



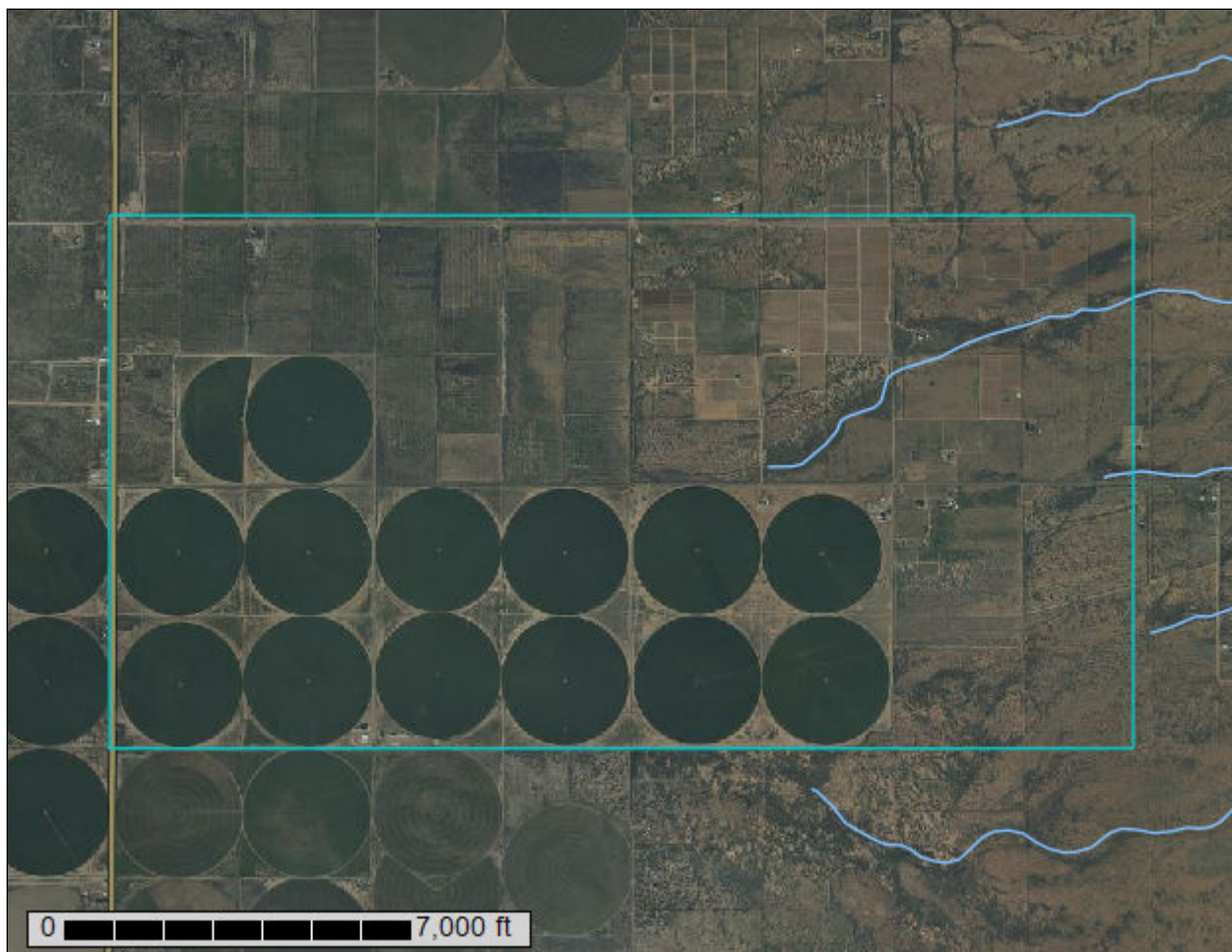
United States
Department of
Agriculture

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 Willcox Area, Arizona Parts of Cochise and Graham Counties



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

Preface	2
How Soil Surveys Are Made	5
Soil Map	8
Soil Map (Az Map AOI).....	9
Legend.....	10
Map Unit Legend (Az Map AOI).....	11
Map Unit Descriptions (Az Map AOI).....	11
Willcox Area, Arizona Parts of Cochise and Graham Counties.....	14
Cc—Cogswell clay loam.....	14
Cg—Cogswell clay.....	15
CmA—Comoro sandy loam, 0 to 2 percent slopes.....	16
Cs—Cowan sandy loam.....	17
Ef—Elfrida silty clay loam.....	18
Gr—Grabe sandy loam.....	19
Gs—Grabe loam.....	20
Ka—Karro loam.....	21
Mc—McAllister loam.....	22
Pm—Pima loam.....	23
SnA—Sonoita sandy loam, 0 to 2 percent slopes.....	24
To—Torrifluvents.....	25
TuA—Tubac sandy loam, 0 to 2 percent slopes.....	25
TwA—Tubac sandy clay loam, 0 to 2 percent slopes.....	26
References	28

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

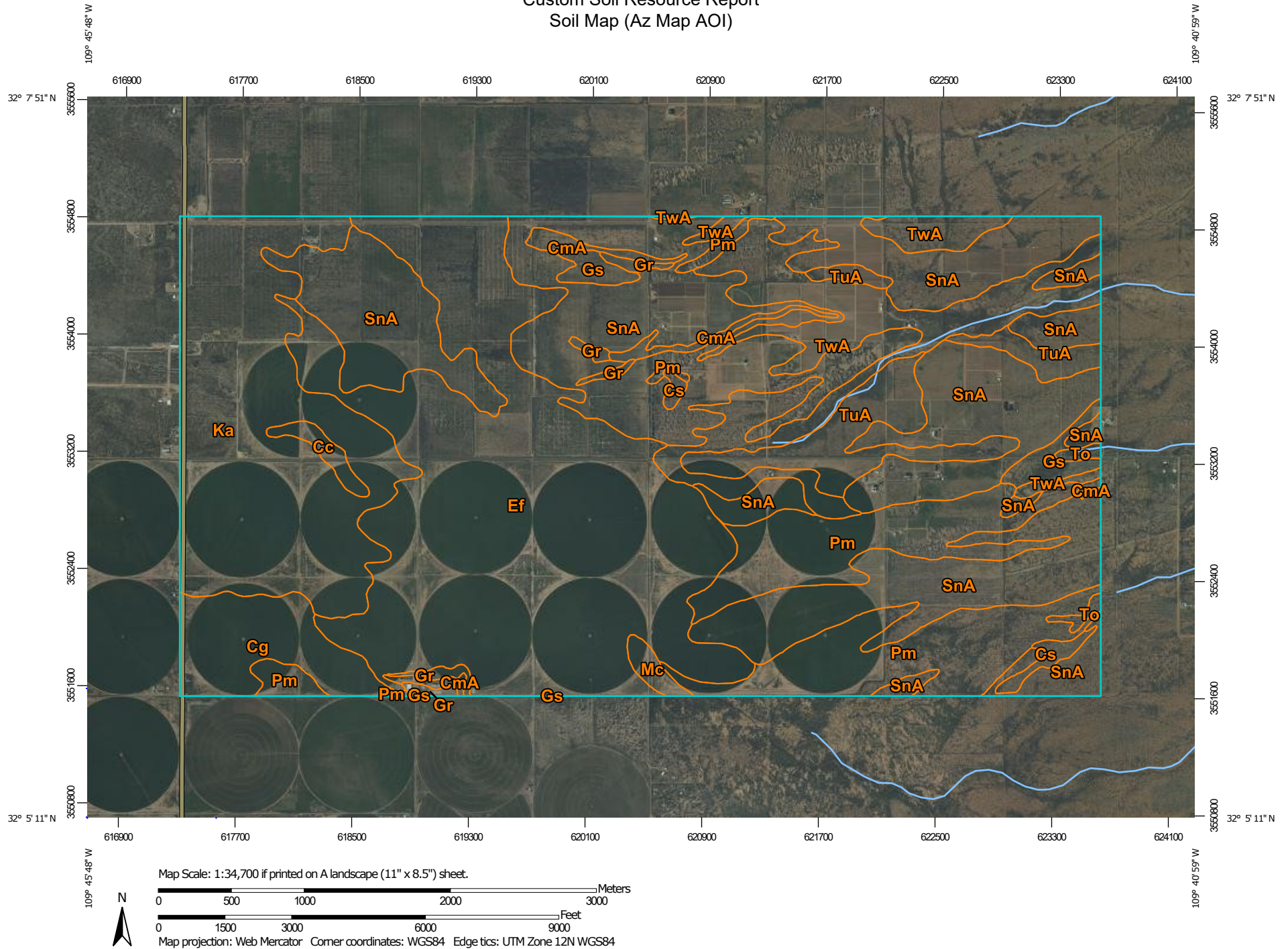
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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

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 (Az Map AOI)



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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.

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: Willcox Area, Arizona Parts of Cochise and Graham Counties

Survey Area Data: Version 16, Aug 29, 2022

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

Date(s) aerial images were photographed: Feb 13, 2020—Feb 15, 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 (Az Map AOI)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Cc	Cogswell clay loam	22.9	0.4%
Cg	Cogswell clay	171.7	3.3%
CmA	Comoro sandy loam, 0 to 2 percent slopes	45.6	0.9%
Cs	Cowan sandy loam	23.1	0.5%
Ef	Elfrida silty clay loam	1,313.9	25.6%
Gr	Grabe sandy loam	29.8	0.6%
Gs	Grabe loam	54.1	1.1%
Ka	Karro loam	709.7	13.8%
Mc	McAllister loam	18.8	0.4%
Pm	Pima loam	515.6	10.1%
SnA	Sonoita sandy loam, 0 to 2 percent slopes	1,590.2	31.0%
To	Torrifluvents	13.4	0.3%
TuA	Tubac sandy loam, 0 to 2 percent slopes	205.6	4.0%
TwA	Tubac sandy clay loam, 0 to 2 percent slopes	415.0	8.1%
Totals for Area of Interest		5,130.1	100.0%

Map Unit Descriptions (Az Map AOI)

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.

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

Willcox Area, Arizona Parts of Cochise and Graham Counties

Cc—Cogswell clay loam

Map Unit Setting

National map unit symbol: 1sw4
Elevation: 4,200 to 4,500 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F
Frost-free period: 180 to 230 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Cogswell and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cogswell

Setting

Landform: Terraces, swales
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, flat
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed alluvium

Typical profile

Ap - 0 to 12 inches: clay loam
A - 12 to 26 inches: clay
Btk - 26 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 1 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 low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: R041XC315AZ - Saline Bottom 12-16" p.z.
Hydric soil rating: No

Cg—Cogswell clay

Map Unit Setting

National map unit symbol: 1sw6
Elevation: 4,100 to 4,500 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F
Frost-free period: 180 to 230 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Cogswell and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cogswell

Setting

Landform: Swales, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, dip
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed alluvium

Typical profile

Ap - 0 to 12 inches: clay
A - 12 to 26 inches: clay
Btk - 26 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 1 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 low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: R041XC315AZ - Saline Bottom 12-16" p.z.
Hydric soil rating: No

CmA—Comoro sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1sw7
Elevation: 4,200 to 4,600 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F
Frost-free period: 180 to 230 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Comoro and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Comoro

Setting

Landform: Flood plains, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

A - 0 to 37 inches: sandy loam
C - 37 to 60 inches: stratified gravelly loamy sand to silt loam

Properties and qualities

Slope: 0 to 2 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): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: R041XC318AZ - Sandy Loam 12-16" p.z. Deep
Hydric soil rating: No

Cs—Cowan sandy loam

Map Unit Setting

National map unit symbol: 1swc

Elevation: 4,200 to 4,500 feet

Mean annual precipitation: 12 to 16 inches

Mean annual air temperature: 60 to 67 degrees F

Frost-free period: 180 to 230 days

Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Cowan and similar soils: 100 percent

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

Description of Cowan

Setting

Landform: Flood plains, terraces

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread, dip

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium

Typical profile

A - 0 to 23 inches: sandy loam

C - 23 to 56 inches: loamy sand

Properties and qualities

Slope: 0 to 1 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 (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 15 percent

Gypsum, maximum content: 2 percent

Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)

Sodium adsorption ratio, maximum: 13.0

Available water supply, 0 to 60 inches: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): 3s

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A

Ecological site: R041XC318AZ - Sandy Loam 12-16" p.z. Deep

Hydric soil rating: No

Ef—Elfrida silty clay loam

Map Unit Setting

National map unit symbol: 1swj

Elevation: 4,000 to 4,300 feet

Mean annual precipitation: 12 to 16 inches

Mean annual air temperature: 60 to 67 degrees F

Frost-free period: 180 to 230 days

Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Elfrida and similar soils: 100 percent

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

Description of Elfrida

Setting

Landform: Terraces, plains, flood plains

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread, dip

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Mixed alluvium

Typical profile

A - 0 to 22 inches: silty clay loam

Bk1 - 22 to 33 inches: loam

Bk2 - 33 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 1 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 (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 content: 10 percent

Gypsum, maximum content: 2 percent

Maximum salinity: Strongly saline (16.0 to 32.0 mmhos/cm)

Sodium adsorption ratio, maximum: 13.0

Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): 1

Land capability classification (nonirrigated): 6c

Hydrologic Soil Group: C

Ecological site: R041XC320AZ - Limy Fan 12-16" p.z.

Hydric soil rating: No

Gr—Grabe sandy loam

Map Unit Setting

National map unit symbol: 1swq

Elevation: 4,200 to 4,600 feet

Mean annual precipitation: 12 to 16 inches

Mean annual air temperature: 60 to 67 degrees F

Frost-free period: 180 to 230 days

Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Grabe and similar soils: 100 percent

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

Description of Grabe

Setting

Landform: Terraces, flood plains

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread, dip

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Mixed alluvium

Typical profile

A1 - 0 to 12 inches: sandy loam

A2 - 12 to 30 inches: loam

C - 30 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): 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 content: 15 percent

Gypsum, maximum content: 2 percent

Maximum salinity: Strongly saline (16.0 to 32.0 mmhos/cm)

Sodium adsorption ratio, maximum: 13.0

Available water supply, 0 to 60 inches: Moderate (about 6.7 inches)

Interpretive groups

Land capability classification (irrigated): 1

Land capability classification (nonirrigated): 6c

Hydrologic Soil Group: C

Custom Soil Resource Report

Ecological site: R041XC311AZ - Loamy Swale 12-16" p.z.

Hydric soil rating: No

Gs—Grabe loam

Map Unit Setting

National map unit symbol: 1swr

Elevation: 4,200 to 4,600 feet

Mean annual precipitation: 12 to 16 inches

Mean annual air temperature: 60 to 67 degrees F

Frost-free period: 180 to 230 days

Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Grabe and similar soils: 100 percent

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

Description of Grabe

Setting

Landform: Flood plains, terraces

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread, dip

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Mixed alluvium

Typical profile

A1 - 0 to 10 inches: loam

A2 - 10 to 30 inches: loam

C - 30 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 1 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 (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 content: 15 percent

Gypsum, maximum content: 2 percent

Maximum salinity: Strongly saline (16.0 to 32.0 mmhos/cm)

Sodium adsorption ratio, maximum: 13.0

Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): 1

Land capability classification (nonirrigated): 6c

Custom Soil Resource Report

Hydrologic Soil Group: C

Ecological site: R041XC311AZ - Loamy Swale 12-16" p.z.

Hydric soil rating: No

Ka—Karro loam

Map Unit Setting

National map unit symbol: 1swv

Elevation: 4,100 to 4,300 feet

Mean annual precipitation: 12 to 16 inches

Mean annual air temperature: 60 to 67 degrees F

Frost-free period: 180 to 230 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Karro and similar soils: 100 percent

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

Description of Karro

Setting

Landform: Plains, terraces

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Mixed alluvium

Typical profile

A - 0 to 15 inches: loam

Bk - 15 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 1 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 (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 content: 80 percent

Gypsum, maximum content: 5 percent

Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Sodium adsorption ratio, maximum: 15.0

Available water supply, 0 to 60 inches: Moderate (about 7.9 inches)

Interpretive groups

Land capability classification (irrigated): 2s

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C

Custom Soil Resource Report

Ecological site: R041XC309AZ - Limy Upland 12-16" p.z.
Hydric soil rating: No

Mc—McAllister loam

Map Unit Setting

National map unit symbol: 1sx0
Elevation: 4,100 to 4,300 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F
Frost-free period: 180 to 230 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Mcallister and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mcallister

Setting

Landform: Valleys, plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed alluvium

Typical profile

Ap - 0 to 12 inches: loam
Bt - 12 to 47 inches: clay loam
Bk - 47 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 1 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 low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: C
Ecological site: R041XC320AZ - Limy Fan 12-16" p.z.

Hydric soil rating: No

Pm—Pima loam

Map Unit Setting

National map unit symbol: 1s2

Elevation: 4,100 to 4,600 feet

Mean annual precipitation: 12 to 16 inches

Mean annual air temperature: 60 to 67 degrees F

Frost-free period: 180 to 230 days

Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Pima and similar soils: 100 percent

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

Description of Pima

Setting

Landform: Flood plains, terraces

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread, dip

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Mixed alluvium

Typical profile

Ap1 - 0 to 4 inches: loam

Ap2 - 4 to 30 inches: stratified clay loam to silty clay loam

C - 30 to 60 inches: loam

Properties and qualities

Slope: 0 to 1 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 (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 content: 5 percent

Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Sodium adsorption ratio, maximum: 5.0

Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): 1

Land capability classification (nonirrigated): 6c

Hydrologic Soil Group: C

Ecological site: R041XC311AZ - Loamy Swale 12-16" p.z.

Hydric soil rating: No

SnA—Sonoita sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1sx4

Elevation: 4,200 to 4,600 feet

Mean annual precipitation: 12 to 16 inches

Mean annual air temperature: 60 to 67 degrees F

Frost-free period: 180 to 230 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Sonoita and similar soils: 100 percent

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

Description of Sonoita

Setting

Landform: Alluvial fans, valleys

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Mixed alluvium derived from igneous rock

Typical profile

A - 0 to 9 inches: sandy loam

Bt - 9 to 53 inches: sandy loam

C - 53 to 60 inches: very gravelly sand

Properties and qualities

Slope: 0 to 2 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): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): 2s

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: A

Ecological site: R041XC318AZ - Sandy Loam 12-16" p.z. Deep

Hydric soil rating: No

To—Torrifluvents

Map Unit Setting

National map unit symbol: 1sx8
Elevation: 4,100 to 4,600 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F
Frost-free period: 180 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Torrifluvents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Torrifluvents

Setting

Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Depth to water table: More than 80 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Ecological site: R041XC317AZ - Sandy Bottom, Woodland 12-16" p.z.
Hydric soil rating: No

TuA—Tubac sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1sxb
Elevation: 4,200 to 4,600 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F
Frost-free period: 180 to 230 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Tubac and similar soils: 100 percent

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

Description of Tubac

Setting

Landform: Alluvial fans, valleys

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Mixed alluvium derived from igneous rock

Typical profile

A - 0 to 16 inches: sandy loam

Bt1 - 16 to 40 inches: sandy clay

Bt2 - 40 to 60 inches: gravelly sandy clay loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 15 percent

Gypsum, maximum content: 1 percent

Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Sodium adsorption ratio, maximum: 12.0

Available water supply, 0 to 60 inches: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): 3s

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C

Ecological site: R041XC319AZ - Sandy Loam Upland 12-16" p.z.

Hydric soil rating: No

TwA—Tubac sandy clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1sxd

Elevation: 4,200 to 4,600 feet

Mean annual precipitation: 12 to 16 inches

Mean annual air temperature: 60 to 67 degrees F

Frost-free period: 180 to 230 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Tubac and similar soils: 100 percent

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

Description of Tubac

Setting

Landform: Alluvial fans, valleys

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Mixed alluvium derived from igneous rock

Typical profile

A - 0 to 16 inches: sandy clay loam

Bt1 - 16 to 40 inches: sandy clay

Bt2 - 40 to 60 inches: gravelly sandy clay loam

Properties and qualities

Slope: 0 to 2 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 low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 15 percent

Gypsum, maximum content: 1 percent

Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Sodium adsorption ratio, maximum: 12.0

Available water supply, 0 to 60 inches: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): 3s

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C

Ecological site: R041XC305AZ - Clay Loam Upland 12-16" p.z.

Hydric soil rating: No

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelpdb1043084>

Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf