NM1-03

Revisions to Financial Assurance Estimates and Closure-Surface Water Management Plan and Approval

June 22, 2026

DBS&A
a Geo-Logic Company

May 11, 2026

Joseph Kennedy
Oil Conservation Division
Energy, Minerals, and Natural Resources Department
1220 S. St. Francis Drive
Santa Fe, NM 87505

Re: Financial Assurance Update

Dear Mr. Kennedy

In accordance with the Closure and Post Closure Plan (CPC) approved by New Mexico's Energy, Minerals, and Natural Resources Department Oil Conservation Division (OCD) on August 11, 2025 for Sundance Services, Inc. (SSI) (Commercial Surface Waste Management Facility Permit NM1-3), SSI has provided financial assurance in the amount of $8,842,672.

Since that date, the following closure activities have been completed.

1. Placement of Fill

The total fill required in the current CPC is 2,345,000 cubic yards (CY), which includes grade fill and evapotranspiration (ET) cover soil. As of December 2025, SSI has placed approximately 495,000 CY of fill across the site.

2. Completion of Excavation

The total excavation required in the current CPC is 359,000 CY. As of December 2025, SSI has completed approximately 279,000 CY of excavation across the site, making significant progress on the two largest stormwater ponds in the closure plan.

3. Revised Final Cover

The proposed final cover has been revised to minimize superfluous fill. The revised figures for total cut and fill, including grade fill and ET cover soil, are:

- 1,964,000 CY of fill (reducing the total grade fill quantity by 381,000 CY)
- 401,000 CY of cut (increasing the total excavation quantity by 42,000 CY)

4. Revised Drainage Design

The hydrological analysis and subsequent channel design was updated to further refine the drainage basins and evaluate the quantity of required turf reinforcement mat (TRM). By

breaking up the site into smaller sub-basins and breaking up the associated stormwater channels into smaller segments, the total quantity of TRM is now 186,000 SF.

SSI has updated the financial assurance estimate (Attachment A). This update reflects

- inflation to March 2026 dollars
- reduction in fill and excavation quantities required to get to final closure based on work already performed - these measurements were taken by aerial survey and compared in AutoCAD to determine quantities
- reduction in total grade fill quantities and increase in total excavation quantities due to revised final cover
- reduction in TRM quantities based on revised hydrological analysis

Accordingly, the new financial assurance estimate (considering the design changes and progress) is $7,038,226 in March 2026 dollars.

A copy of an isopach comparing the 2023 surface to the proposed final cover is provided as Attachment B. A copy of the May 2026 revised drainage report is provided as Attachment C.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.

Kelly Jayne

Kelly Jayne, P.E.
Engineer

KJ/mk

Attachment or Enclosure

Appendix A
Updated Financial Assurance Estimate

DBS&A
a Geo-Logic Company

CLOSURE COST ESTIMATE TASK SUMMARY
(Updated March 2026)
SUNDANCE SERVICES, INC.

Task	Cost Estimate
1.0 LANDFILL CLOSURE CONSTRUCTION	$3,127,192
2.0 LANDFILL MAINTENANCE (Post-Closure)	$386,734
3.0 ENVIRONMENTAL MONITORING (Post-Closure)	$2,144,362
4.0 POND AND PROCESSING AREA CLOSURE CONSTRUCTION	$1,350,064
5.0 PROCESS AREA MAINTENANCE (Post-Closure)	$29,875
Total cost	**$7,038,226**

TASK 1.0 - LANDFILL CLOSURE CONSTRUCTION
CLOSURE COST ESTIMATE
(Updated March 2026)
SUNDANCE SERVICES, INC.

Task 1.0	Unit	Unit Quantity	Unit Cost	Total Cost
1.0 Waste Relocation (Current Landfill COMPLETED)	CY	0	$1.21	$0
1.1 Final Cover Installation				
1.1.1 Final Grading & Contouring				
1.1.1.1 Current Landfill (Completed w/waste relocation)	AC	30.8	$0.00	$0
1.1.1.2 Closed Landfill & adjacent Area	AC	42.2	$1,275.78	$53,774
1.1.1.3 Containment Ponds 1, 5, & 6 (Completed with relocation) & adjacent area	AC	49.7	$0.00	$0
1.1.1.4 Containment Ponds 2, 3, 4, & 9	AC	48.4	$1,275.78	$61,722
1.1.1.5 Fill to achieve design grades (all areas)	CY	776,500	$0.76	$590,131
1.1.2 Install and compact 6" Infiltration (Barrier) Layer				
1.1.2.1 Current Landfill	CY	25,000	$2.55	$63,851
1.1.2.2 Closed Landfill & adjacent Area	CY	34,500	$2.55	$88,115
1.1.2.3 Containment Ponds 1, 5, & 6 & adjacent Area	CY	40,500	$2.55	$103,439
1.1.2.4 Containment Ponds 2, 3, 4 & 9	CY	39,500	$2.55	$100,885
1.1.3 Install 24" Erosion (Vegetative) Layer				
1.1.3.1 Current Landfill	CY	99,500	$2.55	$254,129
1.1.3.2 Closed Landfill & adjacent Area	CY	136,500	$2.55	$348,629
1.1.3.3 Containment Ponds 1, 5, & 6 & adjacent Area	CY	160,500	$2.55	$409,926
1.1.3.4 Containment Ponds 2, 3, 4 & 9	CY	156,500	$2.55	$399,710
1.1.4 Vegetative Layer Seeding (Class A)				
1.1.4.1 Current landfill	AC	30.8	$1,915	$58,960
1.1.4.2 Closed Landfill & adjacent Area	AC	42.2	$1,915	$80,714
1.1.4.3 Containment Ponds 1, 5, & 6 & adjacent Area	AC	43.2	$1,915	$82,686
1.1.4.4 Containment Ponds 2, 3, 4 & 9	AC	48.4	$1,915	$92,644
			Task Subtotal	**$2,789,317**
1.2 Final Cover Construction Quality Assurance (CQA)				
1.2.1 Inspection and Testing	LS	1	$44,672	$44,672
1.2.2 Certification	LS	1	$7,211	$7,211
			Task Subtotal	**$51,884**
1.3 Stormwater Ponds & Channels				
1.3.1 Excavation	CY	122,000	$0.76	$92,719
1.3.2 Final Grading & Contouring	AC	30	$1,275.78	$38,273
1.3.3 Purchase & Installation of Turf Reinforcement Mats (TRM) for Channels	SF	186,000	$0.83	$155,000
			Task Subtotal	**$285,992**
			TOTAL COST	**$3,127,192**

Notes:

1. Closure costs are based on contracting with a qualified third party to complete and certify closure. The activities included in this cost estimate are based on current dollars, previous experience with landfills located in arid climates, and current subcontractor costs.
2. Final cover installation costs assume that:
   The greatest area requiring final cover is 171 acres +/-.
   All soils necessary for closure construction are available on-site.
3. Costs include taxes.
4. CY = Cubic yard
   AC = Acre
   LS = Lump sum

TASK 2.0 - LANDFILL MAINTENANCE
POST-CLOSURE COST ESTIMATE
(Updated March 2026)
SUNDANCE SERVICES, INC.

Task 2.0	Unit Quantity	Unit	Unit Cost	Total Cost per Year	Total Cost for 30 Years
2.1 Final Cover Inspection and Reporting					
2.1.1 Inspection	4	events/yr	$638	$2,552	$76,546.98
2.1.2 Recordkeeping and Reporting	4	events/yr	$638	$2,552	$76,546.98
			Task Subtotals	**$5,103**	**$153,094**
2.2 Final Cover Maintenance					
2.2.1 Cover Maintenance	1	AC/yr	$1,915	$1,915	$57,447.61
2.2.2 Vegetation	2	AC/yr	$1,915	$3,830	$114,895.22
			Task Subtotals	**$5,745**	**$172,343**
2.3 Surface Water Management System					
2.3.1 Inspection/Repairs	1	events/yr	$1,022	$1,022	$30,648.69
			Task Subtotals	**$1,022**	**$30,649**
2.4 Fencing					
2.4.1 Inspection/Repairs	1	events/yr	$1,022	$1,022	$30,648.69
			Task Subtotals	**$1,022**	**$30,649**
			TOTAL COST	**$12,891**	**$386,734**

Notes:

1. Post-closure maintenance costs are based on contracting with a qualified third party to conduct post-closure care for the landfill. The activities included in this cost estimate are based on current dollars, previous experience with landfills located in arid climates, and current subcontractor costs.
2. Costs include taxes
3. AC = Acre

TASK 3.0 - ENVIRONMENTAL MONITORING
POST-CLOSURE COST ESTIMATE
(Updated March 2026)
SUNDANCE SERVICES, INC.

Task 3.0	Unit Quantity	Unit	Unit Cost	Total Cost per Year	Total Cost for 30 Years
3.1 Vadose Zone Monitoring					
3.1.1 Field Services/Lab Analysis/Reporting	4	events/yr	$17,870	$71,478.73	$2,144,362
			Task Subtotal	**$71,479**	**$2,144,362**
			TOTAL COST	**$71,479**	**$2,144,362**

Notes:

1. Post-closure environmental monitoring costs are based on contracting with a qualified third party to conduct post-closure monitoring for the landfill. The activities included in this cost estimate are based on current dollars, previous experience with landfills located in arid climates, and current subcontractor costs.
2. Assume monitoring 7 wells (i.e. sampling and analysis costs).
3. Costs include taxes.

TASK 4.0 - POND AND PROCESSING AREA CLOSURE CONSTRUCTION
CLOSURE COST ESTIMATE
(Updated March 2026)
SUNDANCE SERVICES, INC.

Task 4.0	Units	Unit Cost	Quantity	Total Cost
4.1 Evaporation Pond				
4.1.1 Liquids Transport/Disposal				
4.1.1.1 Transport Liquid	BBL	$0.04	100,000	$ 3,738
4.1.1.2 Disposal Liquids	BBL	$0.76	100,000	$ 75,999
4.1.1.3 Remove/Transport Sludge (included w/Pond Excavation)	CY	$3.19	0	$ -
4.1.1.4 Sludge Solidification	CY	$1.59	250,000	$ 398,682
			Task Subtotal	**$478,419**
4.1.2 Sampling	EA	$1,276	500	$ 637,891
			Task Subtotal	**$ 637,891**
Pond Closure Subtotal:				**$1,116,310**
4.2 Site Work				
4.2.1 Tank Removal	LS		$	31,910
4.2.2 Building Removal	LS		$	31,910
4.2.3 Process Equipment Removal	LS		$	31,910
4.2.4 Earthwork	LS		$	12,764
4.2.5 Sampling	EA	$1,054	9	$ 9,482
		Site Work Subtotal:	**$**	**117,974**
4.3 Engineering				
4.3.1 CQA/Certification	LS		$	51,055
		Engineering Subtotal:	**$**	**51,055**
4.4 Vegetative Layer Seeding (Class A)				
4.4.1 Non-Landfill Areas	AC	$1,915	34	$ 64,724
		Site Work Subtotal:	**$**	**64,724**
		Total:		**$1,350,064**

Notes:

1. Phase I and Phase II Assessment costs are based on contracting with a qualified third party to conduct the activities outlined above. The activities included in this cost estimate are based on current dollars, previous experience with landfills located in arid climates, and current subcontractor costs.
2. Assumes remaining, unevaporated capacity of ponds is remediated onsite.
3. Assumes remaining solids in each pond at closure are soldified and disposed onsite.
4. Site sampling is conducted to a depth confirmed clean.
5. Costs include taxes.
6. CY = Cubic Yard
   AC = Acre
   LS = Lump Sum
   EA = Each Acre
   BBL = Barrell (US)

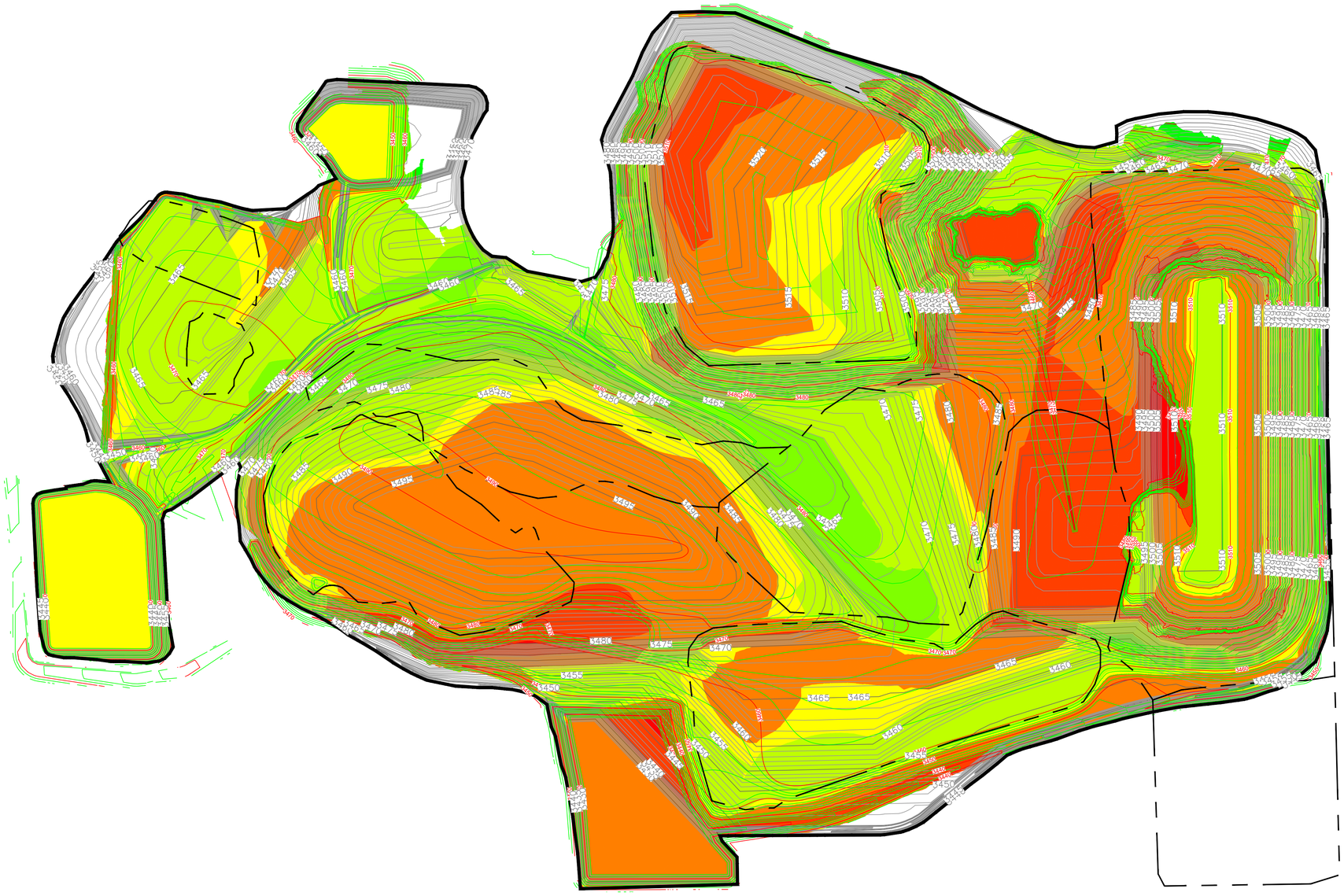
TASK 5.0 - Oil TREATMENT PLANT MAINTENANCE
POST-CLOSURE COST ESTIMATE
(Updated March 2026)
SUNDANCE SERVICES, INC.

Task 5.0	Unit Quantity	Unit	Unit Cost	Total Cost per Year	Total Cost for 3 Years
5.1 Surface Inspection and Reporting					
5.1.1 Inspection	4	events/yr	$511	$2,043	$6,129.74
5.1.2 Recordkeeping and Reporting	4	events/yr	$511	$2,043	$6,129.74
			Task Subtotals	**$4,086**	**$12,259**
5.2 Surface Maintenance					
5.2.1 Cover Maintenance	1	AC/yr	$1,276	$1,276	$3,827.35
5.2.2 Vegetation	2	AC/yr	$1,915	$3,830	$11,489.52
			Task Subtotals	**$5,106**	**$15,317**
5.3 Fencing					
5.3.1 Inspection/Repairs	1	events/yr	$766	$766	$2,298.65
			Task Subtotals	**$766**	**$2,299**
			TOTAL COST	**$9,958**	**$29,875**

Notes:

1. Oil Treatment Plant closure maintenance costs are based on contracting with a qualified third party to conduct post-closure care maintenance. The activities included in this cost estimate are based on current dollars, previous experience with closures located in arid climates, and current subcontractor costs.
2. Costs include taxes

Appendix B
Isopachs of New Grading



Elevations Table			
No.	Min. Elev.	Max. Elev.	Color
1	-30.0	-20.0	
2	-20.0	-10.0	
3	-10.0	-1.0	
4	-1.0	1.0	
5	1.0	10.0	
6	10.0	20.0	
7	20.0	32.3	

VOLUME (Cu.Yds.)

CUT = 928,181.33

FILL = 687,570.55

NET CUT = 240,610.77

NOTES

1. VOLUME COMPARES PREVIOUS FINAL COVER TO CURRENT FINAL COVER.

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 05/11/2026
DESIGNED BY: GP
DRAWN BY: REM
CHECKED BY: KJ/MRK
APPROVED BY: GP

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SUNDANCE SERVICES INC
42 SUNDANCE LANE
EUNICE, NM 88231

SUNDANCE SERVICES INC. SURFACE WASTE MANAGEMENT CLOSURE

SHEET
DWG NO.

JOB NO.
DB18.1209.00

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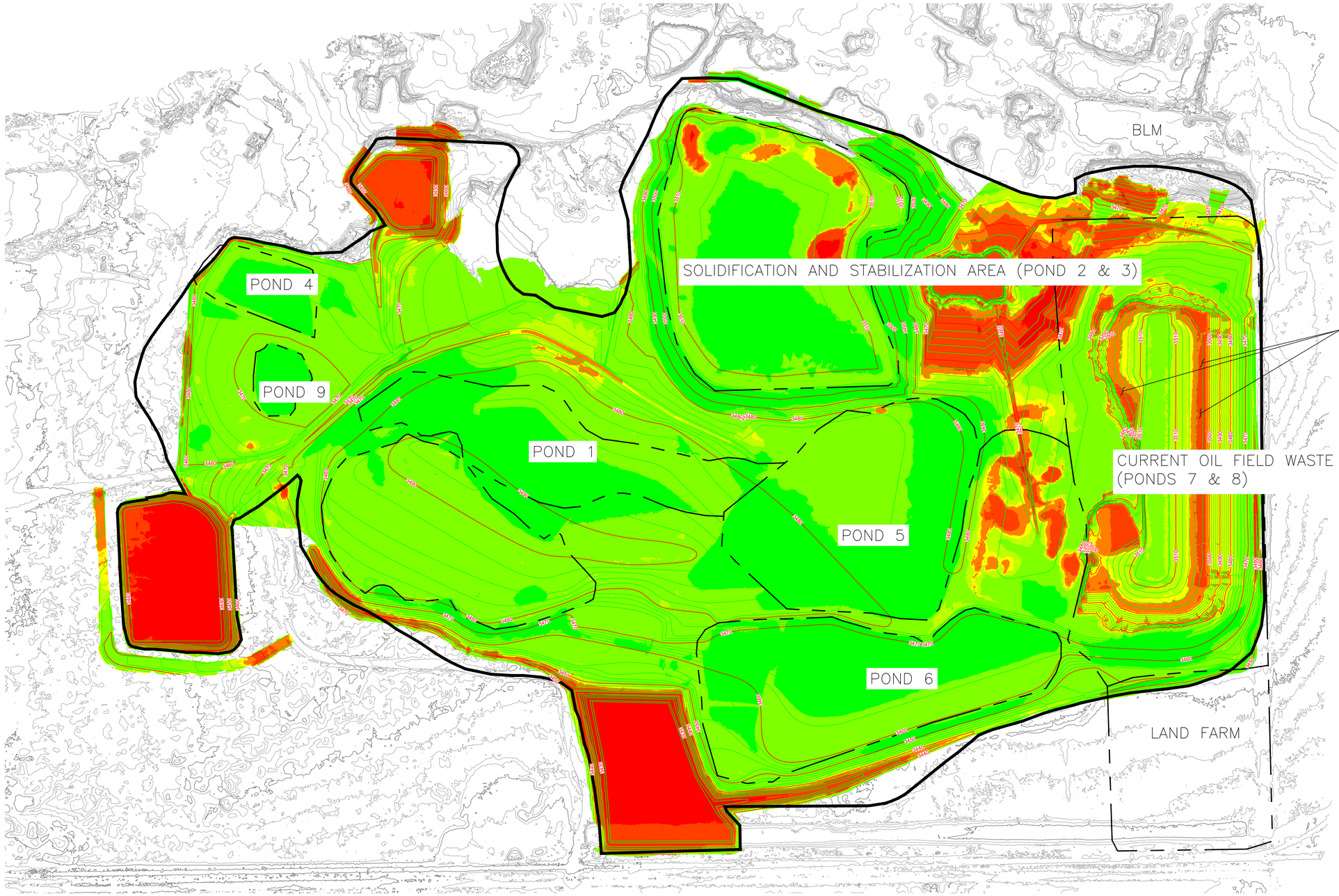

NORTH

VOLUME (Cu.Yds.)

CUT = 400,811.73

FILL = 1,963,398.83

NET FILL = 1,562,587.10

PROPOSED FINAL COVER TO MATCH EXISTING GRADES, NO CUT TO BE DONE. CUT SHOWN REFLECTS AUTOCAD CIVIL 3D SURFACE COMPARISON.

LEGEND

Elevations Table			
No.	Min. Elev.	Max. Elev.	Color
1	-24.7	-10.0	
2	-10.0	-2.5	
3	-2.5	-0.5	
4	-0.5	0.5	
5	0.5	2.5	
6	2.5	10.0	
7	10.0	32.5	

NOTES

1. VOLUME COMPARES AUGUST 2023 SURVEY TO FINAL COVER.

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 05/11/2026
DESIGNED BY: GP
DRAWN BY: REM
CHECKED BY: KJ/MRK
APPROVED BY: GP

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KELLY JAYNE NEW MEXICO 21687 PROFESSIONAL ENGINEER 05/11/26

SUNDANCE SERVICES INC
42 SUNDANCE LANE
EUNICE, NM 88231

SUNDANCE SERVICES INC. SURFACE WASTE MANAGEMENT CLOSURE

SHEET
DWG NO.

JOB NO.
DB18.1209.00

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Appendix C
Updated Surface Water Report

DBS&A
a Geo-Logic Company

Surface Water Management Plan
Sundance Services, Inc.

Prepared for

Sundance Services, Inc.

Prepared by

DBS&A
a Geo-Logic Company

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Albuquerque, New Mexico 87110
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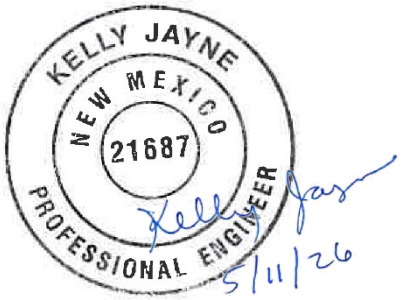

May 11, 2026

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1. Introduction

Daniel B. Stephens & Associates, Inc. (DBS&A) has prepared this report to describe the analysis of stormwater runoff management at closure for the Sundance Services, Inc. (SSI) site east of Eunice, New Mexico. For this analysis, it is assumed that there is no run-on from the surrounding watershed, and that the proposed stormwater management system will manage on-site runoff only. Current and closure grading for the site mitigate the potential for run-on by generally maintaining the natural grade, where surface water moves away from the site. This report describes the applicable design storm, site-specific basin delineation and characteristics, and the design analysis demonstrating the effectiveness of the proposed surface water management system.

2. Design Storm

From Natural Resources Conservation Service (NRCS) TR-55 Figure B-2, it was determined that the SCS Type II rainfall distribution is appropriate for New Mexico (SCS, 1986). This section of TR-55 is provided in Appendix A. Autodesk's Storm and Sanitary Analysis 2016 software (SSA) was used to create the design rainfall distribution by generating the 25-year, 24-hour precipitation rate and applying it to the Type II distribution using 6-minute intervals.

3. Drainage Basin Delineation and Characteristics

The total area contributing to runoff at the site is approximately 200 acres. For the purposes of this analysis, the watershed was subdivided into 14 subbasins (Table 1). Runoff from all 14 subbasins is retained in on-site ponds. The basin delineations are presented in Figure 1.

An NRCS soils map for the adjacent watersheds was compiled to determine the watershed's hydrologic soils groups (Appendix B). The borrow area used for final cover was found to be Group B. The subbasins were assigned a curve number of 86, consistent with newly graded areas in hydrogeologic soils Group B.

Table 1. Subbasins

Subbasin	Area		25-Year Runoff	
	square feet	acres	Maximum (cfs)	Total (cubic feet)
SB-1	1,913,425	43.93	109.94	535,000
SB-1A	470,703	10.81	47.08	132,000
SB-1B	260,034	5.97	33.36	73,000
SB-2	304,347	6.99	30.97	85,500
SB-2A	145,192	3.33	18.49	41,000
SB-3	1,081,217	24.82	82.66	302,500
SB-3A	289,125	6.64	33.87	81,000
SB-3B	660,349	15.16	70.76	185,000
SB-4	843,955	19.37	85.02	236,000
SB-4A	493,364	11.33	30.30	138,000
SB-4B	850,414	19.52	93.01	238,000
SB-5	403,004	9.25	39.46	113,000
SB-5A	84,472	1.94	8.01	24,000
SB-6	680,027	15.61	66.30	190,500

cfs = Cubic feet per second

4. Hydrologic and Hydraulic Modeling

The hydrologic analysis described herein was conducted using SSA—a combined hydrology and hydraulics analysis program frequently used in hydrology and the design of culvert and channel stormwater management systems. The primary aim of the analysis is to design stormwater infrastructure capable of conveying flow to on-site stormwater ponds with adequate capacity. Stormwater runoff calculations were performed in SSA using the curve number method outlined in NRCS TR-55 to determine total run-off quantities and peak runoff flows. The portion of TR-55 used to determine the post-closure runoff curve number is included in Appendix A.

The storage capacity of the stormwater ponds designed to store the total runoff volume was calculated using the Stage Storage extension in Autodesk Civil 3D 2018. The dimensions and capacity of each pond are presented in Table 2.

Table 2. Stormwater Ponds

Pond Name	Top of Pond Elevation (feet msl)	Pond Side Slope (H:V)	Pond Depth (feet)	Contributing Subbasins	Pond Volume (cubic feet)	25-Year Runoff Volume (cubic feet)	Water Elevation (feet msl)	Freeboard (feet)
NW Pond	3,452	3	6	SB-2, 2A	373,886	126,500	3,448.3	3.7
NE Pond	3,456	3	10	SB-3, 3A, 3B	648,615	568,500	3,455.0	1.0
SW Pond	3,446	3	8	SB-1, 1A, 1B SB-5, 5A	1,536,290	877,000	3,442.8	3.3
SE Pond	3,436	3	10	SB-4, 4A, 4B SB-6	2,272,506	802,500	3,430.0	6.0

msl = Above mean sea level

Open-channel flow conditions were analyzed using Bentley FlowMaster—an analysis program frequently used to analyze and design channels for conveying surface water flow. Calculation reports generated by FlowMaster are included in Appendix C. Routing calculations were performed in FlowMaster using Manning's Formula to compute normal depth for a given flow rate. Channel slopes used for modeling in FlowMaster represent the minimum slope throughout the length of the channel. The channels were sized according to maximum flow depths that occur at low velocities. Channels with velocities greater than 4.5 feet per second (fps) will be lined with PYRAMAT turf reinforcement mat (TRM).

5. Proposed Stormwater Infrastructure

5.1 Stormwater Ponds

Stormwater runoff will be detained in four ponds within the site (Figure 1). Ponds are sized to provide a minimum of 1.0 feet of freeboard for the 25-year, 24-hour design storm.

Subbasin SB-1 and Subbasin SB-1A are composed of the central or interior portion of the site and contributes flow to a central channel. SB-1 drains to Center Channel 1, which flows into SB-1A, where the channel is designated as Center Channel 1A as it steepens and accepts drainage from SB-1A. Center Channel 1A continues to the SW Pond, which is in Subbasin SB-1B. SB-5 consists of the western exterior slope and contributes flow to the SW Pond via West Channel 1. SB-5A contributes flows to the SW Pond through West Channel 3. West Channel 1

and West Channel 3 join before conveying flow through a culvert (West Culvert) under the site access road and into the SW Pond.

Subbasin SB-2 consists of the interior slopes north of the site access road and contributes flow to West Channel 2 which conveys the flow to the NW Pond (Subbasin SB-2A).

Subbasin SB-3 consists of the northeast portion of the site and sheet flows to the NE Pond. Subbasin SB-3B consists of the portion of the site south of the NE Pond that drains to the NE Pond through Center Channel 2. Subbasin SB-3A is the upper northeast of the site and drains to the NE Pond through the Northeast Channel.

Subbasin SB-4 and Subbasin SB-4A consist of the east and south exterior slopes of the site, and contribute to flow on the southeast side of the landfill. Flow is conveyed through East Channel 1 and East Channel 2, respectively, to the SE Pond, which is in Subbasin SB-4B.

Subbasin SB-6 consists of the southwest portion of the site and east of the SW Pond. SB-6 flows to the SE Pond through the South Channel.

5.2 Stormwater Conveyance Channels

Based on Table 605-2 from the NMDOT Drainage Design Manual, the permissible velocity for grass-lined channels is 5 fps. All channels with velocities below 4.5 fps will be grass-lined, and the rest of the channels will be lined with TRM or an engineer-approved equal. TRM technical specifications are provided in Appendix D. Five channels will be TRM-lined and five channels will be grass-lined. The cross-sectional geometry and longitudinal slope of each of the 10 channels are provided in Table 3. All channels have a minimum of 0.5 foot of freeboard for the 25-year, 24-hour design storm. The locations of each channel are presented in Figure 1.

Additionally, two 3-foot-deep v-ditches on the northern boundary of SB-3 and SB-1 convey stormwater toward the NE Pond and Center Channel 1, respectively. These v-ditches will be TRM-lined.

Table 3. Stormwater Conveyance Channels

Channel	Contributing Subbasin	Total Length (feet)	Slope (ft/ft)	Total Depth (feet)	Bottom Width (feet)	Side Slopes (H:V)	Peak Discharge (cfs)	Maximum Velocity (fps)	Normal Depth (feet)	Minimum Freeboard (feet)
West Channel 1 [a]	SB-5	1,525	0.008	3	3	2	39	4.3	1.5	1.5
West Channel 2	SB-2	524	0.019	4	10	2	31	4.7	0.6	3.4
West Channel 3 [a]	SB-5A	964	0.025	2	5	4	8	3.4	0.4	1.6
Center Channel 1*	SB-1	966	0.002	3	10	4	110	2.8	2.1	0.9
Center Channel 1A	SB-1,1A	1425	0.011	3	10	4	157	6.0	1.6	1.4
Center Channel 2	SB-3B	896	0.02	3	5	2	71	7.1	1.3	1.7
Northeast Channel [a]	SB-3A	1003	0.012	3	5	3	34	4.3	1.0	2.0
East Channel 1 [a]	SB-4A	1,381	0.010	2	10	3	30	3.5	0.7	1.3
East Channel 2	SB-4, 4A	2,100	0.013	2	10	3	115	6.1	1.3	0.7
South Channel	SB-6	1,178	0.019	4	1	3	66	6.6	1.7	2.3

[a] Vegetative or grass-lined channel
cfs = Cubic feet per second
fps = Feet per second

5.3 Stormwater Culvert

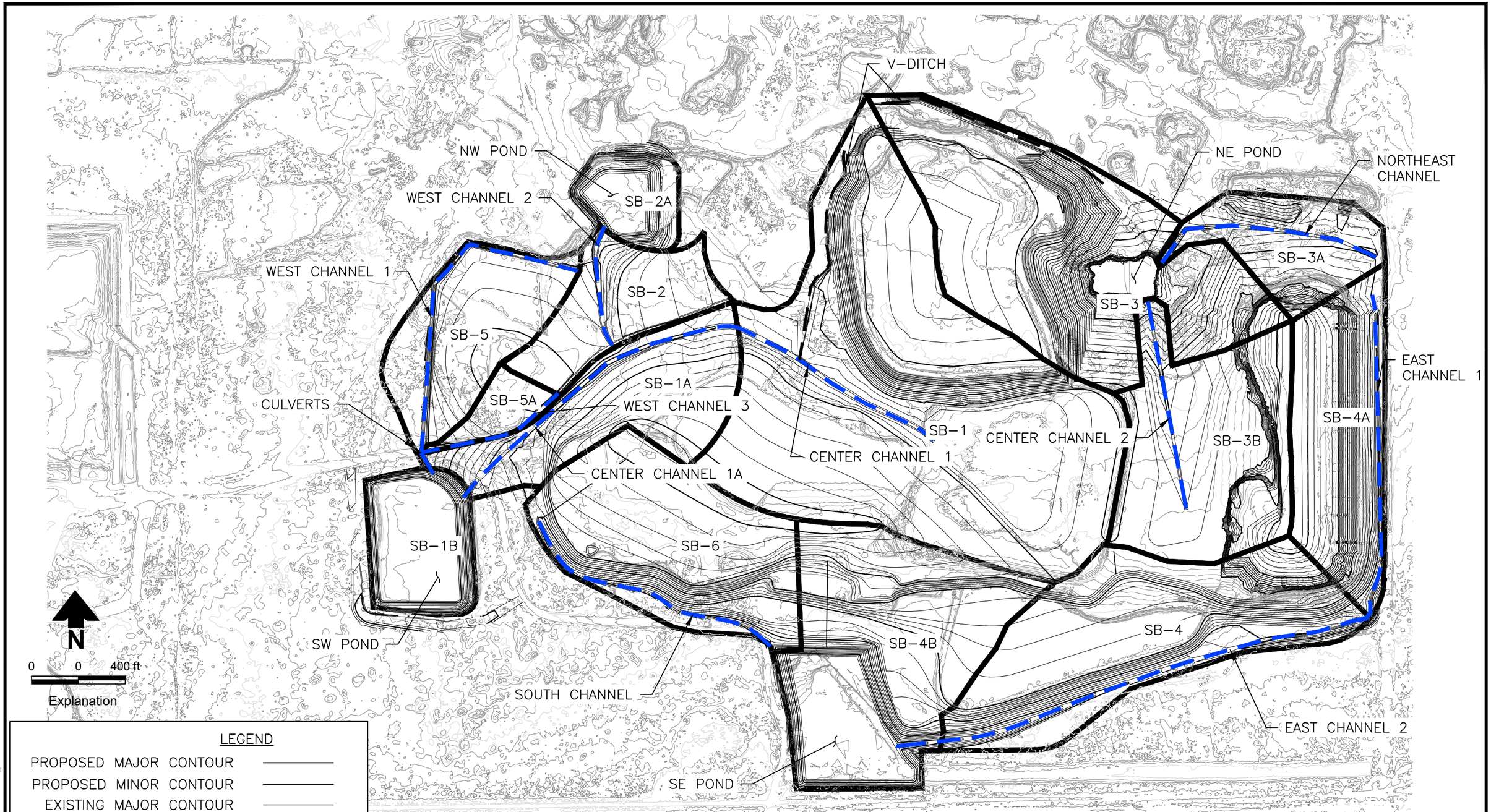
The culvert is designed for the 25-year, 24-hour design storm using Bentley CulvertMaster (Table 4). Calculation reports generated by CulvertMaster are provided in Appendix E. The location of the culvert is presented in Figure 1.

Table 4. Stormwater Culvert

Channel	Contributing Subbasin	Total Length (feet)	Slope (ft/ft)	Number of Pipes	Pipe Diameter (inches)	Peak Discharge (cfs)	Maximum Velocity (fps)	Normal Depth (feet)
West Culvert	SB-5	40	0.010	3	24	47	7.99	1.15

cfs = Cubic feet per second
fps = Feet per second

Figure



Z:\1XNM\TX\SPROJECTS\DB18.1209_SUNDANCE_WEST\ENGINEERING\CALCULATIONS\RUNOFF CALCS\BASIN MAP.DWG

DBS&A a Geo-Logic Company

05/07/2026 DB18.1209

SUNDANCE SERVICES SUNDANCE SERVICES INC.
SURFACE WASTE MANAGEMENT CLOURE

Hydrologic Subbasin and Stormwater Management Map

Figure 1

Appendix A

Excerpts From SCS TR-55

United States
Department of
Agriculture

**Natural
Resources
Conservation
Service**

**Conservation
Engineering
Division**

Technical
Release 55

June 1986

Urban Hydrology for Small Watersheds

TR-55

Figure 2-2 Flow chart for selecting the appropriate figure or table for determining runoff curve numbers.

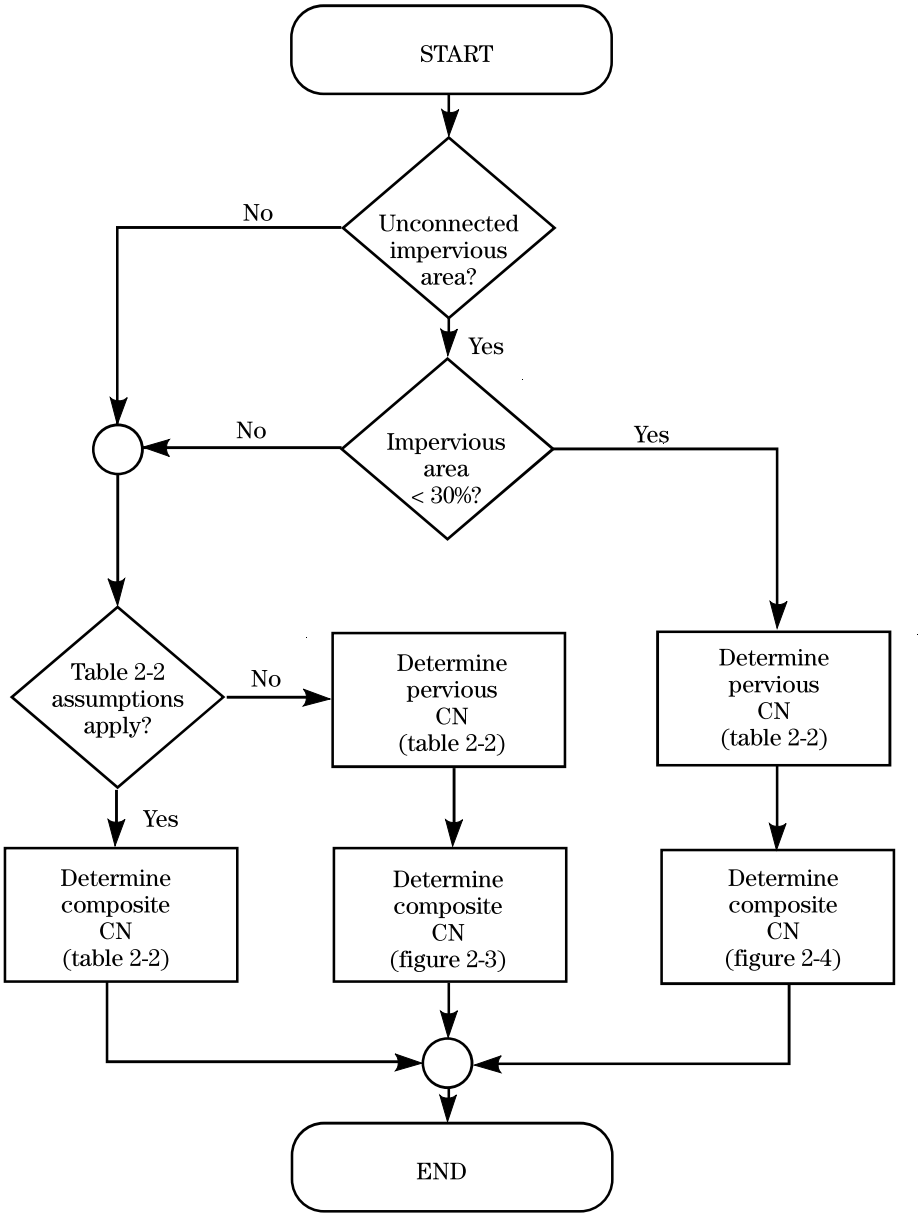


Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2/]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1] Average runoff condition, and $I_a = 0.2S$.
[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands [1/]

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment [2/]	Hydrologic condition [3/]	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

[1] Average runoff condition, and I_a=0.2S

[2] Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

[3] Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.

2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

3 *Poor*: <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

4 Actual curve number is less than 30; use CN = 30 for runoff computations.

5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 2-2d Runoff curve numbers for arid and semiarid rangelands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition [2/]	A [3/]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1 Average runoff condition, and I_a, = 0.2S. For range in humid regions, use table 2-2c.
2 Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.
3 Curve numbers for group A have been developed only for desert shrub.

Appendix B

Watershed Hydrologic Soils Groups

DBS&A
a Geo-Logic Company

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Lea County, New Mexico

Sundance_East_boundary

August 24, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

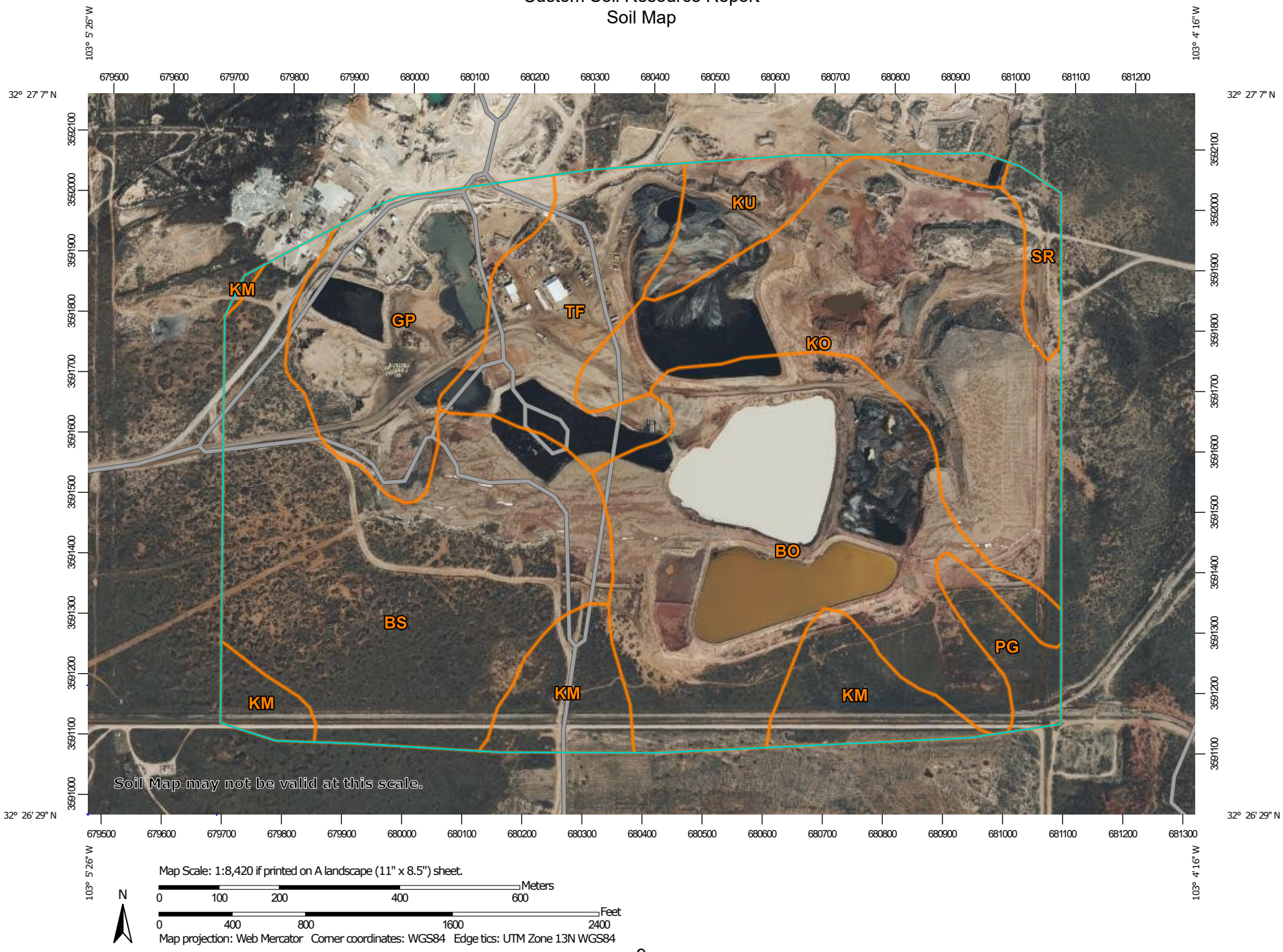
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:8,420 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 100 200 400 600

Feet
0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lea County, New Mexico
Survey Area Data: Version 18, Sep 10, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 18, 2020—Feb 17, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BO	Brownfield-Springer association	77.7	24.1%
BS	Brownfield-Springer association, hummocky	74.5	23.1%
GP	Gravel pit	33.2	10.3%
KM	Kermit soils and Dune land, 0 to 12 percent slopes	25.6	7.9%
KO	Kimbrough gravelly loam, dry, 0 to 3 percent slopes	61.2	19.0%
KU	Kimbrough-Lea complex, dry, 0 to 3 percent slopes	11.3	3.5%
PG	Portales and Gomez fine sandy loams	6.2	1.9%
SR	Simona-Upton association	4.7	1.5%
TF	Tonuco loamy fine sand, 0 to 3 percent slopes	27.4	8.5%
Totals for Area of Interest		**321.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a

given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lea County, New Mexico

BO—Brownfield-Springer association

Map Unit Setting

National map unit symbol: dmpj
Elevation: 3,500 to 4,400 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 58 to 60 degrees F
Frost-free period: 190 to 205 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Brownfield and similar soils: 60 percent
Springer and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brownfield

Setting

Landform: Plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 22 inches: fine sand
Bt - 22 to 60 inches: sandy clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R077DY046TX - Sandy 12-17" PZ
Hydric soil rating: No

Description of Springer

Setting

Landform: Plains

Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 14 inches: loamy fine sand
Bt - 14 to 60 inches: fine sandy loam
Bk - 60 to 79 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R077DY046TX - Sandy 12-17" PZ
Hydric soil rating: No

Minor Components

Patricia

Percent of map unit: 4 percent
Ecological site: R077CY056NM - Sandy Plains
Hydric soil rating: No

Amarillo

Percent of map unit: 4 percent
Ecological site: R077CY035TX - Sandy 16-21" PZ
Hydric soil rating: No

Gomez

Percent of map unit: 1 percent
Ecological site: R077CY056NM - Sandy Plains
Hydric soil rating: No

Tivoli

Percent of map unit: 1 percent
Ecological site: R077DY046TX - Sandy 12-17" PZ
Hydric soil rating: No

BS—Brownfield-Springer association, hummocky

Map Unit Setting

National map unit symbol: dmpk
Elevation: 3,500 to 4,400 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 58 to 60 degrees F
Frost-free period: 190 to 205 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Brownfield and similar soils: 65 percent
Springer and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brownfield

Setting

Landform: Plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 22 inches: fine sand
Bt - 22 to 60 inches: sandy clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R077DY046TX - Sandy 12-17" PZ
Hydric soil rating: No

Description of Springer

Setting

Landform: Plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 7 inches: loamy fine sand
Bt - 7 to 60 inches: fine sandy loam
Bk - 60 to 79 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R077DY046TX - Sandy 12-17" PZ
Hydric soil rating: No

Minor Components

Amarillo

Percent of map unit: 4 percent
Ecological site: R077CY035TX - Sandy 16-21" PZ
Hydric soil rating: No

Arvana

Percent of map unit: 3 percent
Ecological site: R077CY035TX - Sandy 16-21" PZ
Hydric soil rating: No

Tivoli

Percent of map unit: 2 percent
Ecological site: R077DY046TX - Sandy 12-17" PZ
Hydric soil rating: No

Dune land

Percent of map unit: 1 percent
Hydric soil rating: No

GP—Gravel pit

Map Unit Setting

National map unit symbol: 1n9fh
Elevation: 3,600 to 4,400 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 58 to 60 degrees F
Frost-free period: 195 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Pits, gravel: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits, Gravel

Setting

Landform: Plains
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Linear
Parent material: Calcareous alluvium and/or calcareous lacustrine deposits derived from sedimentary rock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A
Hydric soil rating: No

KM—Kermit soils and Dune land, 0 to 12 percent slopes

Map Unit Setting

National map unit symbol: dmpx
Elevation: 3,000 to 4,400 feet
Mean annual precipitation: 10 to 15 inches
Mean annual air temperature: 60 to 62 degrees F
Frost-free period: 190 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Kermit and similar soils: 46 percent
Dune land: 44 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kermit

Setting

Landform: Dunes
Landform position (two-dimensional): Shoulder, backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex
Parent material: Calcareous sandy eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 8 inches: fine sand
C - 8 to 60 inches: fine sand

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Very high (20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 3 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R042XC022NM - Sandhills
Hydric soil rating: No

Description of Dune Land

Setting

Landform: Dunes
Landform position (two-dimensional): Shoulder, backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex
Parent material: Sandy eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 6 inches: fine sand
C - 6 to 60 inches: fine sand

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Pyote
Percent of map unit: 3 percent
Ecological site: R042XC003NM - Loamy Sand
Hydric soil rating: No

Palomas
Percent of map unit: 3 percent
Ecological site: R042XC003NM - Loamy Sand
Hydric soil rating: No

Wink
Percent of map unit: 2 percent
Ecological site: R042XC003NM - Loamy Sand
Hydric soil rating: No

Maljamar
Percent of map unit: 2 percent
Ecological site: R042XC003NM - Loamy Sand
Hydric soil rating: No

KO—Kimbrough gravelly loam, dry, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: 2tw43
Elevation: 2,500 to 4,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition
Kimbrough, dry, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kimbrough, Dry

Setting
Landform: Playa rims, plains
Down-slope shape: Convex, linear
Across-slope shape: Concave, linear
Parent material: Loamy eolian deposits derived from sedimentary rock

Typical profile
A - 0 to 3 inches: gravelly loam
Bw - 3 to 10 inches: loam
Bkkm1 - 10 to 16 inches: cemented material
Bkkm2 - 16 to 80 inches: cemented material

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 4 to 18 inches to petrocalcic
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 95 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R077DY049TX - Very Shallow 12-17" PZ
Hydric soil rating: No

Minor Components

Eunice

Percent of map unit: 10 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R077DY049TX - Very Shallow 12-17" PZ
Hydric soil rating: No

Spraberry

Percent of map unit: 6 percent
Landform: Playa rims, plains
Down-slope shape: Convex, linear
Across-slope shape: Linear
Ecological site: R077DY049TX - Very Shallow 12-17" PZ
Hydric soil rating: No

Kenhill

Percent of map unit: 4 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R077DY038TX - Clay Loam 12-17" PZ
Hydric soil rating: No

KU—Kimbrough-Lea complex, dry, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tw46
Elevation: 2,500 to 4,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Kimbrough and similar soils: 45 percent
Lea and similar soils: 25 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kimbrough

Setting

Landform: Playa rims, plains
Down-slope shape: Convex, linear
Across-slope shape: Concave, linear
Parent material: Loamy eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 3 inches: gravelly loam
Bw - 3 to 10 inches: loam
Bkkm1 - 10 to 16 inches: cemented material
Bkkm2 - 16 to 80 inches: cemented material

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 4 to 18 inches to petrocalcic
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 95 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R077DY049TX - Very Shallow 12-17" PZ

Hydric soil rating: No

Description of Lea

Setting

Landform: Plains
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Calcareous, loamy eolian deposits from the blackwater draw formation of pleistocene age over indurated caliche of pliocene age

Typical profile

A - 0 to 10 inches: loam
Bk - 10 to 18 inches: loam
Bkk - 18 to 26 inches: gravelly fine sandy loam
Bkkm - 26 to 80 inches: cemented material

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 22 to 30 inches to petrocalcic
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 90 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 3.0
Available water supply, 0 to 60 inches: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R077DY047TX - Sandy Loam 12-17" PZ
Hydric soil rating: No

Minor Components

Douro

Percent of map unit: 12 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R077DY047TX - Sandy Loam 12-17" PZ
Other vegetative classification: Unnamed (G077DH000TX)
Hydric soil rating: No

Kenhill

Percent of map unit: 12 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R077DY038TX - Clay Loam 12-17" PZ
Hydric soil rating: No

Spraberry

Percent of map unit: 6 percent
Landform: Playa rims, plains
Down-slope shape: Convex, linear
Across-slope shape: Linear
Ecological site: R077DY049TX - Very Shallow 12-17" PZ
Other vegetative classification: Unnamed (G077DH000TX)
Hydric soil rating: No

PG—Portales and Gomez fine sandy loams

Map Unit Setting

National map unit symbol: dmqm
Elevation: 3,600 to 4,400 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 58 to 60 degrees F
Frost-free period: 190 to 205 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Portales and similar soils: 46 percent
Gomez and similar soils: 44 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Portales

Setting

Landform: Plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous alluvium and/or calcareous eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 8 inches: fine sandy loam
Bk - 8 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum content: 50 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R077CY035TX - Sandy 16-21" PZ
Hydric soil rating: No

Description of Gomez

Setting

Landform: Plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous alluvium and/or calcareous lacustrine deposits derived from sedimentary rock

Typical profile

A - 0 to 6 inches: fine sandy loam
Bk1 - 6 to 22 inches: fine sandy loam
Bk2 - 22 to 60 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 50 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: A
Ecological site: R077CY035TX - Sandy 16-21" PZ
Hydric soil rating: No

Minor Components

Lea

Percent of map unit: 5 percent
Ecological site: R077CY028TX - Limy Upland 16-21" PZ
Hydric soil rating: No

Arvana

Percent of map unit: 3 percent
Ecological site: R077CY035TX - Sandy 16-21" PZ
Hydric soil rating: No

Amarillo

Percent of map unit: 2 percent
Ecological site: R077CY056NM - Sandy Plains
Hydric soil rating: No

SR—Simona-Upton association

Map Unit Setting

National map unit symbol: dmr3
Elevation: 3,000 to 4,400 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 190 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Simona and similar soils: 50 percent
Upton and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Simona

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Calcareous eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 8 inches: gravelly fine sandy loam
Bk - 8 to 16 inches: fine sandy loam
Bkm - 16 to 26 inches: cemented material

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 7 to 20 inches to petrocalcic
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 50 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Very low (about 1.9 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R042XC002NM - Shallow Sandy
Hydric soil rating: No

Description of Upton

Setting
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Calcareous eolian deposits derived from sedimentary rock

Typical profile
A - 0 to 8 inches: gravelly loam
Bkm - 8 to 18 inches: cemented material
BCk - 18 to 60 inches: very gravelly loam

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: 7 to 20 inches to petrocalcic
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 75 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups
Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R042XC025NM - Shallow
Hydric soil rating: No

Minor Components

Kimbrough
Percent of map unit: 6 percent

Ecological site: R077CY037TX - Very Shallow 16-21" PZ
Hydric soil rating: No

Stegall

Percent of map unit: 5 percent
Ecological site: R077CY028TX - Limy Upland 16-21" PZ
Hydric soil rating: No

Slaughter

Percent of map unit: 4 percent
Ecological site: R077CY028TX - Limy Upland 16-21" PZ
Hydric soil rating: No

TF—Tonuco loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tw3c
Elevation: 3,280 to 4,460 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Tonuco and similar soils: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tonuco

Setting

Landform: Ridges, plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Sandy eolian deposits

Typical profile

A - 0 to 12 inches: loamy fine sand
Bw - 12 to 17 inches: loamy sand
Bkkm - 17 to 39 inches: cemented material

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 12 to 20 inches to petrocalcic
Drainage class: Excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R077DY048TX - Shallow 12-17" PZ
Hydric soil rating: No

Minor Components

Simona

Percent of map unit: 15 percent
Landform: Ridges, plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Ecological site: R042XC002NM - Shallow Sandy
Hydric soil rating: No

Berino

Percent of map unit: 10 percent
Landform: Ridges, plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Ecological site: R042XC003NM - Loamy Sand
Hydric soil rating: No

Cacique

Percent of map unit: 5 percent
Landform: Ridges, plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Ecological site: R042XC004NM - Sandy
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

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Appendix C

FlowMaster Calculation Reports

Worksheet for Center Channel 1 - 25yr

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	0.002 ft/ft
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	10.00 ft
Discharge	109.94 cfs

Results	
Normal Depth	25.4 in
Flow Area	39.2 ft²
Wetted Perimeter	27.5 ft
Hydraulic Radius	17.1 in
Top Width	26.96 ft
Critical Depth	15.6 in
Critical Slope	0.014 ft/ft
Velocity	2.81 ft/s
Velocity Head	0.12 ft
Specific Energy	2.24 ft
Froude Number	0.410
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	Dry
Profile Headloss	0.00 ft
Downstream Velocity	∞ ft/s
Upstream Velocity	∞ ft/s
Normal Depth	25.4 in
Critical Depth	15.6 in
Channel Slope	0.002 ft/ft
Critical Slope	0.014 ft/ft

Worksheet for Center Channel 1A - 25yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.028
Channel Slope	0.011 ft/ft
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	10.00 ft
Discharge	157.00 cfs

Results

Normal Depth	19.1 in
Flow Area	26.1 ft²
Wetted Perimeter	23.1 ft
Hydraulic Radius	13.5 in
Top Width	22.73 ft
Critical Depth	19.0 in
Critical Slope	0.011 ft/ft
Velocity	6.03 ft/s
Velocity Head	0.56 ft
Specific Energy	2.16 ft
Froude Number	0.992
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	Dry
Profile Headloss	0.00 ft
Downstream Velocity	∞ ft/s
Upstream Velocity	∞ ft/s
Normal Depth	19.1 in
Critical Depth	19.0 in
Channel Slope	0.011 ft/ft
Critical Slope	0.011 ft/ft

Worksheet for Center Channel 2 - 25yr

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.028
Channel Slope	0.020 ft/ft
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Bottom Width	5.00 ft
Discharge	70.76 cfs

Results	
Normal Depth	15.7 in
Flow Area	10.0 ft²
Wetted Perimeter	10.9 ft
Hydraulic Radius	11.0 in
Top Width	10.24 ft
Critical Depth	18.0 in
Critical Slope	0.012 ft/ft
Velocity	7.09 ft/s
Velocity Head	0.78 ft
Specific Energy	2.09 ft
Froude Number	1.267
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	Dry
Profile Headloss	0.00 ft
Downstream Velocity	∞ ft/s
Upstream Velocity	∞ ft/s
Normal Depth	15.7 in
Critical Depth	18.0 in
Channel Slope	0.020 ft/ft
Critical Slope	0.012 ft/ft

Worksheet for East Channel 1 - 25yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030
Channel Slope	0.010 ft/ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	10.00 ft
Discharge	30.30 cfs

Results

Normal Depth	8.5 in
Flow Area	8.6 ft²
Wetted Perimeter	14.5 ft
Hydraulic Radius	7.2 in
Top Width	14.27 ft
Critical Depth	7.4 in
Critical Slope	0.016 ft/ft
Velocity	3.51 ft/s
Velocity Head	0.19 ft
Specific Energy	0.90 ft
Froude Number	0.794
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	Dry
Profile Headloss	0.00 ft
Downstream Velocity	∞ ft/s
Upstream Velocity	∞ ft/s
Normal Depth	8.5 in
Critical Depth	7.4 in
Channel Slope	0.010 ft/ft
Critical Slope	0.016 ft/ft

Worksheet for East Channel 2 - 25yr

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.028
Channel Slope	0.013 ft/ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	10.00 ft
Discharge	115.30 cfs

Results	
Normal Depth	16.1 in
Flow Area	18.8 ft²
Wetted Perimeter	18.5 ft
Hydraulic Radius	12.2 in
Top Width	18.05 ft
Critical Depth	16.6 in
Critical Slope	0.012 ft/ft
Velocity	6.12 ft/s
Velocity Head	0.58 ft
Specific Energy	1.93 ft
Froude Number	1.057
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	Dry
Profile Headloss	0.00 ft
Downstream Velocity	∞ ft/s
Upstream Velocity	∞ ft/s
Normal Depth	16.1 in
Critical Depth	16.6 in
Channel Slope	0.013 ft/ft
Critical Slope	0.012 ft/ft

Worksheet for Northeast Channel - 25yr

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	0.012 ft/ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	5.00 ft
Discharge	33.87 cfs

Results	
Normal Depth	11.9 in
Flow Area	7.9 ft²
Wetted Perimeter	11.3 ft
Hydraulic Radius	8.4 in
Top Width	10.95 ft
Critical Depth	11.1 in
Critical Slope	0.015 ft/ft
Velocity	4.28 ft/s
Velocity Head	0.29 ft
Specific Energy	1.28 ft
Froude Number	0.889
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	Dry
Profile Headloss	0.00 ft
Downstream Velocity	∞ ft/s
Upstream Velocity	∞ ft/s
Normal Depth	11.9 in
Critical Depth	11.1 in
Channel Slope	0.012 ft/ft
Critical Slope	0.015 ft/ft

Worksheet for South Channel - 25yr

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.028
Channel Slope	0.019 ft/ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	1.00 ft
Discharge	66.30 cfs

Results	
Normal Depth	20.0 in
Flow Area	10.0 ft²
Wetted Perimeter	11.5 ft
Hydraulic Radius	10.4 in
Top Width	10.99 ft
Critical Depth	21.9 in
Critical Slope	0.012 ft/ft
Velocity	6.64 ft/s
Velocity Head	0.69 ft
Specific Energy	2.35 ft
Froude Number	1.229
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	Dry
Profile Headloss	0.00 ft
Downstream Velocity	∞ ft/s
Upstream Velocity	∞ ft/s
Normal Depth	20.0 in
Critical Depth	21.9 in
Channel Slope	0.019 ft/ft
Critical Slope	0.012 ft/ft

Worksheet for West Channel 1 - 25yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030
Channel Slope	0.008 ft/ft
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Bottom Width	3.00 ft
Discharge	39.46 cfs

Results

Normal Depth	18.4 in
Flow Area	9.3 ft²
Wetted Perimeter	9.8 ft
Hydraulic Radius	11.3 in
Top Width	9.12 ft
Critical Depth	15.7 in
Critical Slope	0.015 ft/ft
Velocity	4.26 ft/s
Velocity Head	0.28 ft
Specific Energy	1.81 ft
Froude Number	0.744
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	Dry
Profile Headloss	0.00 ft
Downstream Velocity	∞ ft/s
Upstream Velocity	∞ ft/s
Normal Depth	18.4 in
Critical Depth	15.7 in
Channel Slope	0.008 ft/ft
Critical Slope	0.015 ft/ft

Worksheet for West Channel 2 - 25yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.028
Channel Slope	0.019 ft/ft
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Bottom Width	10.00 ft
Discharge	30.97 cfs

Results

Normal Depth	7.0 in
Flow Area	6.6 ft²
Wetted Perimeter	12.6 ft
Hydraulic Radius	6.2 in
Top Width	12.35 ft
Critical Depth	7.7 in
Critical Slope	0.014 ft/ft
Velocity	4.72 ft/s
Velocity Head	0.35 ft
Specific Energy	0.93 ft
Froude Number	1.143
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	Dry
Profile Headloss	0.00 ft
Downstream Velocity	∞ ft/s
Upstream Velocity	∞ ft/s
Normal Depth	7.0 in
Critical Depth	7.7 in
Channel Slope	0.019 ft/ft
Critical Slope	0.014 ft/ft

Worksheet for West Channel 3 - 25yr

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.030	
Channel Slope	0.025	ft/ft
Left Side Slope	4.000	H:V
Right Side Slope	4.000	H:V
Bottom Width	5.00	ft
Discharge	8.01	cfs

Results		
Normal Depth	4.3	in
Flow Area	2.3	ft²
Wetted Perimeter	8.0	ft
Hydraulic Radius	3.5	in
Top Width	7.89	ft
Critical Depth	4.6	in
Critical Slope	0.020	ft/ft
Velocity	3.44	ft/s
Velocity Head	0.18	ft
Specific Energy	0.55	ft
Froude Number	1.118	
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	Dry	
Profile Headloss	0.00	ft
Downstream Velocity	∞	ft/s
Upstream Velocity	∞	ft/s
Normal Depth	4.3	in
Critical Depth	4.6	in
Channel Slope	0.025	ft/ft
Critical Slope	0.020	ft/ft

Attachment D

TRM Cut Sheet

DBS&A
a Geo-Logic Company

PYRAMAT®

Product Data

PYRAMAT® 25 TRM

PYRAMAT® 25 turf reinforcement mat (TRM) is a three-dimensional, lofty, woven polypropylene geotextile that is available in green which is specially designed for erosion control applications on steep slopes and vegetated waterways. The matrix is composed of polypropylene monofilament yarns featuring X3® technology woven into a uniform configuration of resilient pyramid-like projections. The material exhibits very high interlock and reinforcement capacity with both soil and root systems, demonstrates superior UV resistance, and enhances seedling emergence. The expected design life of PYRAMAT® 25 is up to 25 years because of its superior UV resistance, resistance to corrosion, strength, and durability in the most demanding environments.

PYRAMAT® 25 conforms to the property values listed below[1] and is manufactured at a Propex facility having achieved ISO 9001:2008 certification. Propex performs internal Manufacturing Quality Control (MQC) tests that have been accredited by the Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP).

PROPERTY	TEST METHOD	ENGLISH	METRIC
ORIGIN OF MATERIALS			
% U.S. Manufactured Inputs		100%	100%
% U.S. Manufactured		100%	100%
PHYSICAL			
Mass/Unit Area [4]	ASTM D-6566	8.0 oz/yd²	271 g/m²
Thickness [2]	ASTM D-6525	0.25 in	6.4 mm
Light Penetration (% Passing) [3]	ASTM D-6567	35%	35%
Color	Visual	Green or Tan	
MECHANICAL			
Tensile Strength [2]	ASTM D-6818	2000 x 1800 lbs/ft	29.2 x 26.3 kN/m
Elongation [2]	ASTM D-6818	20 x 20 %	20 x 20 %
Resiliency [2]	ASTM D-6524	70%	70%
Flexibility [4]	ASTM D-6575	0.195 in-lb	225,000 mg-cm
ENDURANCE			
UV Resistance % Retained at 1,000 hrs [4]	ASTM D-4355	90%	90%
UV Resistance % Retained at 3,000 hrs [4]	ASTM D-4355	90%	90%
PERFORMANCE			
Velocity (Vegetated) [4, 5]	Large Scale	20 ft/sec	6.1 m/sec
Shear Stress (Vegetated) [4, 5]	Large Scale	12 lb/ft²	575 Pa
Manning's n (Unvegetated) [4, 6]	Calculated	0.028	0.028
Seedling Emergence [4]	ASTM D-7322	255%	255%
ROLL SIZES		8.5 ft x 120 ft	2.6 m x 36.6 m

NOTES:

1. The property values listed above are effective 03/09/2018 and are subject to change without notice. Values represent testing at time of manufacture.
2. Minimum average roll values (MARV) are calculated as the typical minus two standard deviations. Statistically, it yields a 97.7% degree of confidence that any samples taken from quality assurance testing will exceed the value reported.
3. Maximum Average Roll Value (MaxARV), calculated as the typical plus two standard deviations. Statistically, it yields a 97.7% degree of confidence that any sample taken during quality assurance testing will meet to the value reported.
4. Typical Value.
5. Maximum permissible velocity and shear stress has been obtained through vegetated testing programs featuring specific soil types, vegetation classes, flow conditions, and failure criteria. These conditions may not be relevant to every project nor are they replicated by other manufacturers. Please contact Propex for further information.
6. Calculated as typical values from large-scale flexible channel lining test programs with a flow depth of 6 to 12 inches.

Propex GEOSOLUTIONS

ENGINEERED EARTH ARMORING SOLUTIONS™

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Propex Operating Company, LLC · 4019 Industry Drive · Chattanooga, TN 37416 · ph 800 621 1273 · ph 423 855 1466

Appendix E

CulvertMaster Calculation Report

DBS&A a Geo-Logic Company

Culvert Calculator Report
SSI West 2 Channel Culvert

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,455.00	ft	Headwater Depth/Height	1.12	
Computed Headwater Elevation	3,453.16	ft	Discharge	47.40	cfs
Inlet Control HW Elev.	3,453.07	ft	Tailwater Elevation	3,451.51	ft
Outlet Control HW Elev.	3,453.16	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,450.93	ft	Downstream Invert	3,450.51	ft
Length	40.00	ft	Constructed Slope	0.010375	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.20	ft
Slope Type	Steep		Normal Depth	1.15	ft
Flow Regime	Supercritical		Critical Depth	1.43	ft
Velocity Downstream	7.99	ft/s	Critical Slope	0.005584	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	3				

Outlet Control Properties					
Outlet Control HW Elev.	3,453.16	ft	Upstream Velocity Head	0.67	ft
Ke	0.20		Entrance Loss	0.13	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,453.07	ft	Flow Control	Transition	
Inlet Type	Groove end w/headwall		Area Full	9.4	ft²
K	0.00180		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	2	
C	0.02920		Equation Form	1	
Y	0.74000				

State of New Mexico
Energy, Minerals and Natural Resources Department

BY ELECTRONIC MAIL ONLY

June 22, 2026

Mr. Tariq Mussani
Sundance Services Inc.
42 Sundance Lane Eunice, New Mexico 88231
tmussani@hotmail.com

RE: Review of updated Surface Water Management Plan and Financial Assurance Estimate for Sundance Services, Inc., Permit NM1-03

Dear Mr. Mussani:

The Oil Conservation Division (OCD) received and has reviewed updates submitted by Sundance Services, Inc.(SSI) on May 12, 2026, to the Financial Assurance Estimate (FA) and the Surface Water management Plan (SWMP) that were approved as part of the Closure/Post-Closure Plan (CPCP) for Permit NM-03 on August 11, 2025. The OCD grants approval of these revisions.

SSI may submit replacement Financial Assurance (FA) in the amount of $7,038,226, as reflected in this revision to the CPCP, in accordance with Permit NM1-03, Financial Assurance section, Condition 2. Upon receipt of the replacement FA, OCD will cancel the current Cash Bond and assignment of cash collateral SSI 0500-0006655.1.

Please be advised that this approval does not relieve SSI of liability should operations result in pollution of surface water, groundwater, or the environment. Nor does approval relieve SSI of its responsibility to comply with any other applicable governmental authority's rules and regulations.

If there are any questions regarding this matter, please do not hesitate to contact me at (505) 549-5583 or Joseph.Kennedy@emnrd.nm.gov.

Joe Kennedy ● Senior Environmental Scientist

Sante Fe Main Office
Phone: (505) 476-3441

General Information
Phone: (505) 629-6116

Online Phone Directory
https://www.emnrd.nm.gov/ocd/contact-us

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 584444

CONDITIONS

Operator: SUNDANCE SERVICES, INC. P.O. Box 1737 Eunice, NM 88231	OGRID: 149972
	Action Number: 584444
	Action Type: [C-137] Non-Fee SWMF Submittal (SWMF NON-FEE SUBMITTAL)

CONDITIONS

Created By	Condition	Condition Date
joseph.kennedy	Please see letter emailed to Mr. Mussani on June 22, 2026	6/22/2026