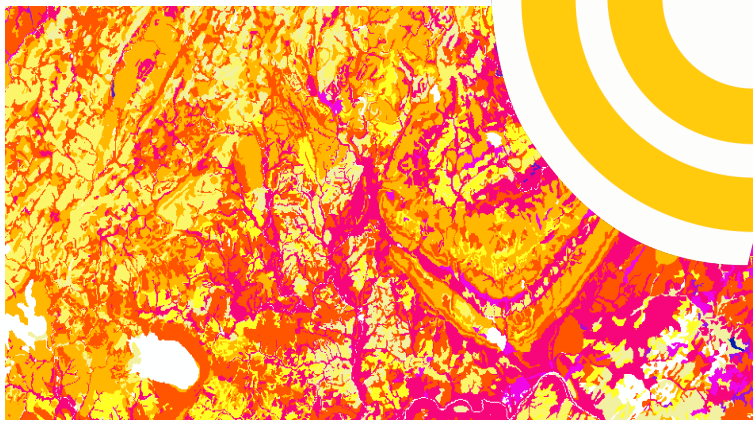
United States Department of Agriculture

Understanding and Using USDA Natural Resource Conservation Service Soils Data and Online Tools



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Natural Resources Conservation Service

nrcs.usda.gov/

Soils Data and Online Tools

I. **Overview**

II. **Trish**
   I. Soil Survey
   II. Web Soil Survey
   III. Soil Data Viewer

III. **Edwin**
   I. SSURGO
      I. Content and broad application
      II. Development and maintenance
      III. The relational database structure,
      IV. How the relationship classes are set up between tables (one-to-one, one-to-many)
      V. How to enable use in Desktop/Pro.
   II. Soil Data Access
   III. National Commodity Crop Productivity Index (NCCPI).

IV. **Doug**
   I. Example projects
   II. AGO item on NJGIN Open Data

Glossary of Terms

SSURGO - Soil **Su**rvey **Geo**graphic database - digital soils data produced and distributed by the Natural Resources Conservation Service; includes the **digital soil maps** and the accompanying soil properties and interpretations **database**. Data exists at the county level.

Web Soil Survey – a web application that provides access to SSURGO for the general public (non-GIS users)

Soil Data Viewer – an extension to ArcMap that allows GIS users to create soil-based thematic maps

Geospatial Data Gateway – NRCS's geospatial clearinghouse website

Soil Data Access – a suite of web services and applications which allow the request and delivery of soil survey spatial and tabular data beyond what can be done on the Web Soil Survey website and the Geospatial Data Gateway website

What is a published soil survey?

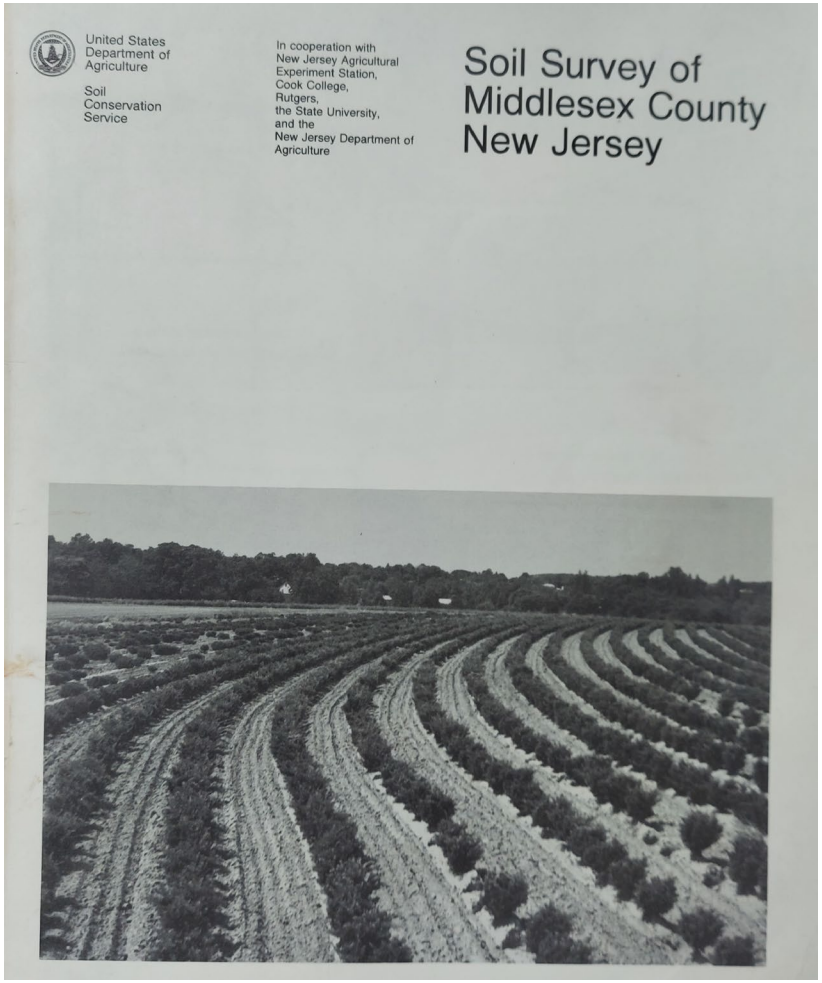
- A soil survey is a detailed report on the soils of an area.
- Includes maps with soil boundaries and photos, descriptions, and tables of soil properties and features
- Soil surveys are used by farmers, land use planners, engineers...

Soil Survey

Published by the USDA, Natural Resources Conservation Service

in cooperation with NJ Agricultural Experiment Station, Rutgers, The State University, and

the NJ Department of Agriculture, State Soil Conservation Committee.



Major parts of a soil survey publication

- Table of Contents
- Detailed soil map units
- Use and management and interpretive tables
- Classification of soils
- References
- Glossary
- Index to map sheets
- Soil maps

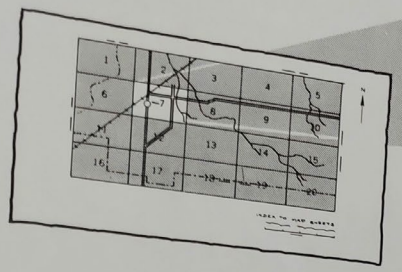
TABLE 12.--CONSTRUCTION MATERIALS

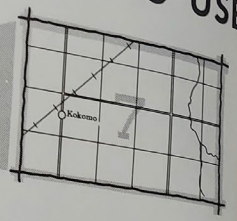
(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
At: Atsion	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness, too sandy.
BoB, BoC, BoD: Boonton	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
BUD*: Boonton	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Urban land.				
ChA, ChB: Chalfont	Poor: wetness, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
DnA, DnC, DoB: Downer	Good	Probable	Improbable: too sandy.	Poor: small stones.
DTD*, DTD*: Downer	Good	Probable	Improbable: too sandy.	Poor: small stones.
Urban land.				
DUB*: Dunellen	Good	Probable	Probable	Poor: small stones, area reclaim.
Urban land.				
DvB, DvB: Dunellen Variant	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
DVD*: Dunellen Variant	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Urban land.				
Ek: Elkton	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
EoA, EoB: Ellington Variant	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.

HOW TO USE THIS SOIL SURVEY

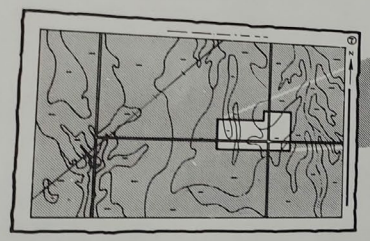
1. Locate your area of interest on the "Index to Map Sheets."

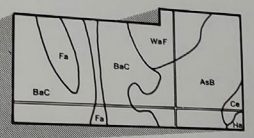




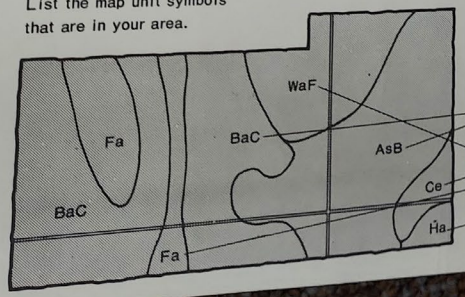
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





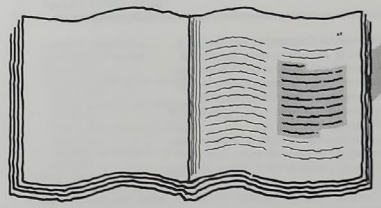
4. List the map unit symbols that are in your area.

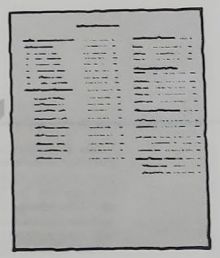


Symbols

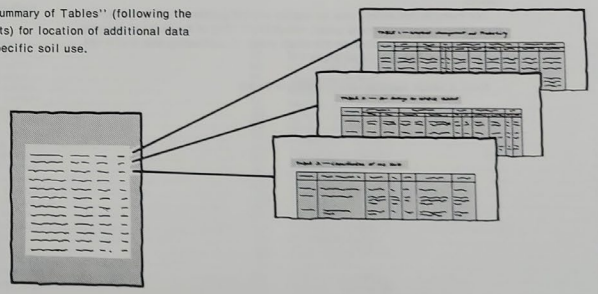
AsB
BaC
Ce
Fa
Ha
WaF

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



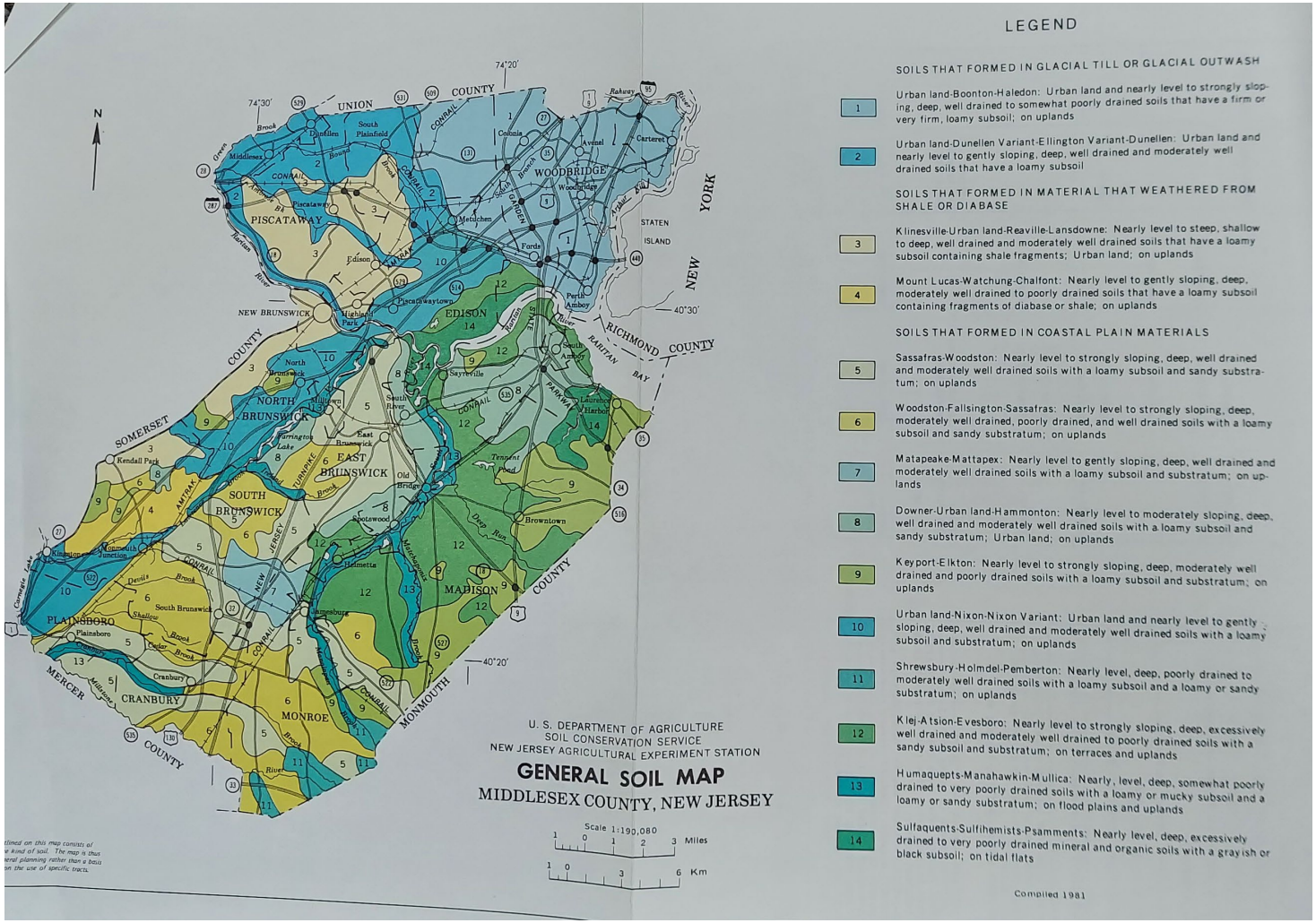


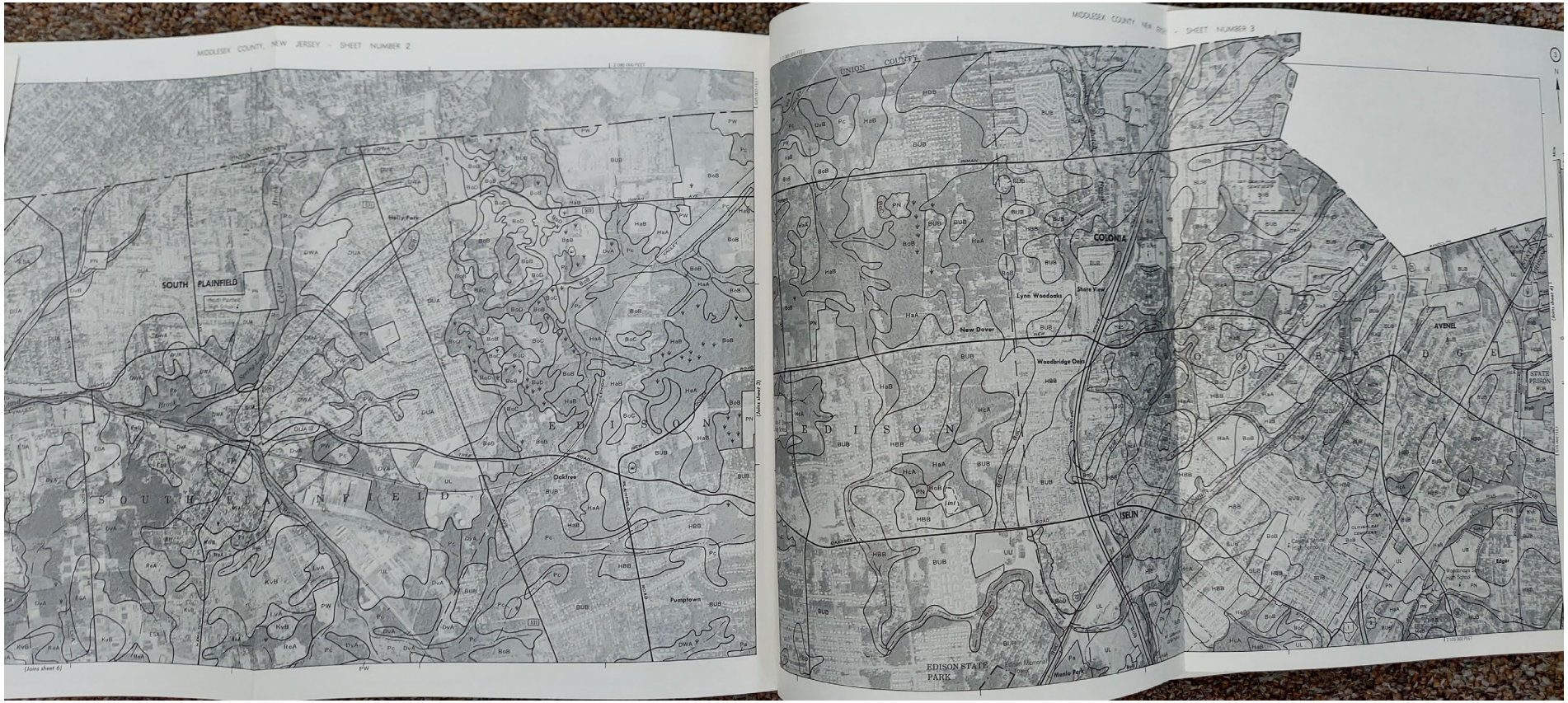
6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

nrcs.usda.gov


LEGEND
SOILS THAT FORMED IN GLACIAL TILL OR GLACIAL OUTWASH
1 Urban land-Boonton-Haledon: Urban land and nearly level to strongly sloping, deep, well drained to somewhat poorly drained soils that have a firm or very firm, loamy subsoil; on uplands
2 Urban land-Dunellen Variant-Ellington Variant-Dunellen: Urban land and nearly level to gently sloping, deep, well drained and moderately well drained soils that have a loamy subsoil
SOILS THAT FORMED IN MATERIAL THAT WEATHERED FROM SHALE OR DIABASE
3 Klinesville-Urban land-Reaville-Lansdowne: Nearly level to steep, shallow to deep, well drained and moderately well drained soils that have a loamy subsoil containing shale fragments; Urban land; on uplands
4 Mount Lucas-Watchung-Chalfont: Nearly level to gently sloping, deep, moderately well drained to poorly drained soils that have a loamy subsoil containing fragments of diabase or shale; on uplands
SOILS THAT FORMED IN COASTAL PLAIN MATERIALS
5 Sassafras-Woodston: Nearly level to strongly sloping, deep, well drained and moderately well drained soils with a loamy subsoil and sandy substratum; on uplands
6 Woodston-Fallsington-Sassafras: Nearly level to strongly sloping, deep, moderately well drained, poorly drained, and well drained soils with a loamy subsoil and sandy substratum; on uplands
7 Matapeake-Mattapex: Nearly level to gently sloping, deep, well drained and moderately well drained soils with a loamy subsoil and substratum; on uplands
8 Downer-Urban land-Hammonton: Nearly level to moderately sloping, deep, well drained and moderately well drained soils with a loamy subsoil and sandy substratum; Urban land; on uplands
9 Keyport-Elkton: Nearly level to strongly sloping, deep, moderately well drained and poorly drained soils with a loamy subsoil and substratum; on uplands
10 Urban land-Nixon-Nixon Variant: Urban land and nearly level to gently sloping, deep, well drained and moderately well drained soils with a loamy subsoil and substratum; on uplands
11 Shrewsbury-Holmdel-Pemberton: Nearly level, deep, poorly drained to moderately well drained soils with a loamy subsoil and a loamy or sandy substratum; on uplands
12 Klej-Atsion-Evesboro: Nearly level to strongly sloping, deep, excessively well drained and moderately well drained to poorly drained soils with a sandy subsoil and substratum; on terraces and uplands
13 Humaquepts-Manahawkin-Mullica: Nearly, level, deep, somewhat poorly drained to very poorly drained soils with a loamy or mucky subsoil and a loamy or sandy substratum; on flood plains and uplands
14 Sulfaquents-Sulfihemists-Psamments: Nearly level, deep, excessively drained to very poorly drained mineral and organic soils with a grayish or black subsoil; on tidal flats
Compiled 1981
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NEW JERSEY AGRICULTURAL EXPERIMENT STATION
GENERAL SOIL MAP
MIDDLESEX COUNTY, NEW JERSEY
Scale 1:190,080
Miles
Km
N
74°30'
74°20'
40°30'
40°20'
UNION COUNTY
PISCATAWAY
NEW BRUNSWICK
NORTH BRUNSWICK
EAST BRUNSWICK
SOUTH BRUNSWICK
PLAINSBORO
CRANBURY
MONROE
MADISON
EDISON
WOODBRIDGE
SOMERSET COUNTY
MERCER COUNTY
MONMOUTH COUNTY
RICHMOND COUNTY
STATEN ISLAND
NEW YORK
RARITAN BAY


MIDDLESEX COUNTY, NEW JERSEY - SHEET NUMBER 2
SOUTH PLAINFIELD
Holly Park
Oakfree
Pumptown
(Joins sheet 6)
MIDDLESEX COUNTY, NEW JERSEY - SHEET NUMBER 3
UNION COUNTY
COLONIA
Lynn Woodoaks
Shore View
New Dover
Woodbridge Oaks
AVENEL
STATE PRISON
ISELIN
EDISON STATE PARK
Menlo Park

Using the soil survey (the old way)

- Obtain a printed soil survey from the NRCS, USDA office, or local conservation office
- Open the soil survey to *Index To Map Sheets.*
- Locate your area of interest or property on the *Index.*
- The numbers in rectangles correspond to the map sheet number located in the second half of the publication.
- Look at the aerial map closely and locate landmarks such as roads or streams to find your area of interest.

Using the soil survey continued…

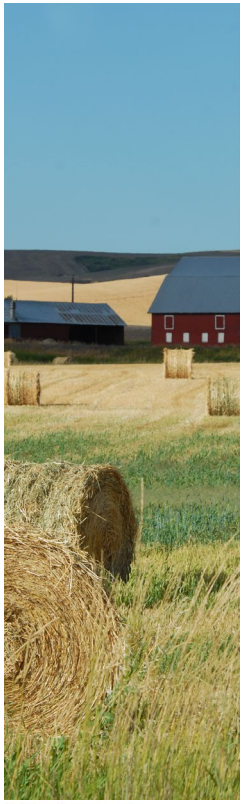
- The lines on the image separate different soil types. Your area of interest may include one or more types.

- The small letters or numbers that are within the same polygon as your area of interest, such as ScC, or KnC, or LaC, designate a map unit. Note this map unit symbol. *It is the key to finding information.*

- Turn to the *Index to Map Units* which shows the page where these map units are described. Also go to the various tables or reports which are organized by map unit symbol.

I. Soil Survey
II. Web Soil Survey
III. Soil Data Viewer

Web Soil Survey - a web application that provides access to SSURGO for the general public, non-GIS users; introduced in 2005.



Web Soil Survey

- The Web Soil Survey is updated and maintained online as the *single, authoritative source of soil survey information*. It is used by the general public.

- Soil Surveys provide soil descriptions, interpretations and maps. This information can be used to assist landowners and communities in land-use planning.

Using the Web Soil Survey

Follow the same sequence:

1. Locate your area of interest on the maps.
2. Note the map unit symbol.
3. Go to the text or tables for information on that map unit.

Enter an address

Search

Area of Interest

Import AOI

Quick Navigation

Address

View

Address: 4 Birch Drive East Brunswick NJ

Show location marker

View

State and County

Soil Survey Area

Latitude and Longitude or Current Location

PLSS (Section, Township, Range)

Bureau of Land Management

Department of Defense

Forest Service

National Park Service

Hydrologic Unit

Legend

Area of Interest Interactive Map

View Extent: Contiguous U.S.

Scale: (not to scale)

Search Specific Area Of Interest

Search

Area of Interest

Open All | Close All

AOI Properties

Clear AOI

AOI Information

Name

Map Unit Symbols

- Use Soil Survey Area Map Unit Symbols
- Use National Map Unit Symbols

Area (acres) 7.16

Soil Data Available from Web Soil Survey

Middlesex County, New Jersey (NJ023)

Data Availability	Tabular and Spatial, complete
Tabular Data	Version 16, Jun 1, 2020
Spatial Data	Version 5, Sep 16, 2019

Clear AOI

Import AOI

Export AOI

Quick Navigation

Address

View

Legend

Area of Interest Interactive Map

View Extent Contiguous U.S. Scale (not to sc

View Soils Data

Area of Interest (AOI) | Soil Map | Soil Data Explorer | Download Soils Data | Shopping Cart (Free)

Search

Map Unit Legend

Middlesex County, New Jersey (NJ023)

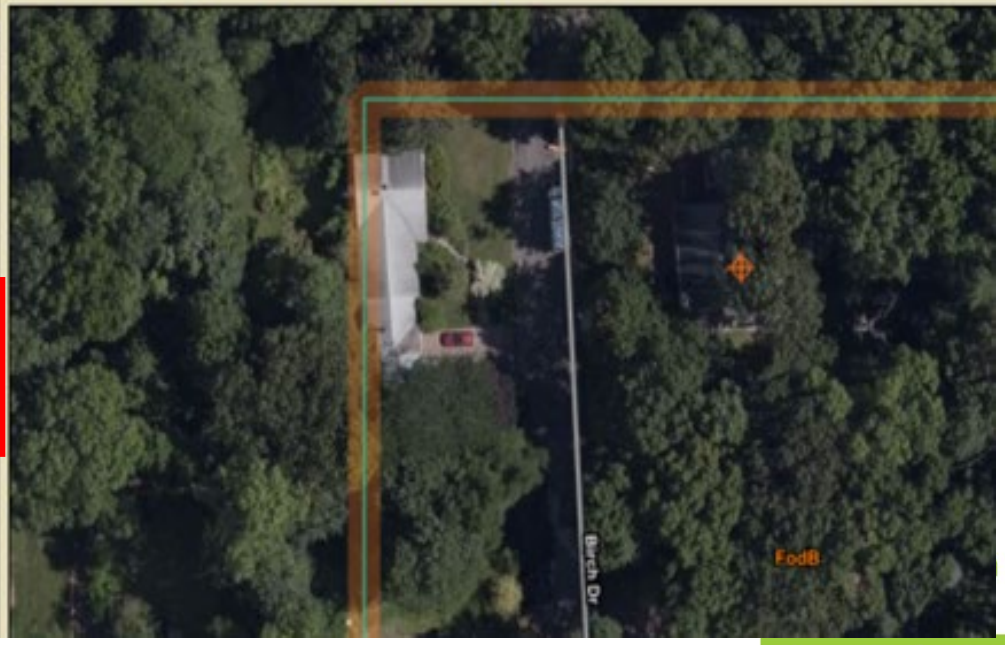
Middlesex County, New Jersey (NJ023)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
FodB	Fort Mott loamy sand, 0 to 5 percent slopes	3.5	100.0%
Totals for Area of Interest		**3.5**	**100.0%**

Legend

Soil Map

Scale (not to scale)

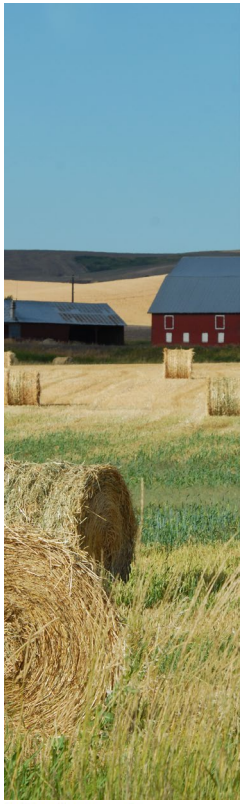


Web Soil Survey and Google Earth Pro

- Web Soil Survey users are not expected to have sophisticated GIS software.
- Many people use Google Earth Pro as their default GIS.
- For this reason, the Web Soil Survey includes a tool that allows people to use Google Earth Pro and an online converter to create shapefiles for import into WSS.

I. Soil Survey
II. Web Soil Survey
III. Soil Data Viewer

Web Soil Survey - “all purpose” website for the general public
Soil Data Viewer – for more advanced users



Soil Data Viewer

An extension to ArcMap that allows a user to create soil-based thematic maps. The application can be run independent of ArcMap, but output is then limited to a tabular report.

The soil survey attribute database associated with the spatial soil map is a complex database with more than 50 tables.

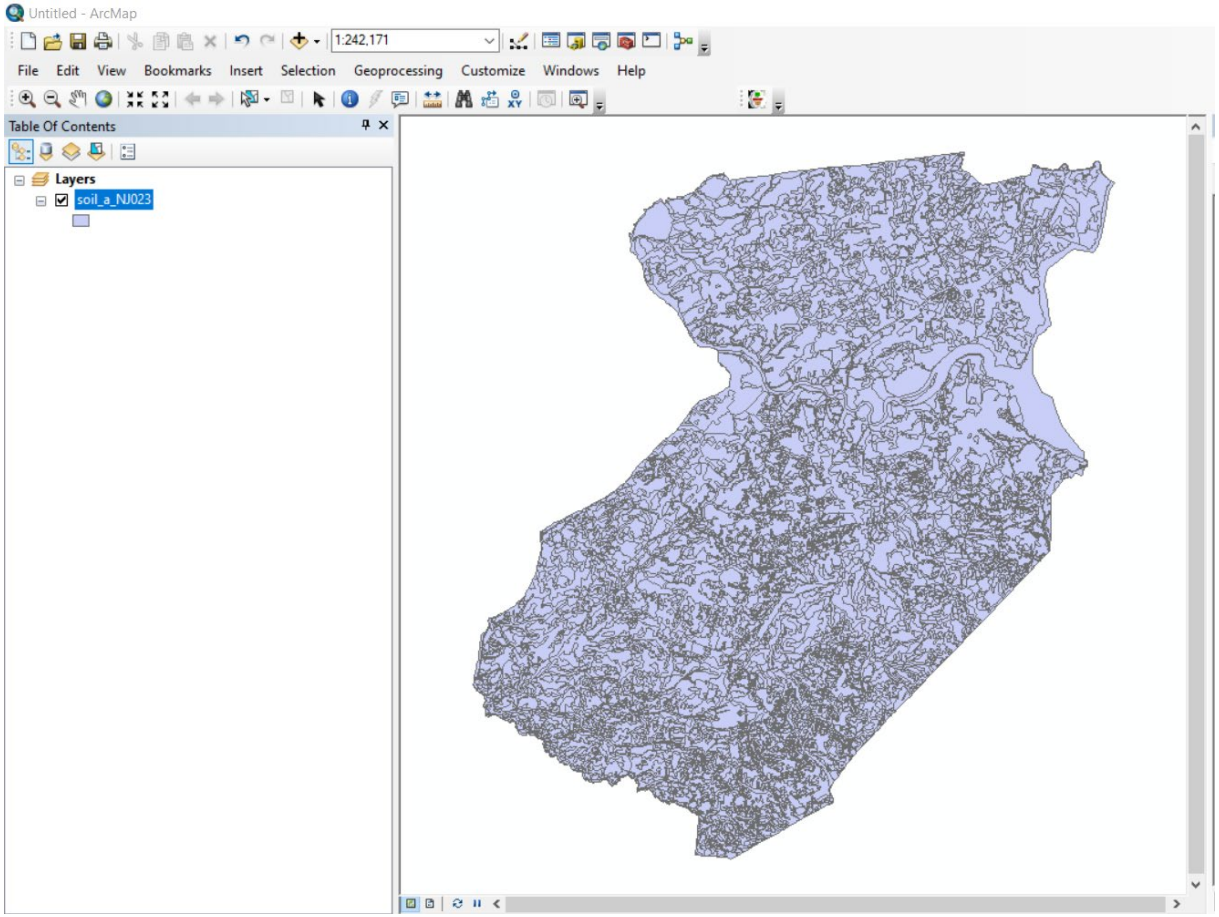
Soil Data Viewer provides users access to soil interpretations and soil properties while shielding them from the complexity of the soil database.

Each soil map unit may contain multiple soil components that may be suitable for different uses and management.

Instead of querying the database, processing the data, and linking to the spatial map, Soil Data Viewer does these steps for you.

- Soil Data Viewer contains processing rules to enforce appropriate use of the data.
- Allows for quick analysis of soil data for use in resource assessment and management.

Middlesex County Soils Polygon Layer (.shp)

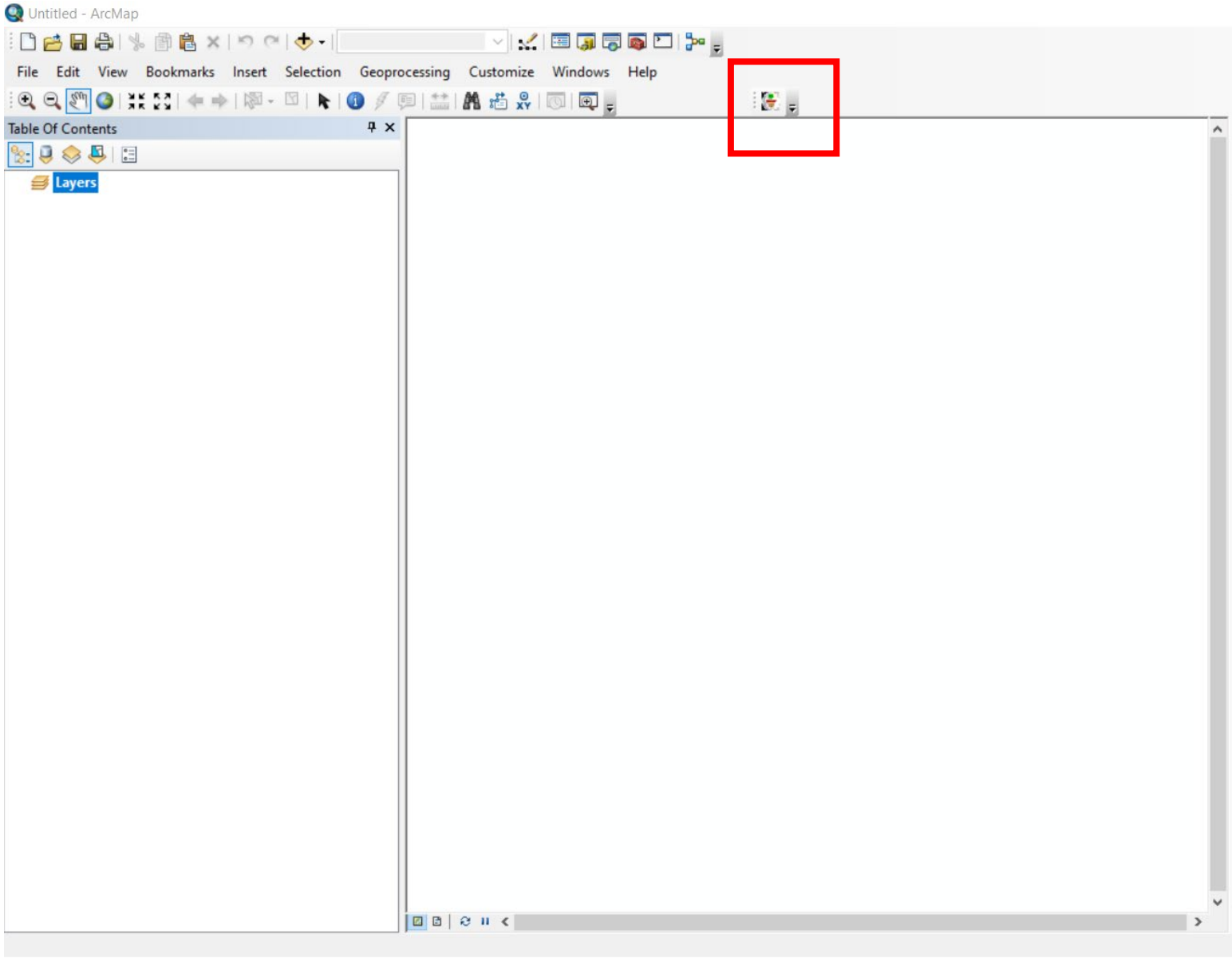


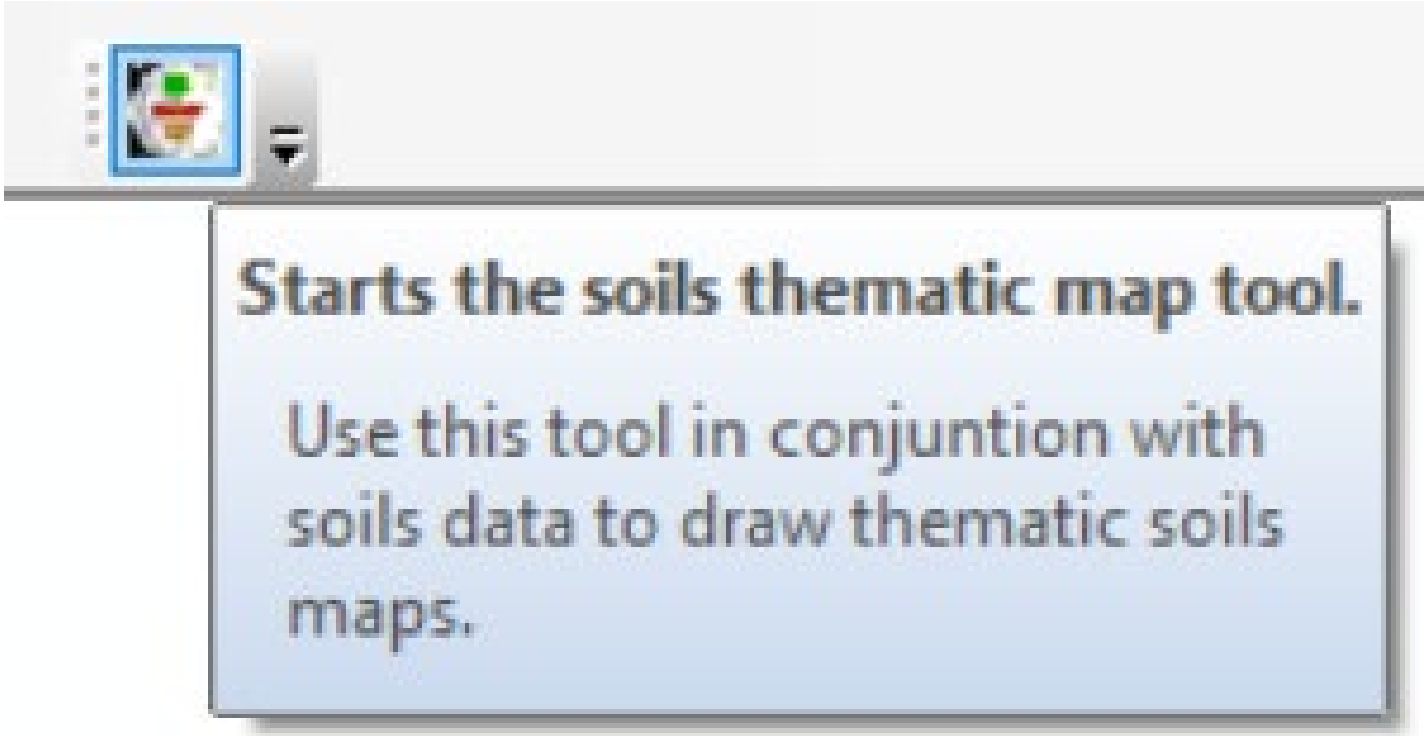
Middlesex County Soils Polygon Layer (.dbf)

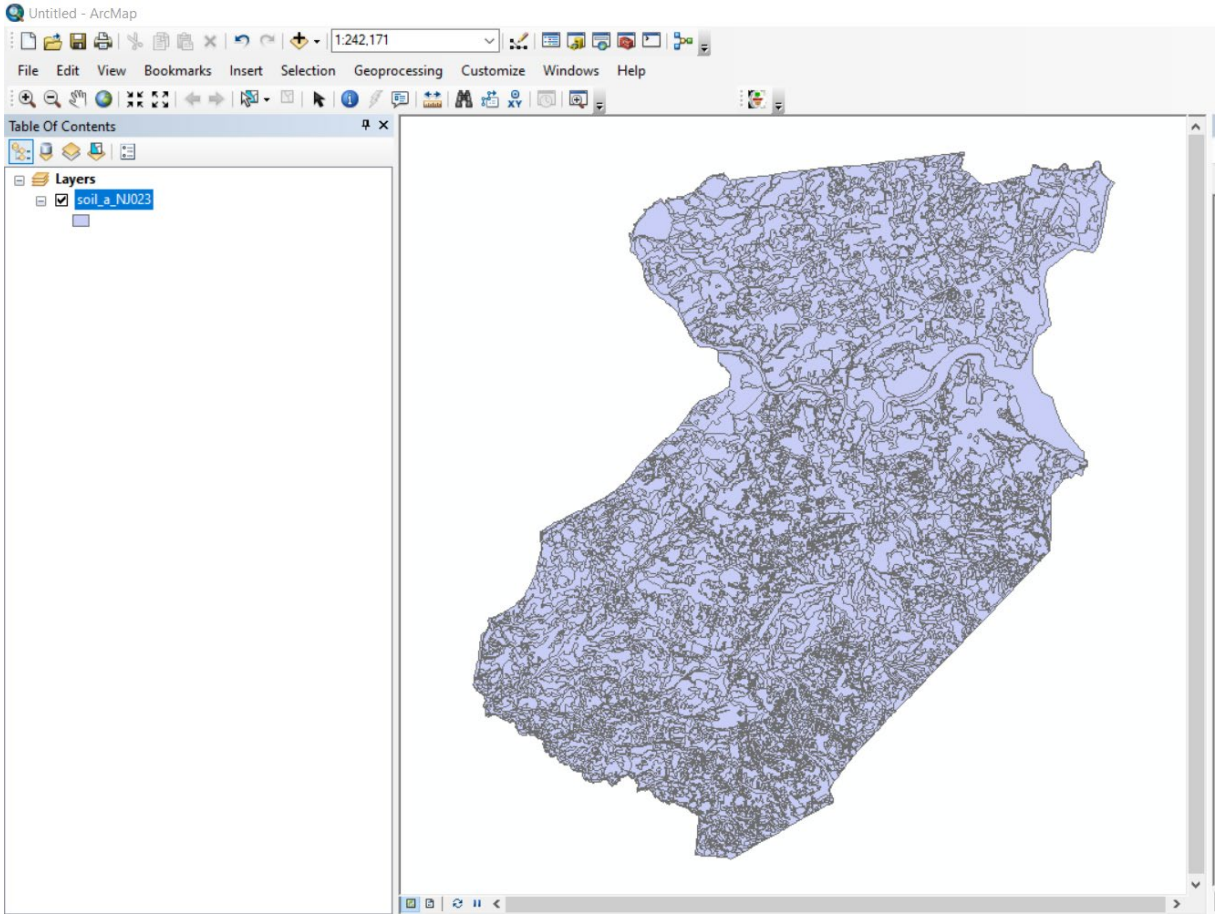
Table

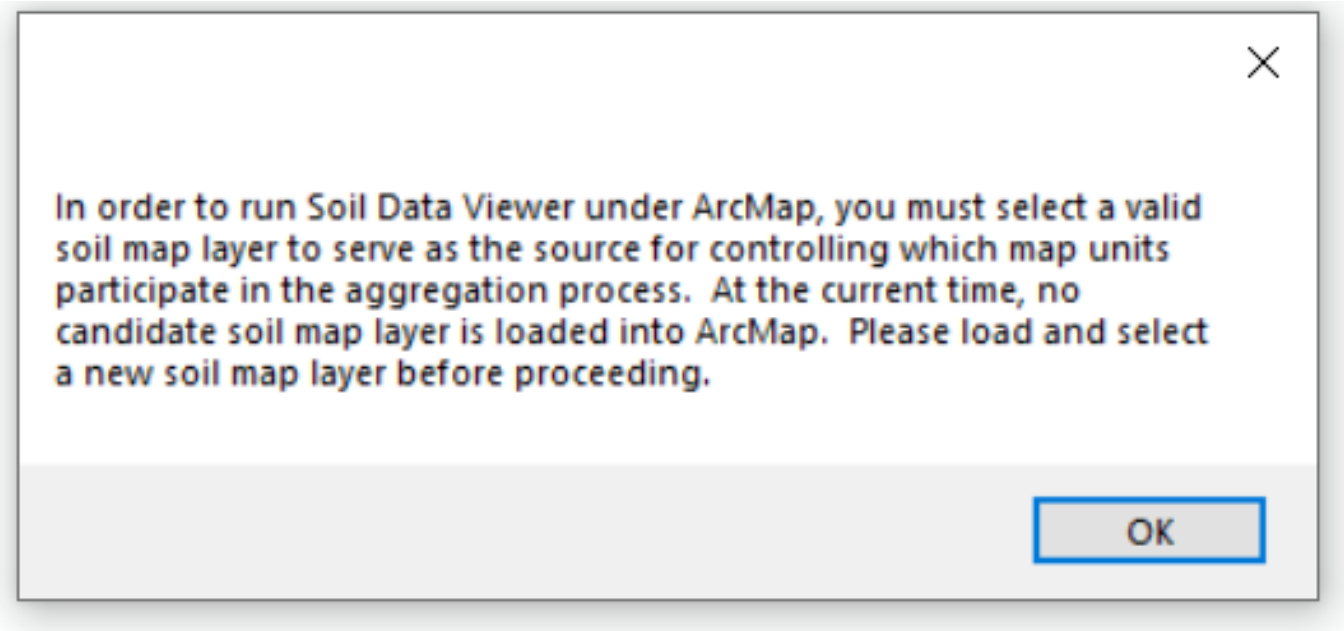
soil_a_NJ023

	FID	Shape *	AREASYMBOL	SPATIALVER	MUSYM	MUKEY	MUNAME
▸	0	Polygon	NJ023	5	MbrA	135408	Matapeake silt loam, 0 to 2 percent slopes
	1	Polygon	NJ023	5	BovB	1426812	Boonton-Urban land-Haledon complex, 0 to 8 percent slopes
	2	Polygon	NJ023	5	BogB	1426807	Boonton loam, 3 to 8 percent slopes
	3	Polygon	NJ023	5	PegB	135425	Pemberton loamy sand, 0 to 5 percent slopes
	4	Polygon	NJ023	5	PegB	135425	Pemberton loamy sand, 0 to 5 percent slopes
	5	Polygon	NJ023	5	SadC	135443	Sassafras gravelly sandy loam, 5 to 10 percent slopes
	6	Polygon	NJ023	5	MakAt	1395413	Manahawkin muck, 0 to 2 percent slopes, frequently flooded
	7	Polygon	NJ023	5	WATER	135456	Water
	8	Polygon	NJ023	5	AtsA	1398150	Atsion sand, 0 to 2 percent slopes, Northern Coastal Plain
	9	Polygon	NJ023	5	AtsA	1398150	Atsion sand, 0 to 2 percent slopes, Northern Coastal Plain
	10	Polygon	NJ023	5	KeoB	135393	Keyport loam, 2 to 5 percent slopes
	11	Polygon	NJ023	5	WoekB	135460	Woodstown sandy loam, clayey substratum, 2 to 5 percent slopes
	12	Polygon	NJ023	5	SafB	135446	Sassafras loam, 2 to 5 percent slopes
	13	Polygon	NJ023	5	SafA	135445	Sassafras loam, 0 to 2 percent slopes
	14	Polygon	NJ023	5	DocC	135358	Downer loamy sand, 5 to 10 percent slopes, Northern Coastal Plain


Untitled - ArcMap
File
Edit
View
Bookmarks
Insert
Selection
Geoprocessing
Customize
Windows
Help
Table Of Contents
Layers


Starts the soils thematic map tool.
Use this tool in conjuntion with soils data to draw thematic soils maps.


Untitled - ArcMap
1:242,171
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
Table Of Contents
Layers
soil_a_NJ023


In order to run Soil Data Viewer under ArcMap, you must select a valid soil map layer to serve as the source for controlling which map units participate in the aggregation process. At the current time, no candidate soil map layer is loaded into ArcMap. Please load and select a new soil map layer before proceeding.
OK

Soil Data Viewer - ArcMap

File View Help

Attribute Folders

- Building Site Development
- Construction Materials
- Disaster Recovery Planning
- Land Classifications
- Land Management
- Military Operations
- Recreational Development
- Sanitary Facilities
- Soil Erosion Factors
- Soil Health
- Soil Health Properties
- Soil Physical Properties
- Soil Qualities and Features
- Subaqueous Soils
- Vegetative Productivity
- Waste Management
- Water Features
- Water Management

Attribute/Folder Description | Rating Options | Report Options

Building site development interpretations are designed to be used as tools for evaluating soil suitability and identifying soil limitations for various construction purposes. As part of the interpretation process, the rating applies to each soil in its described condition and does not consider present land use.

Example interpretations can include corrosion of concrete and steel, shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping.

Basic Mode | Advanced Mode

Aggregation Report | Map Unit Desc. Report | Map | Synchronize | Clear Themes

Synchronization Status: No map units in sync.

Map Layer: C:\geodata\soils\soil_a_NJ023.shp | soil_a_NJ023

Database: C:\FOTG\soil_d_nj001.mdb

Soil Data Viewer - ArcMap

File View Help

Attribute Folders

- Building Site Development
- Construction Materials
- Disaster Recovery Planning
- Land Classifications
- Land Management
- Military Operations
- Recreational Development
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- Soil Erosion Factors
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Basic Mode | Advanced Mode

Aggregation Report | Map Unit Desc. Report | Map | Synchronize | Clear Themes

Synchronization Status: All map units in sync.

Map Layer: C:\geodata\soils\soil_a_NJ023.shp | soil_a_NJ023

Database: C:\FOTG\soil_d_nj023.mdb

Soil Data Viewer - ArcMap

File View Help

Attribute Folders

- Building Site Development
- Construction Materials
- Disaster Recovery Planning
- Land Classifications
- Land Management
- Military Operations
- Recreational Development
- Sanitary Facilities
  - Daily Cover for Landfill
  - Sanitary Landfill (Area)
  - Sanitary Landfill (Trench)
  - Septic Tank Absorption Fields
  - Sewage Disposal (NJ)
  - Sewage Lagoons
  - Soil-Based Residential Wastewater Disposal Ratings (VT)
- Soil Erosion Factors
- Soil Health
- Soil Health Properties
- Soil Physical Properties
- Soil Qualities and Features
- Subaqueous Soils
- Vegetative Productivity
- Waste Management
- Water Features
- Water Management

Attribute/Folder Description | Rating Options | Report Options

Sanitary Facilities interpretations are tools designed to guide the user in site selection for the safe disposal of sewage and solid waste.

Example interpretations include septic tank absorption fields, sewage lagoons, and sanitary landfills.

Basic Mode | Advanced Mode

Aggregation Report | Map Unit Desc. Report | Map | Synchronize | Clear Themes

Synchronization Status: All map units in sync.

Map Layer: C:\geodata\soils\soil_a_NJ023.shp | soil_a_NJ023

Database: C:\FOTG\soil_d_nj023.mdb

Soil Data Viewer - ArcMap

File View Help

Attribute Folders

- Building Site Development
- Construction Materials
- Disaster Recovery Planning
- Land Classifications
- Land Management
- Military Operations
- Recreational Development
- Sanitary Facilities
- Soil Erosion Factors
- Soil Health
- Soil Health Properties
- Soil Physical Properties
- Soil Qualities and Features
  - AASHTO Group Classification (Surface)
  - Depth to a Selected Soil Restrictive Layer
  - Depth to Any Soil Restrictive Layer
  - Drainage Class
  - Frost Action
  - Frost-Free Days
  - Hydrologic Soil Group
  - Map Unit Name
  - Parent Material Name
  - Representative Slope
  - Soil Slippage Potential
  - Unified Soil Classification (Surface)
- Subaqueous Soils
- Vegetative Productivity
- Waste Management
- Water Features

Attribute/Folder Description | Rating Options | Report Options

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Basic Mode | Advanced Mode | Aggregation Report | Map Unit Desc. Report | Map | Synchronize | Clear Themes

Synchronization Status: All map units in sync.

Map Layer: C:\geodata\soils\soil_a_NJ023.shp | soil_a_NJ023

Database: C:\FOTG\soil_d_nj023.mdb

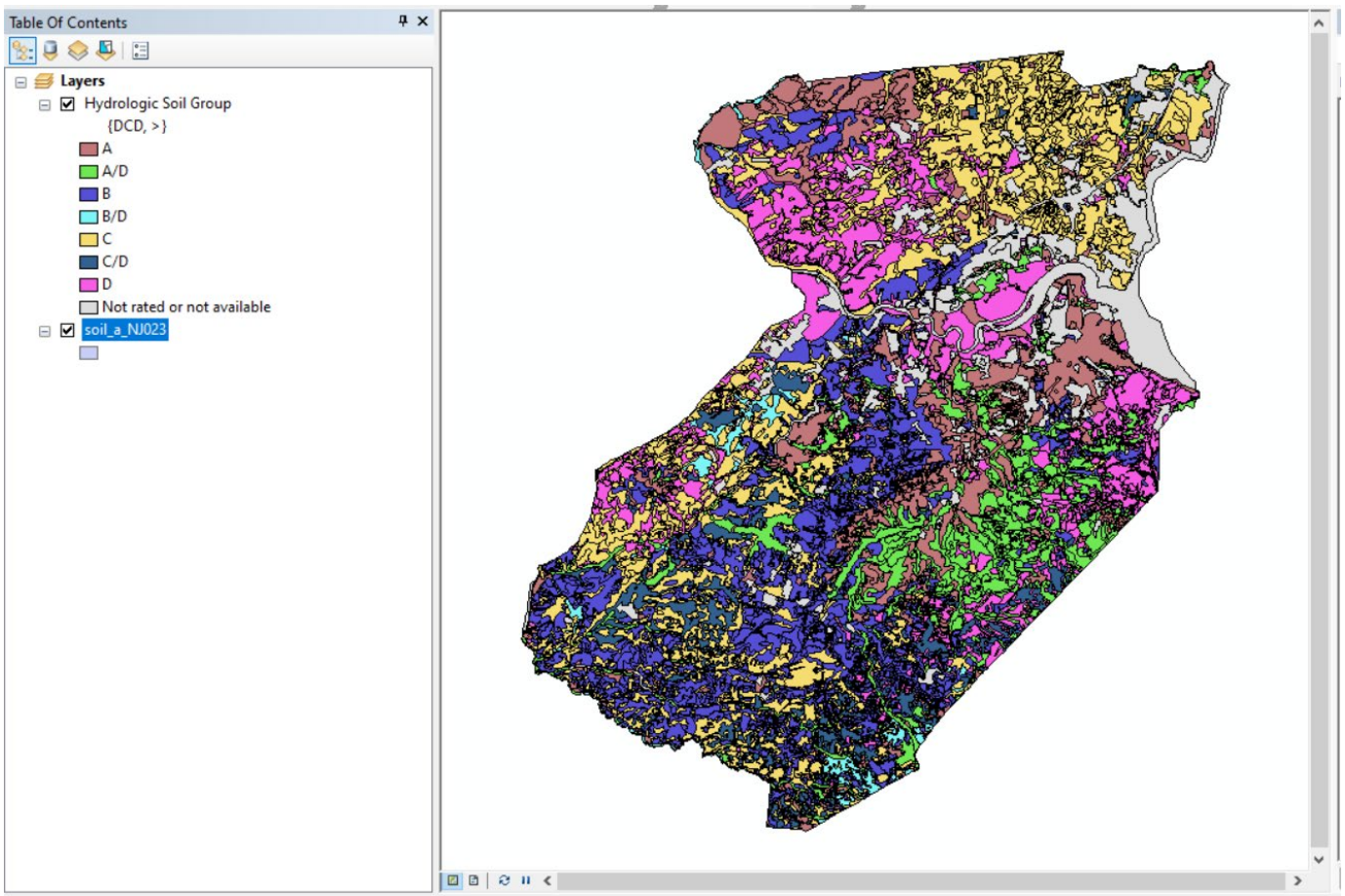


Table Of Contents
Layers
Hydrologic Soil Group
{DCD, >}
A
A/D
B
B/D
C
C/D
D
Not rated or not available
soil_a_NJ023

Glossary of Terms

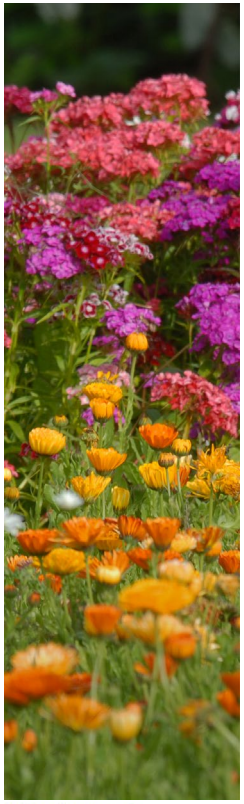
SSURGO - Soil **Su**rvey **Geo**graphic database - digital soils data produced and distributed by the Natural Resources Conservation Service; includes the **digital soil maps** and the accompanying soil properties and interpretations **database**. Data exists at the county level.

Web Soil Survey – a web application that provides access to SSURGO for the general public, non-GIS users

Soil Data Viewer – an extension to ArcMap that allows GIS users to create soil-based thematic maps

Geospatial Data Gateway – NRCS's geospatial clearinghouse website

Soil Data Access – a suite of web services and applications which allow the request and delivery of soil survey spatial and tabular data beyond what can be done on the Web Soil Survey website and the Geospatial Data Gateway website

Questions?

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