed from the sumps will be recirculated onto the landfill. The management of fluid and leachate removed from the sumps including collection, treatment, and disposal methods is outlined in Section 7.6. Sump details are included on Plate 6 and installation requirements, construction methods, and CQA procedures for the sump and its components are included in the CQA Plan in Appendix L.~~

6.3—FINAL COVER

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4.3 Protective Cover

The landfill liner and leachate collection system will be protected by the placement of a one-foot thick layer of specified soils. The protective soils are designed to cover the entire floor (including the sumps) and side slopes out to the lateral limits of the liner. The required characteristics of the soils were engineered to minimize plugging of the upper fabric of the geotextile. Required characteristics, placement methods, and CQA criteria are included in the CQA Plan in Appendix L.

4.4 Final Cover

The final cover has been designed to allow the option of either a water balance cover or a synthetic liner. The water balance cover will consist of a monolithic lightly compacted vegetated evapotranspirative cover, designed using guidance from the Final Guidance Document, Water Balance Covers in Colorado (CDPHE, March 2013). The site has suitable soils meeting the criteria in the guidance document for permitting a 3.5-foot thick water-balance type Alternative Final Cover (AFC). Excess excavation of primarily silty sandy clay and clayey sand (based on data from IC, 1-9931993 and construction geotechnical analysis conducted since the facility has opened) will be placed as loosely as possible over the final lift of refuse. The final lift of refuse requires a minimum one-foot of unspecified intermediate cover, soils if final cover is not placed within 30 days, and these soils may be used as part of the AFC if suitable soil properties, compaction, and moisture conditions are present or constructed. Alternatively the ERL may remove the intermediate soil cover and replace it with the specified thickness of suitable soils or place suitable soils directly over the intermediate final cover. A demonstration to the adequacy of the above described AFC and a CQA Plan for the construction of the AFC is included in Appendix M.

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The optional synthetic-lined final cover will consist of a one-foot prepared subbase. Overlying the subbase is a LLDPE membrane overlain by a 12-inch thick protective soil layer overlain by a 6-inch vegetative layer. In-place densities will be in the range of 80 to 90 percent of the Standard Proctor maximum dry density. The moisture content will be equal to or less than the Standard Proctor optimum. The combined protective soil layer and vegetative layer thickness on the LLDPE will be a minimum of four feet, but may be as much as eight feet depending on soil quantities, 18 inches. The LLDPE will be anchored into the upper layer of soil using anchor trenches (detail on Plate 5). Gas vents are not included in the final cover configuration because the facility has installed a gas collection system. Detail 5 on Plate 7 shows details for boots on penetrations through the LLDE cover by the GCCS system.

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After placement of the final cover, the top six inches it will be raked and then planted with a seed mixture recommended by the local office of the National Resources Conservation Service. The mixture will include both cool and warm weather species. A demonstration relative to the adequacy of the above described evapotranspirative cover will be made to CDPHE and Adams County/Tn County Health in an updated closure plan. The updated closure plan will be submitted for review and approval prior to commencing closure activities. The mixture will include predominantly cool weather species.

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4.5 Slope Stability

Appendix N contains the slope stability evaluation of the East Regional Landfill (ERL) expanded final cover. The slope stability analyses include multiple potential failure alignments through the landfill and multiple different methods of analysis to ensure that the slopes are stable during the construction and at the point the municipal solid waste (MSW) reaches final cover grades. Four different scenarios were modelled as outlined in the evaluation.

The worst-case factors of safety, probabilities of failure, and reliability indices for all four scenarios are shown below. Based on these modelling results, the worst factor of safety observed at the ERL is 1.471 in Scenario 1 – the open condition after the landfill has been constructed and before waste has been placed. This factor of safety exceeds the minimum design criteria of 1.3, so the landfill design is acceptable.

Worst-Case Slope Stabilities for Four Scenarios

<u>Method</u>	<u>Factor of Safety (Deterministic)</u>	<u>Mean Factor of Safety</u>	<u>Probability of Failure</u>	<u>Reliability Index</u>
Scenario 1	1.471	1.478	0.040%	2.748
Scenario 2.A	1.921	1.932	0.000%	5.442
Scenario 2.B	1.934	1.944	0.000%	5.348
Scenario 3	1.665	1.672	0.000%	4.399

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5.0 SURFACE WATER CONTROL

The surface water control system was designed in a document entitled *Drainage Report and Plan, Five Part Landfill* (AEC, December 2009) and received approval from the CDPHE and TCHD. The surface water control system is redesigned in this EDOP as part of the final cover modification. The surface water control system was designed in compliance with the Colorado Regulations Pertaining to Solid Waste Sites and Facilities (6 CCR 1007-2, Part 1, Section 2.5.7) that require permanent surface water control facilities at solid waste sites to prevent run-on from the 24-hour, 25 year storm event, collect run-off from the 24-hour 100 year storm event, and control run-off and run-on for a 24-hour 100-year storm event at the site. The commonly used model HydroCAD (version 10.20-5) was used to evaluate the needed detention pond capacity and performance of the tack-on berm and perimeter channel design. Appendix E includes the drainage analysis for the facility.

Surface water runoff to the site is only possible in an area along the south landfill boundary. That has been effectively blocked using a tree-lined berm and a road on the south property. The runoff is controlled using tack-on berms on the final cover, drop chute structures and perimeter berms. (Plate 8A).

The revised surface water control system consists of four grass-lined channels around the perimeter of the final cover on the landfill, representing anticipated post-closure conditions at the site. The channels will be built in phases as necessary based on the progression of landfilling throughout the operating life of the landfill. This scenario assumes that all operating facilities, including the gatehouse and scales will be removed from the site after it is closed as these structures are within the ultimate disposal area footprint.

Surface water control structures for operational purposes will be constructed as needed during the operating life of the landfill to collect and control the 24-hour, 25-year event as required in 6 CCR 1007-2, Part 1, Sections 2.1.6 and 3.2.6. Generally, these temporary operational controls will consist of proper landfill sloping, temporary ditches or control berms, and excavated retention areas. The operational surface water control structures are highly dependent on the landfill configuration and operating needs such as access roads, soil stockpile areas, etc. and their location and design will change based on the particular landfill configuration at any time. The operational surface water control structures are not included since they will change based on the landfill progress. Aside from operational surface water controls required by regulation to control surface water to and from the refuse fill area, the natural drainage through the site will be maintained as much as possible until the permanent system is constructed.

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6.0 ENVIRONMENTAL MONITORING

6.1 Gas Monitoring System

The Regulations state that the concentration of explosive gas generated by landfill facilities shall not exceed 100 percent of the lower explosive limit (LEL) by volume, which is equal to 5 percent methane in air, at the property boundary, or 25 percent of the LEL, which is equal to 1 percent methane in air, in facility structures.

Explosive gas monitoring at the ERL is conducted by six explosive gas monitoring probes constructed near the facility property boundaries and adjacent to the six groundwater monitoring wells used to monitor groundwater at the site as shown on Plate 2. In 2010, ERL installed three of the gas monitoring probes (GP-2, GP-3, and GP-4) adjacent to the current areas being filled for detecting any gas from the landfill. In 2022, the ERL installed the remaining three gas probes (GP-1, GP-5, and GP-6). The gas probes are completed from five feet below ground to the approximate elevation of the landfill floor adjacent to the probe location. The monitoring probes are equipped with caps containing normally closed quick connect fittings for the explosive gas monitoring purposes. The completion diagrams are included as Appendix O.

Explosive gas concentrations in the probes are measured with a calibrated explosive gas meter.

The condition of each explosive gas monitoring probe is inspected during each monitoring event. The results of the inspection is documented and any deficiencies are remedied within 60 days of the inspection, weather permitting. If deficiencies, malfunctions or deteriorations in the well are observed at other times, such deficiencies will also be documented and remedied within 60 days of discovery, weather permitting.

In compliance with Regulations, the ERL will notify the CDPHE and Adams County of explosive gas levels that exceed the regulatory standards stated above and take immediate steps to ensure protection of human health. A record of the levels detected above regulatory limits and actions taken shall be placed in the Operating Record within seven days, and the ERL will implement an approved remediation plan within 60 days, place the plan in the Operating Record, and notify the CDPHE and Adams County that the plan has been implemented. These steps will be followed unless an alternative approach is approved by the CDPHE and Adams County.

6.1.1 Gas Monitoring Schedule

In compliance with Regulations, gas monitoring of the probes and facility structures will be conducted quarterly unless an alternative schedule is approved by the CDPHE and Adams County.

The current probes are monitored for explosive gas concentrations on a quarterly basis and although the gatehouse is far removed from current disposal operations will also be monitored for the presence of explosive gas on a quarterly basis.

The quarterly monitoring results are submitted to CDPHE and Adams County as part of the ground-water monitoring report if conducted concurrently with the groundwater monitoring or within 60 days in a separate report if ground-water monitoring is not performed that quarter. The

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report will include a tabulation of the data, as well as the results of any inspections and maintenance performed.

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6.1.2 New Source Performance Standards Applicability

The ERL is subject to Subpart Cf of the New Source Performance Standards (NSPS) of the Clean Air Act due to its design capacity and is subject to the applicable Air Pollution Control Division (APCD) regulations. The ERL installed a landfill Gas Collection and Control System in November 2022 in accordance with the regulations. Applicability to Subpart Cf requires the ERL to obtain a Title V Operating Permit. The ERL received a Title V Operating Permit on August 1, 2016. This permit was renewed on November 1, 2022, Operating Permit 10OPAD353. Due to the vertical expansion, an amended design capacity report and permit modification request for the Title V permit will be submitted to the APCD within 90 days of approval of this EDOP.

6.2 Groundwater Monitoring

There are a total of six groundwater monitoring wells approved for the landfill, all six wells are currently installed and used in the detection monitoring program in accordance with Appendix B of 6 CCR 1007-2, Part 1. The approved groundwater monitoring system wells include MW-1, MW-2, MW-3, and MW-4 currently in the detection monitoring system and sampled on a semi-annual basis. MW-5 and MW-6 were installed in March 2021 and are now in detection monitoring and sampled on a semi-annual basis.

A seventh well, CMW-1, is present on the site and used to monitor the compost operations. Because the compost operations are permitted under a separate CD, CMW-1 is not a part of this EDOP. The location of the existing water monitoring wells is shown on Plate 2.

Wells representing upgradient and downgradient conditions for the currently active area include MW-1 (upgradient), MW-2, MW-3, MW-4 (all three downgradient from the northern portions of the facility), MW-5, and MW-6 (both downgradient from the southern portions of the facility). It should be noted that MW-1 was originally planned in a different location as shown in the 2006 Doty EDOP; however, MW-1 was moved to a more appropriate upgradient position on the southern property boundary as documented in a letter to the CDPHE (AEC, March 1, 2010) and approved in a CDPHE letter dated May 11, 2010.

The wells have been, and will continue to be, sampled for analysis of the parameters listed in Appendix IA and IB of the CDPHE solid waste regulations (6 CCR 1007-2, Part 1) unless a modified analytical suite is approved by the CDPHE. Analytical methods are specified in EPA SW-846 or other appropriate sources and the laboratory results are validated using standard methods. Samples are currently collected on a semi-annual basis in MW-1 through MW-4.

The wells will be purged and sampled using dedicated bailers. The dedicated bailers are suspended on dedicated polypropylene rope. Alternatively, at the operator's option, dedicated pumps may be installed in the wells and used for purging and sampling.

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If dedicated bailers are used, the wells are purged of three wellbore storage volumes (the volume standing inside the casing at the start of purging) or to dryness, whichever occurs first. Periodic field measurements of pH, temperature, and specific conductance are taken and recorded prior to collecting the sample. Purging continues until these parameters have stabilized to within 0.2 pH units, 2 degrees C or F, and 10 percent of the specific conductance reading for 2 consecutive readings. Samples are then collected as soon as possible after purging, but no longer than 24 hours after purging.

If dedicated pumps are used, low flow techniques will be used in accordance with the EPA document *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*, the wells will be purged of minimum three pump and tubing volumes at flow rates of 100-500 milliliters per minute or less and sampled immediately after purging. Drawdown will be checked periodically to monitor drawdown in the well as a guide to flow rate adjustment. The goal is minimal drawdown (<0.1 m) during purging. This goal may be difficult to achieve under some circumstances due to geologic heterogeneities within the screened interval and may require adjustment based on site-specific conditions and personal experience. Periodic field measurements, every 3-5 minutes of pH, temperature, specific conductance, Oxidation Reduction Potential (ORP), Dissolved Oxygen (DO), and turbidity are taken and recorded prior to collecting the sample. Purging continues until these parameters have stabilized to within ± 0.1 pH units, $\pm 10\%$ for temperature, $\pm 3\%$ of specific conductance, $\pm 10\text{mv}$ for ORP, and $\pm 10\%$ for DO and turbidity for three consecutive readings. Samples are then collected as soon as possible after purging, but no longer than 24 hours after purging.

Samples are transferred directly from the bailers or discharge tubing into sample bottles provided by the laboratory. Sample bottles and preservation are as specified in the analytical methods employed, except that volatile organic compound (VOC) samples are chilled but otherwise unpreserved (consistent with CDPHE policy). Sample bottles are placed in a cooler or other shipping container and chilled on ice as soon as possible after collection.

Chain-of-custody procedures are used to track the sample from the time of collection until it, or its derived data, is used. A chain-of-custody form is initiated at the time that the samples leave the site. Field personnel complete all applicable sections of the form. The chain-of-custody forms are protected from moisture by encasing them in plastic (e.g., Ziplock plastic bags) and they are then placed inside the shipping containers. The chain-of-custody forms accompany the containers during shipment to the laboratory. The shipping containers are sealed with custody seals.

Field personnel collecting the samples are responsible for custody until the samples are delivered to the laboratory or relinquished to a commercial shipping company. Sample transfer requires the individuals relinquishing and receiving the samples to sign, date, and note the time of transfer on the chain-of-custody forms. Common carriers (e.g., Federal Express) are not expected to sign the chain-of-custody forms. However, the bill of lading or airbill becomes part of the chain-of-custody record when a common carrier is used to transport the samples. The chain-of-custody is considered complete after the analytical laboratory accepts custody of the samples (acceptance of custody is indicated by signature on the chain-of-custody form). A copy of the chain-of-custody record will be maintained along with other field records.

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6.4—SLOPE STABILITY

All slopes have been designed to regulatory standards or to presumptively stable grades. Cut slopes will be 3:1 (horizontal to vertical). Textured HDPE will be used to improve bonding to the 3:1 slope clay liner. The steepest final slopes will be 4:1. Intermediate slopes will not exceed 3:1. Such slopes have proven stable in many landfill applications in Colorado over the years.

6.5—SURFACE WATER CONTROL

A perimeter ditch will be constructed to capture and safely convey the 1 00-year storm event around the facility. The upstream drainage basin (primarily in Section 36) is approximately 380 acres in size. A peak flow of 1 39 cubic feet per second (cfs) is predicted by the Urban Drainage and Flood Control District Colorado Urban Hydrograph Procedure (CUHP). A ten foot wide ditch with 3:1 side slopes was designed to convey this flow around the southeast corner of the site and to discharge it to the original drainage near the intersection of Schumaker Road and 88th Avenue. The ditch has a slope of approximately 0.4 percent (a constraint imposed by the regional topography) and can carry the design flow with a depth of two feet. Slightly less than one foot of freeboard (0.8 feet) is appropriate given the flow velocity (4.3 feet per second). This velocity is sufficiently low (less than 5 feet per second) that grass lining should be stable against erosion.

All other areas of the site will continue to drain into the natural drainage system. The natural drainage system will be protected by maintaining silt fencing near the toe of all slopes until adequate vegetation is established on the final cover.

6.6—GAS CONTROL

An active gas control system will be installed to remove methane gas generated by the facility and to limit atmospheric emissions to those allowed under the Colorado air quality standards. On a preliminary basis, the system will consist of multiple vertical extractions wells connected by header pipes to a blower station. The blower will apply a vacuum to the gas collection system and sufficient pressure to feed the gas to a flare or alternate use. The collected gas may be used as a heating or fuel source, or may be discharged to the atmosphere after combustion in a flare system. Condensate generated by the gas control system will be recirculated into the waste mass.

Details of the gas control system have not yet been developed pending placement of sufficient waste to warrant its installation. This approach will allow the design to be refined based on the particular gas generation characteristics of this facility and to take advantage of advances in gas control technologies. However, it is envisioned that the first extraction wells will be constructed

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once an area of 10 to 20 acres has reached final grade and final cover has been placed. Under the preliminary phasing plan described in this document, this area will be in the northwest portion of the site. The extraction wells will be connected to a blower system and likely a candlestick flare located near the proposed shop facility (northwest of the gas pipeline). The extraction well spacing will likely be on the order of 200 feet and the wells will be designed to extend to ten feet above the base of refuse. A detailed gas control system design will be prepared for review and approval by both CDPHE and Adams County/Tn County Health prior to completing the first portions of the final cover.

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7.0 OPERATIONS PLAN

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7.1 GENERAL

~~The Five Part Development Company Metropolitan Coal Ash facility was permitted by Adams County Case #52-93-CD. Approximately 85.8 acres of the permitted area was sold to Public Service Company of Colorado (now known as Xcel Energy) with an option to purchase the additional approximately 168 acres. Public Service Company did not execute the option and Five Part Development Company retains the permit for 168 acres. CDPHE reviewed the original permit application documents and recommended approval under the solid waste disposal act. Changes to the facility design do not involve substantive differences with the liner, distance to groundwater, cut & fill slopes, ground water monitoring, and closure/post closure care.~~

7.2 SITE ACCESS & CONTROLS

The following quality assurance and quality control (QA/QC) actions are implemented to minimize the potential for biasing the analytical results by laboratory preparation, sampling, and transport activities.

1. Field work is performed by qualified and trained personnel.
2. Samples are analyzed by a qualified laboratory. The laboratory uses appropriate chain of custody, analytical, and QA/QC procedures.
3. A trip blank for VOC analysis is included in each sampling event.
4. Equipment blanks and field duplicates are not collected on a routine basis because disposable or dedicated sampling equipment will be used; however, they may be prepared and analyzed if questions arise relative to the quality of the analytical data.
5. The laboratory results are validated using standard methods.
6. The full laboratory report, including laboratory QC data, is attached to the monitoring reports and are submitted by the operator to both CDPHE and Adams County Health.

The condition of the ground-water monitoring system is inspected during each monitoring event. The results of the inspection are documented and any deficiencies are remedied within 60 days of the inspection, weather permitting. If deficiencies, malfunctions or deteriorations are observed at other times, such deficiencies will also be documented and remedied within 60 days of discovery, weather permitting.

The monitoring results are submitted to CDPHE and Adams County/Tri-County Health along with a statistical evaluation following each monitoring event.

The report includes a tabulation of the data (including water level data), statistical evaluations as appropriate, the results of the system inspection, and a description of any maintenance performed.

6.2.1 Groundwater Statistical Analysis and Reporting

The following is included in a typical semi-annual groundwater monitoring report:

- Time series graphs for all parameters
- Groundwater measurements and elevations charts
- Analytical results presentations and laboratory reports
- Statistical results for groundwater monitoring wells
- Landfill gas measurements

The analytical results for all wells are statistically analyzed in accordance with methods and procedures allowed by Regulation. All of the groundwater results through June of 2010 was collected without any waste having been received at the ERL facility and is considered to be unadulterated. Data collected after September 1, 2010 was collected after the facility had opened. Sampling of each of the monitoring wells was completed and the results were collected in the initial eight quarters of data was used to establish background conditions.

Data is evaluated for statistical outliers and seasonality in accordance with Regulations. The data is adjusted as allowed for outliers and seasonality if appropriate.

6.3 Leachate

The leachate levels in the landfill sumps will initially be checked a minimum of once every month and after large precipitation events during the initial stages of refuse filling in a newly constructed cell to verify that the depth of leachate is in compliance with regulatory requirements. In compliance with regulations, leachate will be removed from the sump prior to reaching a depth of 30 centimeters (12-inches) over the floor on the liner surrounding the sump. When these monthly measurements indicate that the frequency of measuring leachate levels can be reduced and still maintain compliance with regulations, leachate levels will be checked a minimum of every three months on an ongoing basis. Leachate quality will be monitored (sampled and analyzed) annually and the results will be submitted to the CDPHE and Adams County.

6.4 Stormwater

The ERL is regulated by a stormwater permit under the Colorado Water Quality Control Act and the Colorado Discharge Permit System (CDPS permit number COR900439). As a permit requirement, the ERL has a Stormwater Management Plan (SWMP) that provides guidance for inspections, surface water control structures, monitoring, and reporting for the site. The purpose of the SWMP is to protect waters of the State from potentially contaminated site discharges, specifically those associated with site drainage and stormwater runoff. The Permit requires

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monthly visual inspections, an initial four quarterly benchmark samples, potential additional quarterly samples if conditions occur that trigger the additional implementation measures contained within the COR900000 permit, potentially annual effluent limitations sampling for the first year, and annual benchmark and effluent limitation sampling if approved thereafter. For purposes of the annual permit, the monitoring period is from January 1 through December 31.

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7.0 OPERATIONS PLAN

7.1 General

This section discusses the day to day operational aspects of the ERL including, but not limited to, site security and safety, personnel and equipment, waste identification and acceptance procedures, disposal and daily cover protocol, control of nuisance conditions, leachate management, personnel training, and recordkeeping.

The number and type of personnel employed at the landfill and equipment used in various operations may vary from that discussed in this EDOP depending upon current conditions; however, sufficient qualified staff is available to operate the site in a safe and efficient manner. All personnel are trained in safe and proper operating procedures as they relate to their assigned duties and responsibilities.

7.2 Site Access & Controls

Personnel ~~trained sufficiently knowledgeable~~ in operating the facility will control the site entrance located on Schumaker Road, ~~as shown on the attached drawings.~~ A gatehouse ~~(cashier building) or other appropriate access control structure will be~~ with a scale ~~is~~ constructed ~~such that at the entrance and~~ all vehicles must stop there to gain access to the site. The cashier will inquire as to the nature of the material being delivered and its quantity. The cashier will have authority to deny site access if the material is unacceptable or its characteristics are ~~not known-suspect~~. The cashier may have other operational duties, such as heavy equipment operation.

As stated earlier, only municipal solid waste as defined in the CDPHE solid waste regulations ~~will be~~ accepted at the site. Customers on account ~~will be~~ required to sign an agreement stipulating ~~(1) that they will only non-hazardous bring acceptable waste will be delivered to the site and (2) that no hazardous facility.~~ Signage at the facility entrance further stipulates the types of waste ~~will that may be delivered-accepted.~~ Questionable materials transported to the site will be rejected until it can be determined that the material is acceptable. Waste screening procedures are ~~outlined in the Waste Characterization Plan (WCP), provided in Appendix RP. Additional information on waste identification and screening procedures is presented later in this Section.~~

The entire active area of the facility ~~will be~~ fenced. Fencing will be expanded as needed to enclose current and past disposal areas, as well as those under development. A gate ~~will be~~ installed at the site entrance and ~~others may be placed~~ at other locations as may prove convenient for the operator. All gates will be locked except during actual operating hours.

Roads interior to the site ~~will be~~ all-weather roads providing safe access during operating hours in all seasons. Roads accessing the active disposal area (used by customers) ~~and those have posted speed limits.~~ Roads accessing areas under development (used by the operator) ~~will be~~ established but ~~will may~~ change in response to operational needs. In addition, roadways ~~will be~~ constructed around the perimeter of the site and to well locations for inspections and monitoring.

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~~7.3~~ **WASTE TYPES**

~~7.3~~ **The Waste Identification and Screening**

Waste identification and screening procedures implemented at the ERL are outlined in the WCP included in Appendix P. The current WCP for the ERL received CDPHE approval on October 24, 2018. The WCP is slightly revised with this EDOP to include updated Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) regulations (6 CCR 1007-1 Part 20). The WCP discusses acceptable wastes streams, identifies those wastes that are specifically prohibited, waste identification and screening procedures to preclude acceptance of prohibited wastes, and employee training.

This plan is designed to hold the waste generator responsible for:

- Adequately characterizing particular waste streams proposed for disposal at the facility
- Ensuring that these wastes are acceptable for disposal at the ERL

This responsibility is maintained by the generator through a documented formal waste application and acceptance document included with the WCP. The ERL reserves the right to deny acceptance of any waste stream for any reason.

7.3.1 Acceptable Waste Types

The ERL facility is designed for disposal of municipal solid ~~waste~~wastes as defined in the CDPHE solid waste regulations. ~~No hazardous waste will be received at the facility. A partial list of the wastes acceptable for disposal at the facility is as follows.~~

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- o ~~Municipal solid waste~~
- o ~~Agricultural wastes~~
- o ~~Ash~~
- o ~~Commercial wastes~~
- o ~~Construction and demolition debris~~
- o ~~Household wastes~~
- o ~~Industrial wastes~~
- o ~~Inert materials~~
- o ~~Medical wastes (non-infectious)~~
- o ~~Mill tailings~~
- o ~~Non friable asbestos waste~~
- o ~~Scrap tires~~
- o ~~Sludges (passing the paint filter test)~~

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○ Solid waste

○ Water treatment plant residuals sludge (passing the paint filter test)

and most typically consists of residentially and commercially generated trash. Other non-hazardous wastes may be acceptable for disposal at the facility in accordance with the waste characterization plan (Appendix R)-approved WCP included in Appendix P. Certain acceptable wastes require testing and/or specific handling and burial procedures that are also discussed in the WCP.

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7.4 WASTE PLACEMENT

Initially, a layer of select waste (four foot minimum thickness) will be placed directly on the drainage layer.

Additionally, as a condition of the ERL CD, Mill tailings, mining wastes, and treated domestic waste water and water treatment residues that do not contain hazardous waste, as defined by C.R.S. §25-15-101(6), as amended, and 6 CCR 1007-2, Part 2, §2.2(J), as amended, may be accepted on a case-by-case basis, after review and approval by the Adams County Department of Planning and Development. The waste stream shall be submitted by the ERL to the CDPHE for its comments.

7.3.2 Prohibited Waste Types

The ERL CD prohibits acceptance of the following wastes for disposal:

- Hazardous wastes as defined by C.R.S. §25-15-101(6), as amended, 6 CCR 1007-2, Part 2, §2.2(J), as amended, and Adams County Development Standards and Regulations §11-02-235, as amended.
- Radioactive waste, as defined by C.R.S. §25-11-201(3), as amended, classified material, as defined by C.R.S. §25-11-201(1), and low-level radioactive wastes, as defined by C.R.S. §24-60-2204(3), as amended, including, but not limited to, Naturally Occurring Radioactive Material (NORM), as defined by C.R.S. §25-11-101(2.7), as amended, and Technically Enhanced Naturally Occurring Radioactive Material (TENORM), as defined by C.R.S. §25-11-201(4), as amended.
- Liquid waste as defined by CCR 1007-2, Part 1 §1.2, as amended.
- Friable asbestos waste, as defined by 6 CCR 1007-2, Part 1, §1.2, as amended.
- Raw domestic sewage and septage.
- Polychlorinated Biphenyls (PCBs).
- Dioxin
- Used lead acid batteries, used oil, and tires (except tire shreds used as approved ADC), as defined by 6 CCR 1007-2, Part 1, §1.2 and §16, as amended.
- Non-sterilized (non-treated) infectious medical waste.
- Electronic waste as described in the WCP and 6 CCR-1007-2, Part 1, §1.2 and §16, as amended.

Additional wastes that are, or maybe, prohibited for various reasons are identified and discussed in the WCP in Appendix P.

7.3.3 Waste Screening

To ensure only acceptable waste is disposed of at the facility the ERL implements an active screening program. Signs at the entrance to the ERL notify customers of waste that is not accepted and the gatehouse is equipped with a radiation monitor for identifying wastes containing potentially regulated level of radioactivity. The ERL requires generators wishing to deliver waste to the landfill that require special testing or characterization before a determination

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can be made on their acceptability complete an application form that describes the source and nature of the waste, and laboratory test results, and a statement by the generator.

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Waste arriving at the facility are inspected at the gatehouse. If the waste is visible, the gatehouse attendant may question the transporter as to the nature of the waste. The waste is also observed at the working face for potentially unacceptable materials as it is offloaded and spread out for compaction. The ERL also institutes a random waste screening program where one waste load for every 5,000 tons received is randomly selected for more detailed inspection at the working face.

The gatehouse attendant and employees responsible for operations at the working face receive training in the identification of hazardous and prohibited wastes and screening procedures as discussed in the WCP in Appendix P.

7.4 Waste Placement and Cover

To minimize the potential for damage to the drainage layer, the first lift of waste placed directly on the protective soil layer will be a minimum of four foot thick and composed of select waste that does not contain materials likely to damage the drainage layer. Trained landfill operators and spotters will observe the waste placement and remove or reorient waste that may potentially disrupt the leachate collection system or the liner, and this first lift is not specifically compacted. Landfill equipment and delivery vehicles will not be allowed to operate above the liner and leachate collection system until the select waste layer has been placed.

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Landfilling will be done in multiple refuse lifts and numerous refuse cells as shown in the preliminary phasing plan (Figure 6) within the three Modules. Refuse will be placed in a waste cell and kept to the smallest area practical based on the waste volumes received each day. Incoming waste will be spread into layers and compacted with threefour to fivesix passes of the landfill equipment. The process of layering and compacting is repeated until the compacted waste elevation reaches the intended top of the lift or until the end of the working day.

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A six-inch thick daily cover soil layer or approved Alternative Daily Cover (ADC) will be placed over the compacted refuse at the end of each workday. Alternative daily covers such as foam, tarps, hydromulch or others may also be employed. Once an area has reached final grade or an interim grade that will not be disturbed for more than six months30 days, a twelve inch thick intermediate soil cover will be placed. Intermediate cover will be graded to minimize erosion and prevent ponding of water.

7.5 NUISANCE CONTROL

7.5.1—The ERL is currently approved to use a spray-on product known as Posi-Shell® from Posi-Shell Environmental Coatings or 12-inch nominal shredded tires as an alternative to six-inches of soil used to cover exposed waste at the end of each day. The CDPHE approved the use of Posi-Shell ADC on July 7, 2011 and Adams County approved the material for use on August 11, 2011. The CDPHE and Adams County approved the use of 12-inch nominal shredded tires ADC on September 22, 2016. The request and approval information for both Posi-Shell and 12 inch nominal shredded tire ADCs included in Appendix Q. The ERL may request approval for

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other ADC materials that will be used following approval of the CDPHE and Adams County. The ERL will continue to use a six-inch thick soil cover once per week to mitigate fly infestation in accordance with guidance provided by the CDPHE for other facilities using an ADC. The weekly application of soil cover will also help provide periodic fire breaks within the refuse mass. In accordance with regulations, any refuse disposal area that is unused for a period of 30 days or longer will have a minimum of one foot of intermediate cover soil applied.

The ERL currently has a GCCS. Special care will be taken when filling around GCCS components and will be conducted by experienced personnel. Prior to filling in the vicinity, within 30 feet of a vertical gas wells, extensions will be installed to the vertical well casings. The outside of these vertical well casings will be marked with clearly visible and bright paint to prevent heavy equipment travel from damaging the casing extensions. Some GCCS components, such as condensate traps and variable frequency drives, may be temporarily removed so they may be reincorporated back into the system after filling in an area has ceased.

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7.5 Nuisance Control

7.5.1 Litter

Litter is primarily controlled by the application of daily and intermediate cover and by ~~the maintenance of maintaining~~ the smallest practical working face, ~~while considering traffic volumes and safety~~. Additional controls include:

- ~~o~~ Temporary and permanent litter control fencing,
- ~~o~~ ~~Prohibition of Discouraging~~ uncovered loads, ~~through charging a penalty fee~~
- ~~o~~ Litter collection on an as-needed basis, and
- ~~o~~ Site closure during high winds.

As stated earlier, perimeter fencing will be ~~established~~ installed to completely encircle all active and past disposal areas. Interior in-ground and portable fencing will also be used as necessary to minimize off-site excursions of windblown debris. These litter control fences will be relocated as necessary; typically, the portable fencing will be placed downwind of the active face. The fences will be inspected for the presence of debris on a daily basis and any debris will be removed, weather permitting.

Vehicles transporting uncovered loads to the facility can also be a source of windblown litter. ~~Uncovered loads will be prohibited and, to discourage this practice~~ To encourage proper covering of loads, uncovered loads will be charged twice the normal disposal fee.

~~Facility personnel will patrol fences and all areas of the facility, collecting any litter for disposal on site. Within 48 hours after a high wind event (see definition below), additional litter patrol and collection will be done on surrounding public and private properties and along the county roads. The facility manager will respond promptly to concerns voiced by surrounding property owners with respect to the reasonable cleanup and removal of windblown litter. The patrol and pickup of litter on affected private property will conform to the reasonable requirements of the property owners. Property owners will be contacted to schedule windblown litter removal, as necessary.~~

The site will be closed during high wind events. A high wind event is defined as sustained winds of 40 miles per hour or greater, or gusts of 55 miles per hour or greater, that are expected to persist for one hour or longer. An on-site wind meter will be used to monitor the wind speed in order to allow the landfill manager (or appropriate alternate) to make the determination that a high wind event exists. Upon making that determination, the manager will direct personnel to close the site to additional deliveries and to cover the working face with daily cover as rapidly as possible.

~~7.5.2~~ 7.5.2 The facility will assess the presence of escaped litter within their property, surrounding private property (only with approval from the property owner), and along the public-rights-of-way listed in this Section within 24 hours of a high wind warning (see definition below) occurring during operation of the

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facility, with the exception of on Sundays and other days the facility is closed due to weather, holidays, etc. ~~Odor, Vectors & Noise~~

The facility manager will respond promptly to concerns voiced by surrounding property owners with respect to the reasonable cleanup and removal of windblown litter. The patrol and pickup of litter on affected private property will conform to the reasonable requirements of the property owners and only conducted with their permission. Based on the results of this assessment, escaped litter will be collected and returned to the facility as soon as feasible. It is not expected that the exclusion of Sundays and other closure days will decrease the ability of the facility to contain refuse because the refuse will be covered with daily cover material the day prior to the closure so litter will not escape. As an additional measure, the ERL has on-call contracts with temporary labor firms to provide labor for the collection of refuse, including Sundays, holidays, and any other days the facility is closed.

In compliance with Adams County regulation 4-10-02-03-03(h) requiring that the operator remove trash or other waste material, disposed of or treated at their facility, along all public rights-of-way within one (1) mile of the facility and up to five (5) miles along the approved haul routes, or as otherwise specified, the facility will continue to implement the following practice as specified in the August 10, 2009 addendum to the June 1, 2006 EDOP:

1. Facility personnel will patrol the following public-right-of way at least twice per day on days that the facility is open:
 - a. Schumaker Road from one mile south of the facility entrance north to the intersection with 88th Avenue.
 - b. 88th Avenue between one-mile west to one-mile east of the intersection with Schumaker Road.
2. Facility personnel will collect any litter that appears to have escaped from either the facility or vehicles delivering refuse to the facility and dispose of it properly in the facility.
3. The facility will patrol within their facility at least once per day for the presence of litter.
4. The facility will respond as quickly as feasible to valid complaints of litter from surrounding property owners.

7.5.2 Odor, Vectors & Noise

The major source of odors at the facility is the working face and odors from the working face normally dissipate within a few hundred feet. Daily and intermediate cover control odors from the rest of the facility. In the event odors are a persistent and pervasive problem, alternative remedies will be investigated and implemented as appropriate.

Vectors are controlled by good waste compaction and expeditious application of daily cover. Remedies for nuisance vectors in the event they become a problem include the installation of bird lines, noise guns, and controlled predator introduction within the landfill area. The Bird

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Mitigation Plan in Appendix D includes procedures that are implemented to control bird population at the facility. Through nearly three years of operation, the procedures implemented at the facility have proven to be very effective in reducing food sources and controlling birds.

Noise will be reduced and controlled by operation of all equipment in a manner consistent with manufacturer recommendations.

7.5.3 7.5.3—Dust

During periods of dry weather and any time that dust is observed leaving the property, haul roads and areas under development will be sprayed with water or dust suppression fluid (e.g., a magnesium chloride solution). The portion of the customer haul road used to access the disposal area is paved with crushed asphalt that inhibits the generation of dust due to traffic. The ERL also has posted speed limit signs at the entrance to the facility and along the customer road to limit the generation of dust due to traffic.

7.5.4—Fire

The facility has a valid Title V Operating Permit (Permit No. 10OPAD353) issued by the CDPHE Air Pollution Control Division (APCD) that includes additional dust control measures required by the facility as follows:

- Adequate soil moisture must be maintained in topsoil and overburden to control emissions during removal. Watering shall be implemented if necessary.
- Active material stockpiles shall be watered to control fugitive particulate emissions.
- Topsoil and overburden stockpiles shall be compacted and revegetated within one year.
- Haul roads shall be paved with recycled asphalt aggregate and watered as often as needed to control fugitive particulate emissions such that the above guidelines are met.
- The size of the working face shall be reduced to control fugitive dust emissions during windy days.
- The facility shall cease operations during periods of high winds. High winds are defined as sustained winds of forty (40) miles per hour or greater, or gusts of fifty five (55) miles per hour or greater, that are expected to persist for one hour or longer. The facility shall operate and maintain a wind velocity measuring device capable of determining wind speeds at the landfill site. The main purpose of this requirement is to limit blowing litter, but the implementation of this practice also limits traffic and dust migration during periods of high wind.

The Title V Operating Permit is valid for 5 years and these requirements may change with the issuance of a new Title V Operating Permit. The requirements in the active Title V Operating Permit will supersede the requirements listed above.

In addition, the facility will consider the strategic placement of soil stockpiles and berms on the site to further inhibit dust migration if determined to be effective.

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7.5.4 Fire

Waste will not be intentionally burned at this facility. Unintentional waste fires will be extinguished as rapidly as possible using heavy equipment. The burning waste will be excavated and isolated from the non-burning materials. It will be spread on a convenient working surface and the fire smothered under a temporary soil cover. After the waste has cooled, it will be moved to the working face, compacted and covered with the waste being received at that time.

7.6 RECORDKEEPING

The ERL is within the Bennett Fire Department (BFD) district and the BFD has been provided tours of the facility and has a gate key for access during hours the facility is closed. The BFD has conducted inspections of the facility on an annual basis since opening and it is anticipated they will continue to conduct period inspections. For fire situations that cannot be dealt with internally, the BFD will be contacted, and their phone number is listed on the facilities emergency contact list.

The ERL maintains an area for "hot loads" to isolate any incoming loads that are discovered to be on fire. The ERL maintains fire extinguishers are on heavy equipment (compactors, dozers, graders, etc.).

7.6 Leachate Management

The level of leachate in any newly constructed sump will initially be monitored on a monthly basis and following any large precipitation event. In compliance with regulations, leachate will be removed from the sump prior to reaching a depth of 30 centimeters (12-inches) over the floor on the liner surrounding the sump and either transported off-site for disposal at an appropriate facility or used for dust control on the roads. If leachate samples are to be collected for analysis, they will be analyzed for the same parameters as the groundwater wells. The analysis will provide information on the proper disposal of the leachate (sent to a treatment plant, used for dust suppression, etc.) or for comparison to the groundwater monitoring results.

When monthly measurements indicate that the frequency of measuring leachate levels can be reduced and still maintain compliance with regulations and with Division approval, leachate levels will be checked a minimum of every three months on an ongoing basis. Leachate quality will be monitored (sampled and analyzed) annually and the results will be submitted to the CDPHE and Adams County.

7.7 Personnel Training

Landfill personnel shall be trained in various activities depending on each individual's role in the organization. Training topics may include, but are not limited to the following:

1. Waste Screening and Hazardous Waste Identification: Training will be completed for all employees including the gatehouse staff, equipment operators, and others with responsibility for the working face and disposal operations. More specific details on training requirements are included in the WCP in Appendix P.

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2. Annual Storm Water Management Plan Review and Sampling Requirements and Techniques
3. Annual Spill Prevention, Control, and Countermeasure Plan (SPCC)
4. Waste placement procedures. More detail on specific waste placement and disposal procedures is included in the WCP in Appendix P.
5. Safety training. Monthly training often includes safety training for various site operations.
6. Miscellaneous other training as it relates to the equipment used at the site and ERL management requirements. An example of this might be training on the use of the trailer tipper and scale.

Training procedures and employee training records will be retained as part of the Operating Record. These records will be made available at reasonable time to CDPHE and Adams County.

7.8 Recordkeeping

The operation will maintain an operating record documenting including a minimum of the following:-

- location restriction demonstration
 - inspection records, and training procedures
 - incoming waste volumes
 - waste characterization activities
 - ground-water monitoring results
 - explosive gas monitoring results
 - leachate monitoring results
 - construction as-built details
 - variations from approved operating procedures
 - demonstration demonstrations and waiver documentation
-
- cost estimates and financial assurance documentation
 - closure and post-closure care plans and any monitoring, testing, or analytical data

All records contained in the Operating Record will be furnished upon request or be made available at all reasonable times for inspection by Adams County or the CDPHE. The operating record will generally be maintained either on-site or at another management facility in the Denver metropolitan area.

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8.0 — MONITORING PLANS

8.1 — GROUNDWATER

~~Six new wells will be installed to monitor the quality~~although some portions of the shallowest ground water beneath the facility, as shown on Figure 8. ~~The concepts behind the locations are as follows~~operating record may be stored at the Five Part offices.

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8.0 CLOSURE/POST-CLOSURE PLANS

8.1 General Closure

The site will be closed in increments, as areas reach intermediate cover final grade. These areas may vary in acreage during the life of the landfill. The active gas control system described in Section 6.1 of this EDOP will be incrementally installed during the operational life of the facility. It is anticipated that final portions of the active gas control system and the surface water control system will be installed during final closure of the ERL. Other systems (i.e.,
o wells at each of the leachate collection sumps (MW 3 and MW 5)

o three wells equally spaced along the downgradient parcel boundary (MW 2, MW 4 and MW 6)

o one well on the upgradient side of the facility (MW i).

All wells will extend to shallowest ground water. It is expected that MW i and MW 2 will be completed in the “perched aquifer zone” and that the remaining wells will be completed in the “Denver Aquifer zone,” based on information presented in IC (1993).

The wells will be sampled for analysis of the parameters listed in Appendix IA and IB of the CDPHE solid waste regulations. Analytical methods will be as specified in EPA SW 846 or other appropriate sources and the laboratory results will be validated using standard methods. Samples will be collected on a quarterly basis for a period of two years (eight sample sets). After collection of eight samples, the sampling frequency may be reduced to semi-annual, with prior approval from CDPHE and from Adams County/Tn County Health. In addition, after collection of eight samples, the data will be reviewed and a statistical evaluation procedure will be proposed that (1) is consistent with one of the methods specified in the regulations and (2) is appropriate for the site specific data.

The wells will be purged and sampled using either disposable polyethylene bailers or dedicated polyethylene, PVC or Teflon bailers. Disposable bailers will be suspended on new polypropylene rope. Dedicated bailers may be suspended on dedicated polypropylene rope. Alternatively, at the operator's option, dedicated pumps may be installed in the wells and used for purging and sampling.

If bailers are used to purge and sample the wells, the wells will be purged of three wellbore storage volumes (the volume standing inside the casing at the start of purging) or to dryness, whichever occurs first. Periodic field measurements of pH, temperature, and specific conductance will be taken and recorded prior to collecting the sample. Purging will continue until these parameters

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have stabilized to within 0.2 pH units, 2 degrees C or F, and 10 percent of the specific conductance reading. Samples will then be collected as soon as possible after purging, but no longer than 24 hours after purging. Purge waters will be disposed of on the ground by the well from which the fluid was purged. If dedicated pumps are used, the wells will be purged of three pump and tubing volumes at a flow rate of 100 milliliters per minute or less and sampled immediately after purging; the flow rate during sampling will also be 100 milliliters per minute or less.

Samples will be transferred directly from the bailers or pump discharge tubing into sample bottles provided by the laboratory. Sample bottles and preservation will be as specified in the analytical methods employed, except that volatile organic compound (VOC) samples will be chilled but otherwise unpreserved (consistent with CDPHE policy). Sample bottles will be placed in a cooler or other shipping container and chilled as soon as possible after collection.

Chain of custody procedures will be used to track the sample from the time of collection until it, or its derived data, is used. A chain of custody form will be initiated at the time that the samples leave the site. Field personnel will complete all applicable sections of the form. The chain of custody forms will be protected from moisture by encasing them in plastic (e.g., Ziplock plastic bags) and placed inside the shipping containers. The chain of custody forms will accompany the containers during shipment to the laboratory. The shipping containers will be sealed with custody seals.

Field personnel collecting the samples will be responsible for custody until the samples are delivered to the laboratory or relinquished to a commercial shipping company. Sample transfer requires the individuals relinquishing and receiving the samples to sign, date, and note the time of transfer on the chain of custody forms. Common carriers (e.g., Federal Express) are not expected to sign the chain of custody forms. However, the bill of lading or airbill becomes part of the chain of custody record when a common carrier is used to transport the samples. The chain of custody is considered complete after the analytical laboratory accepts custody of the samples (acceptance of custody is indicated by signature on the chain of custody form). A copy of the chain of custody record will be maintained along with other field records.

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The following quality assurance and quality control (QA/QC) actions will be implemented to minimize the potential for biasing the analytical results by laboratory preparation, sampling, and transport activities:

1. Field work will be performed by qualified and trained personnel.
2. Samples will be analyzed by a qualified laboratory. The laboratory will use appropriate chain of custody, analytical, and QA/QC procedures.

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3. ~~A trip blank for VOC analysis will be included in each sampling event.~~
4. ~~Equipment blanks and field duplicates will not be collected on a routine basis because disposable or dedicated sampling equipment will be used; however, they may be prepared and analyzed if questions arise relative to the quality of the analytical data.~~
5. ~~The laboratory results will be validated using standard methods.~~
6. ~~The full laboratory report, including laboratory QC data, will be attached to the monitoring reports submitted by the operator to both CDPHE and Adams County/Tri-County Health.~~

~~The condition of the ground water monitoring system will be inspected during each monitoring event. The results of the inspection will be documented and any deficiencies will be remedied within 60 days of the inspection, weather permitting. If deficiencies, malfunctions or deteriorations are observed at other times, such deficiencies will also be documented and remedied within 60 days of discovery, weather permitting.~~

~~The monitoring results will be submitted to CDPHE and Adams County/Tri-County Health within 60 days of receipt of the laboratory results in the form of a brief report.~~

~~The report will include a tabulation of the data (including water level data), statistical evaluations as appropriate, the results of the system inspection, and a description of any maintenance performed.~~

8.2 EXPLOSIVE GAS

~~Explosive gas concentrations will be measured in six new explosive gas probes that will be installed adjacent to the ground water monitoring wells (Figure 8). The gas probes will be completed from five feet below ground to the elevation of the liner at the probe location. The monitoring probes will be equipped with caps containing normally closed quick connect fittings for the explosive gas monitoring purposes. Explosive gas concentrations will be measured with a calibrated explosive gas meter. After measuring the explosive gas concentration, the cap will be removed and the depth to water will be measured to document that the water level is below the top of the screened interval and that the probe is in good communication with the unsaturated zone.~~

~~The condition of the explosive gas monitoring probes will be inspected during each monitoring event. The results of the inspection will be documented and any deficiencies will be remedied~~

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~~within 60 days of the inspection, weather permitting. If deficiencies, malfunctions or deteriorations are observed at other times, such deficiencies will also be documented and remedied within 60 days of discovery, weather permitting.~~

~~The monitoring results will be submitted to CDPHE and Adams County/Tn County Health as part of the ground water monitoring report or within 60 days of completion of field work in a separate report if ground water monitoring is not performed that quarter. The report will include a tabulation of the data, as well as the results of any inspections and maintenance performed.~~

~~8.3 LEACHATE~~

~~The quantity and quality of leachate in the collection sumps will be monitored on an annual basis. Quantity monitoring will consist of a fluid thickness measurement on the date that the sample is collected, as well as a tabulation of quantities pumped from CDPHE and Adams County/Tri-County Health will be notified when the notation is recorded.~~

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9.0 — CLOSURE/POST CLOSURE PLANS

9.1 — CLOSURE

~~The site will be closed in increments, as areas reach intermediate cover final grade. Final cover will be placed loosely over the intermediate cover, as discussed in Section 6.3 of this document, and seeded with a mixture of cool and warm weather grass species. Final cover will be placed within 30 days of bringing successive 10-acre areas to intermediate cover final grade. Closure of each 10-acre area will be completed within 180 days of commencing final cover placement and a report documenting the work will be submitted to CDPHE and Adams County/Tn County Health. An updated closure plan will be submitted to CDPHE and Adams County/Tn County Health for review and approval prior to commencing closure activities. The updated plan will include a demonstration relative to the effectiveness of an evapotranspirative cover, a sheet showing proposed final grades, maintenance plans, and a schedule for completion of closure activities.~~

~~The gas control system will also be incrementally installed, as described in Section 6.6 of this document. Other systems (i.e., surface water control, ground-water monitoring and explosive gas monitoring) will have been installed well prior to closure.~~

ground-water monitoring and landfill gas monitoring) will be installed prior to closure.

8.1.1 Closure Notification and Certification Requirements

Notification and certification requirements for the closure of ERL will include the following:

- 60 days prior to closure, submit written notification to the CDPHE and Adams County that the landfill will be closing.
- 60 days prior to closure, notify the general public of the landfill closure by posting clearly visible signs of a suitable size at the site entrance.
- Enact precautions to prevent further use of the site for unauthorized disposal.
- Water pollution will not occur at or beyond the Point of Compliance after closure.
- Nuisance conditions will not occur at or beyond the site boundary after closure.
- Initiate routine closure activities within 30 days of reaching final design grades in any phase, unless an extension beyond 30 days is granted by the CDPHE.
- Complete closure within 180 days after closure initiation, or if necessary, obtain an extension from the CDPHE.
- Following closure of each area, submit a report certified by a Colorado registered Professional Engineer (P.E.) to the CDPHE documenting that closure has been completed in accordance with the closure plan. Place a copy of the report in the facility operating record.
- Following closure, record a notation on the deed or other title instrument stating that the land was used as a landfill and that future land use is restricted under Section 3.6.1(7) of the CDPHE solid waste regulations. Notify the CDPHE and Adams County Planning that the notation has been recorded and place a copy of the notation in the operating record.

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8.1.2 Routine Site Closure

Construction of the final cover system will occur concurrent with the progression of landfilling operations. As final design grades are reached, final cover will be completed and certified by a Colorado P.E. in accordance with the EDOP and CQA Plan. By employing this "close as you go" process, only a limited portion of the fill area will require final cover construction after site closure. Final closure activities will begin within 30 days of reaching the final design grades for the final portion of the site unless an extended time period has been granted by the CDPHE. After the site is closed, no off-site waste will be accepted for disposal. However, any refuse generated on site as a result of construction activities will continue to be disposed of in the landfill until final cover placement has been completed.

8.1.3 Closure Requirements

As noted previously, the site will be closed in increments, as areas reach final grade. These areas may vary in acreage during the life of the landfill and will be based on the configuration of the area ready for final cover that is large enough in size to make final cover installation economically feasible. Final cover will be placed within 30 days of reaching final refuse grades in any phase in accordance with Regulations and closure of each phase will be completed within 180 days of commencing final cover placement. Due to seasonal, budgetary, or contractor availability these time frames may be extended with approval from the CDPHE and Adams County. A report documenting the final cover installation work will be submitted to CDPHE and Adams County for review and approval.

The ERL final cover system is redesigned as part of this EDOP revision. The proposed final cover design is an option of either a 3.5-foot thick Alternative Final Cover (AFC) or a LLDPE lined cover with a 1.5-foot thick layer of cover soils including a 1 foot thickness of protective soils and a 6-inch thick vegetative layer. The proposed top of the final cover grades and elevations are shown on Plate 4. AFC material requirements, placement methods, testing requirements, and CQA criteria are also provided in the revised CQA Plan. The AFC will be seeded with a mixture of cool and warm weather grass species as presented in the CQA Plan and any fertilizer and amendments will be applied after testing the soils to be vegetated. Because a one-foot thick intermediate soil cover is required for any waste placement areas not used for at least one month, the final lift of waste in any area may require intermediate cover. If the intermediate cover meets all of the material and placement criteria for an AFC, it may be left in place as part of the final cover system. Alternatively, the required minimum thickness of AFC may be constructed on top of the intermediate cover or the intermediate cover may be removed prior to installation of the final cover. Regardless of the presence of intermediate final cover, the final grades and elevations at the top of the final cover system will conform to those shown on Plate 4.

A financial assurance instrument consistent with those acceptable under the CDPHE solid waste regulations covering the cost of closure will be established prior to initial site development. For purposes of estimating closure costs, the largest area requiring closure at this facility is the entire disposal footprint, 142.3 acres has been established for the ERL. The closure cost estimate will be revised every five years to reflect the remaining closure liability for the subsequent five-year

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period or more frequent if necessary to reflect a change in the design or maximum area assumed open at any one time. The cost estimate will ~~also~~ be adjusted annually to account for inflation in the intervening years. The annual adjusted cost estimate will be submitted to the CDPHE by April 30th of each year.

~~Notice of intent to close will be provided to the general public, CDPHE and Adams County/Tri-County Health 60 days prior to the cessation of waste acceptance at the site. A final closure report will also be submitted to CDPHE and Adams County/Tri-County Health certifying that all closure requirements have been met and documenting the date of final site closure. In addition, a notation on the deed to the facility property will be recorded stating that the property has been used as a landfill and that future uses are restricted under Section 3.6.1(7) of the CDPHE solid waste regulations.~~

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9.2 POST CLOSURE

8.1.4 9.2.1 Early Closure Scenario Provisions

The facility is designed with a specific area designated for refuse and specific final grades and elevations based on a designed refuse capacity needed to achieve these grades and elevations. The CD for the facility includes an expiration date of June 29, 2039. While the CD may be renewed at that time, the potential exists that the CD may not be renewed, and the facility will be forced to close prior to reaching the design elevations and grades. The following protocol for early closure in the case that the facility is not filled to design elevations, and the CD is allowed to expire was included in the August 10, 2009 amendment to the 2006 EDOP and has received approval from the CDPHE and Adams County.

In the case that the CD is allowed to expire and no new CD is issued, and the facility has not reached approved design grades, the owner will evaluate the existing condition of the facility by taking the following steps:

1. The existing refuse fill area and other pertinent site features will be surveyed to determine the magnitude of differences between the existing conditions at closure and the approved final closure conditions.
2. The existing site monitoring system will be evaluated to determine if any changes are necessary to the approved monitoring system to comply with regulatory requirements based on the existing conditions at closure.
3. The surface water drainage and control system will be evaluated to determine if any changes to the approved system are required to comply with regulations based on the existing conditions at closure.
4. An evaluation of the volume and type of soils required to close the facility in compliance with regulations and the soils available on site to conduct closure.

After completion of the above efforts, the owner will develop an alternative closure plan that will address the following:

1. The type and thickness of the final cover system
2. Final slopes on the refuse filling area must be constructed with a maximum of 4H:1V and a minimum of 5%.
3. The surface water drainage and control structures must be designed to comply with regulations considering the existing landfill footprint at closure.
4. A soil balance evaluation discussing the soil needs and soil availability.
5. A groundwater and methane monitoring program specific to the configuration of the facility upon closure.
6. Updated financial assurance costs to reflect the necessary closure and post-closure efforts based on the configuration of the facility upon closure.
7. The facility's ability to provide notification in compliance with regulatory requirements given the timing of the notice that the CD will not be renewed.

The alternative closure plan will be submitted to Adams County and the CDPHE for their review and approval prior to initiating final closure.

8.2 Post-Closure

8.2.1 General

The site will be maintained for a post-closure care period of **a minimum of 30** years after the date of final site closure. The site is expected to remain in a vegetated undeveloped state during the post-closure care period; however, other uses may occur as long as the final cover and other control/monitoring systems are not disturbed.

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8.2.2 Monitoring

During the post-closure care period, the following environmental/physical monitoring will be conducted.

1. Ground-water monitoring will be performed on a semi-annual basis ~~during the 30-year period~~. Analytes, methods and reporting will be as described in Section ~~8.4.6.3~~ of this document ~~or alternative requirements with approval from the CDPHE and Adams County~~.
2. Explosive gas monitoring will be performed on a quarterly basis ~~Methods during the 30-year period~~ and ~~the methods and~~ reporting will be as described in Section ~~8.6.2~~ of this document ~~unless an alternative schedule is approved by the CDPHE and Adams County~~.
3. Leachate ~~levels in the sumps will be checked on the Division approved~~ monitoring schedule (monthly or quarterly as described in Section 7.6).
4. ~~Leachate sampling and analysis~~ will be performed on an annual basis ~~during the post-closure care and maintenance period~~. ~~Leachate levels will also be taken during the annual sampling and may be used to increase the frequency of leachate level measurements to ensure compliance with regulations~~. Analytes, methods and reporting will be as described in Section ~~8.6.3~~ of this document.
- 4.5. Overall site conditions will be inspected on a semi-annual basis. Items covered by the inspections ~~correction of deficiencies and reporting will be as described in Section 8.4 include, but not necessarily limited to: erosion of this document. This includes inspection and maintenance of the the final cover and surface water control structures, the success of the vegetation on the final cover and other areas on the site than have been revegetated, and the condition of the environmental monitoring system, which including the groundwater wells and gas monitoring probes, the active gas collection and control system, and the condition of the security systems at the site such as fencing, gates, and locks, and verification that all required monitoring has been designed to handle the 100 year storm event~~ completed according to the approved schedule. A typical list of items for inspection is included in Appendix R and will be used for reference during the inspections. The results of the inspections will be maintained in the Operating Record for the facility through the post-closure period.

As data are developed on the performance of the site during the post-closure care period, the operator may petition CDPHE and Adams County/~~Tri-County Health~~ for changes in the scope and frequency of the above described post-closure monitoring.

8.2.3 9.2.3 Explosive Gas Control

~~The explosive~~As discussed in Section 6.1, the landfill installed an active gas collection and

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control system. The system will be operated until emissions from the facility meet the requirements of and are demonstrated to the Colorado Air Quality Pollution Control Division to cease operation of the system. The CDPHE Solid Waste Group and approval of Adams County/Tri-County Health will be notified if and the CDPHE is required to cease operation of the gas control system ceases prior to the end of the post-closure care period. All NSPS requirements will be complied with during this time.

8.2.4 9.2.4—Access Control

The perimeter fencing and locking gate will be retained and maintained throughout the post-closure care period to limit unauthorized access to the site.

8.2.5 9.2.5—Financial Assurance

A financial assurance instrument consistent with those acceptable under the CDPHE solid waste regulations covering the cost of post-closure care will be has been established prior to initial site development and in force since the facility opened. The post-closure cost estimate will be revised every five years to reflect the remaining post-closure care requirements. The cost estimate will also be adjusted annually to account for inflation. The annual inflation adjusted cost estimate will be submitted by April 30th of each year. Additionally, since closure will be completed as the landfill reaches final elevations incrementally, the post-closure periods may be staggered and portions of the landfill may be taken out of the post-closure funding over time with approval from the CDPHE and Adams County.

8.2.6 9.2.6—Completion

CDPHE and Adams County/Tri-County Health will be notified when the post-closure care obligation has been met. The notification will consist of a certification from an independent Colorado registered professional engineer that the post-closure care has been completed in accordance with this post-closure care plan.

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Original Doty EDOP (2006)

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ENGINEERING DESIGN & OPERATIONS PLAN FIVE PART DISPOSAL FACILITY

VOLUME I

June 1, 2006

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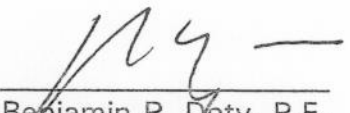

Benjamin P. Doty, P.E.

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1.0 INTRODUCTION

This is a revised Engineering Design & Operations Plan (EDOP) for a portion of the already permitted Five Part Development Company Disposal Facility. This document describes a municipal solid waste disposal facility in the southwestern portion of the original permit area.

The facility is located west of Schumaker Road approximately one-half mile south of 88th Avenue (Irondale Road) in south central Adams County, Colorado. The site is located in the South 1/2 of Section 25, Township 2 South, Range 64 West, 6th Principal Meridian, Adams County, Colorado, approximately 6.75 miles northwest of the town of Bennett (Figure 1). The site consists of approximately 164.5 acres and its legal description is presented in Appendix P.

This document makes extensive reference to the EDOP completed for the entire property (IC, 1993), for which a Certificate of Designation was granted in Adams County Case Number 52-93-CD. Pertinent portions of the original EDOP are attached to this document as appendices. This revised EDOP deals with minor changes to the disposal cell designs, facility configuration, surface water control, waste types, financial assurance, inspections and maintenance, ground-water monitoring, explosive gas control system operation and monitoring, facility operation, environmental monitoring and closure/post-closure care.

The EDOP is organized into the following sections.

- Introduction
- General Information
- Site Description
- Geology/Hydrogeology
- Site Grading
- Facility Details
- Operations Plan
- Environmental Monitoring
- Closure/Post-Closure Plans
- References

2.0 GENERAL INFORMATION

2.1 FACILITY NEED

The facility will accept municipal solid waste for disposal in Cells C and D of the already permitted site. Disposal of municipal solid waste is intended to serve the areas of expected future residential growth in Adams County east of the Denver International Airport. The facility is expected to receive approximately 500 to 1,000 cubic yards (yds) per day in the first 5 years of operation with an increase to over 1,000 yds per day as more development occurs in the area.

2.2 FACILITY DESCRIPTION

The facility is located west of Schumaker Road and south of 88th Avenue (Irondale Road) approximately 6.75 miles north-northwest of Bennett and nine miles north-northeast of Watkins. The parcel to be used as described in this document consists of approximately 164.5 acres within the existing permit area. Disposal will occur on approximately 142 acres, with approximately 22.5 acres used for surface water control, setbacks, easements, access roads and facility structures. The site is located in the South 1/2 of Section 25, Township 2 South, Range 64 West, 6th Principal Meridian, Adams County, Colorado (Figure 1). The property legal description is presented in Appendix P.

Municipal solid waste will be delivered to the facility by commercial solid waste collection operators and the general public. The majority of the solid waste is expected to be from local collection operations and the general public in the area. More information on the composition of the solid waste is found in Section 7.3 of this document.

2.3 ACCESS

Commercial haulers will use State Route 79 to reach 88th Avenue (Irondale Road). Haulers will proceed west on 88th and then south on Schumaker Road to the site entrance. This route is shown on Figure 2. Alternative routes may be used in the future as the roads in the area are improved; however, the use of alternative routes

is subject to prior approval by the Adams County Director of Planning & Development and the Director of Public Works.

On the order of 25 to 50 vehicles are expected to deliver waste to the facility on a daily basis. This additional use is well within the capacity of the roads, based on the traffic study performed by Leigh, Scott and Cleary for the permitting of the adjacent Conservation Services, Inc., (CSI) Facility. The traffic study demonstrated capacities of 1,000 vehicles per day for Imboden Road and 5,000 vehicles per day for Irondale Road.

2.4 ZONING

The subject property is zoned A-3/Agricultural and has a Certificate of Designation for waste disposal from Adams County.

2.5 FEES

The operation will make payments to the Colorado Hazardous Substance Response Fund (HSRF), as required by the Colorado Department of Public Health & Environment (CDPHE) solid waste regulations. In addition, the operation will make payments to the Adams County Solid Waste Management Fund as required by the November 8, 1993 resolution granting the Certificate of Designation.

3.0 SITE DESCRIPTION

Conditions at the site were investigated in detail prior to the initial approval of the facility. This work is described in Section 3.0 of IC (1993), which is attached to this document as Appendix N. Topics covered there include:

- o Location Restrictions,
- o Existing Topography,
- o Surface Water Drainage, and
- o Climatology.

4.0 GEOLOGY/HYDROGEOLOGY

Site geologic and hydrogeologic conditions were investigated in detail prior to the initial approval of the facility. This work is described in Section 4.0 of IC (1993), which is attached to this document as Appendix O. Topics covered there include:

- o Regional Geology,
- o Site Geology,
- o Regional Hydrogeology,
- o Site Hydrogeology,
- o Hydrogeologic Characterization, and
- o Groundwater Flow Paths & Velocities.

5.0 SITE GRADING & PHASED DEVELOPMENT

5.1 DESIGN CONCEPTS

The facility was re-designed using the basic design concepts of the 1993 approval. Specific concepts incorporated in the new design are as follows.

- o Setbacks. The 1993 design called for 30 foot setbacks from all property boundaries except along Schumaker Road, where a 100 foot setback would be maintained. The new design complies with these setbacks except that the 30 foot setback was increased to 40 feet to allow for better perimeter access. The 40 foot setback is also maintained along the buried gas pipeline in the northwestern corner of the parcel.
- o Excavation Slopes. Consistent with the original design, all excavation slopes are 3:1 (horizontal to vertical).
- o Separation from Ground Water. The 1993 plan called for a minimum 10 foot separation between waste and the shallowest ground water, a design requirement that is maintained in the current design. We checked the depths to ground water in the wells and piezometers that remain accessible on the property in July 2005 and found the data presented in IC (1993) to adequately represent current conditions. Water levels from the "Perched Ground Water Zone" defined in IC (1993) were contoured and assumed to continue at a uniform grade to the east where the "Denver Aquifer Zone" has much lower water levels. As a result, this water level contour map is conservative in the eastern portions of the site and was used as the basis for designing the top of liner grades.
- o Liner System. This design uses the same liner system as presented in the original design. It consists of two feet of compacted clay with a saturated hydraulic conductivity of 1×10^{-7} centimeters per second (cm/s) or less, overlain by a 60 mil high density polyethylene (HDPE) geomembrane.

- o Leachate Collection System. The leachate collection system (overlying the liner system) consists of a one foot thick drainage layer with leachate collection piping leading to two sumps. The concepts of the leachate collection system are functionally identical to those in the original design.
- o Final Cover Slopes. Consistent with the 1993 plan, all external slopes were designed at 4:1 grades. Grades on the top of the fill were steepened to 5 percent to comply with the Colorado regulations.
- o Fill Height. The 1993 design intended that the fill height be on the order of 40 feet. The 4:1 side slope heights in the new design range from 24 to 48 feet and are less than 40 feet on average.

5.2 EXCAVATION PLAN

As discussed earlier, the site excavation was designed using the concept that a minimum separation of 10 feet must be maintained between waste and the shallowest ground water. All excavation slopes are 3:1 and the toe of the excavation has a setback of 40 feet from the property boundaries (and the gas pipeline), except along Schumaker Road where the setback is 100 feet. The setback along Schumaker Road is actually somewhat larger than 100 feet in the southern portion of the site because of the need to construct a ditch to route surface water from upstream areas around the facility. In addition, room was left for a cashier building and other entrance operations on Schumaker Road. The facility shop will be located northwest of the gas pipeline easement.

The constraint that the base of excavation (actually top of liner) be 10 feet above shallowest ground water worked well in all portions of the site except along the southern portion of the east boundary. In this area, the separation from ground water constraint resulted in essentially no excavation. In order to provide adequate waste containment, a compacted clay berm was designed in this area. The berm ranges in height from about six to ten feet and has an outside slope of 4:1 and an inside slope of 3:1. The top of the berm has a width of ten feet. The resulting excavation plan is shown on Figure 3 and Sheet 2.

5.3 FINAL GRADES

Final grades were then designed beginning at the toe of the excavation and progressing upward at 4:1 to elevation 5352 feet. Above elevation 5352, 5 percent slopes were designed, rising toward the center of the site. The resulting final grades (top of cover) are shown on Figure 4 and Sheet 1.

5.4 SOIL/MATERIAL BALANCE

The facility has been designed to result in a material quantity balance, considering clay for the liner and toe berm, daily and intermediate cover and final cover requirements. Areas where excavation is expected to be in claystone (and to produce excess clay for use in other areas) are shown on Figure 5. Because a relative thick evapotranspirative final cover will be used at the facility, the design thickness of the final cover was varied to yield a small total soil excess for the operation. The various excavation and fill volumes are presented in Table 1.

5.5 PHASING PLAN

The first activities to develop the site will be the construction of Cell 1 (Figure 6), together with appropriate facility structures. The cashier building or other appropriate access control facility will certainly be installed at this point; the shop will be constructed as needed by the operation.

On a preliminary basis, it is envisioned that the cell one higher in number will be under construction while each cell is being filled with waste (e.g., Cell 2 will be under construction while Cell 1 is being filled). Soils excavated from Cells 1 and 2 will be stockpiled on Cells 11 and 12. Each cell will be filled to a convenient interim grade (perhaps elevation 5320). At that point, filling will begin in the next higher numbered cell. Soils excavated from Cells 3 through 12 will be stockpiled on the interim fills in any filled cells existing at that time. Construction of Cell 9 will be delayed to allow use of the natural drainage system as long as possible; the perimeter ditch will be constructed to convey runoff around the fill prior to the start of Cell 9 construction.

Eventually, fill will be placed above the interim grade to the final refuse grade (final grade less the cover thickness) in the northwestern portion of the site. Soils stockpiled on nearby cells will be used for daily/intermediate and final cover, thereby preparing the nearby cells for additional fill. This process will continue back across the site, from northwest to southeast.

8.2 LEACHATE COLLECTION SYSTEM

A leachate collection system will be constructed on top of the composite liner to route any free liquid at the base of the facility to two leachate removal sumps. The leachate collection system consists of the following.

Drainage Layer. The drainage layer will be 1.5 inches thick and have a minimum hydraulic conductivity of 1×10^{-2} cm/s. The drainage layer will consist of medium to fine, uniformly graded, rounded to subrounded sand. The sand will have no particles larger than 3/8 inches and will have less than 2 percent passing the No. 200 sieve. The drainage layer will cover the bottom of the facility, the excavated side slopes and the toe berm (i.e., the drainage layer will

6.0 FACILITY DETAILS

6.1 LINER

The entire excavation will be covered with a composite liner system consisting of two feet of compacted clay overlain by a 60 mil HDPE geomembrane. In areas of excavation in claystone, the material will be overexcavated two feet, reworked, and compacted into place at a density of at least 95 percent of the Standard Proctor maximum density at a moisture content wet of optimum. Based on data presented in IC (1993), in-place saturated hydraulic conductivities of 1×10^{-7} cm/s or less can be achieved in this manner. In other areas, the subgrade will also be overexcavated two feet and claystone material from other portions of the excavation will be used to create the compacted clay liner, as described above. The surface of the clay liner will be smoothed using a flat wheel or drum compactor prior to placement of the geomembrane. Construction quality assurance procedures are specified in Appendix Q.

The 60 mil HDPE geomembrane will be new material, manufactured with first quality high density polyethylene resin. Textured HDPE will be used on all side slopes. The geomembrane will be anchored along the crest of the excavation or the toe berm in a three foot wide and three foot deep anchor trench. Seams will be sealed between the separate geomembrane sheets using either double fusion welds or extrusion welds. Construction quality assurance procedures are specified in Appendix Q.

6.2 LEACHATE COLLECTION SYSTEM

A leachate collection system will be constructed on top of the composite liner to route any free liquid at the base of the facility to two leachate removal sumps. The leachate collection system consists of the following.

- o Drainage Layer. The drainage layer will be 12 inches thick and have a minimum hydraulic conductivity of 1×10^{-2} cm/s. The drainage layer will consist of medium to fine, uniformly graded, rounded to subrounded sand. The sand will have no particles larger than 3/8 inches and will have less than 2 percent passing the No. 200 sieve. The drainage layer will cover the bottom of the facility, the excavated side slopes and the toe berm (i.e., the drainage layer will

- extend up all slopes to within one vertical foot of the crest of the anchor trench).
- o Piping. A piping system consisting of 6-inch diameter perforated Schedule 80 polyvinyl chloride (PVC) will be installed within the drainage layer. Perforations will be 1/2-inch in diameter. Based on the 2 percent slope of the liner system and the specified drainage layer hydraulic conductivity, the pipes can be spaced at 1,500 feet; however, a smaller collection pipe spacing was selected for constructability and for the sake of conservatism. Any leachate will enter the piping system in well under 12 months. The leachate collection system piping layout is shown on Figure 7 and Sheet 2. The piping will be wrapped in filter fabric, placed directly on the geomembrane and then buried in the drainage material.
 - o Two leachate removal sumps. The sumps will consist of an area 6 foot by 6 foot in plan that is depressed one foot below the surrounding liner grade (2:1 side slopes). The thickness of compacted clay beneath the sump area will be increased to three feet and the geomembrane will be continuous through the sump area. A 12-inch diameter perforated SDR 17 HDPE pipe will be installed on the floor of the sump and connected to a similar solid riser pipe running up the composite-lined side slope. Perforations will be 3/8-inch in diameter and the horizontal section will be buried in 1.5 inch rounded gravel to a depth of 18 inches. The gravel will be covered with filter fabric and then by 6 inches of drainage material. Submersible pumps will be installed in the sumps and fluid will be removed such that the fluid thickness is less than 24 inches (less than 12 inches on the liner outside the sumps). Fluid removed from the sumps will be recirculated onto the landfill.

6.3 FINAL COVER

The final cover will consist of a monolithic lightly compacted vegetated evapotranspirative cover. Excess excavation of primarily silty sandy clay and clayey sand (based on data from IC, 1993) will be placed as loosely as possible over the intermediate cover. In place densities will be in the range of 80 to 90 percent of the Standard Proctor maximum dry density. The moisture content will be equal to or less than the Standard

Proctor optimum. The thickness will be a minimum of four feet, but may be as much as eight feet depending on soil quantities. After placement of the final cover, the top six inches will be raked and then planted with a seed mixture recommended by the local office of the National Resources Conservation Service. The mixture will include both cool and warm weather species. A demonstration relative to the adequacy of the above described evapotranspirative cover will be made to CDPHE and Adams County/Tri-County Health in an updated closure plan. The updated closure plan will be submitted for review and approval prior to commencing closure activities.

6.4 SLOPE STABILITY

All slopes have been designed to regulatory standards or to presumptively stable grades. Cut slopes will be 3:1 (horizontal to vertical). Textured HDPE will be used to improve bonding to the 3:1 slope clay liner. The steepest final slopes will be 4:1. Intermediate slopes will not exceed 3:1. Such slopes have proven stable in many landfill applications in Colorado over the years.

6.5 SURFACE WATER CONTROL

A perimeter ditch will be constructed to capture and safely convey the 100 year storm event around the facility. The upstream drainage basin (primarily in Section 36) is approximately 380 acres in size. A peak flow of 139 cubic feet per second (cfs) is predicted by the Urban Drainage and Flood Control District Colorado Urban Hydrograph Procedure (CUHP). A ten foot wide ditch with 3:1 side slopes was designed to convey this flow around the southeast corner of the site and to discharge it to the original drainage near the intersection of Schumaker Road and 88th Avenue. The ditch has a slope of approximately 0.4 percent (a constraint imposed by the regional topography) and can carry the design flow with a depth of two feet. Slightly less than one foot of freeboard (0.8 feet) is appropriate given the flow velocity (4.3 feet per second). This velocity is sufficiently low (less than 5 feet per second) that grass lining should be stable against erosion.

All other areas of the site will continue to drain into the natural drainage system. The natural drainage system will be protected by maintaining silt fencing near the toe of all slopes until adequate vegetation is established on the final cover.

6.6 GAS CONTROL

An active gas control system will be installed to remove methane gas generated by the facility and to limit atmospheric emissions to those allowed under the Colorado air quality standards. On a preliminary basis, the system will consist of multiple vertical extractions wells connected by header pipes to a blower station. The blower will apply a vacuum to the gas collection system and sufficient pressure to feed the gas to a flare or alternate use. The collected gas may be used as a heating or fuel source, or may be discharged to the atmosphere after combustion in a flare system. Condensate generated by the gas control system will be recirculated into the waste mass.

Details of the gas control system have not yet been developed pending placement of sufficient waste to warrant its installation. This approach will allow the design to be refined based on the particular gas generation characteristics of this facility and to take advantage of advances in gas control technologies. However, it is envisioned that the first extraction wells will be constructed once an area of 10 to 20 acres has reached final grade and final cover has been placed. Under the preliminary phasing plan described in this document, this area will be in the northwest portion of the site. The extraction wells will be connected to a blower system and likely a candlestick flare located near the proposed shop facility (northwest of the gas pipeline). The extraction well spacing will likely be on the order of 200 feet and the wells will be designed to extend to ten feet above the base of refuse. A detailed gas control system design will be prepared for review and approval by both CDPHE and Adams County/Tri-County Health prior to completing the first portions of the final cover.

7.0 OPERATIONS PLAN

7.1 GENERAL

The Five Part Development Company Metropolitan Coal Ash facility was permitted by Adams County Case #52-93-CD. Approximately 85.8 acres of the permitted area was sold to Public Service Company of Colorado (now known as Xcel Energy) with an option to purchase the additional approximately 168 acres. Public Service Company did not execute the option and Five Part Development Company retains the permit for 168 acres. CDPHE reviewed the original permit application documents and recommended approval under the solid waste disposal act. Changes to the facility design do not involve substantive differences with the liner, distance to groundwater, cut & fill slopes, ground-water monitoring, and closure/post-closure care.

7.2 SITE ACCESS & CONTROLS

Personnel trained in operating the facility will control the site entrance located on Schumaker Road. A gatehouse (cashier building) or other appropriate access control structure will be constructed such that all vehicles must stop there to gain access to the site. The cashier will inquire as to the nature of the material being delivered and its quantity. The cashier will have authority to deny site access if the material is unacceptable or its characteristics are not known. The cashier may have other operational duties, such as heavy equipment operation.

As stated earlier, only municipal solid waste as defined in the CDPHE solid waste regulations will be accepted at the site. Customers on account will be required to sign an agreement stipulating (1) that only non-hazardous waste will be delivered to the site and (2) that no hazardous waste will be delivered. Questionable materials transported to the site will be rejected until it can be determined that the material is acceptable. Waste screening procedures are provided in Appendix R.

The entire active area of the facility will be fenced. Fencing will be expanded as needed to enclose current and past disposal areas, as well as those under development. A gate will be installed at the site entrance and at other locations as

may prove convenient for the operator. All gates will be locked except during actual operating hours.

Roads interior to the site will be all-weather roads providing safe access during operating hours in all seasons. Roads accessing the active disposal area (used by customers) and those accessing areas under development (used by the operator) will be established but will change in response to operational needs. In addition, roadways will be constructed around the perimeter of the site and to well locations for inspections and monitoring.

7.3 WASTE TYPES

The facility is designed for disposal of municipal solid waste as defined in the CDPHE solid waste regulations. No hazardous waste will be received at the facility. A partial list of the wastes acceptable for disposal at the facility is as follows.

- o Municipal solid waste
- o Agricultural wastes
- o Ash
- o Commercial wastes
- o Construction and demolition debris
- o Household wastes
- o Industrial wastes
- o Inert materials
- o Medical wastes (non-infectious)
- o Mill tailings
- o Non-friable asbestos waste
- o Scrap tires
- o Sludges (passing the paint filter test)
- o Solid waste
- o Water treatment plant residuals sludge (passing the paint filter test)

Other non-hazardous wastes may be acceptable for disposal at the facility in accordance with the waste characterization plan (Appendix R).

7.4 WASTE PLACEMENT

Initially, a layer of select waste (four foot minimum thickness) will be placed directly on the drainage layer. Trained landfill operators and spotters will observe the waste placement and remove or reorient waste that may potentially disrupt the leachate collection system or the liner. Landfill equipment and delivery vehicles will not be allowed to operate above the liner and leachate collection system until the select waste layer has been placed.

Landfilling will be done in multiple refuse lifts and numerous refuse cells as shown in the preliminary phasing plan (Figure 6). Refuse will be placed in a waste cell and kept to the smallest area practical based on the waste volumes received each day. Incoming waste will be spread into layers and compacted with three to five passes of the landfill equipment. The process of layering and compacting is repeated until the compacted waste elevation reaches the intended top of the lift or until the end of the working day.

A six inch thick daily cover soil layer will be placed over the compacted refuse at the end of each workday. Alternative daily covers such as foam, tarps, hydromulch or others may also be employed. Once an area has reached final grade or an interim grade that will not be disturbed for more than six months, a twelve inch thick intermediate soil cover will be placed. Intermediate cover will be graded to minimize erosion and prevent ponding of water.

7.5 NUISANCE CONTROL

7.5.1 Litter

Litter is primarily controlled by the application of daily and intermediate cover and by the maintenance of the smallest practical working face. Additional controls include:

- o Temporary and permanent litter control fencing,
- o Prohibition of uncovered loads,
- o Litter collection on an as-needed basis, and
- o Site closure during high winds.

As stated earlier, perimeter fencing will be established to completely encircle all active and past disposal areas. Interior in-ground and portable fencing will also be used as necessary to minimize off-site excursions of windblown debris. These litter control fences will be relocated as necessary; typically, the portable fencing will be placed downwind of the active face. The fences will be inspected for the presence of debris on a daily basis and any debris will be removed, weather permitting.

Vehicles transporting uncovered loads to the facility can also be a source of windblown litter. Uncovered loads will be prohibited and, to discourage this practice, uncovered loads will be charged twice the normal disposal fee.

Facility personnel will patrol fences and all areas of the facility, collecting any litter for disposal on site. Within 48 hours after a high wind event (see definition below), additional litter patrol and collection will be done on surrounding public and private properties and along the county roads. The facility manager will respond promptly to concerns voiced by surrounding property owners with respect to the reasonable cleanup and removal of windblown litter. The patrol and pickup of litter on affected private property will conform to the reasonable requirements of the property owners. Property owners will be contacted to schedule windblown litter removal, as necessary.

The site will be closed during high wind events. A high wind event is defined as sustained winds of 40 miles per hour or greater or gusts of 55 miles per hour or greater that are expected to persist for one hour or longer. An on-site wind meter will be used to monitor the wind speed in order to allow the landfill manager (or appropriate alternate) to make the determination that a high wind event exists. Upon making that determination, the manager will direct personnel to close the site to additional deliveries and to cover the working face with daily cover as rapidly as possible.

7.5.2 Odor, Vectors & Noise

The major source of odors at the facility is the working face and odors from the working face normally dissipate within a few hundred feet. Daily and intermediate cover control odors from the rest of the facility. In the event odors are a persistent

and pervasive problem, alternative remedies will be investigated and implemented as appropriate.

Vectors are controlled by good waste compaction and expeditious application of daily cover. Remedies for nuisance vectors in the event they become a problem include the installation of bird lines, noise guns, and controlled predator introduction within the landfill area.

Noise will be reduced and controlled by operation of all equipment in a manner consistent with manufacturer recommendations.

7.5.3 Dust

During periods of dry weather and any time that dust is observed leaving the property, haul roads and areas under development will be sprayed with water or dust suppression fluid (e.g., a magnesium chloride solution).

7.5.4 Fire

Waste will not be intentionally burned at this facility. Unintentional waste fires will be extinguished as rapidly as possible using heavy equipment. The burning waste will be excavated and isolated from the non-burning materials. It will be spread on a convenient working surface and the fire smothered under a temporary soil cover. After the waste has cooled, it will be moved to the working face, compacted and covered with the waste being received at that time.

7.6 RECORDKEEPING

The operation will maintain an operating record documenting the following.

- o incoming waste volumes
- o waste characterization activities
- o ground-water monitoring results
- o explosive gas monitoring results
- o leachate monitoring results

- o construction as-built details
- o variations from approved operating procedures
- o demonstration and waiver documentation

The operating record will be maintained either on-site or at another management facility in the Denver metropolitan area.

8.0 MONITORING PLANS

8.1 GROUND WATER

Six new wells will be installed to monitor the quality of the shallowest ground water beneath the facility, as shown on Figure 8. The concepts behind the locations are as follows.

- o wells at each of the leachate collection sumps (MW-3 and MW-5)
- o three wells equally spaced along the downgradient parcel boundary (MW-2, MW-4 and MW-6)
- o one well on the upgradient side of the facility (MW-1).

All wells will extend to shallowest ground water. It is expected that MW-1 and MW-2 will be completed in the "perched aquifer zone" and that the remaining wells will be completed in the "Denver Aquifer zone," based on information presented in IC (1993).

The wells will be sampled for analysis of the parameters listed in Appendix IA and IB of the CDPHE solid waste regulations. Analytical methods will be as specified in EPA SW-846 or other appropriate sources and the laboratory results will be validated using standard methods. Samples will be collected on a quarterly basis for a period of two years (eight sample sets). After collection of eight samples, the sampling frequency may be reduced to semi-annual, with prior approval from CDPHE and from Adams County/Tri-County Health. In addition, after collection of eight samples, the data will be reviewed and a statistical evaluation procedure will be proposed that (1) is consistent with one of the methods specified in the regulations and (2) is appropriate for the site specific data.

The wells will be purged and sampled using either disposable polyethylene bailers or dedicated polyethylene, PVC or Teflon bailers. Disposable bailers will be suspended on new polypropylene rope. Dedicated bailers may be suspended on dedicated polypropylene rope. Alternatively, at the operator's option, dedicated pumps may be installed in the wells and used for purging and sampling.

If bailers are used to purge and sample the wells, the wells will be purged of three wellbore storage volumes (the volume standing inside the casing at the start of purging) or to dryness, whichever occurs first. Periodic field measurements of pH, temperature, and specific conductance will be taken and recorded prior to collecting the sample. Purging will continue until these parameters have stabilized to within 0.2 pH units, 2 degrees C or F, and 10 percent of the specific conductance reading. Samples will then be collected as soon as possible after purging, but no longer than 24 hours after purging. Purge waters will be disposed of on the ground by the well from which the fluid was purged. If dedicated pumps are used, the wells will be purged of three pump and tubing volumes at a flow rate of 100 milliliters per minute or less and sampled immediately after purging; the flow rate during sampling will also be 100 milliliters per minute or less.

Samples will be transferred directly from the bailers or pump discharge tubing into sample bottles provided by the laboratory. Sample bottles and preservation will be as specified in the analytical methods employed, except that volatile organic compound (VOC) samples will be chilled but otherwise unpreserved (consistent with CDPHE policy). Sample bottles will be placed in a cooler or other shipping container and chilled as soon as possible after collection.

Chain-of-custody procedures will be used to track the sample from the time of collection until it, or its derived data, is used. A chain-of-custody form will be initiated at the time that the samples leave the site. Field personnel will complete all applicable sections of the form. The chain-of-custody forms will be protected from moisture by encasing them in plastic (e.g., Ziplock plastic bags) and placed inside the shipping containers. The chain-of-custody forms will accompany the containers during shipment to the laboratory. The shipping containers will be sealed with custody seals.

Field personnel collecting the samples will be responsible for custody until the samples are delivered to the laboratory or relinquished to a commercial shipping company. Sample transfer requires the individuals relinquishing and receiving the samples to sign, date, and note the time of transfer on the chain-of-custody forms. Common carriers (e.g., Federal Express) are not expected to sign the chain-of-custody forms. However, the bill of lading or airbill becomes part of the chain-of-custody record when a common carrier is used to transport the samples. The chain-of-custody is considered complete

after the analytical laboratory accepts custody of the samples (acceptance of custody is indicated by signature on the chain-of-custody form). A copy of the chain-of-custody record will be maintained along with other field records.

The following quality assurance and quality control (QA/QC) actions will be implemented to minimize the potential for biasing the analytical results by laboratory preparation, sampling, and transport activities.

1. Field work will be performed by qualified and trained personnel.
2. Samples will be analyzed by a qualified laboratory. The laboratory will use appropriate chain of custody, analytical, and QA/QC procedures.
3. A trip blank for VOC analysis will be included in each sampling event.
4. Equipment blanks and field duplicates will not be collected on a routine basis because disposable or dedicated sampling equipment will be used; however, they may be prepared and analyzed if questions arise relative to the quality of the analytical data.
5. The laboratory results will be validated using standard methods.
6. The full laboratory report, including laboratory QC data, will be attached to the monitoring reports submitted by the operator to both CDPHE and Adams County/Tri-County Health.

The condition of the ground-water monitoring system will be inspected during each monitoring event. The results of the inspection will be documented and any deficiencies will be remedied within 60 days of the inspection, weather permitting. If deficiencies, malfunctions or deteriorations are observed at other times, such deficiencies will also be documented and remedied within 60 days of discovery, weather permitting.

The monitoring results will be submitted to CDPHE and Adams County/Tri-County Health within 60 days of receipt of the laboratory results in the form of a brief report.

The report will include a tabulation of the data (including water level data), statistical evaluations as appropriate, the results of the system inspection, and a description of any maintenance performed.

8.2 EXPLOSIVE GAS

Explosive gas concentrations will be measured in six new explosive gas probes that will be installed adjacent to the ground-water monitoring wells (Figure 8). The gas probes will be completed from five feet below ground to the elevation of the liner at the probe location. The monitoring probes will be equipped with caps containing normally closed quick connect fittings for the explosive gas monitoring purposes. Explosive gas concentrations will be measured with a calibrated explosive gas meter. After measuring the explosive gas concentration, the cap will be removed and the depth to water will be measured to document that the water level is below the top of the screened interval and that the probe is in good communication with the unsaturated zone.

The condition of the explosive gas monitoring probes will be inspected during each monitoring event. The results of the inspection will be documented and any deficiencies will be remedied within 60 days of the inspection, weather permitting. If deficiencies, malfunctions or deteriorations are observed at other times, such deficiencies will also be documented and remedied within 60 days of discovery, weather permitting.

The monitoring results will be submitted to CDPHE and Adams County/Tri-County Health as part of the ground-water monitoring report or within 60 days of completion of field work in a separate report if ground-water monitoring is not performed that quarter. The report will include a tabulation of the data, as well as the results of any inspections and maintenance performed.

8.3 LEACHATE

The quantity and quality of leachate in the collection sumps will be monitored on an annual basis. Quantity monitoring will consist of a fluid thickness measurement on the date that the sample is collected, as well as a tabulation of quantities pumped from

each sump since the previous sampling date. Samples will be collected directly from the pump discharge and will be analyzed for the parameters listed in Appendix IA and IB of the CDPHE solid waste regulations. Analytical methods will be as specified in EPA SW-846 or other appropriate sources and the laboratory results will be validated using standard methods. Leachate monitoring results will be included with the ground-water monitoring report covering the same calendar quarter.

8.4 SITE CONDITION

The overall condition of the site will be inspected on a quarterly basis. The inspection will include drainage structures, erosion control measures, covered areas, and vegetation. If deficiencies are noted, they will be rectified within 90 days of the inspection, weather permitting. The results of the overall site condition inspection (and any corrective measures undertaken) will be documented in the ground-water or explosive gas monitoring reports.

9.0 CLOSURE/POST-CLOSURE PLANS

9.1 CLOSURE

The site will be closed in increments, as areas reach intermediate cover final grade. Final cover will be placed loosely over the intermediate cover, as discussed in Section 6.3 of this document, and seeded with a mixture of cool and warm weather grass species. Final cover will be placed within 30 days of bringing successive 10 acre areas to intermediate cover final grade. Closure of each 10 acre area will be completed within 180 days of commencing final cover placement and a report documenting the work will be submitted to CDPHE and Adams County/Tri-County Health. An updated closure plan will be submitted to CDPHE and Adams County/Tri-County Health for review and approval prior to commencing closure activities. The updated plan will include a demonstration relative to the effectiveness of an evapo-transpirative cover, a sheet showing proposed final grades, maintenance plans, and a schedule for completion of closure activities.

The gas control system will also be incrementally installed, as described in Section 6.6 of this document. Other systems (i.e., surface water control, ground-water monitoring and explosive gas monitoring) will have been installed well prior to closure.

A financial assurance instrument consistent with those acceptable under the CDPHE solid waste regulations covering the cost of closure will be established prior to initial site development. For purposes of estimating closure costs, the largest area requiring closure at this facility is the entire disposal footprint, 142.3 acres. The closure cost estimate will be revised every five years to reflect the remaining closure liability. The cost estimate will also be adjusted annually to account for inflation.

Notice of intent to close will be provided to the general public, CDPHE and Adams County/Tri-County Health 60 days prior to the cessation of waste acceptance at the site. A final closure report will also be submitted to CDPHE and Adams County/Tri-County Health certifying that all closure requirements have been met and documenting the date of final site closure. In addition, a notation on the deed to the facility property will be recorded stating that the property has been used as a landfill and that future uses are restricted under Section 3.6.1(7) of the CDPHE solid waste regulations.

CDPHE and Adams County/Tri-County Health will be notified when the notation is recorded.

9.2 POST-CLOSURE

9.2.1 General

The site will be maintained for a post-closure care period of 30 years after the date of final site closure. The site is expected to remain in a vegetated undeveloped state during the post-closure care period; however, other uses may occur as long as the final cover and other control/monitoring systems are not disturbed.

9.2.2 Monitoring

During the post-closure care period, the following environmental/physical monitoring will be conducted.

1. Ground-water monitoring will be performed on a semi-annual basis. Analytes, methods and reporting will be as described in Section 8.1 of this document.
2. Explosive gas monitoring will be performed on a quarterly basis. Methods and reporting will be as described in Section 8.2 of this document.
3. Leachate monitoring will be performed on an annual basis. Analytes, methods and reporting will be as described in Section 8.3 of this document.
4. Overall site conditions will be inspected on a semi-annual basis. Items covered by the inspections, correction of deficiencies and reporting will be as described in Section 8.4 of this document. This includes inspection and maintenance of the surface water control system, which has been designed to handle the 100 year storm event.

As data are developed on the performance of the site during the post-closure care period, the operator may petition CDPHE and Adams County/Tri-County Health for changes in the scope and frequency of the above described post-closure monitoring.

9.2.3 Explosive Gas Control

The explosive gas control system will be operated until emissions from the facility meet the requirements of the Colorado Air Quality Control Division. The CDPHE Solid Waste Group and Adams County/Tri-County Health will be notified if operation of the gas control system ceases prior to the end of the post-closure care period.

9.2.4 Access Control

The perimeter fencing will be maintained throughout the post-closure care period to limit unauthorized access to the site.

9.2.5 Financial Assurance

A financial assurance instrument consistent with those acceptable under the CDPHE solid waste regulations covering the cost of post-closure care will be established prior to initial site development. The post-closure cost estimate will be revised every five years to reflect the remaining post-closure care requirements. The cost estimate will also be adjusted annually to account for inflation.

9.2.6 Completion

CDPHE and Adams County/Tri-County Health will be notified when the post-closure care obligation has been met. The notification will consist of a certification from an independent Colorado registered professional engineer that the post-closure care has been completed in accordance with this post-closure care plan.

10.0 REFERENCES

IC, 1993, Engineering Design and Operations Plan for the Metropolitan Coal Ash Disposal Facility, prepared for Five Part Development Company, Industrial Compliance Project Number 061 4369, December 21.

Highlighted Version of EDOP Showing Changes and Updates Since 2006 CD



Sustainability in Action

EAST REGIONAL LANDFILL ENGINEERING\ DESIGN AND OPERATIONS PLAN

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1.0 INTRODUCTION

1.1 Purpose

This Engineering Design and Operations Plan (EDOP) and supporting appendices presents the design, monitoring, operating, closure, and post-closure plans for the East Regional Landfill (ERL) facility, located in Adams County near Bennett, Colorado for a vertical expansion of the facility. The ERL, originally called the Five Part Development Landfill and referred to as such in earlier documents, is owned and operated by Five Part Development, LLC (Five Part). This expansion does not include an increase in the filling footprint or landfill property size and only includes the vertical expansion. As such, many originally permitted portions of the landfill remain unchanged. The intention of this expansion EDOP is to update the entire EDOP and include both the unchanged portions of the current permit and the modifications as a result of this vertical expansion.

This EDOP provides a written overview of the landfill design and the operational methods used by ERL in meeting applicable County and State requirements including the Colorado Regulation Pertaining to Solid Waste Disposal Sites and Facilities 6 CCR 1007-2, hereinafter referred to as the “Regulations” or “State Regulations”. The EDOP is a compilation of information and plans including the original permit work for the site proposed as an ash fill, the revisions to the permit to modify it to a Municipal Solid Waste (MSW) disposal facility, and the modifications made since the MSW permit approval.

Pertinent portions of the original EDOP are attached to this document as appendices. This EDOP and other referenced documents supersede all previous plans.

1.2 History

This document makes extensive reference to an EDOP (Industrial Compliance (IC), 1993) completed for a large parcel of property for which a Certificate of Designation (CD) for the disposal of coal combustion ash was originally granted on March 5, 1994 by Adams County Case Number 52-93-CD. This facility was called the Metropolitan Denver Coal Ash Disposal Facility (MDCADF) and was never developed. Conditions at the site were investigated in detail prior to the initial approval of the facility. This work is described in Section 3.0 of the 1993 EDOP, which is attached to this document as Appendix A. Relevant topics covered and approved in that EDOP include location restrictions, climatology, and characterization of the site. Location restrictions are excerpted from the 1993 EDOP and are included as Appendix C. In 2005, Alpine Disposal Services (Alpine) purchased Five Part Development and a portion of the MDCADF property and submitted an application for a new CD from Adams County as a Municipal Solid Waste (MSW) disposal facility, taking the form of a new EDOP called the *Engineering Design and Operations Plan, Five Part Disposal Facility* (Doty & Associates, November 4, 2005, Volume 1 and June 1, 2006, Volume 2), hereinafter referred to as the 2006 EDOP. Following an extensive public hearing process the Adams County Board of County Commissioners approved Alpine’s application by Resolution, Case #EXG2009-00001, dated July 29, 2009. After fulfilling the necessary conditions precedent set forth in the Resolution, Adams County issued a conditional CD on September 1, 2010 to operate as an MSW disposal facility and the ERL began disposal operations on September 2, 2010.

In 2011, ERL applied for and was granted an amended CD to conduct composting operations at

the facility, Case #EXG2011-00003. The design plan and requirements for the composting operation are contained within the document called *Engineering Design and Operations Plan Compost Operations, East Regional Landfill* (American Environmental Consulting, LLC March 10, 2011). Referred to as the 2011 Compost EDOP, this EDOP is not included in this document since it is a standalone document and was permitted separately from the MSW landfill.

Since the 2006 EDOP a number of revisions to the facility design and operations have been approved as a result of conditions in the CD, changing regulations, and changes requested by ERL. This revised EDOP is a complete, stand-alone EDOP meeting the requirements in the regulations and incorporates changes from the 2006 EDOP to the disposal cell designs, liner systems, facility configuration, surface water control, waste types, financial assurance, inspections and maintenance, ground-water monitoring, explosive gas monitoring, facility operations, environmental monitoring and closure/post-closure care, as well as operations that have been updated to meet the current Colorado Department of Public Health and Environment (CDPHE) standards, regulations, and ERL operating practices.

This EDOP was developed to incorporate the following approved design and operational changes:

- 1) Improved construction methods and operations of the facility from a reconfigured landfill footprint and modified base grades that optimized the use of the existing permitted landfill area to:
 - a) maintain a 10-foot separation to ground water,
 - b) provided an additional 10 feet of right-of-way (ROW) along Schumaker Road and deeded the ROW to Adams County,
 - c) prohibited landfilling or permanent structures within 40 feet of the southern property boundary along the south Section line of the facility, and provided at least 25 feet of landscaping depth along Schumaker Road and a landscaped buffer along the south side of the site.
- 2) The liner system was revised to substitute a Geosynthetic Clay Liner instead of using a 2-foot thickness of compacted clay and the leachate collection system was modified to substitute a geocomposite drainage layer in place of the one-foot layer of aggregate material and piping on the floor of the landfill.
- 3) Minor modifications to the facility final cover extent are incorporated to correspond to the re-configured landfill footprint in accordance with State Regulations.
- 4) A revised Waste Characterization Plan in compliance with the current standards and ERL practices.
- 5) Revisions to the facility operations, including but not limited to, the use of Alternative Daily Cover (ADC) materials and changes to the environmental monitoring network from that shown in the 2006 EDOP.

- 6) Updated site topography and coordinate system. The original site topography was developed in 1993 based on a local coordinate system. The site topography was updated by aerial photography in January 2012 based on a modified state plane system to allow correlation with offsite features and control points. This change in coordinate system resulted in an elevation change of approximately +3.87 feet. This elevation change did not actually change any of the points in space, but only the elevation designation.
- 7) A Landfill Gas Collection and Control System (GCCS) was installed in Module 1 of the ERL in 2022. Details on maintenance, compliance requirements, and monitoring of the of the GCCS are included in the Title V Operating Permit for the facility, Permit No. 10OPAD353.

Additionally, this EDOP was developed to incorporate the following not yet approved design changes.

- 1) Vertical expansion design. The revised final cover design modifies the cover slopes from a compound slope consisting of a 4:1 side slope with a grade break at 5,350 feet amsl to a 20:1 top slope to an apex at 5,392.37 ft amsl to a compound slope consisting of 3.5:1 side slopes from the cover toe to a higher grade break at 5,484 feet amsl where the slope changes to a 20:1 top slope with two apex points at 5,495.66 and 5,499.25 feet amsl. This design change increases the cover height by approximately 107 feet.
- 2) Final cover system redesign. The revised final cover system changes the final cover design from an Alternative Cover with 4-8 feet of loosely compacted soil to two possible options, a 3.5 foot-thick Alternative Final Cover System designed in accordance with the March 2013 Final Guidance Document Water Balance Covers in Colorado or an LLDPE lined cover with drainage system and protective soil. Additionally, construction requirements for both of the final cover options are presented in a revised CQA Plan.

1.3 Site Description

The facility is located west of Schumaker Road approximately one-half mile south of 88th Avenue (Irondale Road) in south central Adams County, Colorado. The site is located in the South 1/2 of Section 25, Township 2 South, Range 64 West, 6th Principal Meridian, Adams County, Colorado, approximately 6.75 miles northwest of the town of Bennett (Figure 1) with the following physical address:

Physical and Mailing Address:

East Regional Landfill
8201 Schumaker Road
Bennett, CO 80102
(303) 685-2700 phone

The property consists of four parcels designated Parcel A through Parcel D originally totaling 164.17 acres, a slight reduction from that proposed in the 2006 EDOP. The eastern property boundary originally permitted and shown in the 2006 Plan extended to the 30-foot County Right-of-Way (ROW) along Schumaker Road. As a condition of the CD, Five Part Development granted Adams County an additional 10-feet of Right-of-Way (ROW), extending the County ROW to a

total of 40-feet along Schumaker Road. The additional 10-foot ROW was deeded to Adams County, reducing the property by approximately 0.33 acres to 164.17 acres more or less. The original legal description of the property prior to the elimination of the 10-foot ROW and the ROW deeded to Adams County are included in Appendix B.

The northwest corner of the property is also bisected by four buried gas lines running in a northeast to southwest orientation. Five Part Development granted a 70-foot ROW and a 20-foot access easement to Colorado Interstate Gas (CIG) for these pipelines. The pipelines have been surveyed and are shown along with the ROW and easement on the drawings included with this EDOP. The gas pipeline easements are also included in Appendix H. All disposal operations (the landfill footprint) are designed outside of this ROW and easement. There is some ERL property located across the ROW and easement that the ERL may use to support the landfill operations, such as buildings or equipment/soil storage. If approved by the pipeline company, ERL reserves the right to also use the property for borrow soils or any other potential needs of the landfill.

Disposal will occur on approximately 132 acres within the 164-acre permit boundary, with the remainder of the property used for surface water control, setbacks, easements, access roads and facility structures. Municipal solid waste is delivered to the facility by commercial solid waste collection operators and the general public. The majority of the solid waste is from local collection operations and the general public in the area. More information on the composition of the solid waste is found in Section 7.3 of this document.

The ERL also operates a Class II (by Colorado designation) compost facility under a separate CD dated September 28, 2011 (Case #EXG2011-00003) based on a March 10, 2011 EDOP for the compost operations. The compost operations are not a part of this EDOP.

1.4 Access

Commercial haulers are allowed to use State Route 79 to reach 88th Avenue (Irondale Road) then west on 88th Avenue and south on Schumaker Road to the site entrance. They may also use County Road 25 (Imboden Road) from the north or south to 88th Avenue, then east to Schumaker Road to the site entrance. The approved routes are shown on Figure 2. The owner may be required to assist Adams County in construction of a deceleration/right turn lane on 88th Avenue for turning onto Schumaker if warranted based on a traffic study to be conducted by Adams County. In addition, the ERL has an agreement to assist Adams County with paving Schumaker Road from 88th Avenue to the facility entrance when Adams County determines it is feasible.

On average, approximately 70-85 vehicles arrive daily to deliver waste to the facility. This is slightly more than the 25-50 vehicles anticipated in the 2006 Plan prior to operations but is still well within the capacity of the roads, based on the traffic study performed by Leigh, Scott and Cleary for the permitting of the adjacent Conservation Services, Inc., (CSI) Facility. The traffic study demonstrated capacities of 1,000 vehicles per day for Imboden Road and 5,000 vehicles per day for Irondale Road.

1.5 Zoning

The ERL property is zoned A-3/Agricultural and has a Certificate of Designation for MSW disposal from Adams County as well as a Class II compost operation. Adams County has deemed these uses compatible with the zoning and surrounding land uses following review of the

application and the public hearing process.

1.6 Fees

The ERL will make payments to the Colorado Hazardous Substance Response Fund (HSRF), as required by the CDPHE solid waste regulations. In addition, the facility will make payments to Adams County for administrative, monitoring, and inspection costs and expenses as required by the July 29, 2009 resolution granting the September 1, 2010 Certificate of Designation.

2.0 SITE DESCRIPTION

2.1 Location Restrictions

ERL meets each of the nine siting criteria described in Section 3.1 "Location Restrictions/Site Standards" of The Colorado State Regulations and the site location was previously approved. Documentation demonstrating compliance with the location restrictions is included in Appendix A and has been placed within the facility operating record.

2.1.1 Seismic Impact Zone

The USGS 2014 Dynamic Seismic Hazard Map for the conterminous United States was used to find the seismic hazards at the East Regional Landfill. There is a 2% or less chance that the peak ground acceleration at ERL will exceed 8.18% of the earth's gravitational pull in 50 years (equivalent to 10% chance in 250 years), so the site is not located in a seismic impact zone. All components of the landfill design are designed to resist the maximum horizontal acceleration in lithified material for the site. Slope stability analyses are included in Appendix N.

2.1.2 Bird Mitigation Plan and Proximity to the Denver International Airport

As a part of the location restriction information requested by the Federal Aviation Administration (FAA), ERL worked closely with the FAA, the Denver International Airport (DIA) and the Front Range Airport (FRA) to prepare a bird mitigation plan for the facility. The control of birds at ERL deserves special consideration because of the potentially dangerous occurrences of bird strikes by aircraft. Federal regulations (40 CFR § 258.10), require owners and operators of municipal solid waste landfills to demonstrate that landfills within 10,000 feet of any airport runway used by turbo-jet aircraft or within 5,000 feet of any airport runway which receives only piston-type aircraft be designed and operated in a manner which does not pose a bird hazard to aircraft, and requires notification if a landfill is outside of these ranges but within five miles of certain airports. The CDPHE regulations mirror those in 40 CFR§ 258.10.

The ERL facility is located approximately four miles north of the Front Range Airport and eight miles east of the Denver International Airport and is in compliance with all of the USEPA and CDPHE requirements. The facility is not within 10,000 feet of any runway at either of the airports, and ERL provided notification to Ms. Linda Bruce, Colorado State Planner with the FAA of the planned development to accept putrescible waste in October 2007. Although not required by regulation, the ERL also submitted a completed Form 7460-1 dated June 1, 2009 at the request of the FAA for informational purposes.

In 2009, ERL prepared a bird mitigation plan for the facility (Appendix D) because of its relative location to the Denver International Airport. ERL met with and worked closely with representatives of the FAA, United States Department of Agriculture (USDA, as wildlife consultant to the FAA), DIA, and the Front Range Airport to explain the planned operations and develop effective bird mitigation procedures. Each entity was provided an opportunity to review the facility development and voice any concerns they may have as part of the permitting process for the ERL to accept putrescible wastes for disposal. The facility did not receive any negative responses and received a number of positive responses. This bird mitigation plan provides more

specific guidance for the control of birds at the facility in Section 7.5.2, Vector Control of this EDOP.

2.2 Surface Water/Groundwater

No waste will be placed below or into surface or ground water. The facility disposal areas are specifically designed to remain outside the limits of any surface water and above ground water. Additional precautions to control surface water runoff and runoff have been taken and include berms and ditches as necessary during operations. The permanent surface water control system is redesigned in this EDOP as part of the final cover vertical expansion. Operational and post-closure surface water drainage information and calculations are provided in Appendix E and the permanent stormwater control design is based on containing the 24-hour, 25-year storm event and controlling the 24-hour, 100-year storm event.

2.3 Permitted Wells Within Two Miles of Site

The Division of Water Resources data access page was used to update the water well information within two miles of the site, registered as of February 2024. Records provided by the State Engineers Office generally locate the wells by ¼, ¼ Section. A list of these wells based on the information provided is included in Appendix F.

2.4 Adjacent Land Ownership

The original permit document presents the information regarding landowners adjacent to the ERL Facility, as required by Adams County. This information was updated for this EDOP with records obtained from Adams County, and provides the name and address information and is included in Appendix G.

2.5 Site Characterization

Site geologic and hydrogeologic conditions were investigated in detail prior to the initial approval of the facility. This work is described in Section 4.0 of IC (1993), which is attached to this document as Appendix A. Topics covered there include:

- Regional and Site Geology,
- Regional and Site Hydrogeology,
- Hydrogeologic Characterization, and
- Groundwater Flow Paths & Velocities.

Specific site characterization work results including boring logs, packer test results, slug tests, etc are included in Appendix A. Some additional characterization work including HELP modeling has been done since the original work and is discussed in Section 3.2 of this document and is included in the base grade redesign in Appendix J.

2.6 Climatology

The climate data was prepared in the original permit document and is included in Appendix I.

3.0 SITE GRADING & PHASED DEVELOPMENT

3.1 Design Concepts

The facility was redesigned using the basic design concepts of the 1993 approval when it was modified from the ash fill to a solid waste landfill. It was redesigned again in 2011 with a request to have the option of using a Geosynthetic Clay Liner (GCL) in place of the 2 feet of re-compacted clay. Another modification was completed in 2008 to use a geocomposite material in place of the granular collection material for leachate drainage on the floor of the landfill to the sump. A modification to the cover design is included as part of this revised EDOP. This modification includes a vertical expansion of the landfill fill area and a more detailed Alternative Final Cover design than what is presented in the 2006 EDOP as well as an optional final cover design that includes a LLDPE liner, drainage layer, protective soils, and vegetative soils.

3.1.1 Design Concept Summary

Specific design concepts were incorporated in the 2006 EDOP. Some of these concepts were modified subsequent to the issuance of the CD, predominantly as a condition of the CD, and have received approval from the CDPHE and Adams County and are incorporated in this EDOP. A comparison of the design concepts from the approved 2006 design with the designs incorporated herein are summarized below.

1. Disposal Area Footprint. The eastern and southern boundaries of the disposal area footprint have been modified from the 2006 design out of necessity to accommodate Adams County requirements for issuance of the CD and modify the perimeter drainage system to remain on the ERL property (the drainage system for the ERL in the 2006 EDOP extended northward into property not owned by ERL). The southern boundary of the drainage system and footprint was moved northward to comply with Condition Precedent #3 and #5 of the Resolution prohibiting landfill and permanent structures within forty feet of the South Section line and install a landscape buffer on the southern property boundary. The eastern boundary of the drainage system and the landfill footprint was moved westward to accommodate the additional 10-foot ROW deeded to Adams County and the Condition Precedent #5 of the Resolution requiring at least 25-feet of landscape depth and screening berm along Schumaker Road. These modifications resulted in a slight reduction in size of the landfill disposal area footprint from the 2006 design. The disposal footprint is unchanged for this updated EDOP.
2. Excavation Slopes. Consistent with the 2006 design, all excavation slopes of the disposal area footprint are designed at 3H:1V (horizontal to vertical). The excavation slopes are unchanged for this updated EDOP.
3. Separation from Ground Water. The 2006 EDOP maintained the minimum 10-foot separation between waste and the shallowest ground water from the 1993 design, a design requirement that is maintained in the approved design included in this EDOP. The depths to ground water in the wells and piezometers that remained accessible on the property in July 2005 were checked against the data presented in IC (1993) and were found to adequately represent current conditions. Additional piezometers installed in 2010 and discussed in Section 3.2 also verified the original concept of the site. Water levels from the “Perched

Ground Water Zone” defined in IC (1993) were contoured and assumed to continue at a uniform grade to the east where the “Denver Aquifer Zone” has much lower water levels. As a result, this water level contour map is conservative in the eastern portions of the site, and with the data from the 2010 piezometers was used as the basis for designing the top of liner grades.

In addition the excavation for Cell 10 remained open without maintenance for approximately two years before liner was constructed. This allowed surface water to accumulate in and surrounding the cell that infiltrated into the subsurface, resulting in the presence of temporary shallow groundwater above the designed base of Cell 10. An attempt was made to drain the artificially-induced groundwater so that the cell could be constructed as originally designed, but was unsuccessful. In order to expedite construction, the base grades for Cell 10 were raised a minimum 10-feet above the artificial groundwater, necessitating a redesign of the base grades in the vicinity of Module 3 and minor changes in the rest of the landfill as reflected in the approved March 2, 2011 *East Regional Landfill Revised Excavation Plan and Liner Design* document included in Appendix J.

4. Liner System. The 2006 design consisted of two feet of compacted clay with a saturated hydraulic conductivity of 1×10^{-7} centimeters per second (cm/s) or less, overlain by a 60 mil high density polyethylene (HDPE) geomembrane. Subsequent to construction of the first disposal cell (Cell 10) the ERL was approved to substitute a geosynthetic clay liner (GCL) in place of the two feet of compacted clay as an option for the remaining landfill construction.
5. Leachate Collection System. The leachate collection system design presented in the 2006 EDOP consists of a one-foot thick drainage layer with leachate collection piping leading to two sumps. Prior to construction of the first disposal cell the ERL was approved to substitute a geocomposite drainage layer in place of the one-foot aggregate material and piping. The one-foot aggregate drainage layer and piping is no longer an approved option.
6. Landfill Gas Collection and Control System. To meet the requirements of 40 CFR Part 60 Subpart WWW (now subpart Cf with state plan approval) a Landfill Gas Collection and Control System (GCCS) was installed in Module 1 in 2022. The GCCS consists of 31 vertical extraction wells, transmission piping, 3 condensate traps, one condensate sump at the flare skid, a flare, and gas handling skid. Design, operational, and monitoring details for the GCCS are included in the approved documents: East Regional Landfill’s Gas Collection & Control System Plan, dated August 13, 2021, developed by Smith and Gardener Engineers, and the facility’s Title V Operating Permit, Permit No. 10OPAD353.
7. Final Cover Height and Elevation. The 2006 final cover configuration was designed with two “peaks” and a maximum height of approximately 90 feet above the lowest portion of the surrounding ground surface at an elevation of approximately 5,392-feet amsl (above mean sea level) based on the updated state plane coordinate system discussed in Section 1.2. The side slopes in the 2006 Plan were designed at a 4:1 maximum slope up to an elevation of approximately 5,356-feet amsl and five percent up to the final grades. The final sideslope configuration included in this EDOP was designed with a maximum height of approximately 200 feet above the lowest portion of the surrounding ground surface and changes the side

slope configuration to be 3.5:1 slopes from the cover toe to a higher grade break at approximately 5,484-feet amsl to the 5% grade at the top to the two peaks resulting in a peak design elevation of approximately 5,499-feet amsl (adjusted for the change in coordinate system).

8. **Final Cover Design.** The 2006 final cover design proposed an Alternative Final Cover system using a water balance model to limit infiltration into the waste mass. This EDOP continues to propose an AFC using the same water balance model, but provides additional design and construction criteria including a demonstration of the feasibility of this type of AFC and a CQA Plan for its construction. This EDOP also proposes a possible final cover option of using a synthetic-lined cover for the final cover and includes a CQA Plan for its construction.

3.2 Grading and Excavation Plan

The site excavation was designed to continue using the concept that a minimum separation of 10 feet must be maintained between waste and the shallowest ground water. The fill area side slopes have 3:1 grades. The base grades of the landfill floor range in slope from a 1 percent grade to a 4.25 percent grade depending on the module and module area. As previously noted, the redesigned landfill excavation plan maintains a 10-foot separation from the top of the liner to the highest groundwater elevation. The ERL submitted a document entitled *East Regional Landfill Revised Excavation Plan and Liner Design* (AEC, March 2, 2011) that reflected the following:

1. Adjustments to the disposal area footprint necessitated by the Adams County ROW and landscape requirements,
2. Raised the original base grades to ensure the minimum separation to groundwater was maintained.
3. Modified the configuration of the base grades to incorporate three separate leachate sumps instead of the two sumps shown in the 2006 EDOP.

A copy of the March 2, 2011 Plan and CDPHE approval is included in Appendix J. Drawings showing the approved plan for each liner system options and final cover are included in this EDOP as Plates 3A, 3B, and 4.

Modifications to the approved grading plan became necessary after changes were made to the disposal area footprint and property boundary during the public hearing process and also by conditions encountered during construction of Cell 10 requiring raising the base grades in some areas. Additionally, supporting documentation was prepared to demonstrate that the plan meets the CDPHE regulatory requirements.

As stated above, the facility has a minimum 10-foot separation requirement between the top of the clay liner surface and underlying groundwater. A number of piezometers were installed at the facility in 1991 and 1992 to characterize the subsurface for the original permitting of the facility as a coal ash disposal facility. The water levels in these piezometers were measured at various times between installation and March 1993 to establish static groundwater elevations. Nearly all of those piezometers have been destroyed, so an additional 18 piezometers were

installed in November 2010 through February 2011 to verify the original groundwater characterization data and better define the groundwater surface for purposes of the redesign of the grading plan. The piezometers installed in 1991 and 1992 are noted as “pre-existing” and the piezometers installed in 2010 noted as “new” in the attached drawings in Appendix J. In general, the piezometers installed in 2010 verify that the 1991/1992 groundwater data was accurate. As can be seen on Sheet 4, Appendix J, many piezometers are nested or placed in very close proximity to each other, but they indicate a difference in groundwater elevations. For purposes of designing the base grades for the landfill that ensure the required separation, the highest groundwater elevations, which are shown on Sheet 4, Appendix J, were used in these cases. The resulting redesigned landfill grades demonstrate a minimum 10-foot separation between the top of clay (or GCL liner) and the underlying groundwater.

A few of the piezometers, particularly those completed in February 2011 (PZ-98, PZ-99, and PZ-100) are dry to the total depth completed. For purposes of developing groundwater contours and establishing a minimum separation between the top of the liner elevations and the underlying groundwater, groundwater was assumed to be present at the total depth of the dry piezometers. The resulting redesigned landfill grades demonstrate a minimum 10-foot of separation between the top of clay (or GCL liner) and the underlying groundwater. The drawing showing the groundwater contours and the landfill grades on the top of clay surface (or GCL surface) are included in Appendix J. The groundwater contours were developed based on the highest recorded groundwater elevation where conflicting elevations are indicated in nested or nearby piezometers, so the drawings in Appendix J include only the piezometers and groundwater elevations used to develop the groundwater contours.

Additionally, the March 2, 2011 Plan modified the excavation plan to include 3 sumps instead of the originally planned 2 sumps. Updated HELP modeling is included in Appendix L demonstrating that the modified excavation plan is in compliance with the Regulations.

As discussed in Section 1.2, the site topography was updated with new aerial photography in January 2012. The 2006 EDOP and the March 2, 2011 Plan was designed using the original local coordinate system. In conjunction with the 2012 aerial mapping the coordinate system was converted to a modified state plane system, resulting in an approximately +3.87-foot conversion factor for elevation from the original local coordinate system. Therefore, the elevations shown on the attached design drawings have been updated to reflect an elevation conversion factor of approximately 3.87 feet higher than the local coordinate system (shown in Appendix J) although they represent the same point in space.

3.3 Liner Design Modification

The March 2, 2011 Plan included a request to use an optional Geosynthetic Clay Liner (GCL) instead of 2-feet of clay and that option is reflected in this EDOP. As with the previously approved design, a 60-mil HDPE membrane will remain but be placed on top of the GCL rather than the clay. The grading plan continues meet the requirement of a minimum separation between the top of the liner and the groundwater of 10 feet, as approved in the EDOP prepared by Doty & Associates, LLC (June 2006).

An equivalency determination to compare the option of using a GCL in place of the originally approved 24 inches of clay beneath the High Density Polyethylene (HDPE) liner was prepared as part of the March 2, 2011 Plan. This change was approved by the Division and Adams County and incorporated into the EDOP. Liner details are shown on Plate 5. A revised Construction Quality Assurance Plan (CQAP) was developed as part of this EDOP to incorporate final cover modifications and includes the requirements for installing a GCL. No other changes are made to the CQAP from previous versions regarding the liner system. The revised CQAP is included in Appendix M.

3.4 Leachate Collection System Modification

The leachate collection system was modified to use a geocomposite drainage material rather than the originally approved aggregate material layer. This modification was revised in 2008 by Terracon, Inc. and approved by the CDPHE in a letter dated July 15, 2008 (Appendix K). The CQAP (Appendix L) was also modified to include the installation procedures and testing for the material. Transit time calculations to estimate the length of time it would take leachate to travel from the farthest point in each module to that module's sump are included in Appendix J. The transit times were prepared based on the modified landfill base grades and longest flow pathways, including leachate travel down the landfill sideslopes, and are well within the maximum 365-day requirement. Details of the approved leachate collection system are included in Plate 6.

3.5 Stormwater Control System Redesign

The disposal area boundary and fill limits were revised from the 2006 design to provide additional ROW along Schumaker Road and landscaping as a condition of the CD as well as to provide room for design of a permanent perimeter surface water control system. The permanent surface water control system was designed to control the 100-year, 24-hour storm event in compliance with regulations and documented in the *Drainage Report and Plan, Five Part Landfill* dated December 2009. The vertical expansion of the final cover necessitates a redesign to the permanent surface water control system. The redesigned surface water control system is included in Appendix E. This redesigned system is designed to fully contain the runoff from a 25-year, 24-hour Type II storm and control the runoff from a 100-year, 24-hour Type II storm. The system consists of tack on berms on the final cover that route runoff to perimeter drainage ditches around the disposal area and to two site outfall locations. The ditch system also incorporates detention weirs to fully contain the 24-hour, 25-year storm volume and assist in limiting off-site sediment transport and is designed between the disposal area footprint and the required landscape areas on the south and east property boundaries. It is designed on the inside (landfill side) of the 20-foot KinderMorgan gas pipeline easement adjacent to the disposal area. The ditch and associated structures will be constructed in phases concurrent with the disposal area phasing and closure to control run-on to the active disposal areas and runoff from the landfill.

3.6 Final Grades

The final grades and landfill height are modified in this EDOP. The maximum height at the top of the final cover is at an elevation of approximately 5499-feet (modified state plane system), approximately 107 feet higher than the previously approved cover design (elevation 5392). The final cover topography is shown on Plate 4.

3.7 Final Cover System

The final cover system design is updated in this EDOP from the originally approved water balance cover of 4-8 feet thickness of monolithic lightly compacted soils to two options. The first option is a water balance cover with 3.5 feet of thickness of monolithic lightly compacted soils. The second option is a final cover consisting of one foot of prepared subbase overlain by a LLDPE membrane covered by 1.5 foot thick vegetative layer. These final cover options are discussed further in Section 4.4.

3.8 Soil/Material Balance

The facility was originally designed to result in a material quantity balance, considering clay toe berm, daily and intermediate cover and final cover requirements. However, due to the base grade redesign, less excavation soil is available than originally anticipated. In the future, the ERL will acquire a borrow source. The various excavation and fill volumes are presented in Table 1.

3.9 Phasing Plan

The 2006 EDOP segregates the landfill footprint into pre-established “cells” of a specific size. The designation of specific cells is arbitrary and cumbersome in that only portions of cells may be constructed at any one time in practice, requiring a change in the designation of the area constructed during any one event (e.g., Cell 8-Phase 1) or any construction event includes portions of one or more cells (e.g., Cell 8-Phase 3; Cell 9-Phase 1). To simplify the nomenclature, the landfill footprint in the approved grading plan is segregated into three Modules that are defined by physical design features (i.e., a drainage area). A Module is defined as an excavated disposal area of the landfill that drains to a single leachate collection sump located in that module. Within each Module, individual cells will be constructed as they are needed and the size and timing of cell construction is left to the discretion of the landfill operator and based on such considerations as the volume of airspace desired for a period of time and budgetary constraints. With the exception of Cell 10, which was named based on the nomenclature in the 2006 EDOP, any portion of a disposal area constructed at one time will define a cell and the cells number will be sequential. For example, Cell 1 was constructed in one continue construction event, but has two designations, Cell 1A and Cell 1B because it was necessary to document the construction in two separate construction reports. The next cell to be constructed will be called Cell 2, the following cell name Cell 3, etc.

Development of the disposal area at the site began with Cell 10 of Module 1 located in the northeast corner of the site and contains the sump for Module 1. Cell 1 was constructed in 2011 adjacent to Cell 10 to the west and extends to the western boundary of the fill area footprint.

Cell 2 was constructed in 2014 adjacent to Cell 1 to the south and extends to the western boundary of the fill area footprint. Cell 3 was constructed in 2015 adjacent to Cell 2 to the south and extends to the western boundary of the fill area footprint. Cell 3 extends to the southern boundary of the Module 1 fill area footprint. Cell 4 was constructed in 2018 adjacent to Cell 2 and Cell 3 to the east and Cell 10 and Cell 1 to the south. Cell 4 was the final cell in Module 1. Cell 5 was constructed in 2022 as the first cell in Module 2 and contains the sump for Module 2. Cell 5 is in the northern part of Module 2 and is immediately south of Module 1. The currently constructed area includes all of Module 1 and the first cell (Cell 5) of Module 2. Cell construction will generally progress southward in an east-west configuration until the southern boundary of the disposal area footprint is reached, and then cell development will progress eastward to the eastern footprint boundary. Overall, cell development of the site will progress in a northwest to southeast manner.

It is envisioned that the next cell area will be under excavation and/or construction while filling continues in previously constructed cells. Daily and intermediate cover soils may be borrowed from the excavation for the next cell or from existing stockpiles.

4.0 FACILITY DESIGN DETAILS

4.1 Liner

The entire excavation will be covered with a composite liner system consisting of a GCL and 60-mil HDPE geomembrane, or optionally a CCL and 60-mil HDPE geomembrane. Details of liner system are shown on Plate 5. The revised CQA Plan is included in Appendix L.

The 60 mil HDPE geomembrane will be new material, manufactured with first quality high density polyethylene resin. Textured HDPE will be used. The geomembrane will be anchored along the crest of the excavation or the toe berm in a two-foot wide by two foot deep anchor trench. Seams will be sealed between the separate geomembrane sheets using either double fusion welds or extrusion welds. Construction quality assurance procedures are specified in Appendix L.

4.2 Leachate Collection System

A leachate collection system consisting of a geocomposite drainage layer and three leachate removal sumps (one for each module) is designed on top of the composite liner (above the HDPE membrane) to route any free liquid at the base of the facility to leachate removal sumps located in each Module.

4.2.1 Geocomposite Drainage Layer

The 2006 EDOP incorporated a one-foot thick drainage layer of aggregate materials supplemented by a piping system. The aggregate material and piping has been eliminated as an option for the leachate drainage layer and a geocomposite drainage material was approved in its place in a series of design modifications prior to the construction of Cell 10. The geocomposite consists of a polyethylene drainage net with geotextile fabric bonded to each side and designed over the entire floor of the landfill (not the side slopes). The material requirements, installation procedures, and CQA procedures are detailed in the CQA Plan in Appendix L. Details of the leachate collection system are included on Plate 6.

4.2.2 Sumps

Three sumps, one in each Module, are designed at the landfill to provide for collection and removal of leachate. Each of the sumps are configured slightly different but range from approximately 68 to 85 feet wide at the top and all are approximately four feet deeper than the surround elevations on the floor. The sump is lined identically to the floor and sideslopes of the landfill (a composite liner with the 60-mil HDPE overlaying either the compacted clay or GCL).

An 18-inch diameter perforated SDR 17 HDPE pipe will be installed on the floor of the sumps and connected to a similar solid riser pipe running up the composite-lined side slope. Perforations will be 3/8-inch in diameter and the sump will be filled with aggregate meeting the requirements in the CQA Plan to the level of the surround liner surface on the floor. In Module 1 and planned for Module 3, an 8 Oz/Yard² geotextile covers the sump aggregate and is overlapped/seamed with the upper geotextile layer of the geocomposite drainage. The Module 2

sump was constructed by completely covering the sump aggregate with the geocomposite layer. Submersible pumps will be installed in the sumps and fluid will be removed such that the fluid thickness is less than 24 inches (less than 12 inches on the liner outside the sumps). The management of fluid and leachate removed from the sumps including collection, treatment, and disposal methods is outlined in Section 7.6. Sump details are included on Plate 6 and installation requirements, construction methods, and CQA procedures for the sump and its components are included in the CQA Plan in Appendix L.

4.3 Protective Cover

The landfill liner and leachate collection system will be protected by the placement of a one-foot thick layer of specified soils. The protective soils are designed to cover the entire floor (including the sumps) and side slopes out to the lateral limits of the liner. The required characteristics of the soils were engineered to minimize plugging of the upper fabric of the geotextile. Required characteristics, placement methods, and CQA criteria are included in the CQA Plan in Appendix L.

4.4 Final Cover

The final cover has been designed to allow the option of either a water balance cover or a synthetic liner. The water balance cover will consist of a monolithic lightly compacted vegetated evapotranspirative cover designed using guidance from the Final Guidance Document, Water Balance Covers in Colorado (CDPHE, March 2013). The site has suitable soils meeting the criteria in the guidance document for permitting a 3.5-foot thick water-balance type Alternative Final Cover (AFC). Excess excavation of primarily silty sandy clay and clayey sand (based on data from IC, 1993 and construction geotechnical analysis conducted since the facility has opened) will be placed as loosely as possible over the final lift of refuse. The final lift of refuse requires a minimum one-foot of unspecified intermediate cover soils if final cover is not placed within 30 days, and these soils may be used as part of the AFC if suitable soil properties, compaction, and moisture conditions are present or constructed. Alternatively the ERL may remove the intermediate soil cover and replace it with the specified thickness of suitable soils or place suitable soils directly over the intermediate final cover. A demonstration to the adequacy of the above described AFC and a CQA Plan for the construction of the AFC is included in Appendix M.

The optional synthetic-lined final cover will consist of a one-foot prepared subbase. Overlying the subbase is a LLDPE membrane overlain by a 12-inch thick protective soil layer overlain by a 6-inch vegetative layer. In-place densities will be in the range of 80 to 90 percent of the Standard Proctor maximum dry density. The moisture content will be equal to or less than the Standard Proctor optimum. The combined protective soil layer and vegetative layer thickness on the LLDPE will be a minimum of 18 inches. The LLDPE will be anchored into the upper layer of soil using anchor trenches (detail on Plate 5). Gas vents are not included in the final cover configuration because the facility has installed a gas collection system. Detail 5 on Plate 7 shows details for boots on penetrations through the LLDE cover by the GCCS system.

After placement of the final cover, it will be planted with a seed mixture recommended by the local office of the National Resources Conservation Service. The mixture will include

predominantly cool weather species.

4.5 Slope Stability

Appendix N contains the slope stability evaluation of the East Regional Landfill (ERL) expanded final cover. The slope stability analyses include multiple potential failure alignments through the landfill and multiple different methods of analysis to ensure that the slopes are stable during the construction and at the point the municipal solid waste (MSW) reaches final cover grades. Four different scenarios were modelled as outlined in the evaluation.

The worst-case factors of safety, probabilities of failure, and reliability indices for all four scenarios are shown below. Based on these modelling results, the worst factor of safety observed at the ERL is 1.471 in Scenario 1 – the open condition after the landfill has been constructed and before waste has been placed. This factor of safety exceeds the minimum design criteria of 1.3, so the landfill design is acceptable.

Worst-Case Slope Stabilities for Four Scenarios

Method	Factor of Safety (Deterministic)	Mean Factor of Safety	Probability of Failure	Reliability Index
Scenario 1	1.471	1.478	0.040%	2.748
Scenario 2.A	1.921	1.932	0.000%	5.442
Scenario 2.B	1.934	1.944	0.000%	5.348
Scenario 3	1.665	1.672	0.000%	4.399

5.0 SURFACE WATER CONTROL

The surface water control system was designed in a document entitled *Drainage Report and Plan, Five Part Landfill* (AEC, December 2009) and received approval from the CDPHE and TCHD. The surface water control system is redesigned in this EDOP as part of the final cover modification. The surface water control system was designed in compliance with the Colorado Regulations Pertaining to Solid Waste Sites and Facilities (6 CCR 1007-2, Part 1, Section 2.5.7) that require permanent surface water control facilities at solid waste sites to prevent run-on from the 24-hour, 25 year storm event, collect run-off from the 24-hour 100 year storm event, and control run-off and run-on for a 24-hour 100-year storm event at the site. The commonly used model HydroCAD (version 10.20-5) was used to evaluate the needed detention pond capacity and performance of the tack-on berm and perimeter channel design. Appendix E includes the drainage analysis for the facility.

Surface water runoff to the site is only possible in an area along the south landfill boundary. That has been effectively blocked using a tree-lined berm and a road on the south property. The runoff is controlled using tack-on berms on the final cover, drop chute structures and perimeter berms. (Plate 8A).

The revised surface water control system consists of four grass-lined channels around the perimeter of the final cover on the landfill, representing anticipated post-closure conditions at the site. The channels will be built in phases as necessary based on the progression of landfilling throughout the operating life of the landfill. This scenario assumes that all operating facilities, including the gatehouse and scales will be removed from the site after it is closed as these structures are within the ultimate disposal area footprint.

Surface water control structures for operational purposes will be constructed as needed during the operating life of the landfill to collect and control the 24-hour, 25-year event as required in 6 CCR 1007-2, Part 1, Sections 2.1.6 and 3.2.6. Generally, these temporary operational controls will consist of proper landfill sloping, temporary ditches or control berms, and excavated retention areas. The operational surface water control structures are highly dependent on the landfill configuration and operating needs such as access roads, soil stockpile areas, etc. and their location and design will change based on the particular landfill configuration at any time. The operational surface water control structures are not included since they will change based on the landfill progress. Aside from operational surface water controls required by regulation to control surface water to and from the refuse fill area, the natural drainage through the site will be maintained as much as possible until the permanent system is constructed.

6.0 ENVIRONMENTAL MONITORING

6.1 Gas Monitoring System

The Regulations state that the concentration of explosive gas generated by landfill facilities shall not exceed 100 percent of the lower explosive limit (LEL) by volume, which is equal to 5 percent methane in air, at the property boundary, or 25 percent of the LEL, which is equal to 1 percent methane in air, in facility structures.

Explosive gas monitoring at the ERL is conducted by six explosive gas monitoring probes constructed near the facility property boundaries and adjacent to the six groundwater monitoring wells used to monitor groundwater at the site as shown on Plate 2. In 2010, ERL installed three of the gas monitoring probes (GP-2, GP-3, and GP-4) adjacent to the current areas being filled for detecting any gas from the landfill. In 2022, the ERL installed the remaining three gas probes (GP-1, GP-5, and GP-6). The gas probes are completed from five feet below ground to the approximate elevation of the landfill floor adjacent to the probe location. The monitoring probes are equipped with caps containing normally closed quick connect fittings for the explosive gas monitoring purposes. The completion diagrams are included as Appendix O.

Explosive gas concentrations in the probes are measured with a calibrated explosive gas meter.

The condition of each explosive gas monitoring probe is inspected during each monitoring event. The results of the inspection is documented and any deficiencies are remedied within 60 days of the inspection, weather permitting. If deficiencies, malfunctions or deteriorations in the well are observed at other times, such deficiencies will also be documented and remedied within 60 days of discovery, weather permitting.

In compliance with Regulations, the ERL will notify the CDPHE and Adams County of explosive gas levels that exceed the regulatory standards stated above and take immediate steps to ensure protection of human health. A record of the levels detected above regulatory limits and actions taken shall be placed in the Operating Record within seven days, and the ERL will implement an approved remediation plan within 60 days, place the plan in the Operating Record, and notify the CDPHE and Adams County that the plan has been implemented. These steps will be followed unless an alternative approach is approved by the CDPHE and Adams County.

6.1.1 Gas Monitoring Schedule

In compliance with Regulations, gas monitoring of the probes and facility structures will be conducted quarterly unless an alternative schedule is approved by the CDPHE and Adams County.

The current probes are monitored for explosive gas concentrations on a quarterly basis and although the gatehouse is far removed from current disposal operations will also be monitored for the presence of explosive gas on a quarterly basis.

The quarterly monitoring results are submitted to CDPHE and Adams County as part of the ground-water monitoring report if conducted concurrently with the groundwater monitoring or within 60 days in a separate report if ground-water monitoring is not performed that quarter. The

report will include a tabulation of the data, as well as the results of any inspections and maintenance performed.

6.1.2 New Source Performance Standards Applicability

The ERL is subject to Subpart Cf of the New Source Performance Standards (NSPS) of the Clean Air Act due to its design capacity and is subject to the applicable Air Pollution Control Division (APCD) regulations. The ERL installed a landfill Gas Collection and Control System in November 2022 in accordance with the regulations. Applicability to Subpart Cf requires the ERL to obtain a Title V Operating Permit. The ERL received a Title V Operating Permit on August 1, 2016. This permit was renewed on November 1, 2022, Operating Permit 10OPAD353. Due to the vertical expansion, an amended design capacity report and permit modification request for the Title V permit will be submitted to the APCD within 90 days of approval of this EDOP.

6.2 Groundwater Monitoring

There are a total of six groundwater monitoring wells approved for the landfill, all six wells are currently installed and used in the detection monitoring program in accordance with Appendix B of 6 CCR 1007-2, Part 1. The approved groundwater monitoring system wells include MW-1, MW-2, MW-3, and MW-4 currently in the detection monitoring system and sampled on a semi-annual basis. MW-5 and MW-6 were installed in March 2021 and are now in detection monitoring and sampled on a semi-annual basis.

A seventh well, CMW-1, is present on the site and used to monitor the compost operations. Because the compost operations are permitted under a separate CD, CMW-1 is not a part of this EDOP. The location of the existing water monitoring wells is shown on Plate 2.

Wells representing upgradient and downgradient conditions for the currently active area include MW-1 (upgradient), MW-2, MW-3, MW-4 (all three downgradient from the northern portions of the facility), MW-5, and MW-6 (both downgradient from the southern portions of the facility). It should be noted that MW-1 was originally planned in a different location as shown in the 2006 Doty EDOP; however, MW-1 was moved to a more appropriate upgradient position on the southern property boundary as documented in a letter to the CDPHE (AEC, March 1, 2010) and approved in a CDPHE letter dated May 11, 2010.

The wells have been, and will continue to be, sampled for analysis of the parameters listed in Appendix IA and IB of the CDPHE solid waste regulations (6 CCR 1007-2, Part 1) unless a modified analytical suite is approved by the CDPHE. Analytical methods are specified in EPA SW-846 or other appropriate sources and the laboratory results are validated using standard methods. Samples are currently collected on a semi-annual basis in MW-1 through MW-4.

The wells will be purged and sampled using dedicated bailers. The dedicated bailers are suspended on dedicated polypropylene rope. Alternatively, at the operator's option, dedicated pumps may be installed in the wells and used for purging and sampling.

If dedicated bailers are used, the wells are purged of three wellbore storage volumes (the volume

standing inside the casing at the start of purging) or to dryness, whichever occurs first. Periodic field measurements of pH, temperature, and specific conductance are taken and recorded prior to collecting the sample. Purging continues until these parameters have stabilized to within 0.2 pH units, 2 degrees C or F, and 10 percent of the specific conductance reading for 2 consecutive readings. Samples are then collected as soon as possible after purging, but no longer than 24 hours after purging.

If dedicated pumps are used, low flow techniques will be used in accordance with the EPA document *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*, the wells will be purged of minimum three pump and tubing volumes at flow rates of 100-500 milliliters per minute or less and sampled immediately after purging. Drawdown will be checked periodically to monitor drawdown in the well as a guide to flow rate adjustment. The goal is minimal drawdown (<0.1 m) during purging. This goal may be difficult to achieve under some circumstances due to geologic heterogeneities within the screened interval and may require adjustment based on site-specific conditions and personal experience. Periodic field measurements, every 3-5 minutes of pH, temperature, specific conductance, Oxidation Reduction Potential (ORP), Dissolved Oxygen (DO), and turbidity are taken and recorded prior to collecting the sample. Purging continues until these parameters have stabilized to within ± 0.1 pH units, $\pm 10\%$ for temperature, $\pm 3\%$ of specific conductance, $\pm 10\text{mv}$ for ORP, and $\pm 10\%$ for DO and turbidity for three consecutive readings. Samples are then collected as soon as possible after purging, but no longer than 24 hours after purging.

Samples are transferred directly from the bailers or discharge tubing into sample bottles provided by the laboratory. Sample bottles and preservation are as specified in the analytical methods employed, except that volatile organic compound (VOC) samples are chilled but otherwise unpreserved (consistent with CDPHE policy). Sample bottles are placed in a cooler or other shipping container and chilled on ice as soon as possible after collection.

Chain-of-custody procedures are used to track the sample from the time of collection until it, or its derived data, is used. A chain-of-custody form is initiated at the time that the samples leave the site. Field personnel complete all applicable sections of the form. The chain-of-custody forms are protected from moisture by encasing them in plastic (e.g., Ziplock plastic bags) and they are then placed inside the shipping containers. The chain-of-custody forms accompany the containers during shipment to the laboratory. The shipping containers are sealed with custody seals.

Field personnel collecting the samples are responsible for custody until the samples are delivered to the laboratory or relinquished to a commercial shipping company. Sample transfer requires the individuals relinquishing and receiving the samples to sign, date, and note the time of transfer on the chain-of-custody forms. Common carriers (e.g., Federal Express) are not expected to sign the chain-of-custody forms. However, the bill of lading or airbill becomes part of the chain-of-custody record when a common carrier is used to transport the samples. The chain-of-custody is considered complete after the analytical laboratory accepts custody of the samples (acceptance of custody is indicated by signature on the chain-of-custody form). A copy of the chain-of-custody record will be maintained along with other field records.

The following quality assurance and quality control (QA/QC) actions are implemented to minimize the potential for biasing the analytical results by laboratory preparation, sampling, and transport activities.

1. Field work is performed by qualified and trained personnel.
2. Samples are analyzed by a qualified laboratory. The laboratory uses appropriate chain of custody, analytical, and QA/QC procedures.
3. A trip blank for VOC analysis is included in each sampling event.
4. Equipment blanks and field duplicates are not collected on a routine basis because disposable or dedicated sampling equipment will be used; however, they may be prepared and analyzed if questions arise relative to the quality of the analytical data.
5. The laboratory results are validated using standard methods.
6. The full laboratory report, including laboratory QC data, is attached to the monitoring reports and are submitted by the operator to both CDPHE and Adams County Health.

The condition of the ground-water monitoring system is inspected during each monitoring event. The results of the inspection are documented and any deficiencies are remedied within 60 days of the inspection, weather permitting. If deficiencies, malfunctions or deteriorations are observed at other times, such deficiencies will also be documented and remedied within 60 days of discovery, weather permitting.

The monitoring results are submitted to CDPHE and Adams County/Tri-County Health along with a statistical evaluation following each monitoring event.

The report includes a tabulation of the data (including water level data), statistical evaluations as appropriate, the results of the system inspection, and a description of any maintenance performed.

6.2.1 Groundwater Statistical Analysis and Reporting

The following is included in a typical semi-annual groundwater monitoring report:

- Time series graphs for all parameters
- Groundwater measurements and elevations charts
- Analytical results presentations and laboratory reports
- Statistical results for groundwater monitoring wells
- Landfill gas measurements

The analytical results for all wells are statistically analyzed in accordance with methods and procedures allowed by Regulation. All of the groundwater results through June of 2010 was collected without any waste having been received at the ERL facility and is considered to be

unadulterated. Data collected after September 1, 2010 was collected after the facility had opened. Sampling of each of the monitoring wells was completed and the results were collected in the initial eight quarters of data was used to establish background conditions.

Data is evaluated for statistical outliers and seasonality in accordance with Regulations. The data is adjusted as allowed for outliers and seasonality if appropriate.

6.3 Leachate

The leachate levels in the landfill sumps will initially be checked a minimum of once every month and after large precipitation events during the initial stages of refuse filling in a newly constructed cell to verify that the depth of leachate is in compliance with regulatory requirements. In compliance with regulations, leachate will be removed from the sump prior to reaching a depth of 30 centimeters (12-inches) over the floor on the liner surrounding the sump. When these monthly measurements indicate that the frequency of measuring leachate levels can be reduced and still maintain compliance with regulations, leachate levels will be checked a minimum of every three months on an ongoing basis. Leachate quality will be monitored (sampled and analyzed) annually and the results will be submitted to the CDPHE and Adams County.

6.4 Stormwater

The ERL is regulated by a stormwater permit under the Colorado Water Quality Control Act and the Colorado Discharge Permit System (CDPS permit number COR900439). As a permit requirement, the ERL has a Stormwater Management Plan (SWMP) that provides guidance for inspections, surface water control structures, monitoring, and reporting for the site. The purpose of the SWMP is to protect waters of the State from potentially contaminated site discharges, specifically those associated with site drainage and stormwater runoff. The Permit requires monthly visual inspections, an initial four quarterly benchmark samples, potential additional quarterly samples if conditions occur that trigger the additional implementation measures contained within the COR900000 permit, potentially annual effluent limitations sampling for the first year, and annual benchmark and effluent limitation sampling if approved thereafter. For purposes of the annual permit, the monitoring period is from January 1 through December 31.

7.0 OPERATIONS PLAN

7.1 General

This section discusses the day to day operational aspects of the ERL including, but not limited to, site security and safety, personnel and equipment, waste identification and acceptance procedures, disposal and daily cover protocol, control of nuisance conditions, leachate management, personnel training, and recordkeeping.

The number and type of personnel employed at the landfill and equipment used in various operations may vary from that discussed in this EDOP depending upon current conditions; however, sufficient qualified staff is available to operate the site in a safe and efficient manner. All personnel are trained in safe and proper operating procedures as they relate to their assigned duties and responsibilities.

7.2 Site Access & Controls

Personnel sufficiently knowledgeable in operating the facility will control the site entrance located on Schumaker Road as shown on the attached drawings. A gatehouse with a scale is constructed at the entrance and all vehicles must stop there to gain access to the site. The cashier will inquire as to the nature of the material being delivered and its quantity. The cashier will have authority to deny site access if the material is unacceptable or its characteristics are suspect. The cashier may have other operational duties, such as heavy equipment operation.

As stated earlier, only municipal solid waste as defined in the CDPHE solid waste regulations is accepted at the site. Customers on account are required to sign an agreement stipulating that they will only bring acceptable waste to the facility. Signage at the facility entrance further stipulates the types of waste that may be accepted. Questionable materials transported to the site will be rejected until it can be determined that the material is acceptable. Waste screening procedures are outlined in the Waste Characterization Plan (WCP), provided in Appendix P. Additional information on waste identification and screening procedures is presented later in this Section.

The entire active area of the facility is fenced. Fencing will be expanded as needed to enclose current and past disposal areas, as well as those under development. A gate is installed at the site entrance and others may be placed at other locations as may prove convenient for the operator. All gates will be locked except during actual operating hours.

Roads interior to the site are all-weather roads providing safe access during operating hours in all seasons. Roads accessing the active disposal area (used by customers) have posted speed limits. Roads accessing areas under development (used by the operator) are established but may change in response to operational needs. In addition, roadways are constructed around the perimeter of the site and to well locations for inspections and monitoring.

7.3 Waste Identification and Screening

Waste identification and screening procedures implemented at the ERL are outlined in the WCP included in Appendix P. The current WCP for the ERL received CDPHE approval on October 24, 2018. The WCP is slightly revised with this EDOP to include updated Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) regulations (6 CCR 1007-1 Part 20). The WCP discusses acceptable wastes streams, identifies those wastes that are specifically prohibited, waste identification and screening procedures to preclude acceptance of prohibited wastes, and employee training.

This plan is designed to hold the waste generator responsible for:

- Adequately characterizing particular waste streams proposed for disposal at the facility
- Ensuring that these wastes are acceptable for disposal at the ERL

This responsibility is maintained by the generator through a documented formal waste application and acceptance document included with the WCP. The ERL reserves the right to deny acceptance of any waste stream for any reason.

7.3.1 Acceptable Waste Types

The ERL facility is designed for disposal of municipal solid wastes as defined in the CDPHE solid waste regulations and most typically consists of residentially and commercially generated trash. Other non-hazardous wastes may be acceptable for disposal at the facility in accordance with the approved WCP included in Appendix P. Certain acceptable wastes require testing and/or specific handling and burial procedures that are also discussed in the WCP.

Additionally, as a condition of the ERL CD, Mill tailings, mining wastes, and treated domestic waste water and water treatment residues that do not contain hazardous waste, as defined by C.R.S. §25-15-101(6), as amended, and 6 CCR 1007-2, Part 2, §2.2(J), as amended, may be accepted on a case-by-case basis, after review and approval by the Adams County Department of Planning and Development. The waste stream shall be submitted by the ERL to the CDPHE for its comments.

7.3.2 Prohibited Waste Types

The ERL CD prohibits acceptance of the following wastes for disposal:

- Hazardous wastes as defined by C.R.S. §25-15-101(6), as amended, 6 CCR 1007-2, Part 2, §2.2(J), as amended, and Adams County Development Standards and Regulations §11-02-235, as amended.
- Radioactive waste, as defined by C.R.S. §25-11-201(3), as amended, classified material, as defined by C.R.S. §25-11-201(1), and low-level radioactive wastes, as defined by C.R.S. §24-60-2204(3), as amended, including, but not limited to, Naturally Occurring Radioactive Material (NORM), as defined by C.R.S. §25-11-101(2.7), as amended, and Technically

Enhanced Naturally Occurring Radioactive Material (TENORM), as defined by C.R.S. §25-11-201(4), as amended.

- Liquid waste as defined by CCR 1007-2, Part 1 §1.2, as amended.
- Friable asbestos waste, as defined by 6 CCR 1007-2, Part 1, §1.2, as amended.
- Raw domestic sewage and septage.
- Polychlorinated Biphenyls (PCBs).
- Dioxin
- Used lead acid batteries, used oil, and tires (except tire shreds used as approved ADC), as defined by 6 CCR 1007-2, Part 1, §1.2 and §16, as amended.
- Non-sterilized (non-treated) infectious medical waste.
- Electronic waste as described in the WCP and 6 CCR-1007-2, Part 1, §1.2 and §16, as amended.

Additional wastes that are, or maybe, prohibited for various reasons are identified and discussed in the WCP in Appendix P.

7.3.3 Waste Screening

To ensure only acceptable waste is disposed of at the facility the ERL implements an active screening program. Signs at the entrance to the ERL notify customers of waste that is not accepted and the gatehouse is equipped with a radiation monitor for identifying wastes containing potentially regulated level of radioactivity. The ERL requires generators wishing to deliver waste to the landfill that require special testing or characterization before a determination can be made on their acceptability complete an application form that describes the source and nature of the waste, and laboratory test results, and a statement by the generator.

Waste arriving at the facility are inspected at the gatehouse. If the waste is visible, the gatehouse attendant may question the transporter as to the nature of the waste. The waste is also observed at the working face for potentially unacceptable materials as it is offloaded and spread out for compaction. The ERL also institutes a random waste screening program where one waste load for every 5,000 tons received is randomly selected for more detailed inspection at the working face.

The gatehouse attendant and employees responsible for operations at the working face receive training in the identification of hazardous and prohibited wastes and screening procedures as discussed in the WCP in Appendix P.

7.4 Waste Placement and Cover

To minimize the potential for damage to the drainage layer, the first lift of waste placed directly on the protective soil layer will be a minimum of four foot thick and composed of select waste that does not contain materials likely to damage the drainage layer. Trained landfill operators and spotters will observe the waste placement and remove or reorient waste that may potentially disrupt the leachate collection system or the liner and this first lift is not specifically compacted. Landfill equipment and delivery vehicles will not be allowed to operate above the liner and leachate collection system until the select waste layer has been placed.

Landfilling will be done in multiple refuse lifts and numerous refuse cells within the three Modules. Refuse will be placed in a waste cell and kept to the smallest area practical based on the waste volumes received each day. Incoming waste will be spread into layers and compacted with four to six passes of the landfill equipment. The process of layering and compacting is repeated until the compacted waste elevation reaches the intended top of the lift or until the end of the working day.

A six-inch thick daily cover soil layer or approved Alternative Daily Cover (ADC) will be placed over the compacted refuse at the end of each workday. Once an area has reached final grade or an interim grade that will not be disturbed for more than 30 days, a twelve inch thick intermediate soil cover will be placed. Intermediate cover will be graded to minimize erosion and prevent ponding of water.

The ERL is currently approved to use a spray-on product known as Posi-Shell® from Posi-Shell Environmental Coatings or 12-inch nominal shredded tires as an alternative to six-inches of soil used to cover exposed waste at the end of each day. The CDPHE approved the use of Posi-Shell ADC on July 7, 2011 and Adams County approved the material for use on August 11, 2011. The CDPHE and Adams County approved the use of 12-inch nominal shredded tires ADC on September 22, 2016. The request and approval information for both Posi-Shell and 12 inch nominal shredded tire ADCs included in Appendix Q. The ERL may request approval for other ADC materials that will be used following approval of the CDPHE and Adams County. The ERL will continue to use a six-inch thick soil cover once per week to mitigate fly infestation in accordance with guidance provided by the CDPHE for other facilities using an ADC. The weekly application of soil cover will also help provide periodic fire breaks within the refuse mass. In accordance with regulations, any refuse disposal area that is unused for a period of 30 days or longer will have a minimum of one foot of intermediate cover soil applied.

The ERL currently has a GCCS. Special care will be taken when filling around GCCS components and will be conducted by experienced personnel. Prior to filling in the vicinity, within 30 feet of a vertical gas wells, extensions will be installed to the vertical well casings. The outside of these vertical well casings will be marked with clearly visible and bright paint to prevent heavy equipment travel from damaging the casing extensions. Some GCCS components, such as condensate traps and variable frequency drives, may be temporarily removed so they may be reincorporated back into the system after filling in an area has ceased.

7.5 Nuisance Control

7.5.1 Litter

Litter is primarily controlled by the application of daily and intermediate cover and by maintaining the smallest practical working face while considering traffic volumes and safety. Additional controls include:

- Temporary and permanent litter control fencing,
- Discouraging uncovered loads through charging a penalty fee
- Litter collection on an as-needed basis, and
- Site closure during high winds.

As stated earlier, perimeter fencing will be installed to completely encircle all active and past disposal areas. Interior in-ground and portable fencing will also be used as necessary to minimize off-site excursions of windblown debris. These litter control fences will be relocated as necessary; typically, the portable fencing will be placed downwind of the active face. The fences will be inspected for the presence of debris on a daily basis and any debris will be removed, weather permitting.

Vehicles transporting uncovered loads to the facility can also be a source of windblown litter. To encourage proper covering of loads, uncovered loads will be charged twice the normal disposal fee.

The site will be closed during high wind events. A high wind event is defined as sustained winds of 40 miles per hour or greater, or gusts of 55 miles per hour or greater, that are expected to persist for one hour or longer. An on-site wind meter will be used to monitor the wind speed in order to allow the landfill manager (or appropriate alternate) to make the determination that a high wind event exists. Upon making that determination, the manager will direct personnel to close the site to additional deliveries and to cover the working face with daily cover as rapidly as possible.

The facility will assess the presence of escaped litter within their property, surrounding private property (only with approval from the property owner), and along the public-rights-of-way listed in this Section within 24 hours of a high wind warning (see definition below) occurring during operation of the facility, with the exception of on Sundays and other days the facility is closed due to weather, holidays, etc. The facility manager will respond promptly to concerns voiced by surrounding property owners with respect to the reasonable cleanup and removal of windblown litter. The patrol and pickup of litter on affected private property will conform to the reasonable requirements of the property owners and only conducted with their permission. Based on the results of this assessment, escaped litter will be collected and returned to the facility as soon as feasible. It is not expected that the exclusion of Sundays and other closure days will decrease the ability of the facility to contain refuse because the refuse will be covered with daily cover material the day prior to the closure so litter will not escape. As an additional measure, the ERL has on-call contracts with temporary labor firms to provide labor for the collection of refuse, including Sundays, holidays, and any other days the facility is closed.

In compliance with Adams County regulation 4-10-02-03-03(h) requiring that the operator remove trash or other waste material, disposed of or treated at their facility, along all public rights-of-way within one (1) mile of the facility and up to five (5) miles along the approved haul routes, or as otherwise specified, the facility will continue to implement the following practice as specified in the August 10, 2009 addendum to the June 1, 2006 EDOP:

1. Facility personnel will patrol the following public-right-of way at least twice per day on days that the facility is open:
 - a. Schumaker Road from one mile south of the facility entrance north to the intersection with 88th Avenue.
 - b. 88th Avenue between one-mile west to one-mile east of the intersection with Schumaker Road.
2. Facility personnel will collect any litter that appears to have escaped from either the facility or vehicles delivering refuse to the facility and dispose of it properly in the facility.
3. The facility will patrol within their facility at least once per day for the presence of litter.
4. The facility will respond as quickly as feasible to valid complaints of litter from surrounding property owners.

7.5.2 Odor, Vectors & Noise

The major source of odors at the facility is the working face and odors from the working face normally dissipate within a few hundred feet. Daily and intermediate cover control odors from the rest of the facility. In the event odors are a persistent and pervasive problem, alternative remedies will be investigated and implemented as appropriate.

Vectors are controlled by good waste compaction and expeditious application of daily cover. Remedies for nuisance vectors in the event they become a problem include the installation of bird lines, noise guns, and controlled predator introduction within the landfill area. The Bird Mitigation Plan in Appendix D includes procedures that are implemented to control bird population at the facility. Through nearly three years of operation, the procedures implemented at the facility have proven to be very effective in reducing food sources and controlling birds.

Noise will be reduced and controlled by operation of all equipment in a manner consistent with manufacturer recommendations.

7.5.3 Dust

During periods of dry weather and any time that dust is observed leaving the property, haul roads and areas under development will be sprayed with water or dust suppression fluid (e.g., a magnesium chloride solution). The portion of the customer haul road used to access the disposal area is paved with crushed asphalt that inhibits the generation of dust due to traffic. The ERL also has posted speed limit signs at the entrance to the facility and along the customer road to limit the generation of dust due to traffic.

The facility has a valid Title V Operating Permit (Permit No. 10OPAD353) issued by the CDPHE Air Pollution Control Division (APCD) that includes additional dust control measures required by the facility as follows:

- Adequate soil moisture must be maintained in topsoil and overburden to control emissions during removal. Watering shall be implemented if necessary.
- Active material stockpiles shall be watered to control fugitive particulate emissions.
- Topsoil and overburden stockpiles shall be compacted and revegetated within one year.
- Haul roads shall be paved with recycled asphalt aggregate and watered as often as needed to control fugitive particulate emissions such that the above guidelines are met.
- The size of the working face shall be reduced to control fugitive dust emissions during windy days.
- The facility shall cease operations during periods of high winds. High winds are defined as sustained winds of forty (40) miles per hour or greater, or gusts of fifty five (55) miles per hour or greater, that are expected to persist for one hour or longer. The facility shall operate and maintain a wind velocity measuring device capable of determining wind speeds at the landfill site. The main purpose of this requirement is to limit blowing litter, but the implementation of this practice also limits traffic and dust migration during periods of high wind.

The Title V Operating Permit is valid for 5 years and these requirements may change with the issuance of a new Title V Operating Permit. The requirements in the active Title V Operating Permit will supersede the requirements listed above.

In addition, the facility will consider the strategic placement of soil stockpiles and berms on the site to further inhibit dust migration if determined to be effective.

7.5.4 Fire

Waste will not be intentionally burned at this facility. Unintentional waste fires will be extinguished as rapidly as possible using heavy equipment. The burning waste will be excavated and isolated from the non-burning materials. It will be spread on a convenient working surface and the fire smothered under a temporary soil cover. After the waste has cooled, it will be moved to the working face, compacted and covered with the waste being received at that time.

The ERL is within the Bennett Fire Department (BFD) district and the BFD has been provided tours of the facility and has a gate key for access during hours the facility is closed. The BFD has conducted inspections of the facility on an annual basis since opening and it is anticipated they will continue to conduct period inspections. For fire situations that cannot be dealt with internally, the BFD will be contacted, and their phone number is listed on the facilities emergency contact list.

The ERL maintains an area for “hot loads” to isolate any incoming loads that are discovered to be on fire. The ERL maintains fire extinguishers are on heavy equipment (compactors, dozers, graders, etc.).

7.6 Leachate Management

The level of leachate in any newly constructed sump will initially be monitored on a monthly basis and following any large precipitation event. In compliance with regulations, leachate will be removed from the sump prior to reaching a depth of 30 centimeters (12-inches) over the floor on the liner surrounding the sump and either transported off-site for disposal at an appropriate facility or used for dust control on the roads. If leachate samples are to be collected for analysis, they will be analyzed for the same parameters as the groundwater wells. The analysis will provide information on the proper disposal of the leachate (sent to a treatment plant, used for dust suppression, etc.) or for comparison to the groundwater monitoring results.

When monthly measurements indicate that the frequency of measuring leachate levels can be reduced and still maintain compliance with regulations and with Division approval, leachate levels will be checked a minimum of every three months on an ongoing basis. Leachate quality will be monitored (sampled and analyzed) annually and the results will be submitted to the CDPHE and Adams County.

7.7 Personnel Training

Landfill personnel shall be trained in various activities depending on each individual's role in the organization. Training topics may include, but are not limited to the following:

1. Waste Screening and Hazardous Waste Identification: Training will be completed for all employees including the gatehouse staff, equipment operators, and others with responsibility for the working face and disposal operations. More specific details on training requirements are included in the WCP in Appendix P.
2. Annual Storm Water Management Plan Review and Sampling Requirements and Techniques
3. Annual Spill Prevention, Control, and Countermeasure Plan (SPCC)
4. Waste placement procedures. More detail on specific waste placement and disposal procedures is included in the WCP in Appendix P.
5. Safety training. Monthly training often includes safety training for various site operations.
6. Miscellaneous other training as it relates to the equipment used at the site and ERL management requirements. An example of this might be training on the use of the trailer tipper and scale.

Training procedures and employee training records will be retained as part of the Operating Record. These records will be made available at reasonable time to CDPHE and Adams County.

7.8 Recordkeeping

The operation will maintain an operating record documenting including a minimum of the following:

- location restriction demonstration
- inspection records, and training procedures
- incoming waste volumes

- waste characterization activities
- ground-water monitoring results
- explosive gas monitoring results
- leachate monitoring results
- construction as-built details
- variations from approved operating procedures
- demonstrations and waiver documentation
- cost estimates and financial assurance documentation
- closure and post-closure care plans and any monitoring, testing, or analytical data

All records contained in the Operating Record will be furnished upon request or be made available at all reasonable times for inspection by Adams County or the CDPHE. The operating record will generally be maintained on-site although some portions of the operating record may be stored at the Five Part offices.

8.0 CLOSURE/POST-CLOSURE PLANS

8.1 General Closure

The site will be closed in increments, as areas reach intermediate cover final grade. These areas may vary in acreage during the life of the landfill. The active gas control system described in Section 6.1 of this EDOP will be incrementally installed during the operational life of the facility. It is anticipated that final portions of the active gas control system and the surface water control system will be installed during final closure of the ERL. Other systems (i.e., ground-water monitoring and landfill gas monitoring) will be installed prior to closure.

8.1.1 Closure Notification and Certification Requirements

Notification and certification requirements for the closure of ERL will include the following:

- 60 days prior to closure, submit written notification to the CDPHE and Adams County that the landfill will be closing.
- 60 days prior to closure, notify the general public of the landfill closure by posting clearly visible signs of a suitable size at the site entrance.
- Enact precautions to prevent further use of the site for unauthorized disposal.
- Water pollution will not occur at or beyond the Point of Compliance after closure.
- Nuisance conditions will not occur at or beyond the site boundary after closure.
- Initiate routine closure activities within 30 days of reaching final design grades in any phase, unless an extension beyond 30 days is granted by the CDPHE.
- Complete closure within 180 days after closure initiation, or if necessary, obtain an extension from the CDPHE.
- Following closure of each area, submit a report certified by a Colorado registered Professional Engineer (P.E.) to the CDPHE documenting that closure has been completed in accordance with the closure plan. Place a copy of the report in the facility operating record.
- Following closure, record a notation on the deed or other title instrument stating that the land was used as a landfill and that future land use is restricted under Section 3.6.1(7) of the CDPHE solid waste regulations. Notify the CDPHE and Adams County Planning that the notation has been recorded and place a copy of the notation in the operating record.

8.1.2 Routine Site Closure

Construction of the final cover system will occur concurrent with the progression of landfilling operations. As final design grades are reached, final cover will be completed and certified by a Colorado P.E. in accordance with the EDOP and CQA Plan. By employing this “close as you go” process, only a limited portion of the fill area will require final cover construction after site closure. Final closure activities will begin within 30 days of reaching the final design grades for the final portion of the site unless an extended time period has been granted by the CDPHE. After the site is closed, no off-site waste will be accepted for disposal. However, any refuse generated on site as a result of construction activities will continue to be disposed of in the landfill until final cover placement has been completed.

8.1.3 Closure Requirements

As noted previously, the site will be closed in increments, as areas reach final grade. These areas may vary in acreage during the life of the landfill and will be based on the configuration of the area ready for final cover that is large enough in size to make final cover installation economically feasible. Final cover will be placed within 30 days of reaching final refuse grades in any phase in accordance with Regulations and closure of each phase will be completed within 180 days of commencing final cover placement. Due to seasonal, budgetary, or contractor availability these time frames may be extended with approval from the CDPHE and Adams County. A report documenting the final cover installation work will be submitted to CDPHE and Adams County for review and approval.

The ERL final cover system is redesigned as part of this EDOP revision. The proposed final cover design is an option of either a 3.5-foot thick Alternative Final Cover (AFC) or a LLDPE lined cover with a 1.5-foot thick layer of cover soils including a 1 foot thickness of protective soils and a 6-inch thick vegetative layer. The proposed top of the final cover grades and elevations are shown on Plate 4. AFC material requirements, placement methods, testing requirements, and CQA criteria are also provided in the revised CQA Plan. The AFC will be seeded with a mixture of cool and warm weather grass species as presented in the CQA Plan and any fertilizer and amendments will be applied after testing the soils to be vegetated. Because a one-foot thick intermediate soil cover is required for any waste placement areas not used for at least one month, the final lift of waste in any area may require intermediate cover. If the intermediate cover meets all of the material and placement criteria for an AFC, it may be left in place as part of the final cover system. Alternatively, the required minimum thickness of AFC may be constructed on top of the intermediate cover or the intermediate cover may be removed prior to installation of the final cover. Regardless of the presence of intermediate final cover, the final grades and elevations at the top of the final cover system will conform to those shown on Plate 4.

A financial assurance instrument consistent with those acceptable under the CDPHE solid waste regulations covering the cost of closure has been established for the ERL. The closure cost estimate will be revised every five years to reflect the remaining closure liability for the subsequent five-year period or more frequent if necessary to reflect a change in the design or maximum area assumed open at any one time. The cost estimate will be adjusted annually to account for inflation in the intervening years. The annual adjusted cost estimate will be submitted to the CDPHE by April 30th of each year.

8.1.4 Early Closure Scenario Provisions

The facility is designed with a specific area designated for refuse and specific final grades and elevations based on a designed refuse capacity needed to achieve these grades and elevations. The CD for the facility includes an expiration date of June 29, 2039. While the CD may be renewed at that time, the potential exists that the CD may not be renewed, and the facility will be forced to close prior to reaching the design elevations and grades. The following protocol for early closure in the case that the facility is not filled to design elevations, and the CD is allowed to expire was included in the August 10, 2009 amendment to the 2006 EDOP and has received approval from the CDPHE and Adams County.

In the case that the CD is allowed to expire and no new CD is issued, and the facility has not reached approved design grades, the owner will evaluate the existing condition of the facility by taking the following steps:

1. The existing refuse fill area and other pertinent site features will be surveyed to determine the magnitude of differences between the existing conditions at closure and the approved final closure conditions.
2. The existing site monitoring system will be evaluated to determine if any changes are necessary to the approved monitoring system to comply with regulatory requirements based on the existing conditions at closure.
3. The surface water drainage and control system will be evaluated to determine if any changes to the approved system are required to comply with regulations based on the existing conditions at closure.
4. An evaluation of the volume and type of soils required to close the facility in compliance with regulations and the soils available on site to conduct closure.

After completion of the above efforts, the owner will develop an alternative closure plan that will address the following:

1. The type and thickness of the final cover system
2. Final slopes on the refuse filling area must be constructed with a maximum of 4H:1V and a minimum of 5%.
3. The surface water drainage and control structures must be designed to comply with regulations considering the existing landfill footprint at closure.
4. A soil balance evaluation discussing the soil needs and soil availability.
5. A groundwater and methane monitoring program specific to the configuration of the facility upon closure.
6. Updated financial assurance costs to reflect the necessary closure and post-closure efforts based on the configuration of the facility upon closure.
7. The facility's ability to provide notification in compliance with regulatory requirements given the timing of the notice that the CD will not be renewed.

The alternative closure plan will be submitted to Adams County and the CDPHE for their review and approval prior to initiating final closure.

8.2 Post-Closure

8.2.1 General

The site will be maintained for a post-closure care period of a minimum of 30 years after the date of final site closure. The site is expected to remain in a vegetated undeveloped state during the post-closure care period; however, other uses may occur as long as the final cover and other control/monitoring systems are not disturbed.

8.2.2 Monitoring

During the post-closure care period, the following environmental/physical monitoring will be conducted.

1. Ground-water monitoring will be performed on a semi-annual basis during the 30-year period. Analytes, methods and reporting will be as described in Section 6.3 of this document or alternative requirements with approval from the CDPHE and Adams County.
2. Explosive gas monitoring will be performed on a quarterly basis during the 30-year period and the methods and reporting will be as described in Section 6.2 of this document unless an alternative schedule is approved by the CDPHE and Adams County.
3. Leachate levels in the sumps will be checked on the Division approved monitoring schedule (monthly or quarterly as described in Section 7.6).
4. Leachate sampling and analysis will be performed on an annual basis during the post-closure care and maintenance period. Leachate levels will also be taken during the annual sampling and may be used to increase the frequency of leachate level measurements to ensure compliance with regulations. Analytes, methods and reporting will be as described in Section 6.3 of this document.
5. Overall site conditions will be inspected on a semi-annual basis. Items covered by the inspections include, but not necessarily limited to; erosion of the final cover and surface water control structures, the success of the vegetation on the final cover and other areas on the site than have been revegetated, and the condition of the environmental monitoring system including the groundwater wells and gas monitoring probes, the active gas collection and control system, and the condition of the security systems at the site such as fencing, gates, and locks, and verification that all required monitoring has been completed according to the approved schedule. A typical list of items for inspection is included in Appendix R and will be used for reference during the inspections. The results of the inspections will be maintained in the Operating Record for the facility through the post-closure period.

As data are developed on the performance of the site during the post-closure care period, the operator may petition CDPHE and Adams County for changes in the scope and frequency of the above described post-closure monitoring.

8.2.3 Explosive Gas Control

As discussed in Section 6.1, the landfill installed an active gas collection and control system. The system will be operated until emissions from the facility meet the requirements of and are demonstrated to the Colorado Air Pollution Control Division to cease operation of the system. The approval of Adams County and the CDPHE is required to cease operation of the gas control system prior to the end of the post-closure period. All NSPS requirements will be complied with

during this time.

8.2.4 Access Control

The perimeter fencing and locking gate will be retained and maintained throughout the post-closure care period to limit unauthorized access to the site.

8.2.5 Financial Assurance

A financial assurance instrument consistent with those acceptable under the CDPHE solid waste regulations covering the cost of post-closure care has been established and in force since the facility opened. The post-closure cost estimate will be revised every five years to reflect the remaining post-closure care requirements. The cost estimate will also be adjusted annually to account for inflation. The annual inflation adjusted cost estimate will be submitted by April 30th of each year. Additionally, since closure will be completed as the landfill reaches final elevations incrementally, the post-closure periods may be staggered and portions of the landfill may be taken out of the post-closure funding over time with approval from the CDPHE and Adams County.

8.2.6 Completion

CDPHE and Adams County will be notified when the post-closure care obligation has been met. The notification will consist of a certification from an independent Colorado registered professional engineer that the post-closure care has been completed in accordance with this post-closure care plan.

9.0 REFERENCES

1. IC, 1993, Engineering Design and Operations Plan for the Metropolitan Coal Ash Disposal Facility, prepared for Five Part Development Company, Industrial Compliance Project Number 061 4369, December 21.
2. Earth Quake Potential in Colorado, Bulletin 43, Colorado Geological Survey, 1981
3. Flood Insurance Rate Map, Adams County Colorado, Community Panel Number 080001 0210A, Effective Date 1979, Department of Housing and Urban Development
4. Colorado Landslide Hazard Mitigation Plan, Colorado Geological Survey, Colorado Division of Disaster Emergency Services, University of Colorado Center for Community Development and Design, 1988
5. Guidelines and Criteria for Identification and Land-Use Controls of Geologic Hazard and Mineral Resource Areas, Colorado Geological Survey, 1974
6. Subsidence Above Inactive Coal Mines, Colorado Geological Survey and Colorado Mine Land Reclamation Program, 1985
7. USGS Open File Report 82-1033, Probabilistic Estimates of Maximum Acceleration and Velocity in Rock in the Contiguous United States, 1982
8. Soil Survey of Adams County, USDA, SCS and Colorado Agricultural Experiment Station, 1984
9. Engineering Design and Operations Report - Certificate of Designation, Shale Mine Ash Backfill Project, Western Aggregates, Inc.(1992)
10. Specific Yield-Compilation of Specific Yields for Various Materials, Geologic Survey Water-Supply Paper 1662-D (1976)
11. Conservation Services, Incorporated, Design and Operations Plan, October 4, 1991.
12. Geological Structure, Hydrology, and Water Quality of the Laramie-Fox Hills Aquifer in the Denver Basin, Colorado. Robson and others, USGS Map **HA-650**, 1981
13. Geological Structure, Hydrology, and Water Quality of the Arapahoe Aquifer in the Denver Basin, Colorado. Robson and others, USGS Atlas HA-647, 1981
14. Geological Structure, Hydrology, and Water Quality of the Denver Aquifer in the Denver Basin, Colorado. Robson and Romero, USGS Atlas HA-646, 1981
15. Managing Power Plant Wastes, Power Magazine (1991), Issue #135, page 97

Written Summary of Changes from 2006 EDOP

**EAST REGIONAL LANDFILL VERTICAL EXPANSION
ADAMS COUNTY
EDOP CHANGES SUMMARY
January 19, 2026**

This EDOP vertical expansion was developed to incorporate changes made during the time period from the original, approved EDOP to this expansion EDOP. The facility, owned by Five Part Development, was initially approved in 1994 as a coal fly ash disposal facility. A request to add municipal solid waste to the waste stream was approved in 2006 from the MSW EDOP prepared by Doty and Associates in November 2005. The following approved design and operational changes are included in this updated EDOP. Also, the text of the EDOP is included with changes highlighted in yellow:

A. As part of the initial approval of the EDOP, Five Part was required to submit a variety of documents as noted below. These were all included in the 2009 EDOP amendments.

- Development and submittal of the *Five Part Disposal Facility, Adams County, Colorado, Bird Mitigation Plan* submitted on July 24, 2009.
- Development and certification of the *Drainage Report and Plan, Five Part Landfill, Adams County, Colorado* dated December 2009.
- Transferring the requested right-of-way along Schumaker Road by deed (dated September 24, 2009) to Adams County and modifying the landfill footprint and associated drainage control structures northward to remain at least 40 feet from the southern section line.
- Development and submittal of the *Construction Quality Assurance Plan, Liner and Leachate Collection and Removal System* dated January 2010 and the August 10, 2009 *Addendum To Engineering Design and Operations Plan, Five Part Disposal Facility, Volumes I and II, Dated June 6, 2006*.
- Development and submittal of a revised *Landscape and Buffer Plan, Five Part Landfill, Adams County, Colorado* dated October 16, 2009, revised as requested in the Adams County approval letter dated October 14, 2009.

**B. January 21, 2011: Letter from AEC to Adams County, Tri County Health, and CDPHE
March 1, 2011: Follow Up Letter from AEC (providing additional information as requested by agencies)
CDPHE Approval with Modifications: March 31, 2011
TCHD Approval with Modifications: April 4, 2011**

- 1) Improved construction methods and operations of the facility from a reconfigured landfill footprint and modified base grades that optimized the use of the existing permitted landfill area to:
 - a) maintain a 10-foot separation to ground water,
 - b) provided an additional 10 feet of right-of-way (ROW) along Schumaker Road and deeded the ROW to Adams County,
 - c) prohibited landfilling or permanent structures within 40 feet of the southern property boundary along the south Section line of the facility, and provided at least 25 feet of landscaping depth along Schumaker Road and a landscaped buffer along the south side of the site.
- 2) The liner system was revised to substitute a Geosynthetic Clay Liner instead of using a 2-foot thickness of compacted clay and the leachate collection system was modified to substitute a geocomposite drainage layer in place of the one-foot layer of aggregate material and piping on the floor of the landfill.
- 3) A revised Construction Quality Assurance Plan to guide the GCL installation was included.
- 4) Minor modifications to the facility final cover extent are incorporated to correspond to the re-configured landfill footprint in accordance with State Regulations.

**C. December 14, 2010: Initial Compost EDOP Submittal; AEC
CDPHE Approval: March 24, 2011
TCHD Approval: March 30, 2011**

D. Waste Characterization Plan: Through the years, the Waste Characterization Plan has been revised as follows:

- 1) **August 2009:** The original Doty WCP was revised to comply with current regulations in response to the CDPHE comments regarding the original EDOP permitting. Approved with the original EDOP.
- 2) **June 2012-August 2018: Waste Characterization Plan
CDPHE Approval: October 24, 2018
TCHD Approval: December 14, 2018**
Since approval of the 2009 AEC *Waste Characterization and Acceptance Plan* (WCAP), regulatory changes and evolution of the requirements for acceptance of waste into MSW landfill facilities necessitated a revision to the 2009 AEC WCAP.

AEC prepared a revised WCAP dated August 20, 2018 that was the culmination of submittals and comments beginning in 2012. It was submitted to the Colorado Department of Public Health and Environment (CDPHE), Adams County, and the Tri-County Health Department (TCHD) for review and approval. The ERL received approval of this plan from the CDPHE in a letter dated October 24, 2018. As required by

Adams County, the ERL is requesting approval of the revised WCAP as a minor amendment to their CD.

E. Request for ADC Use: May 9, 2011
CDPHE Approval: July 7, 2011
ADCO Approval: August 11, 2011

Revisions to the facility operations to include the use of Posi-Shell spray on material as an Alternative Daily Cover (ADC).

Request for ADC Use: September 15, 2016
CDPHE Approval: September 22, 2016
ADCO Approval: September 22, 2016

Revisions to the facility operations to include the use of tire shreds as an Alternative Daily Cover (ADC).

F. Construction Quality Assurance Plans (CQAP): The original CQA was part of the initial EDOP date 2006. Since that time, modifications to the liner design have been made necessitating changes to the CQAP:

Use of GCL CQAP Change: December 17, 2009
CDPHE Approval: January 4, 2010; Final Approval February 9, 2010
ADCO Approval: August 11, 2011

G. Change in site coordinate system: Updated site topography and coordinate system. The original site topography was developed in 1993 based on a local coordinate system. The site topography was updated by aerial photography in January 2012 based on a modified state plane system to allow correlation with offsite features and control points. This change in coordinate system resulted in an elevation change of approximately +3.87 feet. This elevation change did not actually change any of the points in space, but only the elevation designation.

H. Installation of a landfill gas collection system: A Landfill Gas Collection and Control System (GCCS) was installed in Module 1 of the ERL in 2022. Details on maintenance, compliance requirements, and monitoring of the of the GCCS are included in the Title V Operating Permit for the facility, Permit No. 10OPAD353.

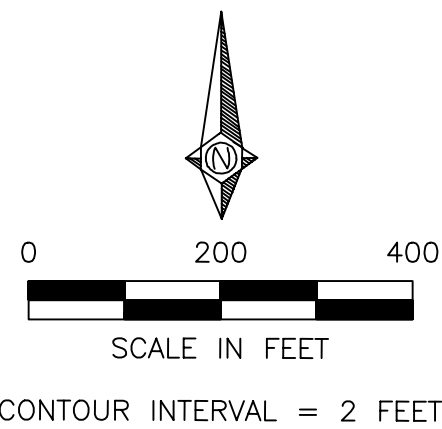
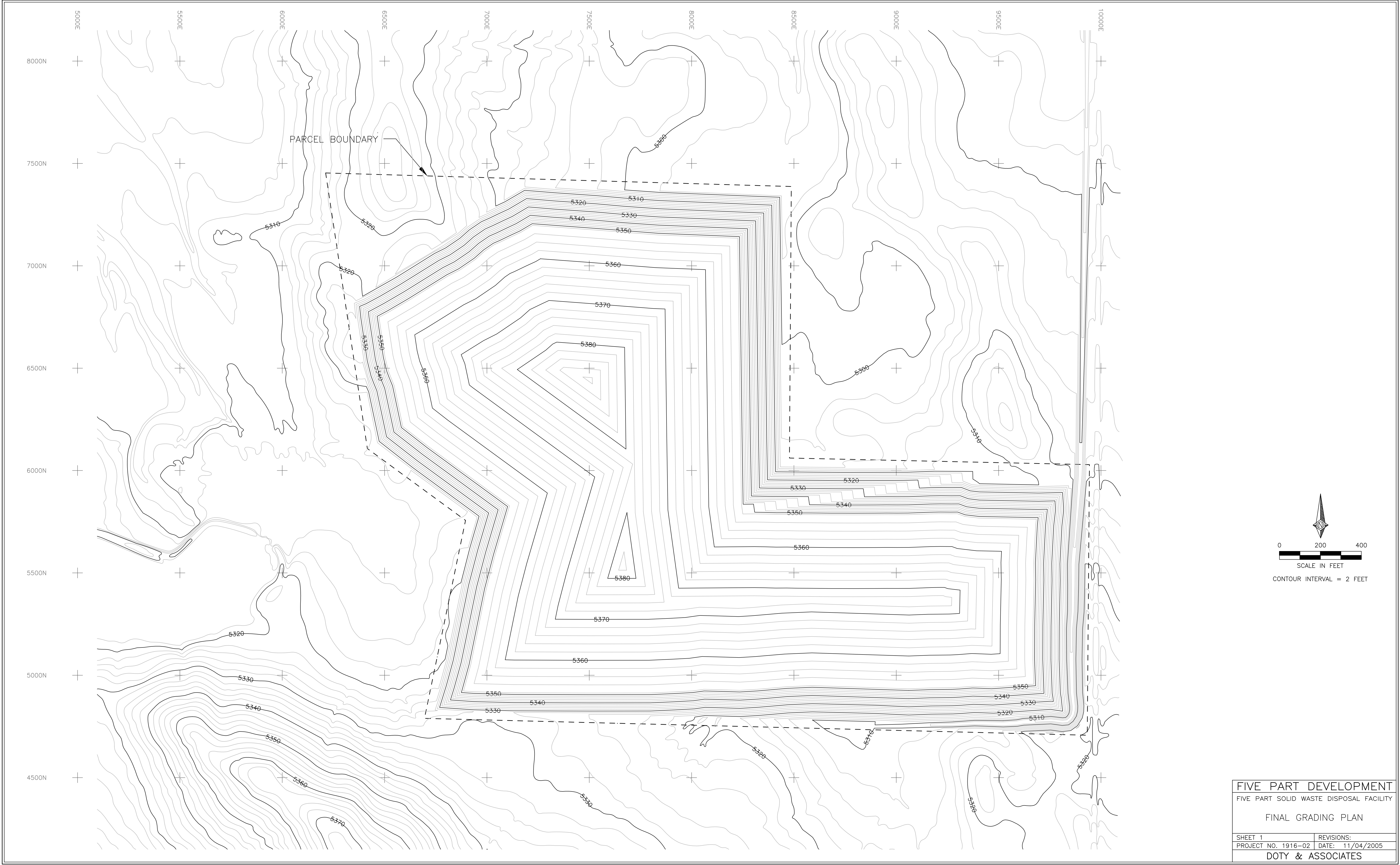
I. Additional groundwater well and gas probe installation, 2021: In 2021, two new groundwater monitoring wells and three new gas probes were installed at the ERL. These wells and probes are included in the monitoring program.

CURRENT CHANGES REQUESTED:

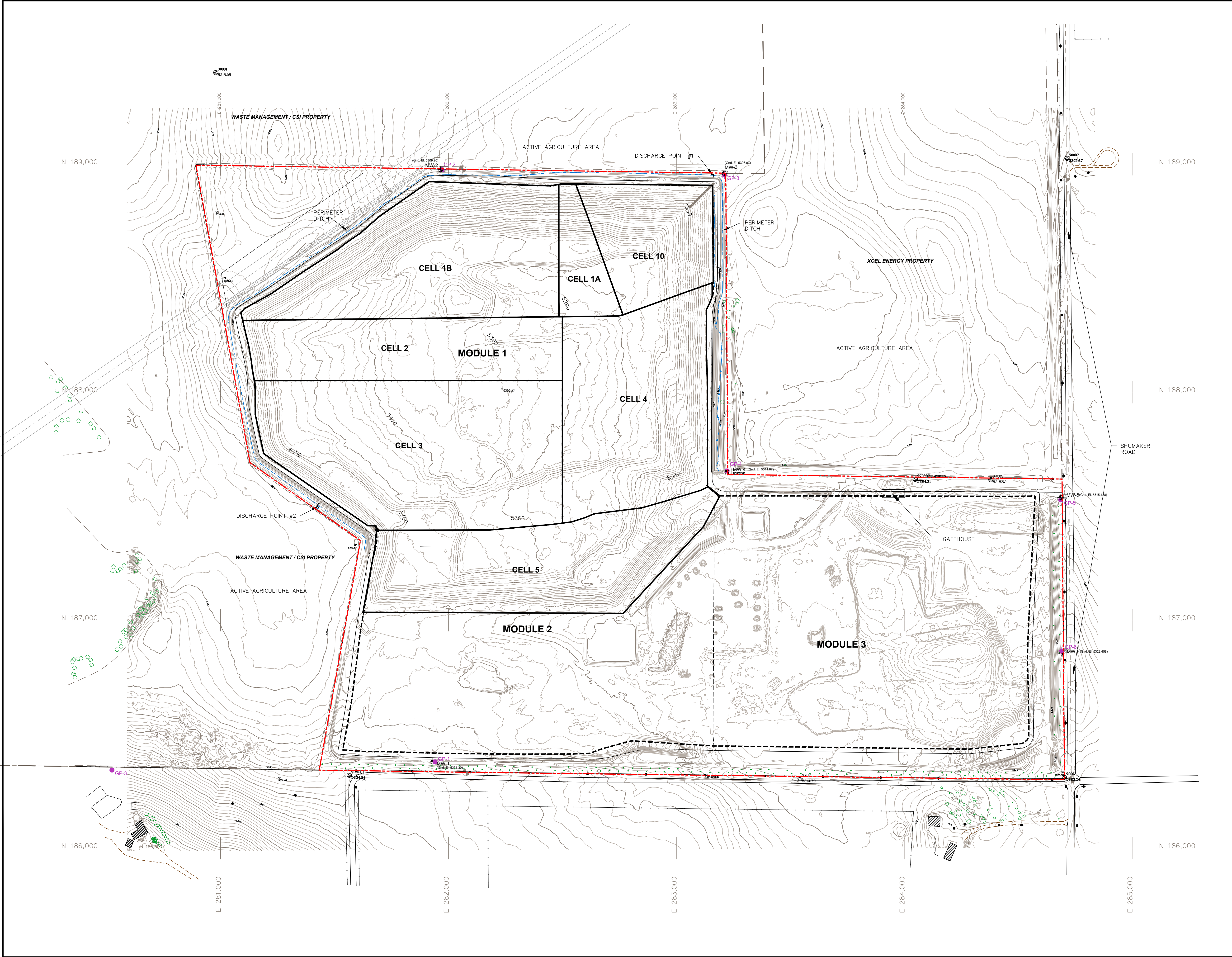
Additionally, this EDOP was developed to incorporate the following not yet approved design changes.

- 1) Vertical expansion design. The revised final cover design modifies the cover slopes from a compound slope consisting of a 4:1 side slope with a grade break at 5,350 feet amsl to a 20:1 top slope to an apex at 5,392.37 ft amsl to a compound slope consisting of 3.5:1 side slopes from the cover toe to a higher grade break at 5,484 feet amsl where the slope changes to a 20:1 top slope with two apex points at 5,495.66 and 5,499.25 feet amsl. This design change increases the cover height by approximately 107 feet.
- 2) Final cover system redesign. The revised final cover system changes the final cover design from an Alternative Cover with 4-8 feet of loosely compacted soil to two possible options, a 3.5 foot-thick Alternative Final Cover System designed in accordance with the March 2013 Final Guidance Document Water Balance Covers in Colorado or an LLDPE lined cover with drainage system and protective soil. Additionally, construction requirements for both of the final cover options are presented in a revised CQA Plan.

Attachment 2-5
Site Plans (Original, Current, and Proposed)



FIVE PART DEVELOPMENT	
FIVE PART SOLID WASTE DISPOSAL FACILITY	
FINAL GRADING PLAN	
SHEET 1	REVISIONS:
PROJECT NO. 1916-02	DATE: 11/04/2005
DOTY & ASSOCIATES	



LEGEND

- 5315 EXISTING CONTOURS (2 FT. INTERVAL)
- SOLID LINE EXISTING AS-BUILT CELL LIMITS
- DASHED LINE PROPOSED LIMIT OF WASTE
- RED DASHED LINE PROPERTY LIMIT (BY R.W. BAYER & ASSOCIATES, 2007)
- 5007 PROPERTY CORNER SURVEY POINT (BY R.W. BAYER & ASSOCIATES, 2007, REBAR, CAP FOUND OR SET)
- SOLID LINE ADJOINING PROPERTY BOUNDARY
- THICK LINE GAS PIPELINE RIGHT OF WAY
- THIN LINE AS BUILT STORM WATER DRAINAGE FLOW LINES
- CROSS-HATCHED RECTANGLE GAS PIPELINE ACCESS ROAD
- CIRCLE WITH CROSS SECTION MARKER
- MW-3 EXISTING GROUND WATER MONITORING LOCATION (APPROXIMATE HIGH GROUNDWATER ELEVATION)
- GP-2 EXISTING GAS MONITORING WELL LOCATION
- DIAGONAL-HATCHED RECTANGLE LANDSCAPED SCREENING BERM
- GREEN DOT SCREENING TREE LOCATION
- GREEN STAR SCREENING BUSH LOCATION

NOTE: PANEL CONTROL POINT LOCATIONS ARE SHOWN IN MODIFIED STATE PLANE THAT IS USED ON SITE FOR MONITORING, DESIGN AND CONSTRUCTION PURPOSES.

0 75 150 300
APPROXIMATE SCALE (FEET)

CONTOUR INTERVAL: 1'
DATE OF TOPOGRAPHY FLIGHT: 4/22/24
SURVEY BY COPPER AERIAL SURVEY CO.
Phoenix, Arizona

PLATE 2
2024 EXISTING CONDITIONS
EAST REGIONAL LANDFILL
ADAMS COUNTY, COLORADO

CLIENT: FIVE PART DEVELOPMENT, LLC	
PROJECT: ERL EXPANSION 2024	DATE COMPLETED: 12/24
PROJECT NO:	APPROVED BY:
DESIGNED BY: AEC	DWG. NAME: PLATE 2 ERL - EXISTING COND
DRAWN BY: RDS	REVISED BY: DATE:
REVISION:	
0 ISSUED FOR REVIEW	

AEC AMERICAN ENVIRONMENTAL CONSULTING, LLC.

Attachment 2-6

Approved Expansion EDOP with CDPHE Approval Letter



COLORADO
Department of Public
Health & Environment

Electronic Document Submittal
SDerus@republicservices.com

July 25, 2025

Mr. Steve Derus
Republic Services
8480 Tower Rd
Commerce City, CO 80022

RE: **Approval** of the Modification to the Engineering Design and Operations Plan
East Regional Landfill, Adam County, Colorado

File: ADM121 CDPHERM HAZ SW - Permitting

Dear Mr. Derus,

The Colorado Department of Public Health and Environment (the "Department") Hazardous Materials and Waste Management Division (the "Division") has received the following modification to the Engineering Design and Operations Plan (the "EDOP") for the change in final cover system design and a vertical expansion of the East Regional Landfill (the "Facility") located at 8201 Schumaker Rd, Bennett, CO 80102.

East Regional Landfill - Engineering Design and Operations. Prepared by:
American Environmental Consulting, LLC. Document dated: February 2025. Document
received: March 12, 2025.

The Division has reviewed the above-referenced EDOP pursuant to 6 CCR 1007-2, Part 1, the *Regulations Pertaining to Solid Waste Sites and Facilities* (the "Regulations"). This revision to the EDOP requests the following changes:

1. Final Cover Grades - Revision to final cover grades that modify the slopes from a compound slope consisting of a 4:1 side slope with a grade break at 5,350 feet amsl to a 20:1 top slope to an apex at 5,392.37 ft amsl to a compound slope consisting of 3.5:1 side slopes from the cover toe to a higher grade break at 5,484 feet amsl where the slope changes to a 20:1 top slope with two apex points at 5,495.66 and 5,499.25 feet amsl. This design change increases the cover height by approximately 107 feet. **It should be noted that this change is due to historic filling above approved top of waste grades so that waste does not need to be relocated throughout the landfill.**
2. Final Cover System - Change in the alternative final cover with 4-8 feet of loosely compacted soil to two possible options, a 3.5 foot-thick alternative final cover designed



in accordance with the March 2013 Final Guidance Document Water Balance Covers in Colorado or an LLDPE lined cover with drainage system and protective soil.

3. CQA Plan - Change to the construction requirements for both of the final cover options in a revised CQA Plan.

Based on this review, the Division approves the EDOP. Please note that final cover grades presented in this EDOP exceed the 4:1 slopes required in the Regulations; however the Division approves this variance to eliminate the need to relocate historic overfilled waste and due to the increased stormwater controls to reduce erosion and establish vegetation that will maintain the integrity of the cover per the closure/post-closure plans.

Please note that this determination does not preclude separate review action by Adams County.

In closing, the Department is authorized to bill for its review of technical submittals at a rate of \$125 per hour, pursuant to Section 1.7 of the Regulations. An invoice for the Division's review of the above-referenced document will be transmitted under separate cover.

Please send any questions regarding this letter to the attention of Jill Parisi at jill.parisi@state.co.us or by phone at 303-692-3348.

Sincerely,

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Sustainability in Action

EAST REGIONAL LANDFILL ENGINEERING\ DESIGN AND OPERATIONS PLAN

Prepared for:

**Five Part Development, LLC
East Regional Landfill
8201 Schumaker Road
Bennett, Colorado 80102
Adams County, Colorado**

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February 2025

**Original Document prepared by:
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1.0 INTRODUCTION

1.1 Purpose

This Engineering Design and Operations Plan (EDOP) and supporting appendices presents the design, monitoring, operating, closure, and post-closure plans for the East Regional Landfill (ERL) facility, located in Adams County near Bennett, Colorado for a vertical expansion of the facility. The ERL, originally called the Five Part Development Landfill and referred to as such in earlier documents, is owned and operated by Five Part Development, LLC (Five Part). This expansion does not include an increase in the filling footprint or landfill property size and only includes the vertical expansion. As such, many originally permitted portions of the landfill remain unchanged. The intention of this expansion EDOP is to update the entire EDOP and include both the unchanged portions of the current permit and the modifications as a result of this vertical expansion.

This EDOP provides a written overview of the landfill design and the operational methods used by ERL in meeting applicable County and State requirements including the Colorado Regulation Pertaining to Solid Waste Disposal Sites and Facilities 6 CCR 1007-2, hereinafter referred to as the “Regulations” or “State Regulations”. The EDOP is a compilation of information and plans including the original permit work for the site proposed as an ash fill, the revisions to the permit to modify it to a Municipal Solid Waste (MSW) disposal facility, and the modifications made since the MSW permit approval.

Pertinent portions of the original EDOP are attached to this document as appendices. This EDOP and other referenced documents supersede all previous plans.

1.2 History

This document makes extensive reference to an EDOP (Industrial Compliance (IC), 1993) completed for a large parcel of property for which a Certificate of Designation (CD) for the disposal of coal combustion ash was originally granted on March 5, 1994 by Adams County Case Number 52-93-CD. This facility was called the Metropolitan Denver Coal Ash Disposal Facility (MDCADF) and was never developed. Conditions at the site were investigated in detail prior to the initial approval of the facility. This work is described in Section 3.0 of the 1993 EDOP, which is attached to this document as Appendix A. Relevant topics covered and approved in that EDOP include location restrictions, climatology, and characterization of the site. Location restrictions are excerpted from the 1993 EDOP and are included as Appendix C. In 2005, Alpine Disposal Services (Alpine) purchased Five Part Development and a portion of the MDCADF property and submitted an application for a new CD from Adams County as a Municipal Solid Waste (MSW) disposal facility, taking the form of a new EDOP called the *Engineering Design and Operations Plan, Five Part Disposal Facility* (Doty & Associates, November 4, 2005, Volume 1 and June 1, 2006, Volume 2), hereinafter referred to as the 2006 EDOP. Following an extensive public hearing process the Adams County Board of County Commissioners approved Alpine’s application by Resolution, Case #EXG2009-00001, dated July 29, 2009. After fulfilling the necessary conditions precedent set forth in the Resolution, Adams County issued a conditional CD on September 1, 2010 to operate as an MSW disposal facility and the ERL began disposal operations on September 2, 2010. In 2011, ERL applied for and was granted an amended CD to conduct composting operations at the facility, Case #EXG2011-00003. The design plan and requirements for the composting

operation are contained within the document called *Engineering Design and Operations Plan Compost Operations, East Regional Landfill* (American Environmental Consulting, LLC March 10, 2011). Referred to as the 2011 Compost EDOP, this EDOP is not included in this document since it is a standalone document and was permitted separately from the MSW landfill.

Since the 2006 EDOP a number of revisions to the facility design and operations have been approved as a result of conditions in the CD, changing regulations, and changes requested by ERL. This revised EDOP is a complete, stand-alone EDOP meeting the requirements in the regulations and incorporates changes from the 2006 EDOP to the disposal cell designs, liner systems, facility configuration, surface water control, waste types, financial assurance, inspections and maintenance, ground-water monitoring, explosive gas monitoring, facility operations, environmental monitoring and closure/post-closure care, as well as operations that have been updated to meet the current Colorado Department of Public Health and Environment (CDPHE) standards, regulations, and ERL operating practices.

This EDOP was developed to incorporate the following approved design and operational changes:

- 1) Improved construction methods and operations of the facility from a reconfigured landfill footprint and modified base grades that optimized the use of the existing permitted landfill area to:
 - a) maintain a 10-foot separation to ground water,
 - b) provided an additional 10 feet of right-of-way (ROW) along Schumaker Road and deeded the ROW to Adams County,
 - c) prohibited landfilling or permanent structures within 40 feet of the southern property boundary along the south Section line of the facility, and provided at least 25 feet of landscaping depth along Schumaker Road and a landscaped buffer along the south side of the site.
- 2) The liner system was revised to substitute a Geosynthetic Clay Liner instead of using a 2-foot thickness of compacted clay and the leachate collection system was modified to substitute a geocomposite drainage layer in place of the one-foot layer of aggregate material and piping on the floor of the landfill.
- 3) Minor modifications to the facility final cover extent are incorporated to correspond to the re-configured landfill footprint in accordance with State Regulations.
- 4) A revised Waste Characterization Plan in compliance with the current standards and ERL practices.
- 5) Revisions to the facility operations, including but not limited to, the use of Alternative Daily Cover (ADC) materials and changes to the environmental monitoring network from that shown in the 2006 EDOP.
- 6) Updated site topography and coordinate system. The original site topography was developed in 1993 based on a local coordinate system. The site topography was updated by aerial

photography in January 2012 based on a modified state plane system to allow correlation with offsite features and control points. This change in coordinate system resulted in an elevation change of approximately +3.87 feet. This elevation change did not actually change any of the points in space, but only the elevation designation.

- 7) A Landfill Gas Collection and Control System (GCCS) was installed in Module 1 of the ERL in 2022. Details on maintenance, compliance requirements, and monitoring of the of the GCCS are included in the Title V Operating Permit for the facility, Permit No. 10OPAD353.

Additionally, this EDOP was developed to incorporate the following not yet approved design changes.

- 1) Vertical expansion design. The revised final cover design modifies the cover slopes from a compound slope consisting of a 4:1 side slope with a grade break at 5,350 feet amsl to a 20:1 top slope to an apex at 5,392.37 ft amsl to a compound slope consisting of 3.5:1 side slopes from the cover toe to a higher grade break at 5,484 feet amsl where the slope changes to a 20:1 top slope with two apex points at 5,495.66 and 5,499.25 feet amsl. This design change increases the cover height by approximately 107 feet.
- 2) Final cover system redesign. The revised final cover system changes the final cover design from an Alternative Cover with 4-8 feet of loosely compacted soil to two possible options, a 3.5 foot-thick Alternative Final Cover System designed in accordance with the March 2013 Final Guidance Document Water Balance Covers in Colorado or an LLDPE lined cover with drainage system and protective soil. Additionally, construction requirements for both of the final cover options are presented in a revised CQA Plan.

1.3 Site Description

The facility is located west of Schumaker Road approximately one-half mile south of 88th Avenue (Irondale Road) in south central Adams County, Colorado. The site is located in the South 1/2 of Section 25, Township 2 South, Range 64 West, 6th Principal Meridian, Adams County, Colorado, approximately 6.75 miles northwest of the town of Bennett (Figure 1) with the following physical address:

Physical and Mailing Address:

East Regional Landfill
8201 Schumaker Road
Bennett, CO 80102
(303) 685-2700 phone

The property consists of four parcels designated Parcel A through Parcel D originally totaling 164.17 acres, a slight reduction from that proposed in the 2006 EDOP. The eastern property boundary originally permitted and shown in the 2006 Plan extended to the 30-foot County Right-of-Way (ROW) along Schumaker Road. As a condition of the CD, Five Part Development granted Adams County an additional 10-feet of Right-of-Way (ROW), extending the County ROW to a total of 40-feet along Schumaker Road. The additional 10-foot ROW was deeded to Adams County, reducing the property by approximately 0.33 acres to 164.17 acres more or less. The

original legal description of the property prior to the elimination of the 10-foot ROW and the ROW deed to Adams County are included in Appendix B.

The northwest corner of the property is also bisected by four buried gas lines running in a northeast to southwest orientation. Five Part Development granted a 70-foot ROW and a 20-foot access easement to Colorado Interstate Gas (CIG) for these pipelines. The pipelines have been surveyed and are shown along with the ROW and easement on the drawings included with this EDOP. The gas pipeline easements are also included in Appendix H. All disposal operations (the landfill footprint) are designed outside of this ROW and easement. There is some ERL property located across the ROW and easement that the ERL may use to support the landfill operations, such as buildings or equipment/soil storage. If approved by the pipeline company, ERL reserves the right to also use the property for borrow soils or any other potential needs of the landfill.

Disposal will occur on approximately 132 acres within the 164-acre permit boundary, with the remainder of the property used for surface water control, setbacks, easements, access roads and facility structures. Municipal solid waste is delivered to the facility by commercial solid waste collection operators and the general public. The majority of the solid waste is from local collection operations and the general public in the area. More information on the composition of the solid waste is found in Section 7.3 of this document.

The ERL also operates a Class II (by Colorado designation) compost facility under a separate CD dated September 28, 2011 (Case #EXG2011-00003) based on a March 10, 2011 EDOP for the compost operations. The compost operations are not a part of this EDOP.

1.4 Access

Commercial haulers are allowed to use State Route 79 to reach 88th Avenue (Irondale Road) then west on 88th Avenue and south on Schumaker Road to the site entrance. They may also use County Road 25 (Imboden Road) from the north or south to 88th Avenue, then east to Schumaker Road to the site entrance. The approved routes are shown on Figure 2. The owner may be required to assist Adams County in construction of a deceleration/right turn lane on 88th Avenue for turning onto Schumaker if warranted based on a traffic study to be conducted by Adams County. In addition, the ERL has an agreement to assist Adams County with paving Schumaker Road from 88th Avenue to the facility entrance when Adams County determines it is feasible.

On average, approximately 70-85 vehicles arrive daily to deliver waste to the facility. This is slightly more than the 25-50 vehicles anticipated in the 2006 Plan prior to operations but is still well within the capacity of the roads, based on the traffic study performed by Leigh, Scott and Cleary for the permitting of the adjacent Conservation Services, Inc., (CSI) Facility. The traffic study demonstrated capacities of 1,000 vehicles per day for Imboden Road and 5,000 vehicles per day for Irondale Road.

1.5 Zoning

The ERL property is zoned A-3/Agricultural and has a Certificate of Designation for MSW disposal from Adams County as well as a Class II compost operation. Adams County has deemed these uses compatible with the zoning and surrounding land uses following review of the application and the public hearing process.

1.6 Fees

The ERL will make payments to the Colorado Hazardous Substance Response Fund (HSRF), as required by the CDPHE solid waste regulations. In addition, the facility will make payments to Adams County for administrative, monitoring, and inspection costs and expenses as required by the July 29, 2009 resolution granting the September 1, 2010 Certificate of Designation.

2.0 SITE DESCRIPTION

2.1 Location Restrictions

ERL meets each of the nine siting criteria described in Section 3.1 "Location Restrictions/Site Standards" of The Colorado State Regulations and the site location was previously approved. Documentation demonstrating compliance with the location restrictions is included in Appendix A and has been placed within the facility operating record.

2.1.1 Seismic Impact Zone

The USGS 2014 Dynamic Seismic Hazard Map for the conterminous United States was used to find the seismic hazards at the East Regional Landfill. There is a 2% or less chance that the peak ground acceleration at ERL will exceed 8.18% of the earth's gravitational pull in 50 years (equivalent to 10% chance in 250 years), so the site is not located in a seismic impact zone. All components of the landfill design are designed to resist the maximum horizontal acceleration in lithified material for the site. Slope stability analyses are included in Appendix N.

2.1.2 Bird Mitigation Plan and Proximity to the Denver International Airport

As a part of the location restriction information requested by the Federal Aviation Administration (FAA), ERL worked closely with the FAA, the Denver International Airport (DIA) and the Front Range Airport (FRA) to prepare a bird mitigation plan for the facility. The control of birds at ERL deserves special consideration because of the potentially dangerous occurrences of bird strikes by aircraft. Federal regulations (40 CFR § 258.10), require owners and operators of municipal solid waste landfills to demonstrate that landfills within 10,000 feet of any airport runway used by turbo-jet aircraft or within 5,000 feet of any airport runway which receives only piston-type aircraft be designed and operated in a manner which does not pose a bird hazard to aircraft, and requires notification if a landfill is outside of these ranges but within five miles of certain airports. The CDPHE regulations mirror those in 40 CFR§ 258.10.

The ERL facility is located approximately four miles north of the Front Range Airport and eight miles east of the Denver International Airport and is in compliance with all of the USEPA and CDPHE requirements. The facility is not within 10,000 feet of any runway at either of the airports, and ERL provided notification to Ms. Linda Bruce, Colorado State Planner with the FAA of the planned development to accept putrescible waste in October 2007. Although not required by regulation, the ERL also submitted a completed Form 7460-1 dated June 1, 2009 at the request of the FAA for informational purposes.

In 2009, ERL prepared a bird mitigation plan for the facility (Appendix D) because of its relative location to the Denver International Airport. ERL met with and worked closely with representatives of the FAA, United States Department of Agriculture (USDA, as wildlife consultant to the FAA), DIA, and the Front Range Airport to explain the planned operations and develop effective bird mitigation procedures. Each entity was provided an opportunity to review the facility development and voice any concerns they may have as part of the permitting process for the ERL to accept putrescible wastes for disposal. The facility did not receive any negative responses and received a number of positive responses. This bird mitigation plan provides more

specific guidance for the control of birds at the facility in Section 7.5.2, Vector Control of this EDOP.

2.2 Surface Water/Groundwater

No waste will be placed below or into surface or ground water. The facility disposal areas are specifically designed to remain outside the limits of any surface water and above ground water. Additional precautions to control surface water runoff and runoff have been taken and include berms and ditches as necessary during operations. The permanent surface water control system is redesigned in this EDOP as part of the final cover vertical expansion. Operational and post-closure surface water drainage information and calculations are provided in Appendix E and the permanent stormwater control design is based on containing the 24-hour, 25-year storm event and controlling the 24-hour, 100-year storm event.

2.3 Permitted Wells Within Two Miles of Site

The Division of Water Resources data access page was used to update the water well information within two miles of the site, registered as of February 2024. Records provided by the State Engineers Office generally locate the wells by $\frac{1}{4}$, $\frac{1}{4}$ Section. A list of these wells based on the information provided is included in Appendix F.

2.4 Adjacent Land Ownership

The original permit document presents the information regarding landowners adjacent to the ERL Facility, as required by Adams County. This information was updated for this EDOP with records obtained from Adams County, and provides the name and address information and is included in Appendix G.

2.5 Site Characterization

Site geologic and hydrogeologic conditions were investigated in detail prior to the initial approval of the facility. This work is described in Section 4.0 of IC (1993), which is attached to this document as Appendix A. Topics covered there include:

- Regional and Site Geology,
- Regional and Site Hydrogeology,
- Hydrogeologic Characterization, and
- Groundwater Flow Paths & Velocities.

Specific site characterization work results including boring logs, packer test results, slug tests, etc are included in Appendix A. Some additional characterization work including HELP modeling has been done since the original work and is discussed in Section 3.2 of this document and is included in the base grade redesign in Appendix J.

2.6 Climatology

The climate data was prepared in the original permit document and is included in Appendix I.

3.0 SITE GRADING & PHASED DEVELOPMENT

3.1 Design Concepts

The facility was redesigned using the basic design concepts of the 1993 approval when it was modified from the ash fill to a solid waste landfill. It was redesigned again in 2011 with a request to have the option of using a Geosynthetic Clay Liner (GCL) in place of the 2 feet of re-compacted clay. Another modification was completed in 2008 to use a geocomposite material in place of the granular collection material for leachate drainage on the floor of the landfill to the sump. A modification to the cover design is included as part of this revised EDOP. This modification includes a vertical expansion of the landfill fill area and a more detailed Alternative Final Cover design than what is presented in the 2006 EDOP as well as an optional final cover design that includes a LLDPE liner, drainage layer, protective soils, and vegetative soils.

3.1.1 Design Concept Summary

Specific design concepts were incorporated in the 2006 EDOP. Some of these concepts were modified subsequent to the issuance of the CD, predominantly as a condition of the CD, and have received approval from the CDPHE and Adams County and are incorporated in this EDOP. A comparison of the design concepts from the approved 2006 design with the designs incorporated herein are summarized below.

1. Disposal Area Footprint. The eastern and southern boundaries of the disposal area footprint have been modified from the 2006 design out of necessity to accommodate Adams County requirements for issuance of the CD and modify the perimeter drainage system to remain on the ERL property (the drainage system for the ERL in the 2006 EDOP extended northward into property not owned by ERL). The southern boundary of the drainage system and footprint was moved northward to comply with Condition Precedent #3 and #5 of the Resolution prohibiting landfill and permanent structures within forty feet of the South Section line and install a landscape buffer on the southern property boundary. The eastern boundary of the drainage system and the landfill footprint was moved westward to accommodate the additional 10-foot ROW deeded to Adams County and the Condition Precedent #5 of the Resolution requiring at least 25-feet of landscape depth and screening berm along Schumaker Road. These modifications resulted in a slight reduction in size of the landfill disposal area footprint from the 2006 design. The disposal footprint is unchanged for this updated EDOP.
2. Excavation Slopes. Consistent with the 2006 design, all excavation slopes of the disposal area footprint are designed at 3H:1V (horizontal to vertical). The excavation slopes are unchanged for this updated EDOP.
3. Separation from Ground Water. The 2006 EDOP maintained the minimum 10-foot separation between waste and the shallowest ground water from the 1993 design, a design requirement that is maintained in the approved design included in this EDOP. The depths to ground water in the wells and piezometers that remained accessible on the property in July 2005 were checked against the data presented in IC (1993) and were found to adequately represent current conditions. Additional piezometers installed in 2010 and discussed in

Section 3.2 also verified the original concept of the site. Water levels from the “Perched Ground Water Zone” defined in IC (1993) were contoured and assumed to continue at a uniform grade to the east where the “Denver Aquifer Zone” has much lower water levels. As a result, this water level contour map is conservative in the eastern portions of the site, and with the data from the 2010 piezometers was used as the basis for designing the top of liner grades.

In addition the excavation for Cell 10 remained open without maintenance for approximately two years before liner was constructed. This allowed surface water to accumulate in and surrounding the cell that infiltrated into the subsurface, resulting in the presence of temporary shallow groundwater above the designed base of Cell 10. An attempt was made to drain the artificially-induced groundwater so that the cell could be constructed as originally designed, but was unsuccessful. In order to expedite construction, the base grades for Cell 10 were raised a minimum 10-feet above the artificial groundwater, necessitating a redesign of the base grades in the vicinity of Module 3 and minor changes in the rest of the landfill as reflected in the approved March 2, 2011 *East Regional Landfill Revised Excavation Plan and Liner Design* document included in Appendix J.

4. Liner System. The 2006 design consisted of two feet of compacted clay with a saturated hydraulic conductivity of 1×10^{-7} centimeters per second (cm/s) or less, overlain by a 60 mil high density polyethylene (HDPE) geomembrane. Subsequent to construction of the first disposal cell (Cell 10) the ERL was approved to substitute a geosynthetic clay liner (GCL) in place of the two feet of compacted clay as an option for the remaining landfill construction.
5. Leachate Collection System. The leachate collection system design presented in the 2006 EDOP consists of a one-foot thick drainage layer with leachate collection piping leading to two sumps. Prior to construction of the first disposal cell the ERL was approved to substitute a geocomposite drainage layer in place of the one-foot aggregate material and piping. The one-foot aggregate drainage layer and piping is no longer an approved option.
6. Landfill Gas Collection and Control System. To meet the requirements of 40 CFR Part 60 Subpart WWW (now subpart Cf with state plan approval) a Landfill Gas Collection and Control System (GCCS) was installed in Module 1 in 2022. The GCCS consists of 31 vertical extraction wells, transmission piping, 3 condensate traps, one condensate sump at the flare skid, a flare, and gas handling skid. Design, operational, and monitoring details for the GCCS are included in the approved documents: East Regional Landfill’s Gas Collection & Control System Plan, dated August 13, 2021, developed by Smith and Gardener Engineers, and the facility’s Title V Operating Permit, Permit No. 10OPAD353.
7. Final Cover Height and Elevation. The 2006 final cover configuration was designed with two “peaks” and a maximum height of approximately 90 feet above the lowest portion of the surrounding ground surface at an elevation of approximately 5,392-feet amsl (above mean sea level) based on the updated state plane coordinate system discussed in Section 1.2. The side slopes in the 2006 Plan were designed at a 4:1 maximum slope up to an elevation of approximately 5,356-feet amsl and five percent up to the final grades. The final sideslope configuration included in this EDOP was designed with a maximum height of approximately

200 feet above the lowest portion of the surrounding ground surface and changes the side slope configuration to be 3.5:1 slopes from the cover toe to a higher grade break at approximately 5,484-feet amsl to the 5% grade at the top to the two peaks resulting in a peak design elevation of approximately 5,499-feet amsl (adjusted for the change in coordinate system).

8. Final Cover Design. The 2006 final cover design proposed an Alternative Final Cover system using a water balance model to limit infiltration into the waste mass. This EDOP continues to propose an AFC using the same water balance model, but provides additional design and construction criteria including a demonstration of the feasibility of this type of AFC and a CQA Plan for its construction. This EDOP also proposes a possible final cover option of using a synthetic-lined cover for the final cover and includes a CQA Plan for its construction.

3.2 Grading and Excavation Plan

The site excavation was designed to continue using the concept that a minimum separation of 10 feet must be maintained between waste and the shallowest ground water. The fill area side slopes have 3:1 grades. The base grades of the landfill floor range in slope from a 1 percent grade to a 4.25 percent grade depending on the module and module area. As previously noted, the redesigned landfill excavation plan maintains a 10-foot separation from the top of the liner to the highest groundwater elevation. The ERL submitted a document entitled *East Regional Landfill Revised Excavation Plan and Liner Design* (AEC, March 2, 2011) that reflected the following:

1. Adjustments to the disposal area footprint necessitated by the Adams County ROW and landscape requirements,
2. Raised the original base grades to ensure the minimum separation to groundwater was maintained.
3. Modified the configuration of the base grades to incorporate three separate leachate sumps instead of the two sumps shown in the 2006 EDOP.

A copy of the March 2, 2011 Plan and CDPHE approval is included in Appendix J. Drawings showing the approved plan for each liner system options and final cover are included in this EDOP as Plates 3A, 3B, and 4.

Modifications to the approved grading plan became necessary after changes were made to the disposal area footprint and property boundary during the public hearing process and also by conditions encountered during construction of Cell 10 requiring raising the base grades in some areas. Additionally, supporting documentation was prepared to demonstrate that the plan meets the CDPHE regulatory requirements.

As stated above, the facility has a minimum 10-foot separation requirement between the top of the clay liner surface and underlying groundwater. A number of piezometers were installed at the facility in 1991 and 1992 to characterize the subsurface for the original permitting of the facility as a coal ash disposal facility. The water levels in these piezometers were measured at various times between installation and March 1993 to establish static groundwater elevations.

Nearly all of those piezometers have been destroyed, so an additional 18 piezometers were installed in November 2010 through February 2011 to verify the original groundwater characterization data and better define the groundwater surface for purposes of the redesign of the grading plan. The piezometers installed in 1991 and 1992 are noted as “pre-existing” and the piezometers installed in 2010 noted as “new” in the attached drawings in Appendix J. In general, the piezometers installed in 2010 verify that the 1991/1992 groundwater data was accurate. As can be seen on Sheet 4, Appendix J, many piezometers are nested or placed in very close proximity to each other, but they indicate a difference in groundwater elevations. For purposes of designing the base grades for the landfill that ensure the required separation, the highest groundwater elevations, which are shown on Sheet 4, Appendix J, were used in these cases. The resulting redesigned landfill grades demonstrate a minimum 10-foot separation between the top of clay (or GCL liner) and the underlying groundwater.

A few of the piezometers, particularly those completed in February 2011 (PZ-98, PZ-99, and PZ-100) are dry to the total depth completed. For purposes of developing groundwater contours and establishing a minimum separation between the top of the liner elevations and the underlying groundwater, groundwater was assumed to be present at the total depth of the dry piezometers. The resulting redesigned landfill grades demonstrate a minimum 10-foot of separation between the top of clay (or GCL liner) and the underlying groundwater. The drawing showing the groundwater contours and the landfill grades on the top of clay surface (or GCL surface) are included in Appendix J. The groundwater contours were developed based on the highest recorded groundwater elevation where conflicting elevations are indicated in nested or nearby piezometers, so the drawings in Appendix J include only the piezometers and groundwater elevations used to develop the groundwater contours.

Additionally, the March 2, 2011 Plan modified the excavation plan to include 3 sumps instead of the originally planned 2 sumps. Updated HELP modeling is included in Appendix L demonstrating that the modified excavation plan is in compliance with the Regulations.

As discussed in Section 1.2, the site topography was updated with new aerial photography in January 2012. The 2006 EDOP and the March 2, 2011 Plan was designed using the original local coordinate system. In conjunction with the 2012 aerial mapping the coordinate system was converted to a modified state plane system, resulting in an approximately +3.87-foot conversion factor for elevation from the original local coordinate system. Therefore, the elevations shown on the attached design drawings have been updated to reflect an elevation conversion factor of approximately 3.87 feet higher than the local coordinate system (shown in Appendix J) although they represent the same point in space.

3.3 Liner Design Modification

The March 2, 2011 Plan included a request to use an optional Geosynthetic Clay Liner (GCL) instead of 2-feet of clay and that option is reflected in this EDOP. As with the previously approved design, a 60-mil HDPE membrane will remain but be placed on top of the GCL rather than the clay. The grading plan continues meet the requirement of a minimum separation between the top of the liner and the groundwater of 10 feet, as approved in the EDOP prepared by Doty & Associates, LLC (June 2006).

An equivalency determination to compare the option of using a GCL in place of the originally approved 24 inches of clay beneath the High Density Polyethylene (HDPE) liner was prepared as part of the March 2, 2011 Plan. This change was approved by the Division and Adam's County and incorporated into the EDOP. Liner details are shown on Plate 5. A revised Construction Quality Assurance Plan (CQAP) was developed as part of this EDOP to incorporate final cover modifications and includes the requirements for installing a GCL. No other changes are made to the CQAP from previous versions regarding the liner system. The revised CQAP is included in Appendix M.

3.4 Leachate Collection System Modification

The leachate collection system was modified to use a geocomposite drainage material rather than the originally approved aggregate material layer. This modification was revised in 2008 by Terracon, Inc. and approved by the CDPHE in a letter dated July 15, 2008 (Appendix K). The CQAP (Appendix L) was also modified to include the installation procedures and testing for the material. Transit time calculations to estimate the length of time it would take leachate to travel from the farthest point in each module to that module's sump are included in Appendix J. The transit times were prepared based on the modified landfill base grades and longest flow pathways, including leachate travel down the landfill sideslopes, and are well within the maximum 365-day requirement. Details of the approved leachate collection system are included in Plate 6.

3.5 Stormwater Control System Redesign

The disposal area boundary and fill limits were revised from the 2006 design to provide additional ROW along Schumaker Road and landscaping as a condition of the CD as well as to provide room for design of a permanent perimeter surface water control system. The permanent surface water control system was designed to control the 100-year, 24-hour storm event in compliance with regulations and documented in the *Drainage Report and Plan, Five Part Landfill* dated December 2009. The vertical expansion of the final cover necessitates a redesign to the permanent surface water control system. The redesigned surface water control system is included in Appendix E. This redesigned system is designed to fully contain the runoff from a 25-year, 24-hour Type II storm and control the runoff from a 100-year, 24-hour Type II storm. The system consists of tack on berms on the final cover that route runoff to perimeter drainage ditches around the disposal area and to two site outfall locations. The ditch system also incorporates detention weirs to fully contain the 24-hour, 25-year storm volume and assist in limiting off-site sediment transport and is designed between the disposal area footprint and the required landscape areas on the south and east property boundaries. It is designed on the inside (landfill side) of the 20-foot KinderMorgan gas pipeline easement adjacent to the disposal area. The ditch and associated structures will be constructed in phases concurrent with the disposal area phasing and closure to control run-on to the active disposal areas and runoff from the landfill.

3.6 Final Grades

The final grades and landfill height are modified in this EDOP. The maximum height at the top of the final cover is at an elevation of approximately 5499-feet (modified state plane system), approximately 107 feet higher than the previously approved cover design (elevation 5392). The final cover topography is shown on Plate 4.

3.7 Final Cover System

The final cover system design is updated in this EDOP from the originally approved water balance cover of 4-8 feet thickness of monolithic lightly compacted soils to two options. The first option is a water balance cover with 3.5 feet of thickness of monolithic lightly compacted soils. The second option is a final cover consisting of one foot of prepared subbase overlain by a LLDPE membrane covered by 1.5 foot thick vegetative layer. These final cover options are discussed further in Section 4.4.

3.8 Soil/Material Balance

The facility was originally designed to result in a material quantity balance, considering clay toe berm, daily and intermediate cover and final cover requirements. However, due to the base grade redesign, less excavation soil is available than originally anticipated. In the future, the ERL will acquire a borrow source. The various excavation and fill volumes are presented in Table 1.

3.9 Phasing Plan

The 2006 EDOP segregates the landfill footprint into pre-established “cells” of a specific size. The designation of specific cells is arbitrary and cumbersome in that only portions of cells may be constructed at any one time in practice, requiring a change in the designation of the area constructed during any one event (e.g., Cell 8-Phase 1) or any construction event includes portions of one or more cells (e.g., Cell 8-Phase 3; Cell 9-Phase 1). To simplify the nomenclature, the landfill footprint in the approved grading plan is segregated into three Modules that are defined by physical design features (i.e., a drainage area). A Module is defined as an excavated disposal area of the landfill that drains to a single leachate collection sump located in that module. Within each Module, individual cells will be constructed as they are needed and the size and timing of cell construction is left to the discretion of the landfill operator and based on such considerations as the volume of airspace desired for a period of time and budgetary constraints. With the exception of Cell 10, which was named based on the nomenclature in the 2006 EDOP, any portion of a disposal area constructed at one time will define a cell and the cells number will be sequential. For example, Cell 1 was constructed in one continue construction event, but has two designations, Cell 1A and Cell 1B because it was necessary to document the construction in two separate construction reports. The next cell to be constructed will be called Cell 2, the following cell name Cell 3, etc.

Development of the disposal area at the site began with Cell 10 of Module 1 located in the northeast corner of the site and contains the sump for Module 1. Cell 1 was constructed in 2011 adjacent to Cell 10 to the west and extends to the western boundary of the fill area footprint.

Cell 2 was constructed in 2014 adjacent to Cell 1 to the south and extends to the western boundary of the fill area footprint. Cell 3 was constructed in 2015 adjacent to Cell 2 to the south and extends to the western boundary of the fill area footprint. Cell 3 extends to the southern boundary of the Module 1 fill area footprint. Cell 4 was constructed in 2018 adjacent to Cell 2 and Cell 3 to the east and Cell 10 and Cell 1 to the south. Cell 4 was the final cell in Module 1. Cell 5 was constructed in 2022 as the first cell in Module 2 and contains the sump for Module 2. Cell 5 is in the northern part of Module 2 and is immediately south of Module 1. The currently constructed area includes all of Module 1 and the first cell (Cell 5) of Module 2. Cell construction will generally progress southward in an east-west configuration until the southern boundary of the disposal area footprint is reached, and then cell development will progress eastward to the eastern footprint boundary. Overall, cell development of the site will progress in a northwest to southeast manner.

It is envisioned that the next cell area will be under excavation and/or construction while filling continues in previously constructed cells. Daily and intermediate cover soils may be borrowed from the excavation for the next cell or from existing stockpiles.

4.0 FACILITY DESIGN DETAILS

4.1 Liner

The entire excavation will be covered with a composite liner system consisting of a GCL and 60-mil HDPE geomembrane, or optionally a CCL and 60-mil HDPE geomembrane. Details of liner system are shown on Plate 5. The revised CQA Plan is included in Appendix L.

The 60 mil HDPE geomembrane will be new material, manufactured with first quality high density polyethylene resin. Textured HDPE will be used. The geomembrane will be anchored along the crest of the excavation or the toe berm in a two-foot wide by two foot deep anchor trench. Seams will be sealed between the separate geomembrane sheets using either double fusion welds or extrusion welds. Construction quality assurance procedures are specified in Appendix L.

4.2 Leachate Collection System

A leachate collection system consisting of a geocomposite drainage layer and three leachate removal sumps (one for each module) is designed on top of the composite liner (above the HDPE membrane) to route any free liquid at the base of the facility to leachate removal sumps located in each Module.

4.2.1 Geocomposite Drainage Layer

The 2006 EDOP incorporated a one-foot thick drainage layer of aggregate materials supplemented by a piping system. The aggregate material and piping has been eliminated as an option for the leachate drainage layer and a geocomposite drainage material was approved in its place in a series of design modifications prior to the construction of Cell 10. The geocomposite consists of a polyethylene drainage net with geotextile fabric bonded to each side and designed over the entire floor of the landfill (not the side slopes). The material requirements, installation procedures, and CQA procedures are detailed in the CQA Plan in Appendix L. Details of the leachate collection system are included on Plate 6.

4.2.2 Sumps

Three sumps, one in each Module, are designed at the landfill to provide for collection and removal of leachate. Each of the sumps are configured slightly different but range from approximately 68 to 85 feet wide at the top and all are approximately four feet deeper than the surround elevations on the floor. The sump is lined identically to the floor and sideslopes of the landfill (a composite liner with the 60-mil HDPE overlaying either the compacted clay or GCL).

An 18-inch diameter perforated SDR 17 HDPE pipe will be installed on the floor of the sumps and connected to a similar solid riser pipe running up the composite-lined side slope. Perforations will be 3/8-inch in diameter and the sump will be filled with aggregate meeting the requirements in the CQA Plan to the level of the surround liner surface on the floor. In Module 1 and planned for Module 3, an 8 Oz/Yard² geotextile covers the sump aggregate and is overlapped/seamed with the upper geotextile layer of the geocomposite drainage. The Module 2

sump was constructed by completely covering the sump aggregate with the geocomposite layer. Submersible pumps will be installed in the sumps and fluid will be removed such that the fluid thickness is less than 24 inches (less than 12 inches on the liner outside the sumps). The management of fluid and leachate removed from the sumps including collection, treatment, and disposal methods is outlined in Section 7.6. Sump details are included on Plate 6 and installation requirements, construction methods, and CQA procedures for the sump and its components are included in the CQA Plan in Appendix L.

4.3 Protective Cover

The landfill liner and leachate collection system will be protected by the placement of a one-foot thick layer of specified soils. The protective soils are designed to cover the entire floor (including the sumps) and side slopes out to the lateral limits of the liner. The required characteristics of the soils were engineered to minimize plugging of the upper fabric of the geotextile. Required characteristics, placement methods, and CQA criteria are included in the CQA Plan in Appendix L.

4.4 Final Cover

The final cover has been designed to allow the option of either a water balance cover or a synthetic liner. The water balance cover will consist of a monolithic lightly compacted vegetated evapotranspirative cover designed using guidance from the Final Guidance Document, Water Balance Covers in Colorado (CDPHE, March 2013). The site has suitable soils meeting the criteria in the guidance document for permitting a 3.5-foot thick water-balance type Alternative Final Cover (AFC). Excess excavation of primarily silty sandy clay and clayey sand (based on data from IC, 1993 and construction geotechnical analysis conducted since the facility has opened) will be placed as loosely as possible over the final lift of refuse. The final lift of refuse requires a minimum one-foot of unspecified intermediate cover soils if final cover is not placed within 30 days, and these soils may be used as part of the AFC if suitable soil properties, compaction, and moisture conditions are present or constructed. Alternatively the ERL may remove the intermediate soil cover and replace it with the specified thickness of suitable soils or place suitable soils directly over the intermediate final cover. A demonstration to the adequacy of the above described AFC and a CQA Plan for the construction of the AFC is included in Appendix M.

The optional synthetic-lined final cover will consist of a one-foot prepared subbase. Overlying the subbase is a LLDPE membrane overlain by a 12-inch thick protective soil layer overlain by a 6-inch vegetative layer. In-place densities will be in the range of 80 to 90 percent of the Standard Proctor maximum dry density. The moisture content will be equal to or less than the Standard Proctor optimum. The combined protective soil layer and vegetative layer thickness on the LLDPE will be a minimum of 18 inches. The LLDPE will be anchored into the upper layer of soil using anchor trenches (detail on Plate 5). Gas vents are not included in the final cover configuration because the facility has installed a gas collection system. Detail 5 on Plate 7 shows details for boots on penetrations through the LLDE cover by the GCCS system.

After placement of the final cover, it will be planted with a seed mixture recommended by the local office of the National Resources Conservation Service. The mixture will include

predominantly cool weather species.

4.5 Slope Stability

Appendix N contains the slope stability evaluation of the East Regional Landfill (ERL) expanded final cover. The slope stability analyses include multiple potential failure alignments through the landfill and multiple different methods of analysis to ensure that the slopes are stable during the construction and at the point the municipal solid waste (MSW) reaches final cover grades. Four different scenarios were modelled as outlined in the evaluation.

The worst-case factors of safety, probabilities of failure, and reliability indices for all four scenarios are shown below. Based on these modelling results, the worst factor of safety observed at the ERL is 1.471 in Scenario 1 – the open condition after the landfill has been constructed and before waste has been placed. This factor of safety exceeds the minimum design criteria of 1.3, so the landfill design is acceptable.

Worst-Case Slope Stabilities for Four Scenarios

Method	Factor of Safety (Deterministic)	Mean Factor of Safety	Probability of Failure	Reliability Index
Scenario 1	1.471	1.478	0.040%	2.748
Scenario 2.A	1.921	1.932	0.000%	5.442
Scenario 2.B	1.934	1.944	0.000%	5.348
Scenario 3	1.665	1.672	0.000%	4.399

5.0 SURFACE WATER CONTROL

The surface water control system was designed in a document entitled *Drainage Report and Plan, Five Part Landfill* (AEC, December 2009) and received approval from the CDPHE and TCHD. The surface water control system is redesigned in this EDOP as part of the final cover modification. The surface water control system was designed in compliance with the Colorado Regulations Pertaining to Solid Waste Sites and Facilities (6 CCR 1007-2, Part 1, Section 2.5.7) that require permanent surface water control facilities at solid waste sites to prevent run-on from the 24-hour, 25 year storm event, collect run-off from the 24-hour 100 year storm event, and control run-off and run-on for a 24-hour 100-year storm event at the site. The commonly used model HydroCAD (version 10.20-5) was used to evaluate the needed detention pond capacity and performance of the tack-on berm and perimeter channel design. Appendix E includes the drainage analysis for the facility.

Surface water runoff to the site is only possible in an area along the south landfill boundary. That has been effectively blocked using a tree-lined berm and a road on the south property. The runoff is controlled using tack-on berms on the final cover, drop chute structures and perimeter berms. (Plate 8A).

The revised surface water control system consists of four grass-lined channels around the perimeter of the final cover on the landfill, representing anticipated post-closure conditions at the site. The channels will be built in phases as necessary based on the progression of landfilling throughout the operating life of the landfill. This scenario assumes that all operating facilities, including the gatehouse and scales will be removed from the site after it is closed as these structures are within the ultimate disposal area footprint.

Surface water control structures for operational purposes will be constructed as needed during the operating life of the landfill to collect and control the 24-hour, 25-year event as required in 6 CCR 1007-2, Part 1, Sections 2.1.6 and 3.2.6. Generally, these temporary operational controls will consist of proper landfill sloping, temporary ditches or control berms, and excavated retention areas. The operational surface water control structures are highly dependent on the landfill configuration and operating needs such as access roads, soil stockpile areas, etc. and their location and design will change based on the particular landfill configuration at any time. The operational surface water control structures are not included since they will change based on the landfill progress. Aside from operational surface water controls required by regulation to control surface water to and from the refuse fill area, the natural drainage through the site will be maintained as much as possible until the permanent system is constructed.

6.0 ENVIRONMENTAL MONITORING

6.1 Gas Monitoring System

The Regulations state that the concentration of explosive gas generated by landfill facilities shall not exceed 100 percent of the lower explosive limit (LEL) by volume, which is equal to 5 percent methane in air, at the property boundary, or 25 percent of the LEL, which is equal to 1 percent methane in air, in facility structures.

Explosive gas monitoring at the ERL is conducted by six explosive gas monitoring probes constructed near the facility property boundaries and adjacent to the six groundwater monitoring wells used to monitor groundwater at the site as shown on Plate 2. In 2010, ERL installed three of the gas monitoring probes (GP-2, GP-3, and GP-4) adjacent to the current areas being filled for detecting any gas from the landfill. In 2022, the ERL installed the remaining three gas probes (GP-1, GP-5, and GP-6). The gas probes are completed from five feet below ground to the approximate elevation of the landfill floor adjacent to the probe location. The monitoring probes are equipped with caps containing normally closed quick connect fittings for the explosive gas monitoring purposes. The completion diagrams are included as Appendix O.

Explosive gas concentrations in the probes are measured with a calibrated explosive gas meter.

The condition of each explosive gas monitoring probe is inspected during each monitoring event. The results of the inspection is documented and any deficiencies are remedied within 60 days of the inspection, weather permitting. If deficiencies, malfunctions or deteriorations in the well are observed at other times, such deficiencies will also be documented and remedied within 60 days of discovery, weather permitting.

In compliance with Regulations, the ERL will notify the CDPHE and Adams County of explosive gas levels that exceed the regulatory standards stated above and take immediate steps to ensure protection of human health. A record of the levels detected above regulatory limits and actions taken shall be placed in the Operating Record within seven days, and the ERL will implement an approved remediation plan within 60 days, place the plan in the Operating Record, and notify the CDPHE and Adams County that the plan has been implemented. These steps will be followed unless an alternative approach is approved by the CDPHE and Adams County.

6.1.1 Gas Monitoring Schedule

In compliance with Regulations, gas monitoring of the probes and facility structures will be conducted quarterly unless an alternative schedule is approved by the CDPHE and Adams County.

The current probes are monitored for explosive gas concentrations on a quarterly basis and although the gatehouse is far removed from current disposal operations will also be monitored for the presence of explosive gas on a quarterly basis.

The quarterly monitoring results are submitted to CDPHE and Adams County as part of the ground-water monitoring report if conducted concurrently with the groundwater monitoring or within 60 days in a separate report if ground-water monitoring is not performed that quarter. The report will include a tabulation of the data, as well as the results of any inspections and

maintenance performed.

6.1.2 New Source Performance Standards Applicability

The ERL is subject to Subpart Cf of the New Source Performance Standards (NSPS) of the Clean Air Act due to its design capacity and is subject to the applicable Air Pollution Control Division (APCD) regulations. The ERL installed a landfill Gas Collection and Control System in November 2022 in accordance with the regulations. Applicability to Subpart Cf requires the ERL to obtain a Title V Operating Permit. The ERL received a Title V Operating Permit on August 1, 2016. This permit was renewed on November 1, 2022, Operating Permit 10OPAD353. Due to the vertical expansion, an amended design capacity report and permit modification request for the Title V permit will be submitted to the APCD within 90 days of approval of this EDOP.

6.2 Groundwater Monitoring

There are a total of six groundwater monitoring wells approved for the landfill, all six wells are currently installed and used in the detection monitoring program in accordance with Appendix B of 6 CCR 1007-2, Part 1. The approved groundwater monitoring system wells include MW-1, MW-2, MW-3, and MW-4 currently in the detection monitoring system and sampled on a semi-annual basis. MW-5 and MW-6 were installed in March 2021 and are now in detection monitoring and sampled on a semi-annual basis.

A seventh well, CMW-1, is present on the site and used to monitor the compost operations. Because the compost operations are permitted under a separate CD, CMW-1 is not a part of this EDOP. The location of the existing water monitoring wells is shown on Plate 2.

Wells representing upgradient and downgradient conditions for the currently active area include MW-1 (upgradient), MW-2, MW-3, MW-4 (all three downgradient from the northern portions of the facility), MW-5, and MW-6 (both downgradient from the southern portions of the facility). It should be noted that MW-1 was originally planned in a different location as shown in the 2006 Doty EDOP; however, MW-1 was moved to a more appropriate upgradient position on the southern property boundary as documented in a letter to the CDPHE (AEC, March 1, 2010) and approved in a CDPHE letter dated May 11, 2010.

The wells have been, and will continue to be, sampled for analysis of the parameters listed in Appendix IA and IB of the CDPHE solid waste regulations (6 CCR 1007-2, Part 1) unless a modified analytical suite is approved by the CDPHE. Analytical methods are specified in EPA SW-846 or other appropriate sources and the laboratory results are validated using standard methods. Samples are currently collected on a semi-annual basis in MW-1 through MW-4.

The wells will be purged and sampled using dedicated bailers. The dedicated bailers are suspended on dedicated polypropylene rope. Alternatively, at the operator's option, dedicated pumps may be installed in the wells and used for purging and sampling.

If dedicated bailers are used, the wells are purged of three wellbore storage volumes (the volume standing inside the casing at the start of purging) or to dryness, whichever occurs first. Periodic

field measurements of pH, temperature, and specific conductance are taken and recorded prior to collecting the sample. Purging continues until these parameters have stabilized to within 0.2 pH units, 2 degrees C or F, and 10 percent of the specific conductance reading for 2 consecutive readings. Samples are then collected as soon as possible after purging, but no longer than 24 hours after purging.

If dedicated pumps are used, low flow techniques will be used in accordance with the EPA document *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*, the wells will be purged of minimum three pump and tubing volumes at flow rates of 100-500 milliliters per minute or less and sampled immediately after purging. Drawdown will be checked periodically to monitor drawdown in the well as a guide to flow rate adjustment. The goal is minimal drawdown (<0.1 m) during purging. This goal may be difficult to achieve under some circumstances due to geologic heterogeneities within the screened interval and may require adjustment based on site-specific conditions and personal experience. Periodic field measurements, every 3-5 minutes of pH, temperature, specific conductance, Oxidation Reduction Potential (ORP), Dissolved Oxygen (DO), and turbidity are taken and recorded prior to collecting the sample. Purging continues until these parameters have stabilized to within ± 0.1 pH units, $\pm 10\%$ for temperature, $\pm 3\%$ of specific conductance, $\pm 10\text{mv}$ for ORP, and $\pm 10\%$ for DO and turbidity for three consecutive readings. Samples are then collected as soon as possible after purging, but no longer than 24 hours after purging.

Samples are transferred directly from the bailers or discharge tubing into sample bottles provided by the laboratory. Sample bottles and preservation are as specified in the analytical methods employed, except that volatile organic compound (VOC) samples are chilled but otherwise unpreserved (consistent with CDPHE policy). Sample bottles are placed in a cooler or other shipping container and chilled on ice as soon as possible after collection.

Chain-of-custody procedures are used to track the sample from the time of collection until it, or its derived data, is used. A chain-of-custody form is initiated at the time that the samples leave the site. Field personnel complete all applicable sections of the form. The chain-of-custody forms are protected from moisture by encasing them in plastic (e.g., Ziplock plastic bags) and they are then placed inside the shipping containers. The chain-of-custody forms accompany the containers during shipment to the laboratory. The shipping containers are sealed with custody seals.

Field personnel collecting the samples are responsible for custody until the samples are delivered to the laboratory or relinquished to a commercial shipping company. Sample transfer requires the individuals relinquishing and receiving the samples to sign, date, and note the time of transfer on the chain-of-custody forms. Common carriers (e.g., Federal Express) are not expected to sign the chain-of-custody forms. However, the bill of lading or airbill becomes part of the chain-of-custody record when a common carrier is used to transport the samples. The chain-of-custody is considered complete after the analytical laboratory accepts custody of the samples (acceptance of custody is indicated by signature on the chain-of-custody form). A copy of the chain-of-custody record will be maintained along with other field records.

The following quality assurance and quality control (QA/QC) actions are implemented to

minimize the potential for biasing the analytical results by laboratory preparation, sampling, and transport activities.

1. Field work is performed by qualified and trained personnel.
2. Samples are analyzed by a qualified laboratory. The laboratory uses appropriate chain of custody, analytical, and QA/QC procedures.
3. A trip blank for VOC analysis is included in each sampling event.
4. Equipment blanks and field duplicates are not collected on a routine basis because disposable or dedicated sampling equipment will be used; however, they may be prepared and analyzed if questions arise relative to the quality of the analytical data.
5. The laboratory results are validated using standard methods.
6. The full laboratory report, including laboratory QC data, is attached to the monitoring reports and are submitted by the operator to both CDPHE and Adams County Health.

The condition of the ground-water monitoring system is inspected during each monitoring event. The results of the inspection are documented and any deficiencies are remedied within 60 days of the inspection, weather permitting. If deficiencies, malfunctions or deteriorations are observed at other times, such deficiencies will also be documented and remedied within 60 days of discovery, weather permitting.

The monitoring results are submitted to CDPHE and Adams County/Tri-County Health along with a statistical evaluation following each monitoring event.

The report includes a tabulation of the data (including water level data), statistical evaluations as appropriate, the results of the system inspection, and a description of any maintenance performed.

6.2.1 Groundwater Statistical Analysis and Reporting

The following is included in a typical semi-annual groundwater monitoring report:

- Time series graphs for all parameters
- Groundwater measurements and elevations charts
- Analytical results presentations and laboratory reports
- Statistical results for groundwater monitoring wells
- Landfill gas measurements

The analytical results for all wells are statistically analyzed in accordance with methods and procedures allowed by Regulation. All of the groundwater results through June of 2010 was collected without any waste having been received at the ERL facility and is considered to be unadulterated. Data collected after September 1, 2010 was collected after the facility had

opened. Sampling of each of the monitoring wells was completed and the results were collected in the initial eight quarters of data was used to establish background conditions.

Data is evaluated for statistical outliers and seasonality in accordance with Regulations. The data is adjusted as allowed for outliers and seasonality if appropriate.

6.3 Leachate

The leachate levels in the landfill sumps will initially be checked a minimum of once every month and after large precipitation events during the initial stages of refuse filling in a newly constructed cell to verify that the depth of leachate is in compliance with regulatory requirements. In compliance with regulations, leachate will be removed from the sump prior to reaching a depth of 30 centimeters (12-inches) over the floor on the liner surrounding the sump. When these monthly measurements indicate that the frequency of measuring leachate levels can be reduced and still maintain compliance with regulations, leachate levels will be checked a minimum of every three months on an ongoing basis. Leachate quality will be monitored (sampled and analyzed) annually and the results will be submitted to the CDPHE and Adams County.

6.4 Stormwater

The ERL is regulated by a stormwater permit under the Colorado Water Quality Control Act and the Colorado Discharge Permit System (CDPS permit number COR900439). As a permit requirement, the ERL has a Stormwater Management Plan (SWMP) that provides guidance for inspections, surface water control structures, monitoring, and reporting for the site. The purpose of the SWMP is to protect waters of the State from potentially contaminated site discharges, specifically those associated with site drainage and stormwater runoff. The Permit requires monthly visual inspections, an initial four quarterly benchmark samples, potential additional quarterly samples if conditions occur that trigger the additional implementation measures contained within the COR900000 permit, potentially annual effluent limitations sampling for the first year, and annual benchmark and effluent limitation sampling if approved thereafter. For purposes of the annual permit, the monitoring period is from January 1 through December 31.

7.0 OPERATIONS PLAN

7.1 General

This section discusses the day to day operational aspects of the ERL including, but not limited to, site security and safety, personnel and equipment, waste identification and acceptance procedures, disposal and daily cover protocol, control of nuisance conditions, leachate management, personnel training, and recordkeeping.

The number and type of personnel employed at the landfill and equipment used in various operations may vary from that discussed in this EDOP depending upon current conditions; however, sufficient qualified staff is available to operate the site in a safe and efficient manner. All personnel are trained in safe and proper operating procedures as they relate to their assigned duties and responsibilities.

7.2 Site Access & Controls

Personnel sufficiently knowledgeable in operating the facility will control the site entrance located on Schumaker Road as shown on the attached drawings. A gatehouse with a scale is constructed at the entrance and all vehicles must stop there to gain access to the site. The cashier will inquire as to the nature of the material being delivered and its quantity. The cashier will have authority to deny site access if the material is unacceptable or its characteristics are suspect. The cashier may have other operational duties, such as heavy equipment operation.

As stated earlier, only municipal solid waste as defined in the CDPHE solid waste regulations is accepted at the site. Customers on account are required to sign an agreement stipulating that they will only bring acceptable waste to the facility. Signage at the facility entrance further stipulates the types of waste that may be accepted. Questionable materials transported to the site will be rejected until it can be determined that the material is acceptable. Waste screening procedures are outlined in the Waste Characterization Plan (WCP), provided in Appendix P. Additional information on waste identification and screening procedures is presented later in this Section.

The entire active area of the facility is fenced. Fencing will be expanded as needed to enclose current and past disposal areas, as well as those under development. A gate is installed at the site entrance and others may be placed at other locations as may prove convenient for the operator. All gates will be locked except during actual operating hours.

Roads interior to the site are all-weather roads providing safe access during operating hours in all seasons. Roads accessing the active disposal area (used by customers) have posted speed limits. Roads accessing areas under development (used by the operator) are established but may change in response to operational needs. In addition, roadways are constructed around the perimeter of the site and to well locations for inspections and monitoring.

7.3 Waste Identification and Screening

Waste identification and screening procedures implemented at the ERL are outlined in the WCP included in Appendix P. The current WCP for the ERL received CDPHE approval on October 24, 2018. The WCP is slightly revised with this EDOP to include updated Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) regulations (6 CCR 1007-1 Part 20). The WCP discusses acceptable wastes streams, identifies those wastes that are specifically prohibited, waste identification and screening procedures to preclude acceptance of prohibited wastes, and employee training.

This plan is designed to hold the waste generator responsible for:

- Adequately characterizing particular waste streams proposed for disposal at the facility
- Ensuring that these wastes are acceptable for disposal at the ERL

This responsibility is maintained by the generator through a documented formal waste application and acceptance document included with the WCP. The ERL reserves the right to deny acceptance of any waste stream for any reason.

7.3.1 Acceptable Waste Types

The ERL facility is designed for disposal of municipal solid wastes as defined in the CDPHE solid waste regulations and most typically consists of residentially and commercially generated trash. Other non-hazardous wastes may be acceptable for disposal at the facility in accordance with the approved WCP included in Appendix P. Certain acceptable wastes require testing and/or specific handling and burial procedures that are also discussed in the WCP.

Additionally, as a condition of the ERL CD, Mill tailings, mining wastes, and treated domestic waste water and water treatment residues that do not contain hazardous waste, as defined by C.R.S. §25-15-101(6), as amended, and 6 CCR 1007-2, Part 2, §2.2(J), as amended, may be accepted on a case-by-case basis, after review and approval by the Adams County Department of Planning and Development. The waste stream shall be submitted by the ERL to the CDPHE for its comments.

7.3.2 Prohibited Waste Types

The ERL CD prohibits acceptance of the following wastes for disposal:

- Hazardous wastes as defined by C.R.S. §25-15-101(6), as amended, 6 CCR 1007-2, Part 2, §2.2(J), as amended, and Adams County Development Standards and Regulations §11-02-235, as amended.
- Radioactive waste, as defined by C.R.S. §25-11-201(3), as amended, classified material, as defined by C.R.S. §25-11-201(1), and low-level radioactive wastes, as defined by C.R.S. §24-60-2204(3), as amended, including, but not limited to, Naturally Occurring Radioactive Material (NORM), as defined by C.R.S. §25-11-101(2.7), as amended, and Technically

Enhanced Naturally Occurring Radioactive Material (TENORM), as defined by C.R.S. §25-11-201(4), as amended.

- Liquid waste as defined by CCR 1007-2, Part 1 §1.2, as amended.
- Friable asbestos waste, as defined by 6 CCR 1007-2, Part 1, §1.2, as amended.
- Raw domestic sewage and septage.
- Polychlorinated Biphenyls (PCBs).
- Dioxin
- Used lead acid batteries, used oil, and tires (except tire shreds used as approved ADC), as defined by 6 CCR 1007-2, Part 1, §1.2 and §16, as amended.
- Non-sterilized (non-treated) infectious medical waste.
- Electronic waste as described in the WCP and 6 CCR-1007-2, Part 1, §1.2 and §16, as amended.

Additional wastes that are, or maybe, prohibited for various reasons are identified and discussed in the WCP in Appendix P.

7.3.3 Waste Screening

To ensure only acceptable waste is disposed of at the facility the ERL implements an active screening program. Signs at the entrance to the ERL notify customers of waste that is not accepted and the gatehouse is equipped with a radiation monitor for identifying wastes containing potentially regulated level of radioactivity. The ERL requires generators wishing to deliver waste to the landfill that require special testing or characterization before a determination can be made on their acceptability complete an application form that describes the source and nature of the waste, and laboratory test results, and a statement by the generator.

Waste arriving at the facility are inspected at the gatehouse. If the waste is visible, the gatehouse attendant may question the transporter as to the nature of the waste. The waste is also observed at the working face for potentially unacceptable materials as it is offloaded and spread out for compaction. The ERL also institutes a random waste screening program where one waste load for every 5,000 tons received is randomly selected for more detailed inspection at the working face.

The gatehouse attendant and employees responsible for operations at the working face receive training in the identification of hazardous and prohibited wastes and screening procedures as discussed in the WCP in Appendix P.

7.4 Waste Placement and Cover

To minimize the potential for damage to the drainage layer, the first lift of waste placed directly on the protective soil layer will be a minimum of four foot thick and composed of select waste that does not contain materials likely to damage the drainage layer. Trained landfill operators and spotters will observe the waste placement and remove or reorient waste that may potentially disrupt the leachate collection system or the liner and this first lift is not specifically compacted. Landfill equipment and delivery vehicles will not be allowed to operate above the liner and leachate collection system until the select waste layer has been placed.

Landfilling will be done in multiple refuse lifts and numerous refuse cells within the three Modules. Refuse will be placed in a waste cell and kept to the smallest area practical based on the waste volumes received each day. Incoming waste will be spread into layers and compacted with four to six passes of the landfill equipment. The process of layering and compacting is repeated until the compacted waste elevation reaches the intended top of the lift or until the end of the working day.

A six-inch thick daily cover soil layer or approved Alternative Daily Cover (ADC) will be placed over the compacted refuse at the end of each workday. Once an area has reached final grade or an interim grade that will not be disturbed for more than 30 days, a twelve inch thick intermediate soil cover will be placed. Intermediate cover will be graded to minimize erosion and prevent ponding of water.

The ERL is currently approved to use a spray-on product known as Posi-Shell® from Posi-Shell Environmental Coatings or 12-inch nominal shredded tires as an alternative to six-inches of soil used to cover exposed waste at the end of each day. The CDPHE approved the use of Posi-Shell ADC on July 7, 2011 and Adams County approved the material for use on August 11, 2011. The CDPHE and Adams County approved the use of 12-inch nominal shredded tires ADC on September 22, 2016. The request and approval information for both Posi-Shell and 12 inch nominal shredded tire ADCs included in Appendix Q. The ERL may request approval for other ADC materials that will be used following approval of the CDPHE and Adams County. The ERL will continue to use a six-inch thick soil cover once per week to mitigate fly infestation in accordance with guidance provided by the CDPHE for other facilities using an ADC. The weekly application of soil cover will also help provide periodic fire breaks within the refuse mass. In accordance with regulations, any refuse disposal area that is unused for a period of 30 days or longer will have a minimum of one foot of intermediate cover soil applied.

The ERL currently has a GCCS. Special care will be taken when filling around GCCS components and will be conducted by experienced personnel. Prior to filling in the vicinity, within 30 feet of a vertical gas wells, extensions will be installed to the vertical well casings. The outside of these vertical well casings will be marked with clearly visible and bright paint to prevent heavy equipment travel from damaging the casing extensions. Some GCCS components, such as condensate traps and variable frequency drives, may be temporarily removed so they may be reincorporated back into the system after filling in an area has ceased.

7.5 Nuisance Control

7.5.1 Litter

Litter is primarily controlled by the application of daily and intermediate cover and by maintaining the smallest practical working face while considering traffic volumes and safety. Additional controls include:

- Temporary and permanent litter control fencing,
- Discouraging uncovered loads through charging a penalty fee
- Litter collection on an as-needed basis, and
- Site closure during high winds.

As stated earlier, perimeter fencing will be installed to completely encircle all active and past disposal areas. Interior in-ground and portable fencing will also be used as necessary to minimize off-site excursions of windblown debris. These litter control fences will be relocated as necessary; typically, the portable fencing will be placed downwind of the active face. The fences will be inspected for the presence of debris on a daily basis and any debris will be removed, weather permitting.

Vehicles transporting uncovered loads to the facility can also be a source of windblown litter. To encourage proper covering of loads, uncovered loads will be charged twice the normal disposal fee.

The site will be closed during high wind events. A high wind event is defined as sustained winds of 40 miles per hour or greater, or gusts of 55 miles per hour or greater, that are expected to persist for one hour or longer. An on-site wind meter will be used to monitor the wind speed in order to allow the landfill manager (or appropriate alternate) to make the determination that a high wind event exists. Upon making that determination, the manager will direct personnel to close the site to additional deliveries and to cover the working face with daily cover as rapidly as possible.

The facility will assess the presence of escaped litter within their property, surrounding private property (only with approval from the property owner), and along the public-rights-of-way listed in this Section within 24 hours of a high wind warning (see definition below) occurring during operation of the facility, with the exception of on Sundays and other days the facility is closed due to weather, holidays, etc. The facility manager will respond promptly to concerns voiced by surrounding property owners with respect to the reasonable cleanup and removal of windblown litter. The patrol and pickup of litter on affected private property will conform to the reasonable requirements of the property owners and only conducted with their permission. Based on the results of this assessment, escaped litter will be collected and returned to the facility as soon as feasible. It is not expected that the exclusion of Sundays and other closure days will decrease the ability of the facility to contain refuse because the refuse will be covered with daily cover material the day prior to the closure so litter will not escape. As an additional measure, the ERL has on-call contracts with temporary labor firms to provide labor for the collection of refuse, including Sundays, holidays, and any other days the facility is closed.

In compliance with Adams County regulation 4-10-02-03-03(h) requiring that the operator remove trash or other waste material, disposed of or treated at their facility, along all public rights-of-way within one (1) mile of the facility and up to five (5) miles along the approved haul routes, or as otherwise specified, the facility will continue to implement the following practice as specified in the August 10, 2009 addendum to the June 1, 2006 EDOP:

1. Facility personnel will patrol the following public-right-of way at least twice per day on days that the facility is open:
 - a. Schumaker Road from one mile south of the facility entrance north to the intersection with 88th Avenue.
 - b. 88th Avenue between one-mile west to one-mile east of the intersection with Schumaker Road.
2. Facility personnel will collect any litter that appears to have escaped from either the facility or vehicles delivering refuse to the facility and dispose of it properly in the facility.
3. The facility will patrol within their facility at least once per day for the presence of litter.
4. The facility will respond as quickly as feasible to valid complaints of litter from surrounding property owners.

7.5.2 Odor, Vectors & Noise

The major source of odors at the facility is the working face and odors from the working face normally dissipate within a few hundred feet. Daily and intermediate cover control odors from the rest of the facility. In the event odors are a persistent and pervasive problem, alternative remedies will be investigated and implemented as appropriate.

Vectors are controlled by good waste compaction and expeditious application of daily cover. Remedies for nuisance vectors in the event they become a problem include the installation of bird lines, noise guns, and controlled predator introduction within the landfill area. The Bird Mitigation Plan in Appendix D includes procedures that are implemented to control bird population at the facility. Through nearly three years of operation, the procedures implemented at the facility have proven to be very effective in reducing food sources and controlling birds.

Noise will be reduced and controlled by operation of all equipment in a manner consistent with manufacturer recommendations.

7.5.3 Dust

During periods of dry weather and any time that dust is observed leaving the property, haul roads and areas under development will be sprayed with water or dust suppression fluid (e.g., a magnesium chloride solution). The portion of the customer haul road used to access the disposal area is paved with crushed asphalt that inhibits the generation of dust due to traffic. The ERL also has posted speed limit signs at the entrance to the facility and along the customer road to limit the generation of dust due to traffic.

The facility has a valid Title V Operating Permit (Permit No. 10OPAD353) issued by the CDPHE Air Pollution Control Division (APCD) that includes additional dust control measures required by the facility as follows:

- Adequate soil moisture must be maintained in topsoil and overburden to control emissions during removal. Watering shall be implemented if necessary.
- Active material stockpiles shall be watered to control fugitive particulate emissions.
- Topsoil and overburden stockpiles shall be compacted and revegetated within one year.
- Haul roads shall be paved with recycled asphalt aggregate and watered as often as needed to control fugitive particulate emissions such that the above guidelines are met.
- The size of the working face shall be reduced to control fugitive dust emissions during windy days.
- The facility shall cease operations during periods of high winds. High winds are defined as sustained winds of forty (40) miles per hour or greater, or gusts of fifty five (55) miles per hour or greater, that are expected to persist for one hour or longer. The facility shall operate and maintain a wind velocity measuring device capable of determining wind speeds at the landfill site. The main purpose of this requirement is to limit blowing litter, but the implementation of this practice also limits traffic and dust migration during periods of high wind.

The Title V Operating Permit is valid for 5 years and these requirements may change with the issuance of a new Title V Operating Permit. The requirements in the active Title V Operating Permit will supersede the requirements listed above.

In addition, the facility will consider the strategic placement of soil stockpiles and berms on the site to further inhibit dust migration if determined to be effective.

7.5.4 Fire

Waste will not be intentionally burned at this facility. Unintentional waste fires will be extinguished as rapidly as possible using heavy equipment. The burning waste will be excavated and isolated from the non-burning materials. It will be spread on a convenient working surface and the fire smothered under a temporary soil cover. After the waste has cooled, it will be moved to the working face, compacted and covered with the waste being received at that time.

The ERL is within the Bennett Fire Department (BFD) district and the BFD has been provided tours of the facility and has a gate key for access during hours the facility is closed. The BFD has conducted inspections of the facility on an annual basis since opening and it is anticipated they will continue to conduct period inspections. For fire situations that cannot be dealt with internally, the BFD will be contacted, and their phone number is listed on the facilities emergency contact list.

The ERL maintains an area for “hot loads” to isolate any incoming loads that are discovered to be on fire. The ERL maintains fire extinguishers are on heavy equipment (compactors, dozers, graders, etc.).

7.6 Leachate Management

The level of leachate in any newly constructed sump will initially be monitored on a monthly basis and following any large precipitation event. In compliance with regulations, leachate will be removed from the sump prior to reaching a depth of 30 centimeters (12-inches) over the floor on the liner surrounding the sump and either transported off-site for disposal at an appropriate facility or used for dust control on the roads. If leachate samples are to be collected for analysis, they will be analyzed for the same parameters as the groundwater wells. The analysis will provide information on the proper disposal of the leachate (sent to a treatment plant, used for dust suppression, etc.) or for comparison to the groundwater monitoring results.

When monthly measurements indicate that the frequency of measuring leachate levels can be reduced and still maintain compliance with regulations and with Division approval, leachate levels will be checked a minimum of every three months on an ongoing basis. Leachate quality will be monitored (sampled and analyzed) annually and the results will be submitted to the CDPHE and Adams County.

7.7 Personnel Training

Landfill personnel shall be trained in various activities depending on each individual's role in the organization. Training topics may include, but are not limited to the following:

1. Waste Screening and Hazardous Waste Identification: Training will be completed for all employees including the gatehouse staff, equipment operators, and others with responsibility for the working face and disposal operations. More specific details on training requirements are included in the WCP in Appendix P.
2. Annual Storm Water Management Plan Review and Sampling Requirements and Techniques
3. Annual Spill Prevention, Control, and Countermeasure Plan (SPCC)
4. Waste placement procedures. More detail on specific waste placement and disposal procedures is included in the WCP in Appendix P.
5. Safety training. Monthly training often includes safety training for various site operations.
6. Miscellaneous other training as it relates to the equipment used at the site and ERL management requirements. An example of this might be training on the use of the trailer tipper and scale.

Training procedures and employee training records will be retained as part of the Operating Record. These records will be made available at reasonable time to CDPHE and Adams County.

7.8 Recordkeeping

The operation will maintain an operating record documenting including a minimum of the following:

- location restriction demonstration
- inspection records, and training procedures
- incoming waste volumes

- waste characterization activities
- ground-water monitoring results
- explosive gas monitoring results
- leachate monitoring results
- construction as-built details
- variations from approved operating procedures
- demonstrations and waiver documentation
- cost estimates and financial assurance documentation
- closure and post-closure care plans and any monitoring, testing, or analytical data

All records contained in the Operating Record will be furnished upon request or be made available at all reasonable times for inspection by Adams County or the CDPHE. The operating record will generally be maintained on-site although some portions of the operating record may be stored at the Five Part offices.

8.0 CLOSURE/POST-CLOSURE PLANS

8.1 General Closure

The site will be closed in increments, as areas reach intermediate cover final grade. These areas may vary in acreage during the life of the landfill. The active gas control system described in Section 6.1 of this EDOP will be incrementally installed during the operational life of the facility. It is anticipated that final portions of the active gas control system and the surface water control system will be installed during final closure of the ERL. Other systems (i.e., ground-water monitoring and landfill gas monitoring) will be installed prior to closure.

8.1.1 Closure Notification and Certification Requirements

Notification and certification requirements for the closure of ERL will include the following:

- 60 days prior to closure, submit written notification to the CDPHE and Adams County that the landfill will be closing.
- 60 days prior to closure, notify the general public of the landfill closure by posting clearly visible signs of a suitable size at the site entrance.
- Enact precautions to prevent further use of the site for unauthorized disposal.
- Water pollution will not occur at or beyond the Point of Compliance after closure.
- Nuisance conditions will not occur at or beyond the site boundary after closure.
- Initiate routine closure activities within 30 days of reaching final design grades in any phase, unless an extension beyond 30 days is granted by the CDPHE.
- Complete closure within 180 days after closure initiation, or if necessary, obtain an extension from the CDPHE.
- Following closure of each area, submit a report certified by a Colorado registered Professional Engineer (P.E.) to the CDPHE documenting that closure has been completed in accordance with the closure plan. Place a copy of the report in the facility operating record.
- Following closure, record a notation on the deed or other title instrument stating that the land was used as a landfill and that future land use is restricted under Section 3.6.1(7) of the CDPHE solid waste regulations. Notify the CDPHE and Adams County Planning that the notation has been recorded and place a copy of the notation in the operating record.

8.1.2 Routine Site Closure

Construction of the final cover system will occur concurrent with the progression of landfilling operations. As final design grades are reached, final cover will be completed and certified by a Colorado P.E. in accordance with the EDOP and CQA Plan. By employing this “close as you go” process, only a limited portion of the fill area will require final cover construction after site closure. Final closure activities will begin within 30 days of reaching the final design grades for the final portion of the site unless an extended time period has been granted by the CDPHE. After the site is closed, no off-site waste will be accepted for disposal. However, any refuse generated on site as a result of construction activities will continue to be disposed of in the landfill until final cover placement has been completed.

8.1.3 Closure Requirements

As noted previously, the site will be closed in increments, as areas reach final grade. These areas may vary in acreage during the life of the landfill and will be based on the configuration of the area ready for final cover that is large enough in size to make final cover installation economically feasible. Final cover will be placed within 30 days of reaching final refuse grades in any phase in accordance with Regulations and closure of each phase will be completed within 180 days of commencing final cover placement. Due to seasonal, budgetary, or contractor availability these time frames may be extended with approval from the CDPHE and Adams County. A report documenting the final cover installation work will be submitted to CDPHE and Adams County for review and approval.

The ERL final cover system is redesigned as part of this EDOP revision. The proposed final cover design is an option of either a 3.5-foot thick Alternative Final Cover (AFC) or a LLDPE lined cover with a 1.5-foot thick layer of cover soils including a 1 foot thickness of protective soils and a 6-inch thick vegetative layer. The proposed top of the final cover grades and elevations are shown on Plate 4. AFC material requirements, placement methods, testing requirements, and CQA criteria are also provided in the revised CQA Plan. The AFC will be seeded with a mixture of cool and warm weather grass species as presented in the CQA Plan and any fertilizer and amendments will be applied after testing the soils to be vegetated. Because a one-foot thick intermediate soil cover is required for any waste placement areas not used for at least one month, the final lift of waste in any area may require intermediate cover. If the intermediate cover meets all of the material and placement criteria for an AFC, it may be left in place as part of the final cover system. Alternatively, the required minimum thickness of AFC may be constructed on top of the intermediate cover or the intermediate cover may be removed prior to installation of the final cover. Regardless of the presence of intermediate final cover, the final grades and elevations at the top of the final cover system will conform to those shown on Plate 4.

A financial assurance instrument consistent with those acceptable under the CDPHE solid waste regulations covering the cost of closure has been established for the ERL. The closure cost estimate will be revised every five years to reflect the remaining closure liability for the subsequent five-year period or more frequent if necessary to reflect a change in the design or maximum area assumed open at any one time. The cost estimate will be adjusted annually to account for inflation in the intervening years. The annual adjusted cost estimate will be submitted to the CDPHE by April 30th of each year.

8.1.4 Early Closure Scenario Provisions

The facility is designed with a specific area designated for refuse and specific final grades and elevations based on a designed refuse capacity needed to achieve these grades and elevations. The CD for the facility includes an expiration date of June 29, 2039. While the CD may be renewed at that time, the potential exists that the CD may not be renewed, and the facility will be forced to close prior to reaching the design elevations and grades. The following protocol for early closure in the case that the facility is not filled to design elevations, and the CD is allowed to expire was included in the August 10, 2009 amendment to the 2006 EDOP and has received approval from the CDPHE and Adams County.

In the case that the CD is allowed to expire and no new CD is issued, and the facility has not reached approved design grades, the owner will evaluate the existing condition of the facility by taking the following steps:

1. The existing refuse fill area and other pertinent site features will be surveyed to determine the magnitude of differences between the existing conditions at closure and the approved final closure conditions.
2. The existing site monitoring system will be evaluated to determine if any changes are necessary to the approved monitoring system to comply with regulatory requirements based on the existing conditions at closure.
3. The surface water drainage and control system will be evaluated to determine if any changes to the approved system are required to comply with regulations based on the existing conditions at closure.
4. An evaluation of the volume and type of soils required to close the facility in compliance with regulations and the soils available on site to conduct closure.

After completion of the above efforts, the owner will develop an alternative closure plan that will address the following:

1. The type and thickness of the final cover system
2. Final slopes on the refuse filling area must be constructed with a maximum of 4H:1V and a minimum of 5%.
3. The surface water drainage and control structures must be designed to comply with regulations considering the existing landfill footprint at closure.
4. A soil balance evaluation discussing the soil needs and soil availability.
5. A groundwater and methane monitoring program specific to the configuration of the facility upon closure.
6. Updated financial assurance costs to reflect the necessary closure and post-closure efforts based on the configuration of the facility upon closure.
7. The facility's ability to provide notification in compliance with regulatory requirements given the timing of the notice that the CD will not be renewed.

The alternative closure plan will be submitted to Adams County and the CDPHE for their review and approval prior to initiating final closure.

8.2 Post-Closure

8.2.1 General

The site will be maintained for a post-closure care period of a minimum of 30 years after the date of final site closure. The site is expected to remain in a vegetated undeveloped state during the post-closure care period; however, other uses may occur as long as the final cover and other control/monitoring systems are not disturbed.

8.2.2 Monitoring

During the post-closure care period, the following environmental/physical monitoring will be conducted.

1. Ground-water monitoring will be performed on a semi-annual basis during the 30-year period. Analytes, methods and reporting will be as described in Section 6.3 of this document or alternative requirements with approval from the CDPHE and Adams County.
2. Explosive gas monitoring will be performed on a quarterly basis during the 30-year period and the methods and reporting will be as described in Section 6.2 of this document unless an alternative schedule is approved by the CDPHE and Adams County.
3. Leachate levels in the sumps will be checked on the Division approved monitoring schedule (monthly or quarterly as described in Section 7.6).
4. Leachate sampling and analysis will be performed on an annual basis during the post-closure care and maintenance period. Leachate levels will also be taken during the annual sampling and may be used to increase the frequency of leachate level measurements to ensure compliance with regulations. Analytes, methods and reporting will be as described in Section 6.3 of this document.
5. Overall site conditions will be inspected on a semi-annual basis. Items covered by the inspections include, but not necessarily limited to; erosion of the final cover and surface water control structures, the success of the vegetation on the final cover and other areas on the site than have been revegetated, and the condition of the environmental monitoring system including the groundwater wells and gas monitoring probes, the active gas collection and control system, and the condition of the security systems at the site such as fencing, gates, and locks, and verification that all required monitoring has been completed according to the approved schedule. A typical list of items for inspection is included in Appendix R and will be used for reference during the inspections. The results of the inspections will be maintained in the Operating Record for the facility through the post-closure period.

As data are developed on the performance of the site during the post-closure care period, the operator may petition CDPHE and Adams County for changes in the scope and frequency of the above described post-closure monitoring.

8.2.3 Explosive Gas Control

As discussed in Section 6.1, the landfill installed an active gas collection and control system. The system will be operated until emissions from the facility meet the requirements of and are demonstrated to the Colorado Air Pollution Control Division to cease operation of the system. The approval of Adams County and the CDPHE is required to cease operation of the gas control system prior to the end of the post-closure period. All NSPS requirements will be complied with

during this time.

8.2.4 Access Control

The perimeter fencing and locking gate will be retained and maintained throughout the post-closure care period to limit unauthorized access to the site.

8.2.5 Financial Assurance

A financial assurance instrument consistent with those acceptable under the CDPHE solid waste regulations covering the cost of post-closure care has been established and in force since the facility opened. The post-closure cost estimate will be revised every five years to reflect the remaining post-closure care requirements. The cost estimate will also be adjusted annually to account for inflation. The annual inflation adjusted cost estimate will be submitted by April 30th of each year. Additionally, since closure will be completed as the landfill reaches final elevations incrementally, the post-closure periods may be staggered and portions of the landfill may be taken out of the post-closure funding over time with approval from the CDPHE and Adams County.

8.2.6 Completion

CDPHE and Adams County will be notified when the post-closure care obligation has been met. The notification will consist of a certification from an independent Colorado registered professional engineer that the post-closure care has been completed in accordance with this post-closure care plan.

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