IRRIGATION WATER MANAGEMENT PLAN

DATE:	February 23, 2009
COOPERATOR:	I. M. Sample
LOCATION:	Sample Farm, Sample County
FIELD NUMBERS:	1 (see attached maps)
CROP:	Soybeans
GROWING SEASON:	April 15 – August 30
ROOTING DEPTH:	24 in
PEAK CONSUMPTIVE USE RATE:	0.25 in/day
IRRIGATION SYSTEM:	Center pivot (360 degree) - 1990' span length, End Gun Radius = 98' and 122 gpm, Total Acres – 315, Pivot pressure = 45 psi, Capacity = 1900 GPM, 6.04 GPM/Acre, 40 ft highest elev, 0.0 lowest elevation.
WATER SUPPLY:	Well
PREDOMINANT SOIL SERIES:	Loring Silt Loam, Adler

Sample

OBJECTIVE

A well designed and managed irrigation system reduces water loss to evaporation, deep percolation, and runoff and minimizes erosion from applied water. Application of this plan will reduce the waste of irrigation water, improve water use efficiency, and reduce the total pollutant discharge from an irrigation system. It focuses on components to manage the timing, amount and location of water applied to match crop water needs, and special precautions (i.e., backflow preventers, prevent runoff, and control deep percolation) when chemigation is used.

IRRIGATION WATER MANAGEMENT PLAN ACCEPTANCE

I/we have reviewed and do accept the attached plan. I/we agree to implement this plan for the life of the practice, including the attached Operation and Maintenance Plan for the crop year identified in the plan. I/we recognize that this is a management plan that should be reviewed and updated annually, with the help of a qualified technical specialist.

Landowner Signed: ________________________________ Date: ______________

Developed by: ____________________________________ Date: ______________

Tech Reg Cert. No.__________

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Cooperator: I M Sample Field No. _1_ Location: Irrigate Farm

CURRENT MANAGEMENT PRACTICE: None

RECOMMENDATIONS:

The most important aspect of irrigation water management is properly evaluating and monitoring the available soil moisture for the particular crop. By observing moisture levels in the soil, the operator can determine how long and how much water to apply. The landowner will be using one of the following methods to evaluate moisture. Use of tensiometers, electrical resistance blocks, neutron gauge, or feel and appearance methods are acceptable. See attached feel and appearance worksheets.

Sample

The system is designed to meet peak consumptive use for soybeans on **315** acres.

Moisture should always be available above the Management Allowable Depletion (MAD) level for the planned crops. MAD is defined as 50% of available water capacity in the root zone. The critical period for soybeans is pod filling and for corn is from tasseling through silk stage until the kernels become firm for corn. As part of this plan, the soil moisture will be checked and recorded to determine how much irrigation water should be applied for each irrigation.

For planned crop yield, irrigation should commence when the available soil moisture drops below the MAD. See Table 1 for how long to operate the system for various rooting depths and a MAD of 50%.

The irrigation system should be checked periodically to ensure proper operation of the pump, pipeline and sprinklers. No puddling or runoff should occur in the system. A visual inspection should be performed during operation to determine if any puddling or other irrigation-induced erosion is occurring. If so, increase the speed of the center pivot and the frequency of irrigation until no erosion occurs.

Table 2 provided by manufacture is used to determine the time required per revolution, gross application and net application for various dial settings.

Table 3 provides a sample of irrigation scheduling records to keep for monitoring soil moisture and depletion levels. If there is change in the soil moisture monitoring method or irrigation method, contact the NRCS field office. Additional records to keep are listed in Summary section.

Cooperator: I M Sample   Field No. 1   Location: Irrigate Farm

TABLE 1

Operating Times for Various Rooting Depths and 50%MAD

Crop	Rooting Depth (inches)	[1/] AWC (in)	[2/] MAD (in)	[3/] Gross Application Irrigation (in)	Critical Irrigation Period	Gross Application Amount per revolution (in)	[4/] Dial Setting	[4/] Time per Run (hours)	[5/]Net Application Amount (in)	[6/] No. of Runs to achieve Gross
Soybean	24”	5.3	2.65	2.65	Pod growth and seed fill	0.7	31.1	52.4	0.6	4

Sample

[1/] *Available Water Capacity within the root zone (AWC).*
[2/] *Management Allowable Depletion (MAD)*
[3/] *Application depth necessary to replace water used by crop at 50% MAD assuming an application efficiency of 85%*
[4/] *Calculated from manufacturer’s data. This should be re-calculated after checkout or evaluation. Also, divide by 2 for half circle pivots*
[5/] *Refer to manufacturer’s data (pivot application chart)*
[6/] ***Irrigation water should be applied so as not to puddle or runoff. In most cases it will take more than 1 revolution to accomplish gross application amount when moisture level in soil is depleted to 50%.***

TABLE 2

Pivot information provided by manufacture

Gross Application inches per 360 degrees (in.)	Pivot % Timer	Hours per 360 degrees
0.218	100.0	16.3
0.30	72.5	22.5
0.40	54.4	30.0
0.50	43.5	37.5
0.60	36.3	44.9
0.70	31.1	52.4
0.80	27.2	59.9
0.90	24.2	67.4
1.0	21.8	74.8
1.25	17.4	93.7

Cooperator: I M Sample Field No. _1_ Location: Irrigate Farm

TABLE 3

Format for estimating the net amount of water needed for an irrigation using the feel and appearance method to measure soil moisture.

1	2	3	4	5	6
Depth	**Soil Series _Lexington_**	**Available Water Capacity**	**Soil Water Content Before Irrigation**		**Soil Water deficiency**
feet	**texture**	**inches**	**percent**	**inches**	**inches**
0-1	Silt Loam	2.64			
1-2	Silt Loam	2.64			
Total		5.28			

Sample

Column 1, the depth increment sampled.

Column 2, the soil texture of the sample.

Column 3, the available water capacity based on the texture of the sample.

Column 4, the percent of soil water content (remaining)

- 0-25% - AWC - Dry, loose, will hold together if not disturbed, loose sand grains on fingers with applied pressure.
- 25-50% - AWC - Slightly moist, forms a very weak ball with well-defined finger marks, light coating of loose and aggregated sand grains remains on fingers.
- 50-75% - AWC - Moist, forms a weak ball with loose and aggregated sand grains, darkened color, moderate water staining on fingers, will not ribbon.
- 75-100% - AWC - Wet, forms a weak ball, loose and aggregated sand grains remain on fingers, darkened color, heavy water staining on fingers, will not ribbon.
- 100% - AWC - Wet, forms a weak ball, moderate to heavy soil/water coatings on fingers, wet outline of soft ball remains on hand.

Column 5, Column 3 x Column 4, the soil-moisture balance, inches.

Column 6, Column 3 - Column 5, soil-moisture deficiency or net irrigation requirement.

See the United States Department of Agriculture, Natural Resource Conservation Service, *Estimating Soil Moisture by Feel and Appearance* (Program Aid 1619) at the end of this section.

Cooperator: I M Sample　　Field No. 1　　Location: Irrigate Farm

Summary

Irrigation water management is the process of determining and controlling the volume, frequency, and application rate of irrigation water in a planned, efficient manner. The intent of this plan is to assist the irrigation manager to meet the following goals: manage soil moisture to promote the desired crop response, optimize use of available water supplies, decrease non-point source pollution of surface and groundwater resources, and manage air, soil, and plant micro-climates.

At a minimum, irrigation water management for crop production will consist of monitoring soil moisture to determine the timing of irrigations through the growing season, and developing an understanding of irrigation system performance to determine the duration of irrigations. In order to implement proper irrigation water management, the following records will be kept during the growing season on a daily or weekly basis (information in excel spreadsheet MOIST available at http://bioengr.ag.utk.edu/weather/):

Sample

Date	Actual Daily crop ET (in)	Forecast crop ET (in)	Cumulative total ET (in)	Rainfall (in)	Irrigation applied (in)	Cumulative total irrigation (in)	Soil water content (in)	Allowable depletion balance (in)

Table 1 summarizes the benchmark conditions and typical or recommended operating conditions for your irrigation system. Use this information to determine the duration of irrigations. Additional information is included in the *Operations and Maintenance* plan to assist you in determining when to irrigate.

Additional Requirements:

Operation and Maintenance Plan

System Maintenance

A properly operated, maintained, and managed irrigation system is an asset to your farm. Your system was designed and installed to apply irrigation water to meet the needs of the crop without causing erosion, runoff, or losses to deep percolation. The estimated life span of a new system is 15 years. The life of the system can be assured and usually increased by carrying out a good operation and maintenance program.

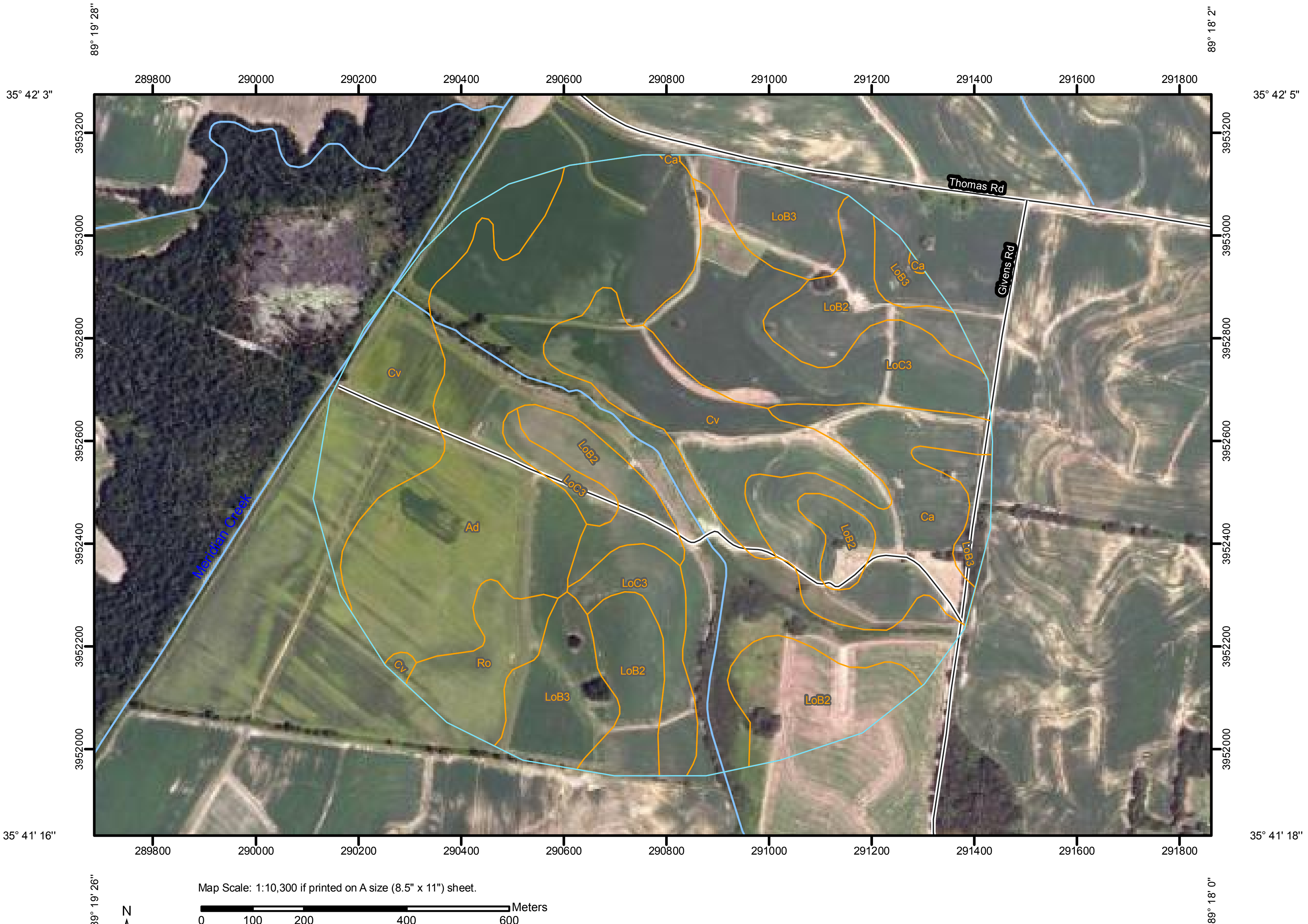
Sample

Operate and maintain the system to the specifications as designed, including those listed on the *Table1* of this plan. Consult the proper technical specialist and NRCS before making changes to these specifications.

Make sure that all measuring devices, valves, nozzle heads, surface pipeline, and other mechanical parts of the system are checked periodically, and worn or damaged parts are repaired or replaced as needed. Always replace a worn or improperly functioning nozzle with the design size and type. Nozzle heads operate efficiently and provide uniform application when they are plumb, in good operating condition, and operated at the planned pressure. Maintain all pumps, piping, valves, and electrical and mechanical equipment in accordance with manufacturer recommendations. Check and clean screens and filters as necessary to prevent unnecessary hydraulic friction loss and to maintain water flow necessary for efficient pump operation. When chemigation is used, include backflow preventers for wells.

Protect pumping plant and all associated electrical and mechanical controls from damage by rodents, insects, heat, water, flooding, lightning, sudden power failure, and sudden water source loss. Provide and maintain good surface drainage to prevent water ponding around pump and electrical equipment. Ensure that all electrical/gas fittings are secure and safe. Always replace worn or excessively weathered electric cables and wires and gas tubing and fittings when first noticed. Check periodically for undesirable stray currents and leaks. Display appropriate bilingual operating instructions and warning signs as necessary. During non-seasonal use, drain pipelines and valves, and secure and protect all movable equipment.

Pollution hazards to ground and surface water can be minimized when good irrigation water management practices are followed. Losses of irrigation water to deep percolation and runoff should be minimized. Deep percolation and runoff from irrigation can carry nutrients and pesticides into ground and surface water. Avoiding spills from agricultural chemicals, fuels, and lubricants will also minimize potential pollution hazards to ground and surface water.



Map Scale: 1:10,300 if printed on A size (8.5" x 11") sheet.

N

Meters: 0, 100, 200, 400, 600

Feet: 0, 500, 1,000, 2,000, 3,000

MAP LEGEND

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

Soils
- Soil Map Units

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
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

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

MAP INFORMATION

Map Scale: 1:10,300 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 16N NAD83

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

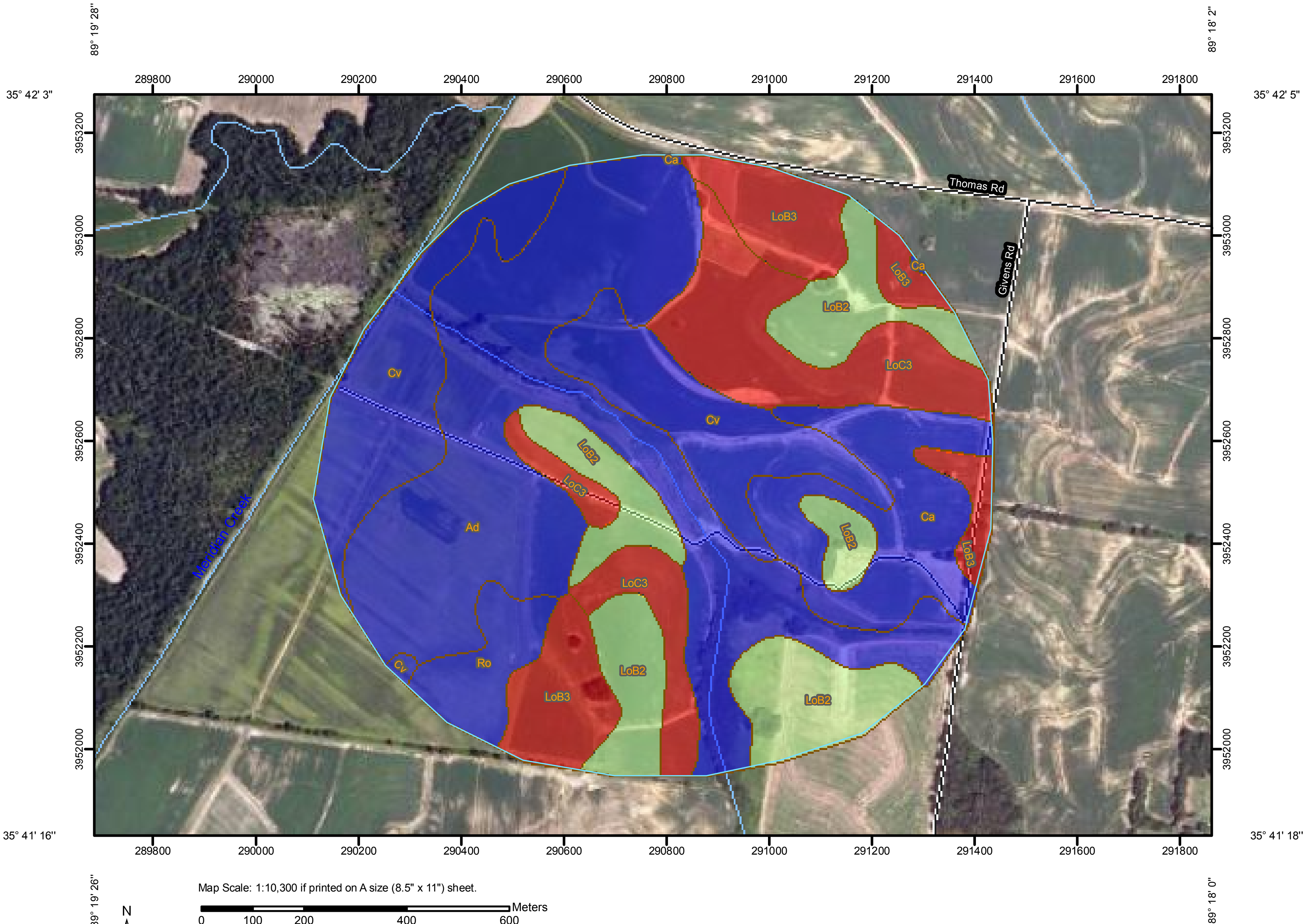
Soil Survey Area: Haywood County, Tennessee
Survey Area Data: Version 8, Aug 4, 2008

Date(s) aerial images were photographed: 7/24/2006; 7/31/2006

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

Haywood County, Tennessee (TN075)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Ad	Adler silt loam, occasionally flooded	102.9	32.6%
Ca	Calloway silt loam	29.2	9.3%
Cv	Convent silt loam, frequently flooded	51.9	16.5%
LoB2	Loring silt loam, 1 to 5 percent slopes, eroded	49.4	15.7%
LoB3	Loring silt loam, 1 to 5 percent slopes, severely eroded	30.6	9.7%
LoC3	Loring silt loam, 5 to 8 percent slopes, severely eroded	40.8	12.9%
Ro	Routon silt loam	10.5	3.3%
Totals for Area of Interest		**315.4**	**100.0%**



Map Scale: 1:10,300 if printed on A size (8.5" x 11") sheet.

N

Meters: 0, 100, 200, 400, 600

Feet: 0, 500, 1,000, 2,000, 3,000

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- <= 0.17
- > 0.17 AND <= 0.21
- > 0.21 AND <= 0.22
- Not rated or not available

Political Features

- Cities

Water Features

- Oceans
- Streams and Canals

Transportation

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

MAP INFORMATION

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Soil Properties and Qualities

Soil Properties and Qualities— Summary by Map Unit — Haywood County, Tennessee				
Map unit symbol	**Map unit name**	**Rating (centimeters per centimeter)**	**Acres in AOI**	**Percent of AOI**
Ad	Adler silt loam, occasionally flooded	0.22	102.9	32.6%
Ca	Calloway silt loam	0.22	29.2	9.3%
Cv	Convent silt loam, frequently flooded	0.22	51.9	16.5%
LoB2	Loring silt loam, 1 to 5 percent slopes, eroded	0.21	49.4	15.7%
LoB3	Loring silt loam, 1 to 5 percent slopes, severely eroded	0.17	30.6	9.7%
LoC3	Loring silt loam, 5 to 8 percent slopes, severely eroded	0.17	40.8	12.9%
Ro	Routon silt loam	0.22	10.5	3.3%
Totals for Area of Interest			**315.4**	**100.0%**

Description

Available water capacity (AWC) refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in centimeters of water per centimeter of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure, with corrections for salinity and rock fragments. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. It is not an estimate of the quantity of water actually available to plants at any given time.

Available water supply (AWS) is computed as AWC times the thickness of the soil. For example, if AWC is 0.15 cm/cm, the available water supply for 25 centimeters of soil would be 0.15 x 25, or 3.75 centimeters of water.

For each soil layer, AWC is recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters per centimeter

Aggregation Method: Weighted Average

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options: Depth Range

Top Depth: 0

Bottom Depth: 24

Units of Measure: Inches

Soil Reports

This table shows estimates of some physical 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.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (Ksat), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and Ksat. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Reference:

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (http://soils.usda.gov)

Report—Soil Reports

Soil Reports– Haywood County, Tennessee															
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
Ad—Adler silt loam, occasionally flooded														
Adler	0-4	—	—	10-25	1.50-1.55	4.00-14.00	0.20-0.23	0.0-2.9	0.5-2.0	.43	.43	5		
	4-60	—	—	5-18	1.50-1.55	4.00-14.00	0.20-0.23	0.0-2.9	0.1-1.5	.43	.43			
Ca—Calloway silt loam														
Calloway	0-30	—	—	10-30	1.40-1.55	4.00-14.00	0.20-0.23	0.0-2.9	0.5-2.0	.49	.49	4		
	30-60	—	—	10-32	1.35-1.55	0.42-1.40	0.09-0.12	0.0-2.9	0.0-0.3	.43	.43			
Cv—Convent silt loam, frequently flooded														
Convent	0-11	—	—	0-18	1.30-1.65	4.00-14.00	0.18-0.23	0.0-2.9	0.5-2.0	.43	.43	5		
	11-60	—	—	0-18	1.30-1.65	4.00-14.00	0.20-0.23	0.0-2.9	0.5-1.0	.37	.37			
LoB2—Loring silt loam, 1 to 5 percent slopes, eroded														
Loring	0-6	—	—	8-18	1.30-1.50	4.00-14.00	0.20-0.23	0.0-2.9	0.5-2.0	.49	.49	4		
	6-26	—	—	18-32	1.40-1.50	4.00-14.00	0.20-0.22	0.0-2.9	0.2-0.8	.43	.43			
	26-57	—	—	15-30	1.50-1.70	0.42-1.40	0.06-0.13	0.0-2.9	0.0-0.3	.43	.43			
	57-60	—	—	10-25	1.30-1.60	1.40-14.00	0.06-0.13	0.0-2.9	0.0-0.3	.43	.43			

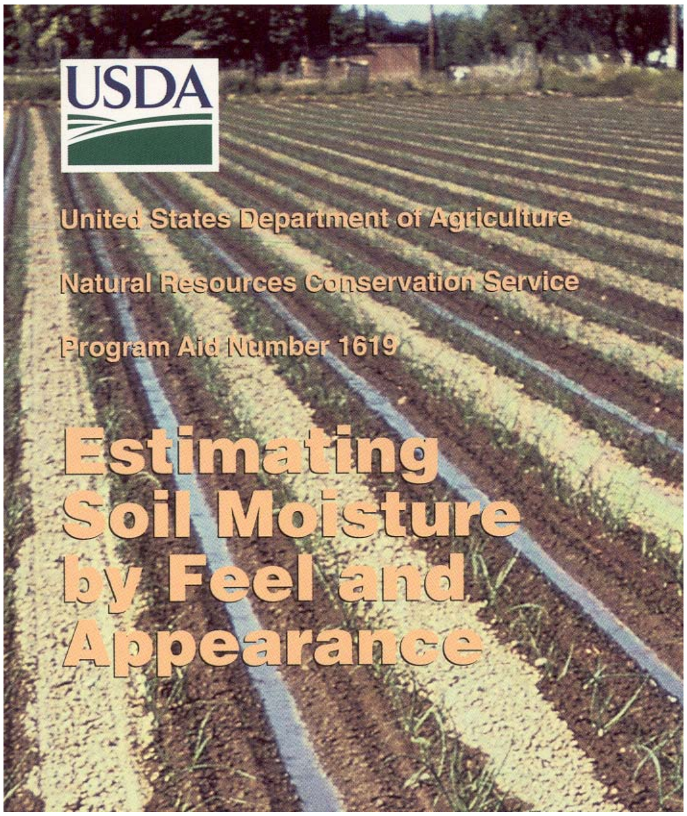
Soil Reports– Haywood County, Tennessee															
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
LoB3—Loring silt loam, 1 to 5 percent slopes, severely eroded														
Loring	0-4	—	—	8-18	1.30-1.50	4.00-14.00	0.20-0.23	0.0-2.9	0.5-2.0	.49	.49	3		
	4-14	—	—	18-32	1.40-1.50	4.00-14.00	0.20-0.22	0.0-2.9	0.2-0.8	.43	.43			
	14-44	—	—	15-30	1.50-1.70	0.42-1.40	0.06-0.13	0.0-2.9	0.0-0.3	.43	.43			
	44-60	—	—	10-25	1.30-1.60	1.40-14.00	0.06-0.13	0.0-2.9	0.0-0.3	.43	.43			
LoC3—Loring silt loam, 5 to 8 percent slopes, severely eroded														
Loring	0-4	—	—	8-18	1.30-1.50	4.00-14.00	0.20-0.23	0.0-2.9	0.5-2.0	.49	.49	3		
	4-14	—	—	18-32	1.40-1.50	4.00-14.00	0.20-0.22	0.0-2.9	0.2-0.8	.43	.43			
	14-44	—	—	15-30	1.50-1.70	0.42-1.40	0.06-0.13	0.0-2.9	0.0-0.3	.43	.43			
	44-60	—	—	10-25	1.30-1.60	1.40-14.00	0.06-0.13	0.0-2.9	0.0-0.3	.43	.43			
Ro—Routon silt loam														
Routon	0-18	—	—	15-25	1.40-1.55	4.00-14.00	0.20-0.24	0.0-2.9	0.5-2.0	.49	.49	5		
	18-60	—	—	20-35	1.35-1.50	0.42-1.40	0.18-0.22	0.0-2.9	0.2-0.8	.49	.49			

Data Source Information

Soil Survey Area: Haywood County, Tennessee
Survey Area Data: Version 8, Aug 4, 2008

Estimating Soil Moisture by Feel and Appearance

Irrigation Water Management (IWM) is applying water according to crop needs in an amount that can be stored in the plant root zone of the soil.



The "feel and appearance method" is one of several irrigation scheduling methods used in IWM. It is a way of monitoring soil moisture to determine when to irrigate and how much water to apply. Applying too much water causes excessive runoff and/or deep percolation. As a result, valuable water is lost along with nutrients and chemicals, which may leach into the ground water.

The feel and appearance of soil vary with texture and moisture content. Soil moisture conditions can be estimated, with experience, to an accuracy of about 5 percent. Soil moisture is typically sampled in l-foot increments to the root depth of the crop at three or more sites per field. It is best to vary the number of sample sites and depths according to crop, field size, soil texture, and soil stratification. For each sample the "feel and appearance method" involves:

1. Obtaining a soil sample at the selected depth using a probe, auger, or shovel;
2. Squeezing the soil sample firmly in your hand several times to form an irregularly shaped "ball";
3. Squeezing the soil sample out of your hand between thumb and forefinger to form a ribbon;
4. Observing soil texture, ability to ribbon, firmness and surface roughness of ball, water glistening, loose soil particles, soil/water staining on fingers, and soil color. [Note: A very weak ball will disintegrate with one bounce of the hand. A weak ball disintegrates with two to three bounces;
5. Comparing observations with photographs and/or charts to estimate percent water available and the inches depleted below field capacity.

Example:

Sample Depth	Zone	USDA Texture	AWC*for Zone	Soil Moisture Delpetion**	Percent Depletion
6”	0-12"	sandy loam	1.4"	1.0"	70
18"	12-24"	sandy loam	1.4"	.8"	55
30"	24-36"	loam	2.0"	.8"	40
42"	36-48"	loam	2.0"	.5"	25
			6.8"	3.1"	

Result: A 3.1" net irrigation will refill the root zone.
** Available Water Capacity*
*** Determined by “feel and appearance method”*

Available Water Capacity (AWC) is the portion of water in a soil that can be readily absorbed by plant roots of most crops.

Soil Moisture Deficit (SMD) or Depletion is the amount of water required to raise the soil-water content of the crop root zone to field capacity.

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

100 percent available
0.0 in./ft. depleted (field capacity)

Wet, forms a weak ball, moderate to heavy soil/water coating on fingers, wet outline of soft ball remains on hand. (Not pictured)

Appearance of sandy loam and fine sandy loam soils at various soil moisture conditions.

Available WaterCapacity 1.3-1.7 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 7-1.0 in/ft. depleted

Dry, forms a very weak ball, aggregated soil grains break away easily from ball. (Not pictured)

25-50 percent available 1.3-0.7 in/ft. depleted

Slightly moist, forms a weak ball with defined finger marks, darkened color, no water staining on fingers, grains break away.

50-75 percent available 0.9-0.3 in./ft. depleted

Moist, forms a ball with defined finger marks, very light soil/water staining on fmgers, darkened color, will not slick.

75-100 percent available 0.4-0.0 in./ft. depleted

Wet, forms a ball with wet outline left on hand, light to medium staining on fingers, makes a weak ribbon between the thumb and forefinger.

100 percent available 0.0 in./ft. depleted (field capacity)

Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking, medium to heavy soil/water coating on fingers. (Not pictured)

Appearance of sandy clay loam, loam, and silt loam soils at various soil moisture conditions.

Available WaterCapacity 1.5-2.1 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
2.1-1.1 in./ft. depleted

Dry, soil aggregations break away easily, no staining on fingers, clods crumble with applied pressure. (Not pictured)

25-50 percent available
1.6-0.8 in./ft. depleted

Slightly moist, forms a weak ball with rough surfaces, no water staining on fingers, few aggregated soil grains break away.

50-75 percent available
1.1-0.4 in./ft. depleted

Moist, forms a ball, very light staining on fingers, darkened color, pliable, forms a weak ribbon between the thumb and forefinger.

75-100 percent available
0.5-0.0 in/ft. depleted

Wet, forms a ball with well-defined finger marks, light to heavy soil/water coating on fingers, ribbons between thumb and forefinger.

100 percent available
0.0 in/ft. depleted (field capacity)

Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking, medium to heavy soil/water coating on fingers. (Not pictured)

Appearance of clay, clay loam, and silt clay loam soils at various soil moisture conditions.

Available WaterCapacity 1.6-2.4 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
2.4-1.2 in/ft. depleted

Dry, soil aggregations separate easily, clods are hard to crumble with applied pressure. (Not pictured)

25-50 percent available
1.8-0.8 in/ft. depleted

Slightly moist, forms a weak ball, very few soil aggregations break away, no water stains, clods flatten with applied pressure.

50 - 75 percent available
1.2-0.4 in./ft. depleted

Moist, forms a smooth ball with defined finger marks, light soil/water staining on fingers, ribbons between thumb and forefinger.

75-100 percent available
0.6-0.0 in./ft. depleted

Wet, forms a ball, uneven medium to heavy soil/water coating on fingers, ribbons easily between thumb and forefinger.

100 percent available
0.0 in./ft. depleted (field capacity)

Wet, forms a soft ball, free water appears on soil surface after squeezing or shaking, thick soil/water coating on fingers, slick and sticky. (Not pictured)

Guidelines for Estimating Soil Moisture Conditions

	Coarse Texture- Fine Sand and Loamy Fine Sand	Moderately Coarse Texture Sandy Loam and Fine Sandy Loam	Medium Texture - Sandy Clay Loam, Loam, and Silt Loam	Fine Texture- Clay, Clay Loam, or Silty Clay Loam
	Available Water Capacity (Inches/Foot)			
	0.6-1.2	1.3-1.7	1.5-2.1	1.6-2.4
Available Soil Moisture Percent	Soil Moisture Deficit (SMD) in inches per foot when the feel and appearance of the soil are as described.			
0-25	Dry, loose, will hold together if not disturbed, loose sand grains on fingers with applied pressure. SMD 1.2-0.5	Dry, forms a very weak ball, aggregated soil grains break away easily from ball. SMD 1.7 -1.0	Dry. Soil aggregations break away easily. no moisture staining on fingers, clods crumble with applied pressure. SMD 2.1-1.1	Dry, soil aggregations easily separate, clods are hard to crumble with applied pressure SMD 2.4-1.2
25-50	Slightly moist, forms a very weak ball with well-defined finger marks, light coating of loose and aggregated sand grains remain on fingers. SMD O.9-0.3	Slightly moist, forms a weak ball with defined finger marks, darkened color, no water staining on fingers, grains break away. SMD 1.3-0.7	Slightly moist, forms a weak ball with rough surfaces, no water staining on fingers, few aggregated soil grains break away. SMD1.6-0.8	Slightly moist, forms a weak ball, very few soil aggregations break away, no water stains, clods flatten with applied pressure SMD 1.8-0.8
50-75	Moist, forms a weak ball with loose and aggregated sand grains on fingers, darkened color, moderate water staining on fingers, will not ribbon. SMD O.6-0.2	Moist, forms a ball with defined finger marks. very light soil/water staining on fingers. darkened color, will not slick. SMD O.9-0.3	Moist, forms a ball, very light water staining on fingers, darkened color, pliable, forms a weak ribbon between thumb and forefinger. SMD 1.1- 0.4	Moist. forms a smooth ball with defined finger marks, light soil/water staining on fingers, ribbons between thumb and forefinger. SMD I.2-0.4
75-100	Wet, forms a weak ball, loose and aggregated sand grains remain on fingers, darkened color, heavy water staining on fingers, will not ribbon. SMD O.3-0.0	Wet, forms a ball with wet outline left on hand, light to medium water staining on fingers, makes a weak ribbon between thumb and forefinger. SMD O.4-0.0	Wet, forms a ball with well defined finger marks, light to heavy soil/water coating on fingers, ribbons between , thumb and forefinger. SMD O.5 -0.0	Wet, forms a ball, uneven medium to heavy soil/water coating on fingers, ribbons easily between thumb and forefinger. SMD O.6-0.0
Field Capacity (100 %)	Wet, forms a weak ball, moderate to heavy soil/ water coating on fingers, wet outline of soft ball remains on hand. SMD 0.0	Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking,medium to heavy soil/water coating on fingers. SMD 0.0	Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking, medium to heavy soil/water coating on fingers. SMD 0.0	Wet, forms a soft ball, free water appears on soil surface after squeezing or shaking, thick soil/water coating on fingers, slick and sticky. SMD 0.0

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April 1998