

Official Soil Series Description

The descriptions, maps, and information in the appendices were generated using publically accessible websites developed and supported by the USDA Natural Resources Conservation Service. They are examples of the soil survey products discussed in this manual. These products are developed and delivered to the public with the integrated use of standardized procedures, terminology, technologies, and data systems in a cooperative environment that includes Federal, State, and local units of government and universities (i.e., the National Cooperative Soil Survey).

The appendices provide examples of four main pillars of soil survey information: (1) official soil series descriptions (OSDs), (2) detailed map unit descriptions, (3) the National Cooperative Soil Survey Soil Characterization Database, and (4) Web Soil Survey.

The OSD database is the national collection of more than 20,000 detailed soil series descriptions from across the U.S. and its territories. The OSDs are managed in a text format following specific standards for organization and content. The name of a soil series is the common reference term used in the name of soil map units. Soil series are the most homogenous classes in Soil Taxonomy. The descriptions contain soil properties that define a specific soil series and distinguish it from other soil series and serve as the basis for the taxonomic classification.

As an example, the official description of the Olton series follows.

Olton Series

Location, Olton: TX+NM

Established Series

Rev. TCB-JKA-RM

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The Olton series consists of very deep, well drained, moderately slowly permeable soils that formed in clayey, calcareous eolian sediments in the Blackwater Draw Formation of Pleistocene age. These soils are

on nearly level to gently sloping plains and upper side slopes of playas and draws. Slope ranges from 0 to 5 percent. Mean annual precipitation is 483 mm (19 in), and mean annual temperature is 15 degrees C (59 degrees F).

TAXONOMIC CLASS: Fine, mixed, superactive, thermic Aridic Paleustolls

TYPICAL PEDON: Olton clay loam, on a northeast-facing, convex, 2 percent slope in cropland at an elevation of about 1,120 m (3,675 ft.). (Colors are for dry soil unless otherwise stated.)

A—0 to 20 cm (0 to 8 in); brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate medium granular and subangular blocky structure; hard, friable; many fine roots; common fine pores; common earthworm channels; common wormcasts; neutral; gradual smooth boundary. (15 to 36 cm [6 to 14 in] thick)

Bt1—20 to 38 cm (8 to 15 in); brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; very hard, firm; common fine roots; few fine pores and root channels; few distinct clay films on faces of peds; slightly alkaline; gradual wavy boundary. (10 to 25 cm [4 to 10 in] thick)

Bt2—38 to 79 cm (15 to 31 in); reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; moderate medium angular blocky structure; very hard, firm; few fine roots, mostly between peds; earthworm channels and casts; few distinct clay films on faces of peds; noneffervescent in upper part; few films and threads of calcium carbonate at a depth of about 22 inches, slightly effervescent; moderately alkaline; gradual wavy boundary. (20 to 41 cm [8 to 16 in] thick)

Btk1—79 to 122 cm (31 to 48 in); reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; weak medium angular blocky structure; very hard, firm; common fine root channels and pores; few distinct clay films on faces of peds; about 5 percent fine films and threads of calcium carbonate; violently effervescent; moderately alkaline; clear wavy boundary. (38 to 66 cm [15 to 26 in] thick)

Btk2—122 to 191 cm (48 to 75 in); pink (5YR 7/3) clay loam, light reddish brown (5YR 6/4) moist; weak medium angular blocky and subangular blocky structure; hard, firm; about 35 percent fine and medium calcium carbonate masses and medium and coarse calcium carbonate concretions and nodules; violently effervescent; moderately alkaline; diffuse wavy boundary. (25 to 91 cm [10 to 26 in] thick)

Btk3—191 to 251 cm (75 to 99 in); red (2.5YR 5/6) clay loam, red (2.5YR 4/6) moist; weak very coarse prismatic structure parting to moderate medium subangular blocky; very hard, firm; few distinct clay films on faces of peds and clay bridged sand grains; common soft to weakly cemented films of calcium carbonate, amount decreases with depth and is less than 2 percent in lower part of horizon; strongly effervescent ped surfaces, some noneffervescent ped interiors; moderately alkaline.

TYPE LOCATION: Randall County, Texas; from the intersection of U.S. Highways 87 and 60 in Canyon, 8.9 kilometers (5.5 miles) west on U.S. Highway 60, about 2.4 kilometers (1.5 miles) north on county road, 966 meters (0.6 mile) east and 644 m (0.4 mile) north in cultivated field or 854 m (2,800 ft.) east and 488 m (1,600 ft.) north of SE corner of sec. 7, Block 1. T. T. R. R. Survey; latitude: 35 degrees, 01 minute, 28 seconds N; longitude: 102 degrees, 01 minute, 03 seconds W; Bivins Lake, Texas USGS quad; NAD27.

RANGE IN CHARACTERISTICS: Soil moisture: An ustic moisture regime bordering on aridic. The soil moisture control section is dry in some or all parts for more than 180 but less than 205 days, cumulative, in normal years. July through August and December through February are the driest months. These soils are intermittently moist in September through November and March through June.

Mean annual soil temperature: 15 to 18 degrees C (59 to 64 degrees F)

Depth to argillic horizon: 15 to 36 cm (6 to 14 in)

Depth to secondary carbonates: 36 to 71 cm (14 to 28 in)

Depth to calcic horizon: 76 to 152 cm (30 to 60 in)

Solum thickness: more than 203 cm (80 in)

Particle-size control section: 35 to 50 percent silicate clay

A horizon:

Hue: 5YR to 10YR

Value: 3 to 5, 2 to 4 moist

Chroma: 2 or 3

Texture: Loam, clay loam

Effervescence: None to slight

Reaction: Neutral to moderately alkaline

Bt horizons:

Hue: 5YR or 7.5YR

Value: 3 to 5, 2 to 4 moist

Chroma: 2 to 6

Texture: Clay loam, clay

Visible calcium carbonate: Few films and threads at about 56 cm (22 in)

Effervescence: None to slight

Reaction: Slightly alkaline or moderately alkaline

Btk horizons:

Hue: 2.5 to 7.5YR

Value: 5 to 7, 4 to 6 moist

Chroma: 3 to 8

Texture: Clay loam, silty clay loam

Visible calcium carbonate: 15 to 60 percent as masses, films, threads, concretions, and nodules

Effervescence: Violent

Reaction: Moderately alkaline or strongly alkaline

B't horizon below the calcic (where present):

Hue: 2.5YR to 7.5YR

Value: 5 to 7, 4 to 6 moist

Chroma: 3 to 8

Texture: Loam, sandy clay loam, clay loam

Visible calcium carbonate: Few threads, films, and nodules

Effervescence: Slight or strong

Reaction: Moderately alkaline or strongly alkaline

COMPETING SERIES: There are no other series in this family. Similar soils include the [Acuff](#), [Estacado](#), [Pullman](#), and [Pantex](#) series.

[Acuff](#) series: Has 18 to 35 percent silicate clay in the particle-size control section.

[Estacado](#) series: Is calcareous in upper horizons and has 20 to 35 percent silicate clay in the particle-size control section.

[Pantex](#) and [Pullman](#) series: Have COLE of more than 0.06.

GEOGRAPHIC SETTING:

Parent material: Clayey, calcareous eolian sediments in the Blackwater Draw Formation of Pleistocene age

Landform: Nearly level to gently sloping plains and upper side slopes of playas and draws

Slopes: Dominantly less than 3 percent, but can range up to 5 percent

Mean annual air temperature: 14 to 17 degrees C (57 to 62 degrees F)

Mean annual precipitation: 432 to 533 mm (17 to 21 in)

Frost-free period: 180 to 220 days

Elevation: 793 to 1,524 m (2,600 to 5,000 ft.)

Thornthwaite annual P-E Index values: 30 to 34

GEOGRAPHICALLY ASSOCIATED SOILS: These are the similar [Acuff](#), [Estacado](#), and [Pullman](#) series and also the [Amarillo](#), [Pep](#), and [Portales](#) series.

[Acuff](#), [Amarillo](#), and [Estacado](#) soils: Are in landscape positions similar to those of the Olton series and average less than 35 percent clay in the particle-size control section.

[Pep](#) soils: Are in landscape positions similar to those of the Olton series and do not have an argillic horizon.

[Portales](#) soils: Are in slightly lower landscape positions and average less than 35 percent clay in the particle-size control section.

[Pullman](#) soils: Are in landscape positions similar to those of the Olton series and have COLE of more than 0.06.

DRAINAGE AND PERMEABILITY: Well drained. Moderately slow permeability. Runoff is low where slopes are 0 to 1 percent and medium where slopes are 1 to 5 percent.

USE AND VEGETATION: Mainly cultivated for cotton, sorghum, and winter wheat. A considerable acreage is irrigated. Climax native vegetation is dominantly shortgrasses with a few midgrasses and includes blue grama and buffalograss. Also included are lesser amounts of vine-mesquite, western wheatgrass, sideoats grama, galleta, tobosa, silver bluestem, wild alfalfa, and prairie clover. This soil has been correlated to the Deep Hardland (077CY022TX) range site in MLRA 77C.

DISTRIBUTION AND EXTENT: Southern High Plains, Southern Part (MLRA 77C in LRR H) of western Texas and eastern New Mexico. The series is extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (SSRO)

RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Lamb County, Texas; 1960.

REMARKS: This is a Benchmark Series.

Diagnostic horizons and features recognized in this pedon are:

Mollic epipedon: 0 to 38 cm (0 to 15 in) (A, Bt1 horizons)

Argillic horizon: 20 to 251 cm (8 to 99 in) (Bt1, Bt2, Btk1, Btk2, Btk3 horizons)

Calcic horizon: 79 to 191 cm (31 to 75 in) (Btk1, Btk2 horizons)

ADDITIONAL DATA: NSSL Characterization data: Sample Nos. S78TX-381-001 and S90TX-381-001, 001A, 001B, 001C, 001D

(Randall Co.); S81TX-069-001 (Castro Co.); S90TX-359-001, 001A, 001B, 001C, 001D (Oldham Co.); S81TX-069-001 and S93TX-069-001 (Castro Co.); and S92TX-369-001, 001B, 001C, 001D, 001E, 001F and S96TX-369-001, 002 (Parmer Co.). USDA-ARS Bulletin B-1727 “Olton Soils, Distribution, Importance, Variability and Management” 4-98, Paul W. Unger and Fred B. Pringle.

Taxonomic Version: Keys to Soil Taxonomy, Twelfth Edition, 2014.

Figure A-1



Profile of the Olton series.

Detailed Map Unit Description

The following map unit description is typical of those produced by the Web Soil Survey (WSS). Note that for ease of use by the public in the U.S., metric units have been converted to English units.

OcA—Olton clay loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: f5sv

Elevation: 2,800 to 5,000 feet

Mean annual precipitation: 17 to 21 inches

Mean annual air temperature: 57 to 63 degrees F

Frost-free period: 185 to 220 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Olton and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the map unit.

Setting

Landform: Plains

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Clayey eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical profile

Ap - 0 to 8 inches: clay loam

Bt - 8 to 31 inches: clay loam

Btk1 - 31 to 48 inches: clay loam

Btk2 - 48 to 80 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (K_{sat}):

Moderately high (0.20 to 0.57 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 50 percent

Salinity, maximum in profile: Nonsaline (0.0 to 1.0 mmho/cm)

Sodium adsorption ratio, maximum in profile: 1.0

Available water storage in profile: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 3e

Hydrologic soil group: C

Ecological site: Deep Hardland 16-21" PZ (R077CY022TX)

Hydric soil rating: No

Minor Components

Pullman soils

Percent of map unit: 7 percent

Landform: Plains

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: Deep Hardland 16-21" PZ (R077CY022TX)

Hydric soil rating: No

Acuff soils

Percent of map unit: 5 percent

Landform: Plains

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: Deep Hardland 16-21" PZ (R077CY022TX)

Hydric soil rating: No

Estacado soils

Percent of map unit: 3 percent

Landform: Plains

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: Deep Hardland 16-21" PZ (R077CY022TX)

Hydric soil rating: No

NCSS Soil Characterization Database

The National Cooperative Soil Survey (NCSS) Soil Characterization Database contains the analytical results from the Kellogg Soil Survey Laboratory (KSSL) at the National Soil Survey Center (NSSC) in Lincoln, Nebraska, as well as the results from numerous cooperating State university laboratories in the United States. Properties measured in the laboratory serve as the basis for interpretations related to soil use and management. Standardized methodologies and procedures used in the laboratory are contained in the *Kellogg Soil Survey Laboratory Methods Manual*, Soil Survey Investigations Report (SSIR) No. 42 (by the Soil Survey Staff). The KSSL data are provided in reports (for example, Primary and Supplementary Characterization Data Sheets) and are available in various electronic forms, including online, tape, CD, and DVD.

The database includes pedons that represent the central concept of a soil series, pedons that represent the central concept of a map unit but not of a series, and pedons sampled to bracket a range of properties within a series or landscape. Not all analyses are conducted for every soil. Suites of analytical procedures are run based upon anticipated or known conditions regarding the nature of the soil being analyzed. Results are reported in tiers. For example, soils of arid environments are routinely analyzed for salts and carbonates as part of the standard analysis suite. Tables A-1 and A-2 show some of the primary characterization data and supplemental data for a pedon of Olton series sampled in Castro County, Texas, in 2006.

Table A-1**Primary Characterization Data**

*** Primary Characterization Data ***

Pedon ID: S2006TX069003

(Castro, Texas)

Sampled as on Mar 29, 2006:

Olton; Fine, mixed, superactive, thermic Calcic Haplustert

Revised to correlated:

Olton; Fine, mixed, superactive, thermic Aridic Paleustolls

SSL - Project	C2006USNL085	MLRA 77D							United States Department of Agriculture
- Site ID	S2006TX069003	Lat: 34° 20' 54.50" north	Long: 102° 10' 55.09" west	MLRA: 77D					Natural Resources Conservation Service
- Pedon No.	06N0716								National Soil Survey Center
- General Methods	1B1A, 2A1, 2B								Kellogg Soil Survey Laboratory
									Lincoln, Nebraska 68508-3866

Layer	Horizon	Orig Hzn	Depth (cm)	Field Label 1	Field Label 2	Field Label 3	Field Texture	Lab Texture
06N02986	Ap	Ap	0-12	S06TX069-003-1			CL	CL
06N02987	Bt1	Bt1	12-27	S06TX069-003-2			C	CL
06N02988	Bt2	Bt2	27-48	S06TX069-003-3			C	CL
06N02989	Btk	Btk	48-99	S06TX069-003-4			SCL	CL
06N02990	Btkk1	Btkk1	99-125	S06TX069-003-5			CL	C
06N02991	Btkk2	Btkk2	125-203	S06TX069-003-6			CL	CL

Calculation Name	Pedon Calculations	
	Result	Units of Measure
LE, Whole Soil, Summed to 1m	6	cm/m

PSDA & Rock Fragments				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	
Layer	Depth (cm)	Horz	Prep	Lab	(- - - Total -- - -) (- - Clay - - -)				(- - - Silt - - -)		(- - - - - Sand - - - - -)				(Rock Fragments (mm))							
				Text- ure	Clay	Silt	Sand	Fine	CO ₃	Fine	Coarse	VF	F	M	C	VC	(- - - Weight - - - -) >2 mm wt% whole soil					
					(- - - - - % of <2mm Mineral Soil - - - - -)				(- - - % of <75mm - -)													
					3A1a1a		3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a						
06N02986	0-12	Ap	S	cl	31.8	37.9	30.3	22.5		13.9	24.0	16.8	11.2	2.2	0.1	tr	--	--	--	14	--	
06N02987	12-27	Bt1	S	cl	32.7	36.8	30.5	25.1		14.5	22.3	16.8	11.5	2.1	0.1	--	--	--	--	14	--	
06N02988	27-48	Bt2	S	cl	39.0	33.9	27.1	28.8		13.8	20.1	13.8	11.4	1.9	tr	--	--	--	--	13	--	
06N02989	48-99	Btk	S	cl	36.9	33.0	30.1	16.0	1.3	11.9	21.1	14.7	12.3	2.7	0.2	0.2	1	tr	--	16	1	
06N02990	99-125	Btkk1	S	c	41.3	38.1	20.6	9.4	30.7	25.4	12.7	10.4	7.9	2.0	0.2	0.1	2	2	tr	14	4	
06N02991	125-203	Btkk2	S	cl	38.3	40.3	21.4	9.7	24.5	26.7	13.6	10.8	8.4	1.7	0.3	0.2	1	2	--	13	3	

Bulk Density & Moisture				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-					
Layer	Depth (cm)	Horz	Prep	(Bulk Density)		Cole (-----Water Content-----)				WRD	Aggst										
				33	Oven	Whole	6	10	33	1500	1500 kPa	Ratio	Whole	Stabl	(Ratio/Clay)						
				33	Dry	Soil	kPa	kPa	kPa	kPa	Moist	AD/ OD	Soil	2-0.5mm	CEC7	1500 kPa					
				(- - - g cm ⁻³ - - -)		(- - - - - % of <2mm - - - - -)				cm ³ cm ⁻³		%									
				DbWR1	DbWR1							3D1									
06N02986	0-12	Ap	S	1.27	1.52	0.062			25.0	13.3		1.036	0.15			0.62	0.42				
06N02987	12-27	Bt1	S	1.39	1.71	0.072			25.6	14.2		1.039	0.16			0.62	0.43				
06N02988	27-48	Bt2	S	1.39	1.73	0.076			26.9	16.0		1.045	0.15			0.61	0.41				
06N02989	48-99	Btk	S	1.48	1.74	0.055			22.8	14.9		1.044	0.12			0.56	0.40				
06N02990	99-125	Btkk1	S	1.43	1.50	0.016			22.8	9.3		1.017	0.19			0.17	0.23				
06N02991	125-203	Btkk2	S	1.50	1.63	0.028			18.8	9.6		1.019	0.13			0.21	0.25				

Carbon & Extractions				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	
Layer	Depth (cm)	Horz	Prep	(- - - - Total - - - -)			Est	OC	C/N	(Dith-Cit Ext)			(- - - - Ammonium Oxalate Extraction - - - -)					(-Na Pyro-Phosphate-)					
				C	N	S	OC (WB)	Ratio	Fe	Al	Mn	Al+½Fe	ODOE	Fe	Al	Si	Mn	C	Fe	Al	Mn		
				(- - - - % of <2 mm - - - -)						(- - - - - % of < 2mm - - - - -)			mg kg ⁻¹					(- - - % of <2mm - - -)					
				4H2a	4H2a	4H2a				4G1	4G1	4G1	4G2	4G2	4G2	4G2	4G2	4G2					
06N02986	0-12	Ap	S	1.18	0.13	tr	1.2	9	0.9	0.1	tr	--	0.02	--	--	--	--	--	--	--	--	--	--
06N02987	12-27	Bt1	S	0.65	0.09	tr	0.6	7	0.9	0.1	tr	0.13	0.02	0.08	0.09	0.06	268.3						
06N02988	27-48	Bt2	S	0.63	0.09	--	0.6	7	1.1	0.1	tr	0.16	0.02	0.09	0.12	0.07	249.2						
06N02989	48-99	Btk	S	0.69	0.09	--	0.3	4	1.0	0.1	tr	0.13	0.01	0.06	0.10	0.06	215.4						
06N02990	99-125	Btkk1	S	6.93	0.09	--	0.4	5	0.3	--	--	0.02	0.01	0.01	0.02	0.02	9.8						
06N02991	125-203	Btkk2	S	6.11	0.03	0.01	0.2	5	0.3	--	--	0.02	0.01	0.01	0.02	0.02	15.1						

CEC & Bases				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	
Layer	Depth (cm)	Horz	Prep	(- - - - NH ₄ OAC Extractable Bases - - - -)								CEC8	CEC7	ECEC	(- - - Base - - - -)			
				Ca	Mg	Na	K	Sum	Acid-	Extr	KCl	Sum	NH ₄	Bases	Al	(-- Saturation --)		
				(- - - - - cmol(+) kg ⁻¹ - - - - -)								mg kg ⁻¹		(- - - - cmol(+) kg ⁻¹ - - - -)			Sum	NH ₄ OAC
				4B1a1a	4B1a1a	4B1a1a	4B1a1a	4B2b1a1						4B1a1a				
06N02986	0-12	Ap	S	13.0*	6.3	--	1.9	21.2	3.2			24.4	19.6			87	100	
06N02987	12-27	Bt1	S	14.6*	5.9	--	1.1	21.6	2.4				20.4				100	
06N02988	27-48	Bt2	S	18.6*	7.0	0.1	0.9	26.6	2.4				23.7				100	
06N02989	48-99	Btk	S	50.2*	6.9	0.2	0.8	58.1					20.7				100	
06N02990	99-125	Btkk1	S	45.6*	3.7	0.3	0.4	50.0					7.2				100	
06N02991	125-203	Btkk2	S	46.4*	3.1	0.3	0.5	50.3					8.1				100	

*Extractable Ca may contain Ca from calcium carbonate or gypsum. CEC7 base saturation set to 100.

Salt				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
(- - - - - Water Extracted From Saturated Paste - - - - -) 1:2																							
Layer	Depth (cm)	Horz	Prep	Ca 4F2	Mg 4F2	Na 4F2	K 4F2	CO ₃ 4F2	HCO ₃ 4F2	F 4F2	Cl 4F2	PO ₄ 4F2	Br 4F2	OAC 4F2	SO ₄ 4F2	NO ₂ 4F2	NO ₃ 4F2	H ₂ O 4F2	Total Salts 4F2	Elec Cond 4F2	Elec Cond 4F1a1a1	Exch Na %	SAR
06N02986	0-12	Ap	S	2.5	1.6	0.3	0.6	--	3.7	--	0.7	tr	--	--	0.6	tr	0.1	56.3	--	0.52	0.28	--	tr
06N02987	12-27	Bt1	S																		0.24	--	
06N02988	27-48	Bt2	S																		0.19	tr	
06N02989	48-99	Btk	S																		0.18	1	
06N02990	99-125	Btkk1	S																		0.23	5	
06N02991	125-203	Btkk2	S	2.1	0.8	3.2	0.2	--	1.7	0.2	2.0	--	--	--	2.8	tr	tr	43.1	tr	0.72	0.29	2	3

pH & Carbonates													-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-
(- - - - - pH - - - - -) (- - Carbonate - -) (- - Gypsum - -)																							
Layer	Depth (cm)	Horz	Prep	KCl 4C1a2a	CaCl ₂ 0.01M 1:2 4C1a2a	H ₂ O 1:1 4C1a2a	Sat Paste 4F2	Oxid	NaF	As CaCO ₃ <2mm 4E1a1a1a1	As CaSO ₄ *2H ₂ O <20mm 4E1a1a1a1	Resist ohms cm ⁻¹											
06N02986	0-12	Ap	S		6.8	7.1	7.1																
06N02987	12-27	Bt1	S		7.3	7.6			tr														
06N02988	27-48	Bt2	S		7.5	7.8			tr														
06N02989	48-99	Btk	S		7.8	8.2			3														
06N02990	99-125	Btkk1	S		7.9	8.5			54														
06N02991	125-203	Btkk2	S		7.8	8.3	8.0		49														

Phosphorous				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	
				(------ Phosphorous -----)											KCl	
Layer	Depth (cm)	Horz	Prep	Melanolic Index	NZ	Acid Oxal	Anion Available	Exch Capacity	Resin	Bray 1	Bray 2	Olsen	H ₂ O	Citric Acid	Mehlich III	Extr NO ₃
				(------ mg kg ⁻¹ -----)												
				4D8a1	4G2											
06N02986	0-12	Ap	S	14	--											
06N02987	12-27	Bt1	S	18	82.2											
06N02988	27-48	Bt2	S	23	54.5											
06N02989	48-99	Btk	S	25	40.0											
06N02990	99-125	Btkk1	S	78	113.7											
06N02991	125-203	Btkk2	S	87	109.0											

Clay Mineralogy (<.002 mm)																	
		X-Ray	Thermal						Elemental					EGME	Inter		
								SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	MgO	CaO	K ₂ O	Na ₂ O	Retn	preta	
			7A1a1	((----- peak size-----)			((--- % ---))			((------ % -----))					mg g ⁻¹	tion	
Layer	Depth (cm)	Horz	Fract ion														
06N02986	0.0-12.0	Ap	tcly	MI 3	KK 2	QZ 1											CMIX
06N02988	27.0-48.0	Bt2	tcly	KK 2	QZ 1											CMIX	
06N02991	125.0-203.0	Btkk2	tcly	CA 3	MI 1	KK 1											CMIX

FRACTION INTERPRETATION:

tcly - Total Clay <0.002 mm

MINERAL INTERPRETATION:

CA Calcite KK Kaolinite MI Mica QZ Quartz

RELATIVE PEAK SIZE: 5 Very Large 4 Large 3 Medium 2 Small 1 Very Small 6 No Peaks

INTERPRETATION (BY HORIZON):

CMIX - Mixed Clay

Sand - Silt Mineralogy (2.0-0.002 mm)		-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	
Layer	Depth (cm)	Horz ion	Fract ion	X-Ray			Thermal			Tot Re	Optical						EGME Retn	Inter preta tion		
				(- - - - peak size - - - -)			(- - - - % - - - -)				Grain Count									
				(- - - - peak size - - - -)			(- - - - % - - - -)			7B1a2										
06N02987	12.0-27.0	Bt1	csi							89	QZ 83	FK 8	CD 3	OP 2	PR 2	FE 1				SMIX
											PO tr	TM tr	ZR tr	FP tr	GN tr	GS tr				
											HN tr	MS tr	AR tr	BT tr	BY tr	CB tr				

FRACTION INTERPRETATION:

csi - Coarse Silt 0.02-0.05 mm

MINERAL INTERPRETATION:

AR Weatherable Aggregates	BT Biotite	BY Beryl	CB Carbonate Aggregates	CD Chert (Chalcedony)
FE Iron Oxides (Goethite)	FK Potassium Feldspar	FP Plagioclase Feldspar	GN Garnet	GS Glass
HN Hornblende	MS Muscovite	OP Opaques	PO Plant Opal	PR Pyroxene
QZ Quartz	TM Tourmaline	ZR Zircon		

INTERPRETATION (BY HORIZON):

SMIX - Mixed Sand

Table A-2

Supplementary Characterization Data

*** Supplementary Characterization Data ***

Pedon ID: S2006TX069003

(Castro, Texas)

Sampled as on Mar 29, 2006:

Olton; Fine, mixed, superactive, thermic Calcic Haplustert

Revised to correlated:

Olton; Fine, mixed, superactive, thermic Aridic Paleustolls

		United States Department of Agriculture Natural Resources Conservation Service National Soil Survey Center Kellogg Soil Survey Laboratory Lincoln, Nebraska 68508-3866																											
SSL - Project		C2006USNL085 MLRA 77D																											
- Site ID		S2006TX069003 Lat: 34° 20' 54.50" north Long: 102° 10' 55.09" west MLRA: 77D																											
- Pedon No.		06N0716																											
- General Methods		1B1A, 2A1, 2B																											
Tier 1		-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-	-21-	-22-	-23-	-24-	-25-			
		Engineering PSDA										Cumulative Curve Fractions (<75mm)										Atter-		(Gradation)					
		Percentage Passing Sieve										USDA Less Than Diameters (mm) at										berg)		Uni- Cur-					
		Inches										Microns										Percentile		%---		CU CC			
Layer	Depth (cm)	Horz	Prep	3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10	LL	PI	fnty	vtur	
06N02986	0-12	Ap	S	100	100	100	100	100	100	100	100	100	99	80	46	37	32	100	100	98	87	70	0.03	0.024	tr			83.7	0.2
06N02987	12-27	Bt1	S	100	100	100	100	100	100	100	100	100	99	80	47	38	33	100	100	98	86	70	0.03	0.022	tr			83.7	0.2
06N02988	27-48	Bt2	S	100	100	100	100	100	100	100	100	100	100	81	53	44	39	100	100	98	87	73	0.03	0.013	tr			76.9	0.1
06N02989	48-99	Btk	S	100	100	100	100	100	100	100	100	99	98	77	48	41	37	99	99	96	84	69	0.03	0.022	tr			88.9	0.1
06N02990	99-125	Btkk1	S	100	100	100	100	100	99	98	96	95	82	64	49	40	96	96	94	86	76	0.01	0.005	tr			38.2	0.3	
06N02991	125-203	Btkk2	S	100	100	100	100	100	99	98	97	96	82	63	47	37	97	97	95	87	76	0.02	0.006	tr			41.0	0.3	

Tier 2				-26-	-27-	-28-	-29-	-30-	-31-	-32-	-33-	-34-	-35-	-36-	-37-	-38-	-39-	-40-	-41-	-42-	-43-	-44-	-45-	-46-	-47-	-48-	-49-	-50-		
				Weight Fractions													Weight Per Unit Volume (g cm ⁻³)										(--Void--)			
				Whole Soil (mm)										<75 mm Fraction					Whole Soil					<2 mm Fraction					Ratios	
				>2	250	250	75	75	20	5		75	75	20	5		Soil Sur	Engineering	Soil Survey		Engineering	At 33 kPa								
				-UP	-75	-2	-20	-5	-2	<2	-2	-20	-5	-2	<2	33	Oven	Moist	Satur	33	1500	Oven	Moist	Satur	Whole	<2				
Layer	Depth (cm)	Horz	Prep	----- % of Whole Soil -----										---- % of <75 mm ----					kPa	-dry		-ated	DbWR1	DbWR1		-ated	Soil	mm		
06N02986	0-12	Ap	S	--	--	--	--	--	100	--	--	--	--	100	1.27	1.52	1.59	1.79	1.27	1.41	1.52	1.59	1.79	1.09	1.09					
06N02987	12-27	Bt1	S	--	--	--	--	--	100	--	--	--	--	100	1.39	1.71	1.75	1.87	1.39	1.56	1.71	1.75	1.87	0.91	0.91					
06N02988	27-48	Bt2	S	--	--	--	--	--	100	--	--	--	--	100	1.39	1.73	1.77	1.87	1.39	1.56	1.73	1.76	1.87	0.91	0.91					
06N02989	48-99	Btk	S	1		1	--	tr	1	99	1	--	tr	1	99	1.49	1.75	1.83	1.93	1.48	1.59	1.74	1.82	1.92	0.78	0.79				
06N02990	99-125	Btkk1	S	4		4	tr	2	2	96	4	tr	2	2	96	1.46	1.53	1.78	1.91	1.43	1.47	1.50	1.76	1.89	0.82	0.85				
06N02991	125-203	Btkk2	S	3		3	--	2	1	97	3	--	2	1	97	1.51	1.64	1.78	1.94	1.50	1.57	1.63	1.78	1.93	0.75	0.77				

Tier 3				-51-	-52-	-53-	-54-	-55-	-56-	-57-	-58-	-59-	-60-	-61-	-62-	-63-	-64-	-65-	-66-	-67-	-68-	-69-	-70-	-71-	-72-	-73-	-74-	-75-							
				Volume Fractions													C (- - - - Ratios To Clay - - -) (- - Linear Extensibility - -) (- - -WRD - - -)																		
				Whole Soil (mm) At 33 kPa										/N					<2 mm Fraction					Whole Soil					<2 mm					Whole <2	
				>2	250	250	75	75	20	5		2-	.05-	LT	Pores		Rat	Fine	CEC	1500	LEP	33 kPa	1500	Oven	1500	Oven									
				-UP	-75	-2	-20	-5	-2	<2	.05	.002	.002	D	F	-io	Clay	Sum	NH ₄	kPa	33	1500	Oven	1500	Oven										
Layer	Depth (cm)	Horz	Prep	----- % of Whole Soil -----										Cats	OAC	H ₂ O	kPa	kPa	-dry	kPa	-dry	(--in ³ /in ³ --)													
06N02986	0-12	Ap	S	--	--	--	--	--	--	--	100	14	18	15	20	32	9	0.71	0.77		0.42	0.195	3.5	6.2	3.5	6.2	0.15	0.15							
06N02987	12-27	Bt1	S	--	--	--	--	--	--	--	100	16	19	17	12	36	7	0.77		0.43	0.220	3.9	7.2	3.9	7.2	0.16	0.16								
06N02988	27-48	Bt2	S	--	--	--	--	--	--	--	100	14	18	20	10	38	7	0.74		0.41	0.195	3.7	7.6	3.9	7.6	0.15	0.15								
06N02989	48-99	Btk	S	1	--	--	1	--	--	1	99	17	18	21	10	34	4	0.43		0.40	0.149	2.4	5.5	2.4	5.5	0.12	0.12								
06N02990	99-125	Btkk1	S	2	--	--	2	tr	1	1	98	11	20	22	13	32	5	0.23		0.23	0.039	0.9	1.6	0.9	1.6	0.19	0.19								
06N02991	125-203	Btkk2	S	1	--	--	2	--	1	1	99	12	23	21	16	27	5	0.25		0.25	0.073	1.5	2.8	1.5	2.8	0.13	0.14								

Tier 4				-76-	-77-	-78-	-79-	-80-	-81-	-82-	-83-	-84-	-85-	-86-	-87-	-88-	-89-	-90-	-91-	-92-	-93-	-94-	-95-	-96-	-97-	-98-
Layer	Depth (cm)	Horz	Prep	(- - - - - Weight Fractions - Clay Free - - - - -)														Text	PSDA (mm)			pH	Elect.		Part- icle Den- sity g cm ⁻³	
				(- - - - - Whole Soil - - - - -)							(- - - - - <2 mm Fraction - - - - -)								ure	Sand	Silt		Clay	Ca		Res- ist.
				>2	75	20	2-	.05-	<	(- - - - - Sands - - - - -)							(- - Silts -) Cl					PSDA			.05	
				-20	-2	.05	.002	.002	VC	C	M	F	VF	C	F	ay	<2 mm	(- - - - - % of 2 mm - - - - -)		(- - - - - <2 mm - - - - -)						
06N02986	0-12	Ap	S	--	--	--	44	56	47	--	tr	3	16	25	35	20	47	cl	30.3	37.9	31.8	6.8			0.52	
06N02987	12-27	Bt1	S	--	--	--	45	55	49	--	tr	3	17	25	33	22	49	cl	30.5	36.8	32.7	7.3				
06N02988	27-48	Bt2	S	--	--	--	44	56	64	--	--	3	19	23	33	23	64	cl	27.1	33.9	39.0	7.5				
06N02989	48-99	Btk	S	2	2	2	47	51	58	tr	tr	4	19	23	33	19	58	cl	30.1	33.0	36.9	7.8				
06N02990	99-125	Btkk1	S	7	7	7	33	61	66	tr	tr	3	13	18	22	43	70	c	20.6	38.1	41.3	7.9				
06N02991	125-203	Btkk2	S	5	5	5	33	62	59	tr	tr	3	14	18	22	43	62	cl	21.4	40.3	38.3	7.8			0.72	

Web Soil Survey

By Kenneth Scheffe and Soil Science Division Staff.

Soil Survey Maps and Map Products

Web Soil Survey (WSS) is the largest natural resource information delivery system in the world. It is the primary delivery mechanism for the maps and data of the National Cooperative Soil Survey and is operated by the USDA Natural Resources Conservation Service. Information can be displayed as maps (fig. A-2) or in tables. The user selects an area of interest on a map and then can view and print a soils map of the area. The user can also access additional soil data for the area. The mapping can be used for natural resource planning and management by landowners, townships, counties, and others. Some knowledge regarding soils data and map scale is necessary to avoid misunderstandings. WSS is updated and maintained as the single authoritative source of soil survey information.

The data system supporting WSS is the SSURGO (Soil Survey Geographic) database, which consists of spatial and tabular databases. SSURGO datasets consist of digital map data, tabular data, and information about how the maps and tables were created. The extent of a SSURGO dataset is a soil survey area, which may consist of a single county, multiple counties, or parts of multiple counties.

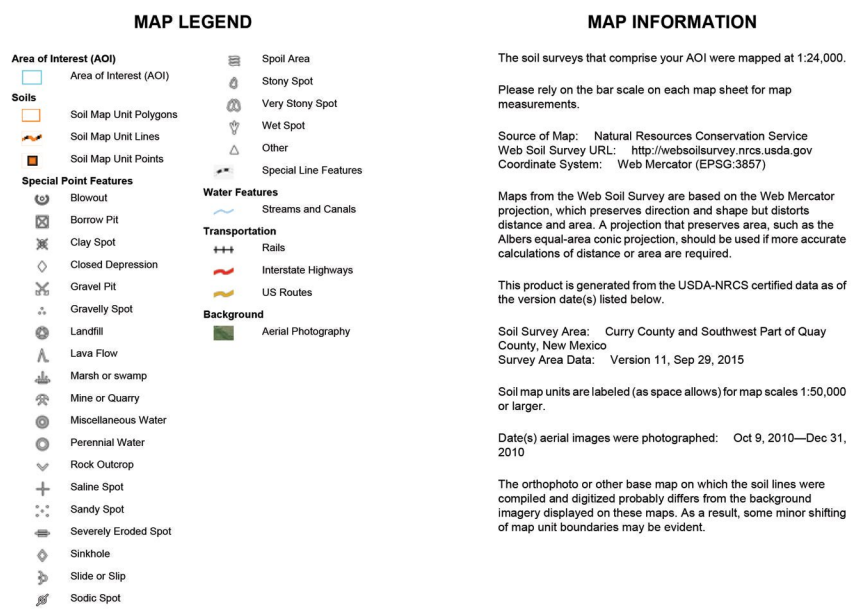
Soil maps generated in WSS show the soil map unit names and symbols. A legend of conventional and special symbols appearing on the soil maps (fig. A-3 and table A-3) is also generated. The maps are linked to information about the component soils and their properties for each map unit. Each map unit includes up to three major components and some minor components. Web Soil Survey allows map-based display and tabular data for: (1) soil properties and qualities, (2) interpretive ratings (suitabilities and limitations) for various uses, (3) soil reports, and (4) ecological site assessments.

Figure A-2



Soil map showing an area of interest on the Southern High Plains of western Texas and eastern New Mexico. The area is part of Major Land Resource Area 77C in Land Resource Area H. Note the distribution of map unit OcA (Olton clay loam, 0 to 1 percent slopes).

Figure A-3



The map legend and conventional symbols found on soil maps.

Table A-3**Map Unit Symbols and Names Displayed on the Soil Map for the Area of Interest**

Curry County and Southwest Part of Quay County, New Mexico (NM669)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AcA	Acuff loam, 0 to 1 percent slopes	1,052.6	17.5%
AcB	Acuff loam, 1 to 3 percent slopes	373.9	6.2%
AfA	Amarillo fine sandy loam, 0 to 1 percent slopes	28.6	0.5%
AfB	Amarillo fine sandy loam, 1 to 3 percent slopes	23.6	0.4%
BcA	Bippus clay loam, 0 to 2 percent slopes, occasionally flooded	25.5	0.4%
EsA	Estacado loam, 0 to 1 percent slopes	86.0	1.4%
EsB	Estacado loam, 1 to 3 percent slopes	137.6	2.3%
KmB	Kimberson gravelly loam, 0 to 3 percent slopes	80.6	1.3%
OcA	Olton clay loam, 0 to 1 percent slopes	4,083.0	67.8%
PsB	Posey fine sandy loam, 1 to 3 percent slopes	113.4	1.9%
RcA	Ranco clay, 0 to 1 percent slopes, frequently ponded	5.6	0.1%
SpA	Sparenberg clay, 0 to 1 percent slopes, occasionally ponded	10.8	0.2%
Totals for Area of Interest		6,021.1	100.0%

Soil properties and qualities are presented as aggregate values or classes that were measured, observed, or estimated for each soil component of map units in the survey area. A broad array of physical and chemical properties, as well as soil qualities and features (such as depth, drainage class, and hydrologic soil group) are displayed on a thematic map and in tabular format.

Suitabilities and limitations are soil ratings for various uses, such as agricultural production, engineering, urban development, and waste and water management. Tables list the properties or qualities that limit a soil's suitability for given uses. The interpretations are displayed as thematic maps with a summary table for the soil map units in the selected area of interest.

For each map unit, a single value or rating is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation. Aggregation

is the process by which a set of component values is reduced to a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation is necessary because map units are delineated but individual components are not. For each component in a map unit, a corresponding percent composition is recorded. For example, a percent composition of 60 indicates that the corresponding component typically makes up approximately 60 percent of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods. Table A-4 lists the various aggregation methods.

Soil reports include various formatted tabular and narrative reports (tables) containing data for each soil map unit in the selected area of interest and for each component of each soil map unit. The reports contain soil interpretive information as well as basic soil properties and qualities,

Table A-4

Aggregation Methods

[These methods determine the attribute value for thematic maps of soil properties and interpretative ratings in WSS.]

Method	Description
Dominant Condition	Groups components in a map unit based on like-values for the attribute. For each group, percent composition becomes the sum of the percent composition of all components in the group. These groups therefore represent conditions rather than components. If more than one group shares the highest percent composition, a corresponding tie-breaker rule determines which value is returned.
Dominant Component	Returns the attribute value associated with the component that has the highest percent composition in the map unit. If more than one component shares the highest percent composition, a corresponding tie-breaker rule determines which value is returned.
Most Limiting	Suitable only for attributes used to generate a soil suitability rating for a particular use. The most limiting result among all components of the map unit is returned. This method may or may not represent the dominant condition. The result may be based on the limitations of a map unit component of minor extent.

Table A-4.—continued

Method	Description
Least Limiting	Suitable only for attributes used to generate a soil suitability rating for a particular use. The least limiting result among all components of the map unit is returned. This method may or may not represent the dominant condition. The result may be based on the limitations of a map unit component of minor extent.
Weighted Average	Computes a weighted average of the value for all components in the map unit. Percent composition is the weighting factor.
All Components	Returns the lowest or highest attribute value among all components of the map unit, depending on the corresponding tie-breaker rule. In this case, the tie-breaker rule indicates whether the lowest or highest value among all components is returned. For this aggregation method, percent composition ties cannot occur. The result returned represents either the minimum or the maximum value of the corresponding attribute throughout the map unit. The result may be based on a map unit component of minor extent.
Absence/ Presence	Returns a value, for all components of a map unit, that indicates if a condition is always present, never present, or partially present or whether the condition's presence or absence is unknown.
No Aggregation Necessary	Although the majority of soil attributes are associated with a component of a map unit, some are associated with a map unit as a whole. An attribute of a map unit does not have to be aggregated in order to render a corresponding thematic map. Therefore, the "aggregation method" for any attribute of a map unit is referred to as No Aggregation Necessary.
Component Percent Cutoff	Components whose percent composition is below the cutoff value are not considered. If no cutoff value is specified, all components in the database are considered.
Tie-Break Rule	Indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Table A-4.—continued	
Method	Description
Interpret Nulls as Zero	Indicates if a null value for a component should be converted to zero before aggregation. This conversion is done only for map units that have at least one component for which the attribute value is not null.
Layer Options	For an attribute of a soil horizon, a fixed depth range must be specified. Either centimeters or inches may be used, but the bottom depth must be greater than the top depth. The top depth can be greater than zero. When “Surface Layer” is specified, only the surface layer or horizon is used to derive a value for a component. When “All Layers” is specified, all layers recorded for a component are considered when deriving the value for that component. Whenever more than one layer or horizon is considered, a weighted average value is returned based upon layer or horizon thickness.
Month Range	For an attribute that is recorded by month, a range of months must be specified.

but do not require aggregation of data. Soil reports are organized by category, such as “Recreational Development.” A description of each report (table) is available.

Examples of Maps and Reports

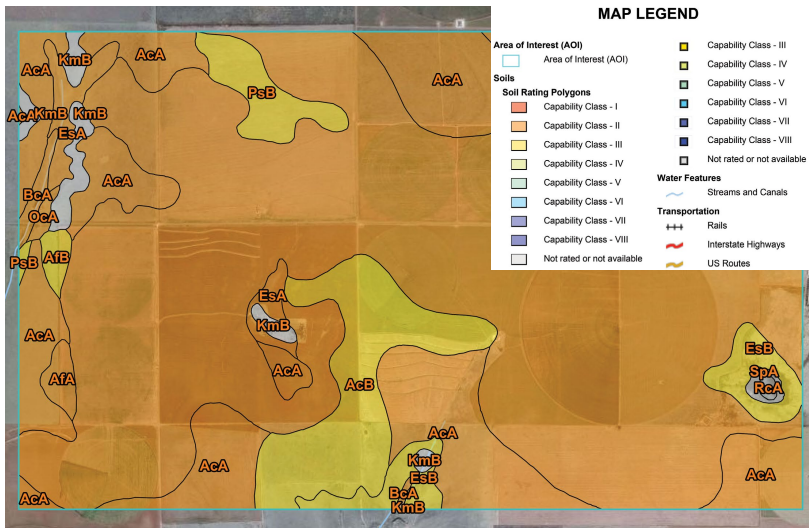
The following pages demonstrate a few of the many maps that can be generated in Web Soil Survey with the full integration of spatial and tabular databases. Over 100 thematic maps for various suitability or limitation ratings have been developed as well as almost 50 thematic maps of soil properties and qualities. Each thematic map includes a tabular report by map unit and component for the thematic data. In addition, over 60 tabular reports of various combinations of soil interpretations, properties, and features can be generated.

Land Capability Class

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops (fig. A-4). Crops that require special

management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

Figure A-4



Map showing land capability class.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use.

Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

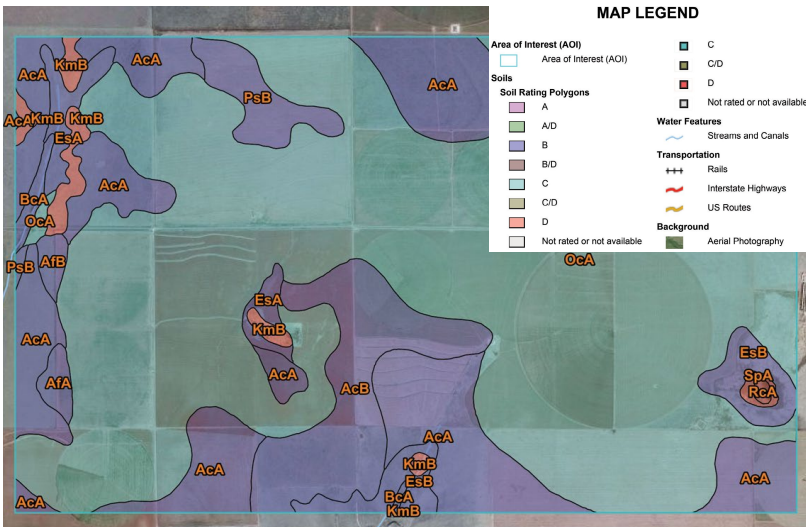
Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential (fig. A-5). Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long duration storms. The soils in the United States are assigned to four groups (A, B, C, and D)

Figure A-5



Map showing hydrologic soil groups. Soils in group A are most permeable and soils in group D least permeable. Dual classes (e.g., C/D) indicate hydrological soil groups for both the drained and undrained conditions.

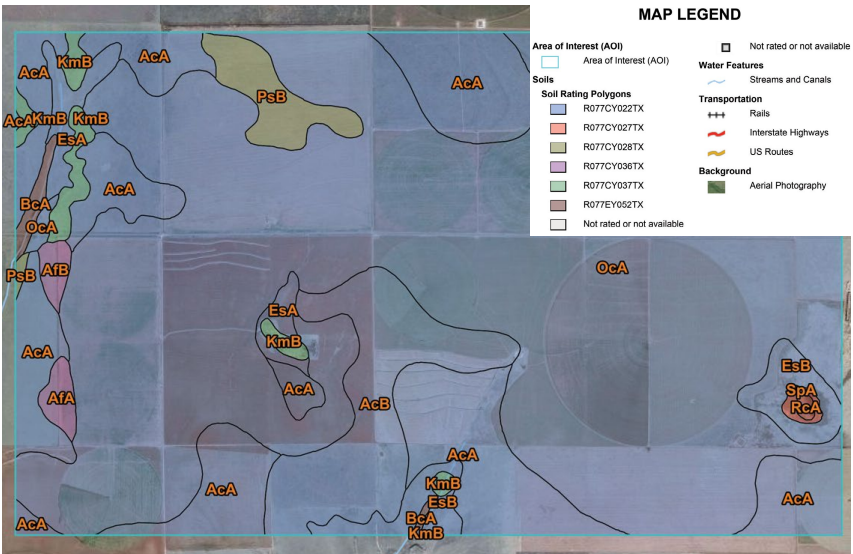
and three dual classes (A/D, B/D, and C/D) where the first letter is for drained areas and the second is for undrained areas. Only the soils that are in group D in their natural condition are assigned dual classes.

Ecological Site Assessments

Ecological site assessments document the ecological conditions and plant communities correlated to components of the soil map units. They provide maps (fig. A-6), descriptions, tables, illustrations, and photographs (fig. A-7). They include information on species composition, annual production, and growth curves and a state-and-transition diagram (fig. A-8).

An ecological site is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. For example, the hydrology of the site is influenced by development of the soil and plant community.

Figure A-6



Map showing ecological sites. The dominant ecological site is Deep Hardland, 16-21'' PZ (R077CY022TX).

Figure A-7

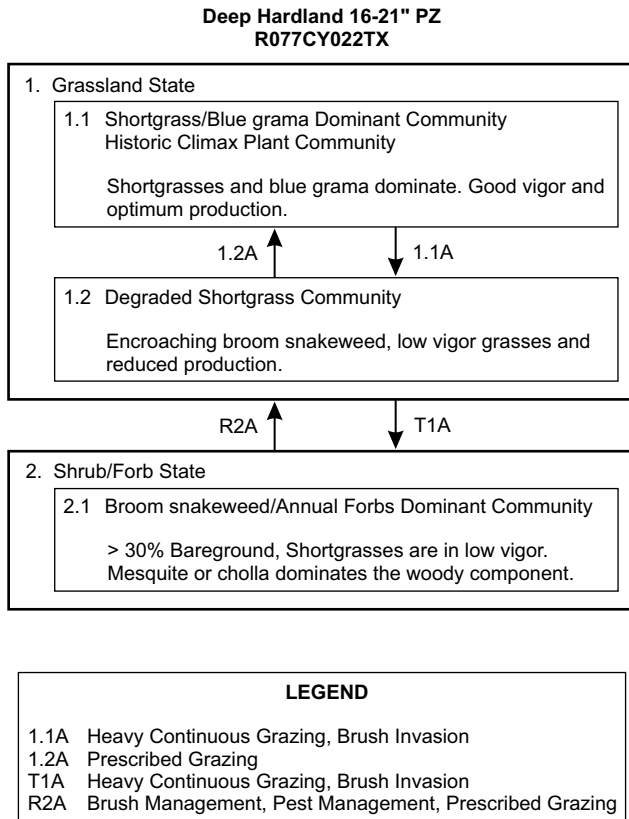
Shortgrass/blue gramma dominant community of the Deep Hardland ecological site (R077CY022TX).

The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production.

An ecological site name provides a general description of a particular ecological site. For example, “Loamy Upland” is the name of a rangeland ecological site. An ecological site ID is the symbol assigned to a particular ecological site.

The “Dominant Ecological Site” map identifies the dominant ecological site for each map unit, aggregated by dominant condition. Other ecological sites may occur within each map unit. Each map unit typically consists of one or more components (soils and/or miscellaneous areas). Each soil component is associated with an ecological site. Miscellaneous areas, such as Rock outcrop, Sand dunes, and Badlands, have little or no soil material and support little or no vegetation. These areas are not linked to an ecological site. The table “Ecological Sites by Map Unit Component” lists all of the ecological sites for each map unit component in the area of interest.

Figure A-8



State-and-transition model showing pathways and causes of change in the plant communities.

Engineering Properties

Table A-5 gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area. Included are hydrologic soil group, USDA texture, Unified and AASHTO classification, coarse fragments, percent of soil passing standard sieves, liquid limit, and plasticity index.

Soil Chemical Properties

Table A-6 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Table A-5

Engineering Properties and Classifications

Map unit symbol and soil name	Pct. of map unit	Hydro-logic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>L-R-H</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	

AcA—Acuff loam, 0 to 1 percent slopes

Acuff	85	B	0-12	Loam	CL, CL-ML	A-4, A-6	0-0-0	0-0-0	100-100-100	100-100-100	90-99-100	51-60-68	24-35-39	6-13-19
			12-38	Clay loam, sandy clay loam, loam	CL	A-6, A-7-6	0-0-0	0-0-0	100-100-100	100-100-100	91-98-100	55-63-67	31-40-45	13-19-22
			38-58	Clay loam, sandy clay loam	CL, SM	A-6, A-7-6	0-0-0	0-0-0	90-93-97	80-87-95	73-85-95	45-54-67	27-35-45	5-14-24
			58-80	Clay loam, sandy clay loam, loam	CL, SC	A-6, A-7-6	0-0-0	0-0-0	93-96-99	86-91-98	78-89-98	45-55-69	27-37-48	8-17-27

AcB—Acuff loam, 1 to 3 percent slopes

Acuff	85	B	0-12	Loam	CL	A-6, A-4, A-7-6	0-0-0	0-0-0	100-100-100	100-100-100	90-98-100	60-67-74	27-36-43	8-13-19
			12-38	Clay loam, sandy clay loam, loam	CL	A-6, A-7-6	0-0-0	0-0-0	100-100-100	100-100-100	91-98-100	55-63-67	31-40-45	13-19-22
			38-58	Clay loam, sandy clay loam	CL, SM	A-6, A-4, A-7-6	0-0-0	0-0-0	90-93-97	80-87-95	73-85-95	45-54-67	27-35-45	5-14-24
			58-80	Clay loam, sandy clay loam, loam	CL, SC	A-6, A-4, A-7-6	0-0-0	0-0-0	93-96-99	86-91-98	78-89-98	45-55-69	27-37-48	8-17-27

Table A-6**Soil Chemical Properties**

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
AcA—Acuff loam, 0 to 1 percent slopes								
Acuff	0-12	9.0-23	—	6.6-7.8	0	0	0.0-2.0	0-1
	12-38	16-25	—	6.6-8.4	0-2	0	0.0-2.0	0
	38-58	8.4-11	—	7.9-9.0	40-65	0	0.0-2.0	0-1
	58-80	14-20	—	7.9-8.4	15-70	0	0.0-2.0	0-1
AcB—Acuff loam, 1 to 3 percent slopes								
Acuff	0-12	11-23	—	6.6-7.8	0	0	0.0-2.0	0-1
	12-38	16-25	—	6.6-8.4	0-2	0	0.0-2.0	0-1
	38-58	8.4-11	—	7.9-9.0	40-65	0	0.0-2.0	0-1
	58-80	14-20	—	7.9-8.4	15-50	0	0.0-2.0	0-1
AfA—Amarillo fine sandy loam, 0 to 1 percent slopes								
Amarillo	0-10	8.6-17	—	6.6-8.4	0	0	0.0-2.0	0-1
	10-41	16-27	—	7.4-8.4	0-3	0	0.0-2.0	0-1
	41-56	9.6-13	—	7.9-9.0	40-65	0	0.0-2.0	0-1
	56-80	12-19	—	7.9-8.4	15-50	0	0.0-2.0	0-1

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