

**Make the Most of Your Water
by
Making the Most of Your Soil**

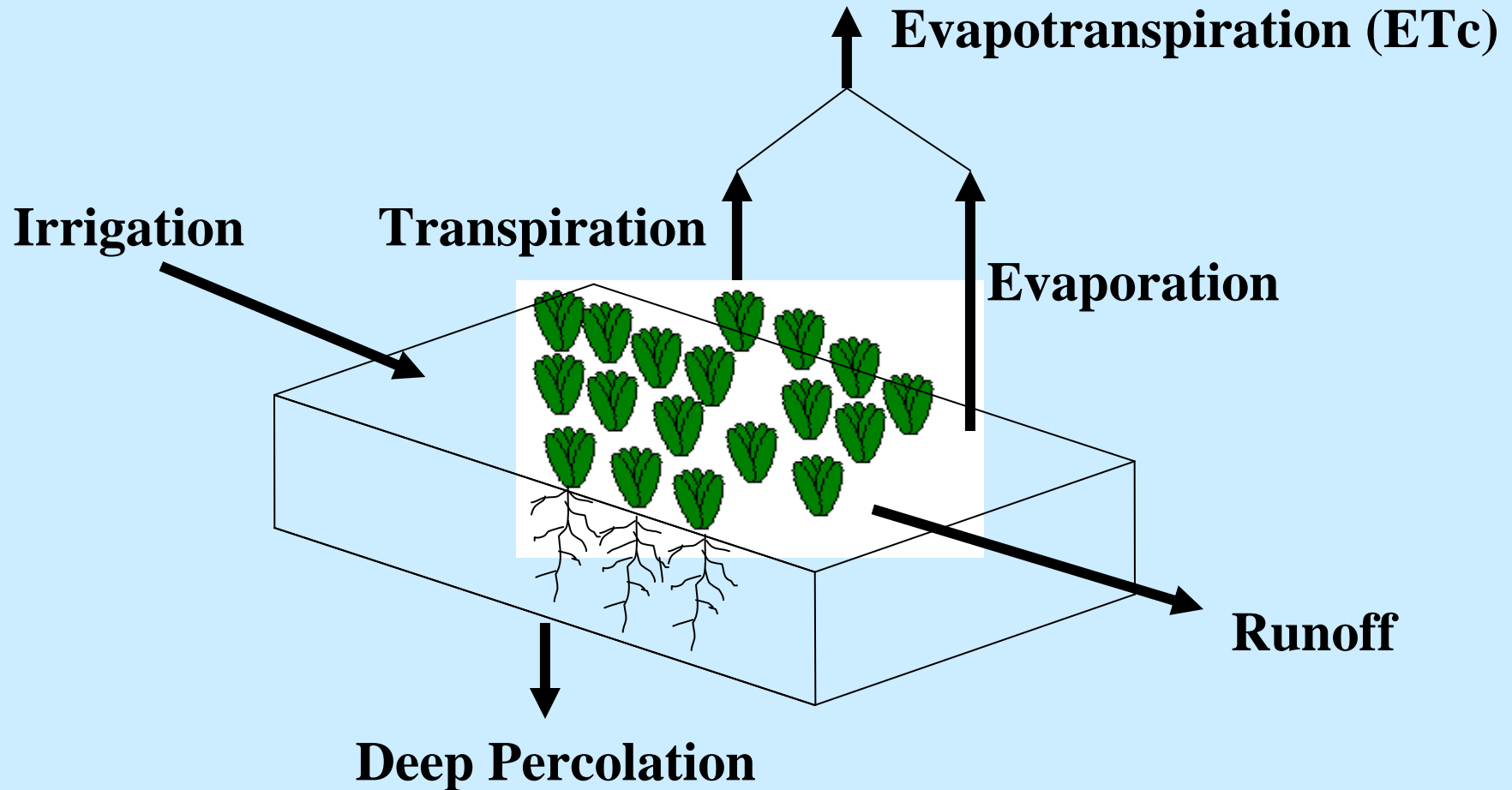
Irrigation Management Based on Your Soil

What you **need to know** about your soil.

How to **Get data** for your soil.

Calculate how much **water to apply**.

Irrigation Water Destinations



Soil Is Like An Irrigation Pond

Minimize Losses To:

Evaporation

Tail-water

Perched Water Table
on restrictive layer

Deep Percolation



You need to know:

Rooting Depth

Infiltration Rate

Available Water Holding Capacity

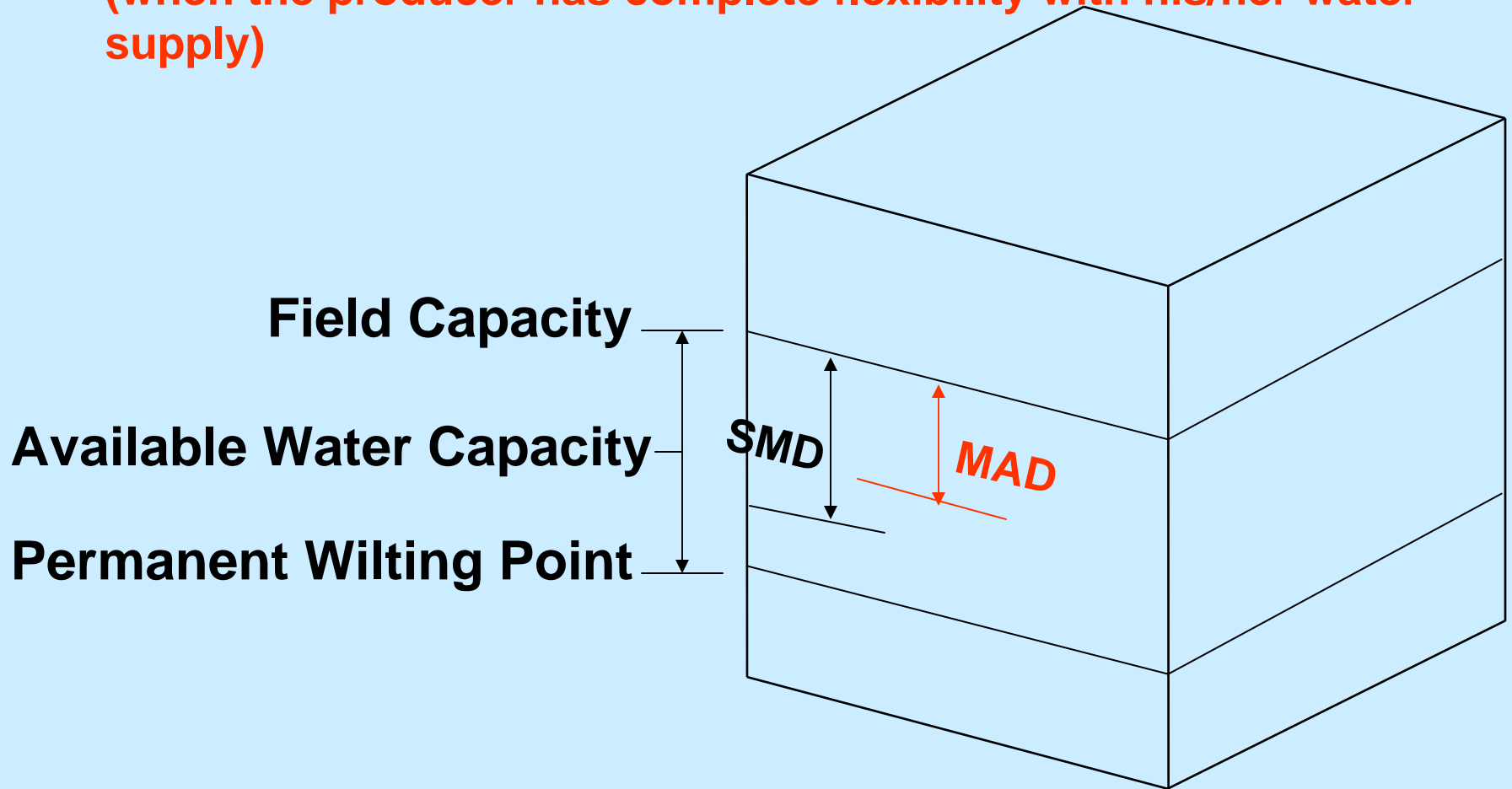
Soil Moisture Depletion

Management Allowed Depletion

Soil Moisture Depletion

Management Allowed Depletion

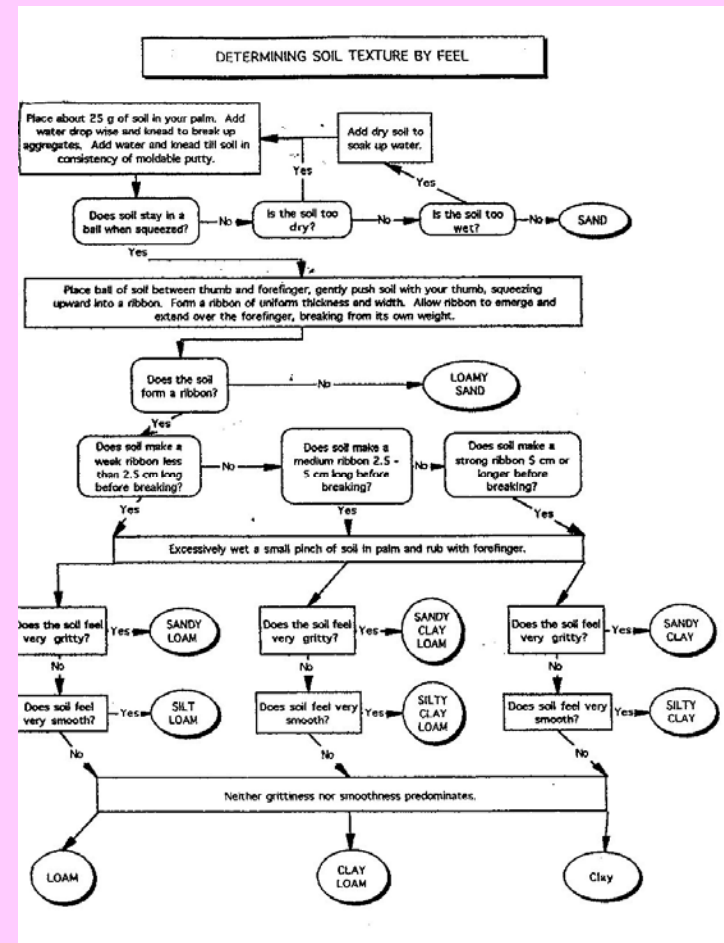
(when the producer has complete flexibility with his/her water supply)



Get It Yourself



Soil Texture By Feel



Get It On-line Web Soil Survey

<http://websoilsurvey.nrcs.usda.gov>

[http://websoilsurvey.nrcs.usda
.gov](http://websoilsurvey.nrcs.usda.gov)

Home Page


Web Soil Survey - Home - Microsoft Internet Explorer

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Back Forward Stop Home Search Favorites Refresh Print Mail Print Preview

Address <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm> Go Links

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Natural Resources Conservation Service

Web Soil Survey

Home About Soils Help Contact Us

You are here: Web Soil Survey Home

Search


Enter Keywords

All NRCS Sites


Browse by Subject

- ▶ Soils Home
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- ▶ Official Soil Series Descriptions (OSD)
- ▶ Soil Series Extent Mapping Tool
- ▶ Soil Data Mart
- ▶ Geospatial Data Gateway
- ▶ eFOTG
- ▶ National Soil Characterization Data

The simple yet powerful way to access and use soil data.



Welcome to Web Soil Survey (WSS)



Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site is updated and maintained online as the single authoritative source of soil survey information.

Three Basic Steps

- 1 Define.
Area of Interest (AOI) Use the **Area of Interest** tab to define your area of interest.

I Want To...

- Start Web Soil Survey (WSS)
- Know the requirements for running Web Soil Survey
- Know whether Web Soil Survey works in my web browser
- Know the Web Soil Survey hours of operation
- Find what areas of the U.S. have soil data

Announcements/Events

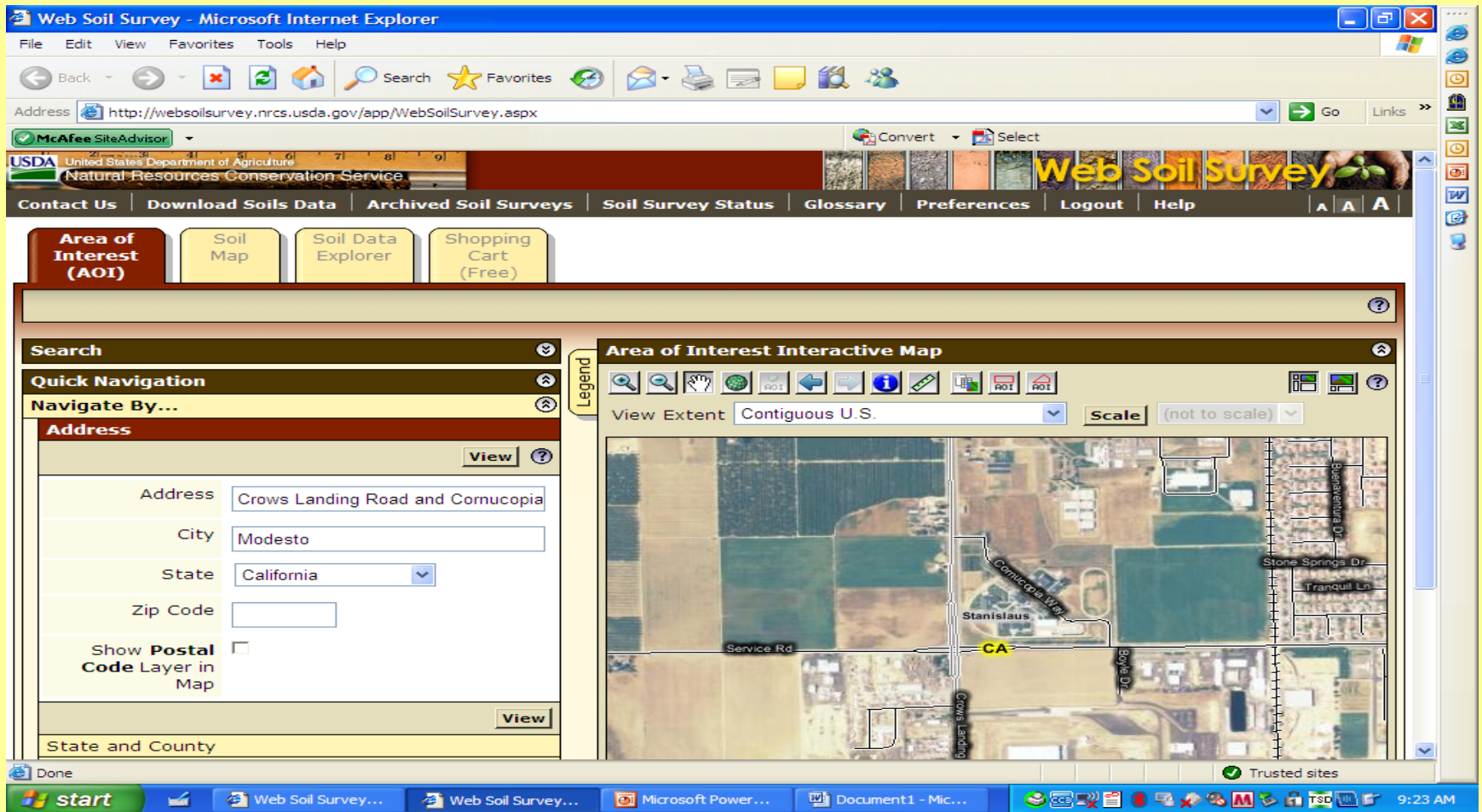
- Web Soil Survey 2.2.2 Has Been Released!
- Web Soil Survey Release History

I Want Help With...

Trusted sites

start Web Soil Survey - Ho... Microsoft PowerPoint ... 9:10 AM

Address



Area of Interest (AOI)

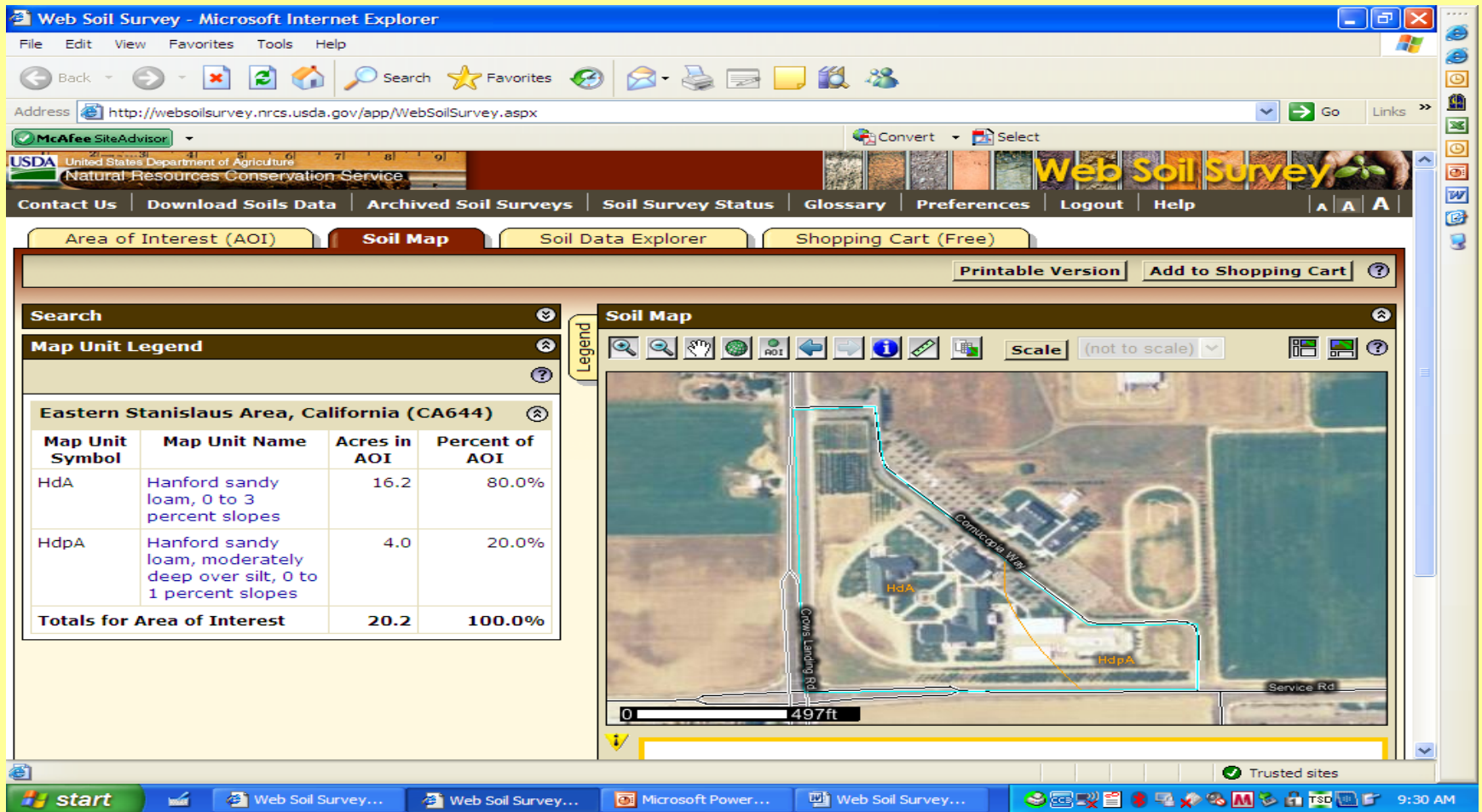
The screenshot displays the Web Soil Survey interface within a Microsoft Internet Explorer browser window. The address bar shows the URL: <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>. The page features a navigation bar with links: Contact Us, Download Soils Data, Archived Soil Surveys, Soil Survey Status, Glossary, Preferences, Logout, and Help. Below this, there are four main tabs: Area of Interest (AOI), Soil Map, Soil Data Explorer, and Shopping Cart (Free). The AOI tab is currently selected.

The main content area is divided into two sections. On the left, the "Search" section includes "Area of Interest Properties" with a "Clear AOI" button. Below this, the "AOI Information" section contains a "Name" field, "Map Unit Symbols" (with radio buttons for "Use Soil Survey Area Map Unit Symbols" and "Use National Map Unit Symbols"), and "Area (acres)" set to 20.5. The "Soil Data Available from Web Soil Survey" section lists "Eastern Stanislaus Area, California (CA644)" with "Soil Maps" (Version 2, Mar 24, 2006) and "Soil Data" (Version 5, Jul 22, 2009). A "Clear AOI" button is also present at the bottom of this section.

On the right, the "Area of Interest Interactive Map" section shows a map of the Stanislaus area in California. The map is overlaid with a blue dashed line indicating the selected Area of Interest. The map includes labels for "Stanislaus", "Cross Landing Rd", "Service Rd", and "CA". The "View Extent" is set to "Contiguous U.S." and the "Scale" is set to "(not to scale)".

The Windows taskbar at the bottom shows the Start button and several open applications: Web Soil Survey..., Microsoft Power..., and Document1 - Mic... The system clock indicates the time is 9:27 AM.

Soil Map



Report — Physical Soil Properties

Eastern Stanislaus Area, California

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>
HdA—Hanford sandy loam, 0 to 3 percent slopes									
Hanford	0-12	-68-	-20-	7-13-18	1.50-1.60	14.00-42.00	0.11-0.13	0.0-2.9	0.5-1.0
	12-60	-68-	-20-	7-13-18	1.50-1.60	14.00-42.00	0.12-0.15	0.0-2.9	0.0-0.5
HdpA—Hanford sandy loam, moderately deep over silt, 0 to 1 percent slopes									
Hanford	0-12	-68-	-20-	7-13-18	1.50-1.60	14.00-42.00	0.11-0.13	0.0-2.9	0.5-1.0
	12-36	-68-	-20-	7-13-18	1.50-1.60	14.00-42.00	0.12-0.15	0.0-2.9	0.0-0.5
	36-60	-21-	-55-	20-25-30	1.45-1.55	1.40-4.00	0.15-0.18	0.0-2.9	0.0-0.5

Shopping Cart

Web Soil Survey - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx> Go Links

McAfee SiteAdvisor Convert Select

USDA United States Department of Agriculture
Natural Resources Conservation Service

Web Soil Survey

Contact Us Download Soils Data Archived Soil Surveys Soil Survey Status Glossary Preferences Logout Help

Area of Interest (AOI) Soil Map Soil Data Explorer **Shopping Cart (Free)**

Check Out ?

Search

Report Properties

Title

Title Custom Soil Resource Report for Eastern Stanislaus Area, California

Subtitle

☐ Area of Interest Name: (none defined)

☒ Custom Subtitle:
Stanislaus Ag Center

☐ None

Size

Total Size 919 KB (0.9 MB)

Map Options

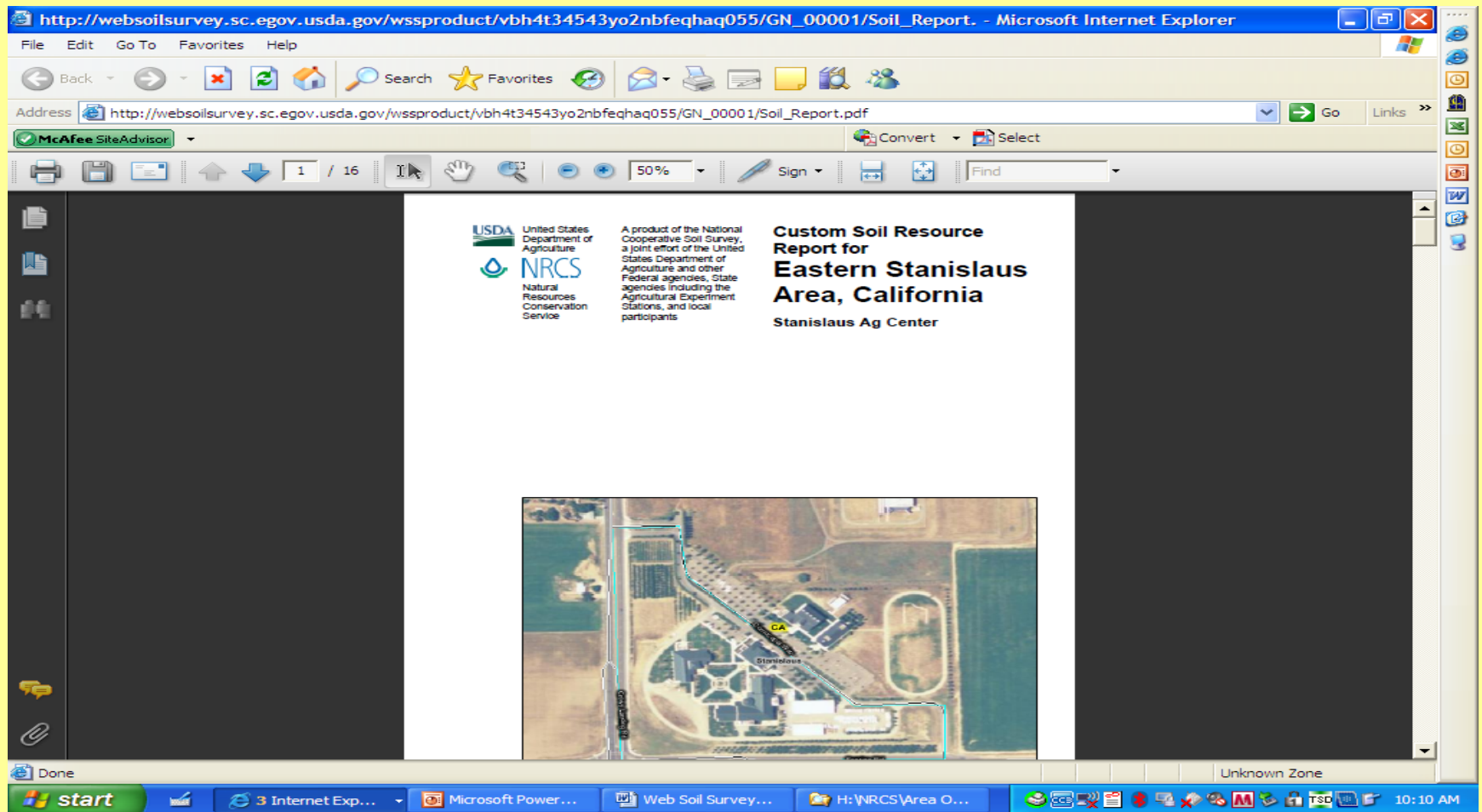
Map Scale Automatic

Printed Sheet Size A (8.5" x 11") — 1 sheet

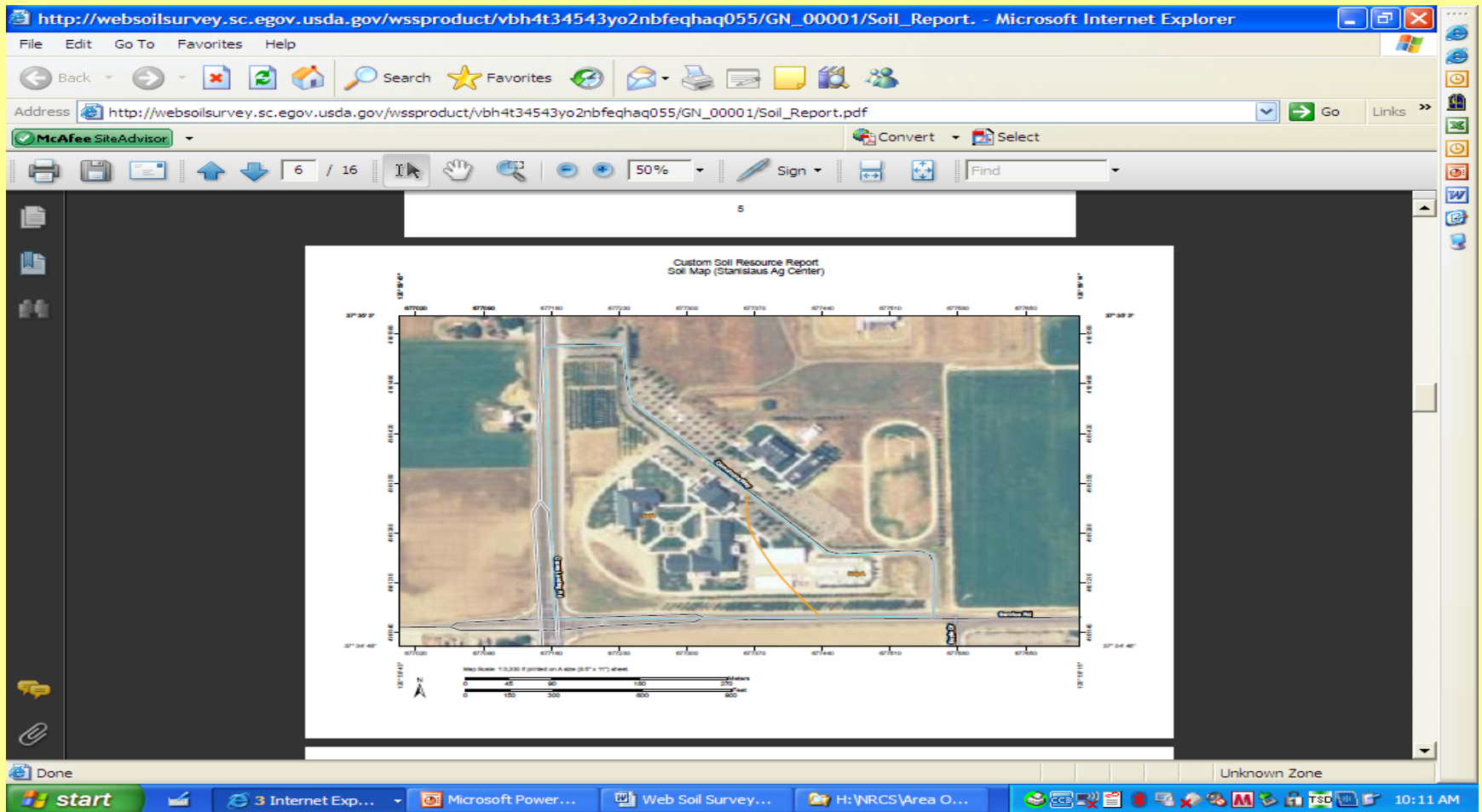
Done Trusted sites

start 2 Internet Exp... Microsoft Power... Web Soil Survey... H:\NRCS\Area O... 10:08 AM

Custom Report: Cover



Custom Report: Soil Map



Custom Report: Map Unit Description

The screenshot shows a Microsoft Internet Explorer window with the address bar displaying http://websoilsurvey.sc.egov.usda.gov/wssproduct/vbh4t34543yo2nbfeqhaq055/GN_00001/Soil_Report.pdf. The browser's toolbar includes a McAfee SiteAdvisor icon, navigation buttons (Back, Forward, Home, Search, Favorites), and a status bar at the bottom showing 'Done' and 'Unknown Zone'.

The main content area displays a 'Custom Soil Resource Report' for the 'Eastern Stanislaus Area, California'. The report details the 'HdA—Hanford sandy loam, 0 to 3 percent slopes' map unit. It includes sections for 'Map Unit Setting' (Elevation: 150 to 900 feet, Mean annual precipitation: 10 to 20 inches, Mean annual air temperature: 63 degrees F, Frost-free period: 250 to 280 days), 'Map Unit Composition' (Hanford and similar soils: 85 percent, Minor components: 15 percent), 'Description of Hanford' (Setting: Alluvial fans, Landform position (two-dimensional): Toeslope, Landform position (three-dimensional): Tail, Down-slope shape: Linear, Across-slope shape: Linear, Parent material: Alluvium derived from igneous rock), 'Properties and qualities' (Slope: 0 to 3 percent, Depth to restrictive feature: More than 80 inches, Drainage class: Well drained, 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, Available water capacity: Moderate (about 8.1 inches)), 'Interpretive groups' (Land capability classification (irrigated): 1, Land capability (nonirrigated): 4c), 'Typical profile' (0 to 12 inches: Sandy loam, 12 to 80 inches: Sandy loam), and 'Minor Components' (Tujunga: 5 percent, Grangeville: 5 percent, Dinuba: 5 percent).

Custom Report: Soil Chemical Properties w/ Salinity

Web Soil Survey - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>

McAfee SiteAdvisor

You have zoomed in beyond the scale at which the soil map for this area is intended to be used. Mapping of soils is done at a particular surveys that comprise your AOI were mapped at 1:24,000. The design of map units and the level of detail shown in the resulting soil ma that map scale.

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

Report — Chemical Soil Properties

Eastern Stanislaus Area, California

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>
HdA—Hanford sandy loam, 0 to 3 percent slopes							
Hanford	0-12	5.0-10	—	6.1-7.8	0	0	0
	12-60	5.0-10	—	6.1-7.8	0	0	0
HdpA—Hanford sandy loam, moderately deep over silt, 0 to 1 percent slopes							
Hanford	0-12	5.0-10	—	6.1-7.8	0	0	0
	12-36	5.0-10	—	6.1-7.8	0	0	0
	36-60	10-15	—	6.1-7.8	0	0	0

Description — Chemical Soil Properties

Chemical Soil Properties

This table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of ea

Done Trusted sites

start Internet Exp... Microsoft Power... Web Soil Survey... H:\NRCs\Area O...

10:20 AM

Custom Report: Physical Soil Properties Table

http://websoilsurvey.sc.egov.usda.gov/wssproduct/vbh4t34543yo2nbfeqhaq055/GN_00001/Soil_Report. - Microsoft Internet Explorer

File Edit Go To Favorites Help

Address http://websoilsurvey.sc.egov.usda.gov/wssproduct/vbh4t34543yo2nbfeqhaq055/GN_00001/Soil_Report.pdf

McAfee SiteAdvisor Convert Select

16 / 16 50% Sign Find

15

Custom Soil Resource Report

Physical Soil Properties-- Eastern Stanislaus Area, California

Map symbol and soil name	Depth	Sand	Silt	Clay	Molal bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
	in	Pct	Pct	Pct	g/cc	micro m/sec	%in	Pct	Pct	Kw	Kf	T		
Hidalgo-Hanford sandy loam, 0 to 3 percent slopes														
Hanford	0-12	-66-	-20-	7-13- 18	1.50-1.80	14.00-42.00	0.11-0.13	0.0-2.9	0.5-1.0	32	32	5	3	88
	12-40	-66-	-20-	7-13- 18	1.50-1.80	14.00-42.00	0.12-0.15	0.0-2.9	0.0-0.5	32	32			
Hidalgo-Hanford sandy loam, moderately deep over silt, 0 to 1 percent slopes														
Hanford	0-12	-66-	-20-	7-13- 18	1.50-1.80	14.00-42.00	0.11-0.13	0.0-2.9	0.5-1.0	32	32	5	3	88
	12-36	-66-	-20-	7-13- 18	1.50-1.80	14.00-42.00	0.12-0.15	0.0-2.9	0.0-0.5	32	32			
	36-60	-21-	-05-	20-25- 30	1.45-1.55	1.40-4.00	0.15-0.18	0.0-2.9	0.0-0.5	49	49			

16

Unknown Zone

start 3 Internet Exp... Microsoft Power... Web Soil Survey... H:\WRCS\Area O... 10:13 AM

Get Soil Moisture by Feel and Appearance

Appearance of fine sand and loamy fine sand soils at various soil moisture conditions.

Available Water Capacity **0.6-1.2 inches/foot**

Percent Available: Currently available soil moisture as a percent of available water capacity.

In/ft. Depleted: Inches of water currently needed to refill a foot of soil to field capacity.

0-25 percent available
1.2-0.5 in./ft. depleted

Dry, loose, will hold together if not disturbed, loose sand grains on fingers with applied pressure. (Not pictured)



25-50 percent available
0.9-0.3 in./ft. depleted

Slightly moist, forms a very weak ball with well-defined finger mark



50-75 percent available
0.6-0.2 in./ft. depleted

Moist, forms a weak ball with loose and aggregated sand grains on fingers, darkened color, moderate water staining on fingers, will not ribbon.



75-100 percent available
0.3-0.0 in./ft. depleted

Wet, forms a weak ball, loose and aggregated sand grains remain on fingers, darkened color, heavy water staining on fingers, will not ribbon

Field Form for Soil Data

Sample Depth (inches)	Layer Thickness (feet)	Texture Name	Salinity (dS/m)	Available Water Holding Capacity (AWC) (inches/foot)	Cumulative AWC (feet)	Soil Moisture Deficit (SMD) (inches/foot)	Cumulative SMD (feet)
6	1						
12	1						
30	1						
42	1						
54	1						

Write Down Your Soil Data

Determine Available Water Holding Capacity (AWC) of your soil:
Hanford sandy loam

Soil Texture	Texture Depth (inches)	Layer Thickness (inches)	AWC (in. water/ in. soil)	Total AWC (inches)	Infiltration Rate (Ksat) mm/sec in/hr	
sandy loam	0-12	12	0.12	1.44	14-42	2-6
sandy loam	12-60	48	0.13	6.48	14-42	2-6
Total Rooting Depth: 60			Total = 9.33			

How Much Water to Apply

Crop: **Trees**

Potential Root Zone: **60** inches

Effective Rooting (Upper 1/2 of maximum root zone): **30** inches

Zone of 90% of the roots by weight, and supplying 70% of the water.

Available Water Holding Capacity (AWC): $9.33/2 = 4.67$ inches

Management Allowed Depletion (MAD): **50 % = 0.5**. Inches required = **0.5**

* **4.67** AWC (inches) = **2.33**.

Lettuce: 25%

Alfalfa hay: 50%

Trees: 50%

Application Efficiency (AE): **80 % = 0.8**

Level border or furrow: 60-80%

Sprinkler (solid set): 70-85%

Micro spray: 85-90%

Net Inches Required **2.33**

Gross Inches = $\frac{\text{Net Inches Required}}{\text{AE}} = \frac{2.33}{0.8} = 2.91$

When Salt Is an Issue

EC_e = Salinity of the Soil (dS/m) = **4.0**

EC_{iw} = Salinity of Irrigation Water (dS/m) = **2**

$$\text{Leaching Requirement (LR)} = \frac{EC_{iw}}{(5 \times EC_e) - EC_{iw}} = \frac{2}{(5 \times 4.0) - 2} = 0.11$$

Net Inches Required **2.33**

$$\text{Gross Inches} = \frac{\text{Net Inches Required}}{(1 - LR)(AE)} = \frac{2.33}{(1 - 0.11)(0.8)} = 3.69$$



United States Department of Agriculture
Natural Resources Conservation Service