A VARIETY OF EXAMPLES FOR UTILIZING THE SSURGO DATABASE IN MAPPING AND ANALYSIS

Douglas M. Schleifer, Manager

NJ Office of Information Technology

Office of GIS

doug.schleifer@tech.nj.gov

Heather Korski

GIS Specialist

NJ Dept of Environmental Protection

Assistant Commissioner's Office for Natural & Historic Resources

Auction of leased farm fields within state parks, forests and wildlife management areas

- Farm fields delineated from aerial photography
- SSURGO is used to identify soil types
- Rental rates are determined for each soil type by the USDA Farm Service Agency

Physical State: New Jersey (34)

Physical County: Hunterdon (019)

United States Department of Agriculture
Farm Service Agency
Conservation On-Line System (COLS)

Prepared: 11-22-2019
02:03:14 CST

Report Page: 1 of 1
Total County Page: 1 of 1

Soil Rental Rate – Posting Report for General CRP Signup

Category	Soil Survey Area ID	Rental Rate ($)	Map Unit Symbol
OTHER/CREP		55	AVGRT
NON-IRRIGATED CROPLAND	NJ019	28	CoaBb, CoxBb, HcuAt, HdyEb, NehEb, ParEe, PdtE, RepwA, RepwB
		42	AnoC2, BegC2, BegD2, BoyAt, CanBb, ChcC2, CoaA, CoxA, HdyC2, HdyDb, KkoC, KkoD, LdmC2, LemC2, LemD2, LemDb, MemC2, ParC, ParD, PeoC2, PepC2, RedC2, RehC2
		55	ANWTB, ANWTC, AbrA, AbrB, AnoB, AtdB, AtdC2, AtdD2, BefB, BefC2, BegB, BhnA, BhnB, BhnC2, BucB, BucC2, CakA, CakB, ChcA, ChcB, ChcCb, CheCb, ChfB, CoxB, DufB, DufC2, DugCg, DugDh, GKAPCC, GkaoB, GkaoC2, GkaoD, HdyB, HdyD, LbmB, LbmC2, LbmD, LbtB, LdmB, LegB, LegC, LegD, LemB, LemBb, MemB, MonB, MopBb, NeeB, NehB, NehC2, NehCb, NehDb, NemCb, NotB, NotC2, NotD2, PdtB, PdtC2, PdtD, PdtmB, PeoB, PeoD, PepB, PomAs, QukA, QukB, QukC2, QukD2, QupC2, RarAr, RarB, RedB, RehA, RehB, RksB, RksC, RorAt, TurB, UdrB, WadB, WadC2, WasA

Table ID	County	Farm Field ID	Soil Unit	Soil Acreage	Rental Value per Acre	Total Rental Value
1	HUNTERDON	21-003A	KkoC	0.081545	42	$3.00
2	HUNTERDON	21-003A	PeoC2	1.506689	42	$63.00
3	HUNTERDON	21-003B	KkoD	0.117297	42	$5.00
4	HUNTERDON	21-003B	KkoC	0.65174	42	$27.00
5	HUNTERDON	21-003B	PeoC2	2.171451	42	$91.00
6	HUNTERDON	21-003C	KkoC	10.125676	42	$425.00
7	HUNTERDON	21-003C	PeoC2	5.299626	42	$223.00
8	HUNTERDON	21-003D	KkoC	1.486278	42	$62.00

N

Exhibit A - Farm Lease - LE21-003
D&R Canal State Park - Alexandria Twp, Hunterdon County

100 Feet

Heather Korski

GIS Specialist

NJ Dept of Environmental Protection

Assistant Commissioner's Office for Natural & Historic Resources

Auction of leased farm fields within state parks, forests and wildlife management areas

- Farm fields delineated from aerial photography
- SSURGO is used to identify soil types
- Rental rates are determined for each soil type by the USDA Farm Service Agency

Physical State: New Jersey (34)
Physical County: Hunterdon (019)

United States Department of Agriculture
Farm Service Agency
Conservation On-Line System (COLS)

Prepared: 11-22-2019
02:03:14 CST

Report Page: 1 of 1
Total County Page: 1 of 1

Soil Rental Rate – Posting Report for General CRP Signup

Category	Soil Survey Area ID	Rental Rate ($)	Map Unit Symbol
OTHER/CREP		55	AVGRT
NON-IRRIGATED CROPLAND	NJ019	28	CoaBb, CoxBb, HcuAt, HdyEb, NehEb, ParEe, PdtE, RepwA, RepwB
		42	AnoC2, BegC2, BegD2, BoyAt, CanBb, ChcC2, CoaA, CoxA, HdyC2, HdyDb, KkoC, KkoD, LdmC2, LemC2, LemD2, LemDb, MemC2, ParC, ParD, PeoC2, PepC2, RedC2, RehC2
		55	ANWTB, ANWTC, AbrA, AbrB, AnoB, AtdB, AtdC2, AtdD2, BefB, BefC2, BegB, BhnA, BhnB, BhnC2, BucB, BucC2, CakA, CakB, ChcA, ChcB, ChcCb, CheCb, ChfB, CoxB, DufB, DufC2, DugCg, DugDh, GKAPCC, GkaoB, GkaoC2, GkaoD, HdyB, HdyD, LbmB, LbmC2, LbmD, LbtB, LdmB, LegB, LegC, LegD, LemB, LemBb, MemB, MonB, MopBb, NeeB, NehB, NehC2, NehCb, NehDb, NemCb, NotB, NotC2, NotD2, PdtB, PdtC2, PdtD, PdtmB, PeoB, PeoD, PepB, PomAs, QukA, QukB, QukC2, QukD2, QupC2, RarAr, RarB, RedB, RehA, RehB, RksB, RksC, RorAt, TurB, UdrB

Table ID	County	Farm Field ID	Soil Unit	Soil Acreage	Rental Value per Acre	Total Rental Value
1	HUNTERDON	21-003A	KkoC	0.081545	42	$3.00
2	HUNTERDON	21-003A	PeoC2	1.506689	42	$63.00
3	HUNTERDON	21-003B	KkoD	0.117297	42	$5.00
4	HUNTERDON	21-003B	KkoC	0.65174	42	$27.00
5	HUNTERDON	21-003B	PeoC2	2.171451	42	$91.00
6	HUNTERDON	21-003C	KkoC	10.125676	42	$425.00
7	HUNTERDON	21-003C	PeoC2	5.299626	42	$223.00
8	HUNTERDON	21-003D	KkoC	1.486278	42	$62.00

David Dumont

Environmental Scientist

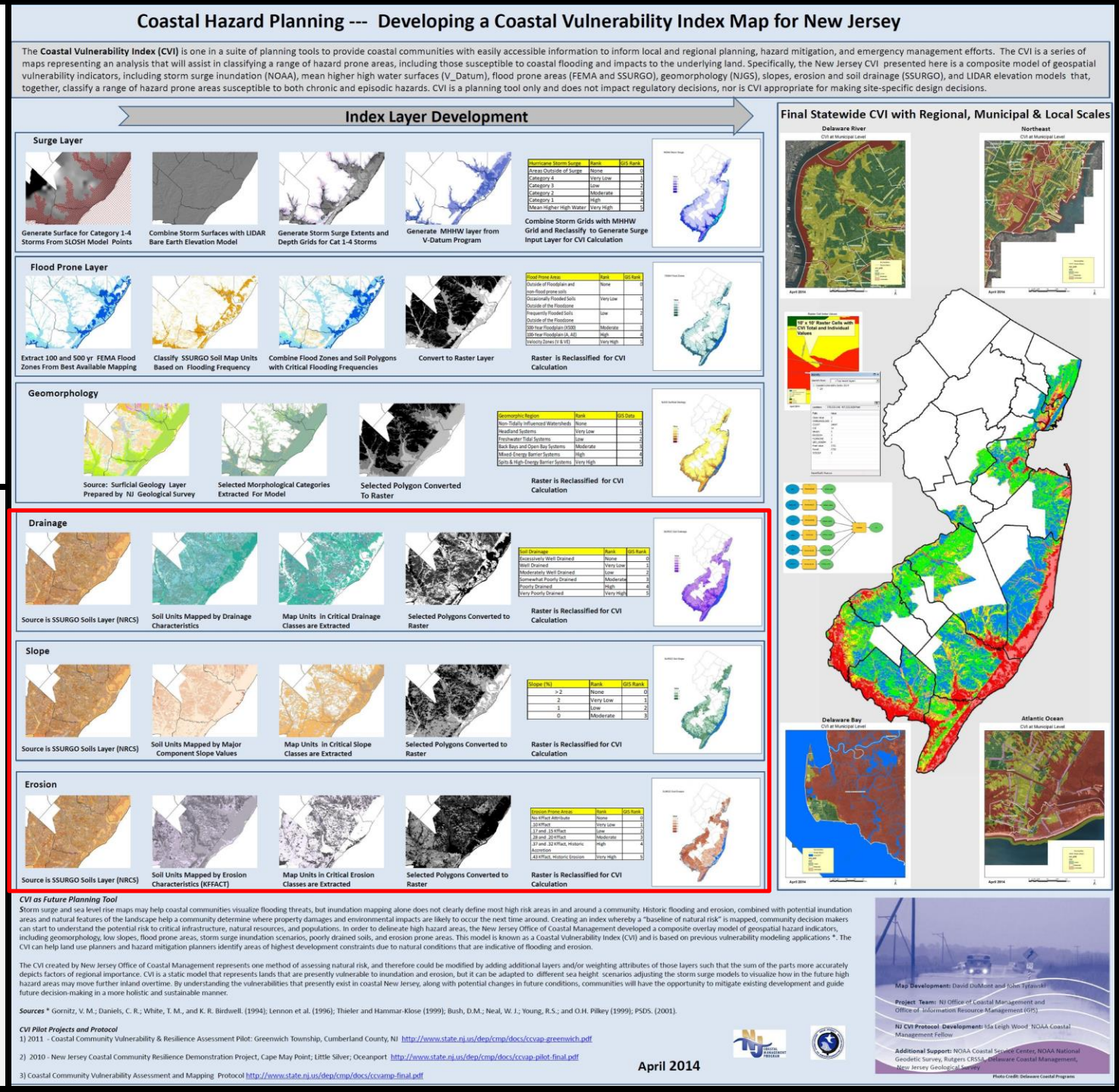
NJ Dept of Environmental Protection

Climate Resilience Planning

Coastal Vulnerability Index Map

SSURGO Soils were used for 3 Index layers:

1. **Drainage** - (Excessively Well Drained, Well Drained, Moderately Well Drained, Somewhat Poorly Drained, Very Poorly Drained)
2. **Slope** - (Very Low, Low, Moderate)
3. **Erosion** - (Very Low, Low, Moderate, High, Very High) - used Kffact value for breaks

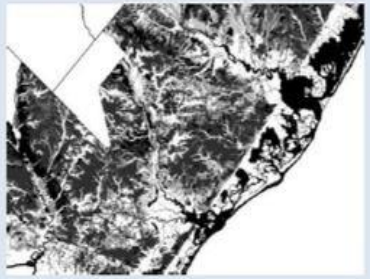


Drainage

Source is SSURGO Soils Layer (NRCS)

Soil Units Mapped by Drainage Characteristics

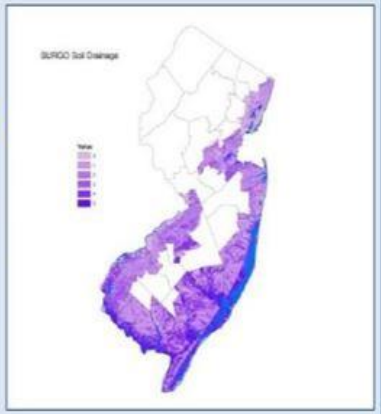
Map Units in Critical Drainage Classes are Extracted



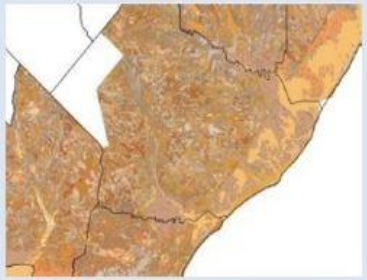
Selected Polygons Converted to Raster

Soil Drainage	Rank	GIS Rank
Excessively Well Drained	None	0
Well Drained	Very Low	1
Moderately Well Drained	Low	2
Somewhat Poorly Drained	Moderate	3
Poorly Drained	High	4
Very Poorly Drained	Very High	5

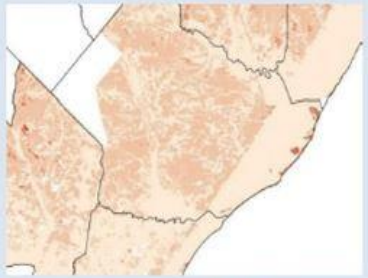
Raster is Reclassified for CVI Calculation



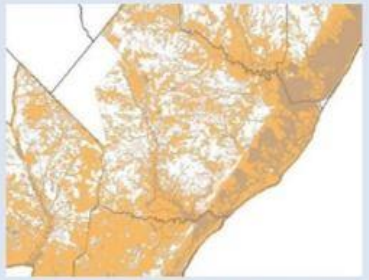
Slope



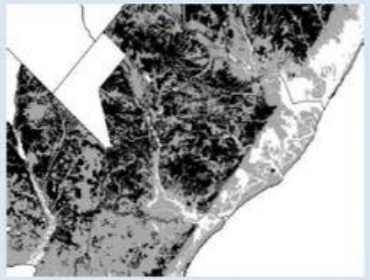
Source is SSURGO Soils Layer (NRCS)



Soil Units Mapped by Major Component Slope Values



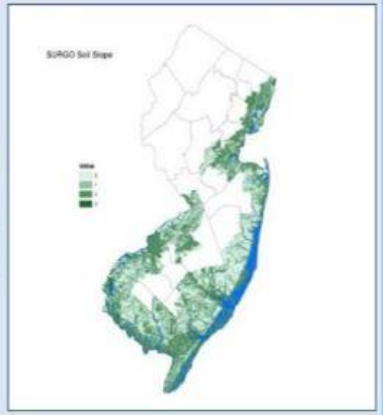
Map Units in Critical Slope Classes are Extracted



Selected Polygons Converted to Raster

Slope (%)	Rank	GIS Rank
> 2	None	0
2	Very Low	1
1	Low	2
0	Moderate	3

Raster is Reclassified for CVI Calculation

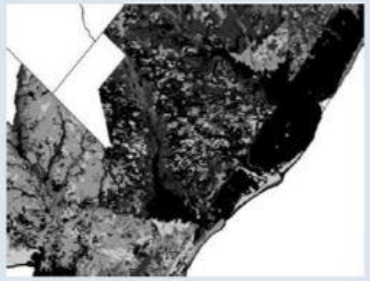


Erosion

Source is SSURGO Soils Layer (NRCS)

Soil Units Mapped by Erosion Characteristics (KFFACT)

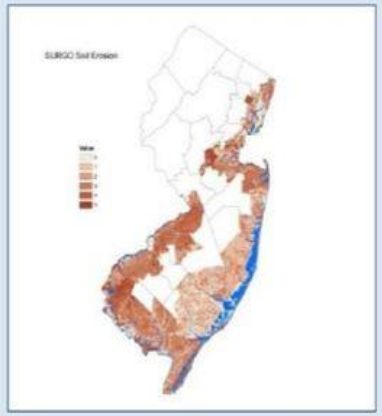
Map Units in Critical Erosion Classes are Extracted



Selected Polygons Converted to Raster

Erosion Prone Areas	Rank	GIS Rank
No Kffact Attribute	None	0
.10 Kffact	Very Low	1
.17 and .15 Kffact	Low	2
.28 and .20 Kffact	Moderate	3
.37 and .32 Kffact, Historic Accretion	High	4
.43 Kffact, Historic Erosion	Very High	5

Raster is Reclassified for CVI Calculation



David Dumont

Environmental Scientist

NJ Dept of Environmental Protection

Climate Resilience Planning

Marsh Migration Index Map

SSURGO Soils were used for 1 Index layer:

Drainage - (Well Drained, Moderately Drained, Poorly Drained)

Developing a Tidal Marsh Migration Model

(1)

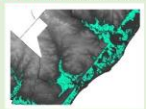
Healthy marshes are extremely valuable for their environmental resources, buffering coastal communities, protecting valuable assets and bringing dollars to coastal communities from eco – tourism and commercial and recreational fishing. Most of the salt water fish rely on tidal marshes, so without this habitat, we would not have most of the fish we eat (2).

Sea level rise will be one of the primary effects of global climate change in New Jersey. Sea level rise can increase the height of storm waves, making more areas vulnerable to storm damage. Sea level rise can inundate low lying areas, causing losses to tidal wetlands, habitat, and agricultural areas. Sea level rise also can cause higher water tables interfering with septic systems and salt water intrusion interfering with drinking water and irrigation water (3).

The **Marsh Migration Index (MMI)** is a predictive spatial tool to provide coastal communities with easily accessible information to inform local and regional living shore planning. The MMI is a series of maps representing an analysis that will assist in showing where coastal marshes will retreat in response to rising sea levels. Specifically, the New Jersey MMI presented here is a composite model of geospatial indicators, including Mean Higher High Water Surfaces (V_Datum), Coastal Wetland Buffers, Land Use/ Land Cover Types, Slopes, Soil Drainage (SSURGO), and LIDAR Elevation Models that, together, classify a range of conditions that would be compatible or not compatible for marsh re-establishment inland of increasing surface water heights. MMI is a planning tool only and does not impact regulatory decisions, nor is MMI appropriate for making site-specific design decisions.

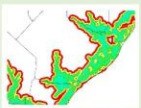
Index Layer Development

INDEX GRID - Distances from Tidal Wetlands



Reselect Tidal Wetlands from LULC

Generated 3 Buffer extents from Tidal Wetlands



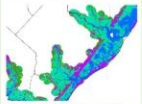
Merge Buffers and Convert to a Raster (Analysis Extent)

Distance	Rank	GIS Rank
No Data	No Data	0
6,000 Feet	Distant	1
3,000 Feet	Intermediate	2
1,000 Feet	Proximate	3

Raster is Reclassified for MMI Calculation

INDEX GRID - Land Use/ Land Cover 2012

Source is Land Use/ Land Cover NJDEP



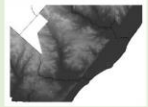
Clip LULC to 6,000 foot Buffer

Selected Polygons Convert to a Raster

LU/LC Type	Rank	GIS Rank
Water	No Data	0
Urban	Unlikely Compatible	1
Barren	Somewhat Compatible	2
Wetland, Forest, Agriculture	Compatible	3

Raster is Reclassified for MMI Calculation

INDEX GRID - Slope



Source is LIDAR NJDEP

Generated slope percentage From LIDAR

Selected Polygons Convert to a Raster

Slope %	Rank	GIS Rank
No Data	No Data	0
> 5.88	Steep	1
1.4 - 5.88	Moderate	2
0 - 1.4	Flat	3

Raster is Reclassified for MMI Calculation

INDEX GRID - Soils Drainage

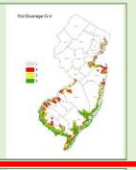
Source is SSURGO Soils Layer (NRCS)

Map Units in Selected Drainage Classes are Extracted

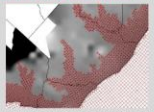
Selected Polygons Converted to Raster

Soil Drainage	Rank	GIS Rank
No Data	No Data	0
Well Drained	Well Drained	1
Moderately Drained	Moderately Drained	2
Poorly Drained	Poorly Drained	3

Raster is Reclassified for MMI Calculation



INDEX GRID ZERO VALUE - Future Water Layer (Mean Higher High Water increased 3.3 feet)



Generate Surface for MHHW added 3.3 feet in Raster Calculator

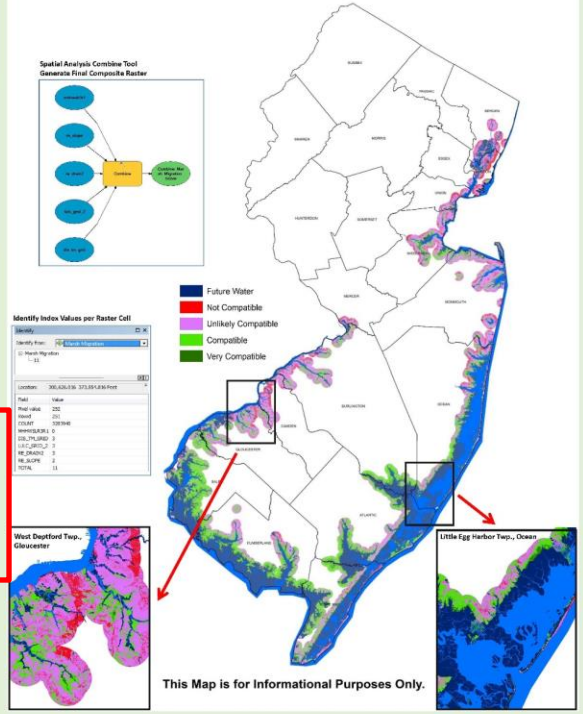
Subtract MHHW Surfaces with LIDAR Bare Earth Elevation Model

Generated Depth Grid Raster

MHHW	Rank	GIS Rank
No Data	No Data	0
MHHW	MHHW	0

Raster is Reclassified for MMI Calculation

Final Output Tidal Marsh Migration



Spatial Analysis Method (4)

This raster analysis was performed within an area between the estimated Year 2100 sea level rise of 3.3 feet over Mean Higher High Water (MHHW) to a landward extent of 6,000 feet from the edge of the Tidal Wetlands within New Jersey. The raster cell resolution in this analysis is 10'x10'. A snapping function was used in the development of the raster surface to insure alignment with base NJ LiDAR layer. Soil drainage, Slope, Land Use/ Land Cover, Distance from Tidal Wetlands were classified into four categories. The MHHW was classified into two categories. The higher the number, the more likely the cell is to have the characteristics to allow marsh migration. These five layers were combined in spatial analysis to create a composite final raster. A total index value was then calculated in raster calculator.

The final model output resulted in scores ranging from zero to twelve, with twelve having the most potential for future marsh migration. The final model total values were classified into five ranges. Cells receiving a score of zero due to MHHW or LULC water (future water level) are completely unsuitable for marsh migration. Cells receiving a score of 0.1 – 4 are Not Compatible; 4.1 – 7 are Unlikely Compatible; 7.1 – 10 are Compatible and 10.1 – 12 Very Compatible for marsh migration.

Map Development: Dave DuMont, NJDEP OCLUP (1)

Model Protocol: Delaware Coastal Management Program (DNREC DCMP)

References:

1) Photos Credit – Steve Jacobus, NJDEP OCLUP
2) EPA. 2004.National Coastal Report II.EPA, Office of Research and Development, Office of Water
3) Delaware Coastal Program-http://www.dnrec.delaware.gov/coastal/Pages/SeaLevelRiseAdaptation.aspx
4) Delaware Coastal Management Program (DNREC DCMP)

APRIL 2017

NEW JERSEY COASTAL MANAGEMENT PROGRAM

David Dumont

Environmental Scientist

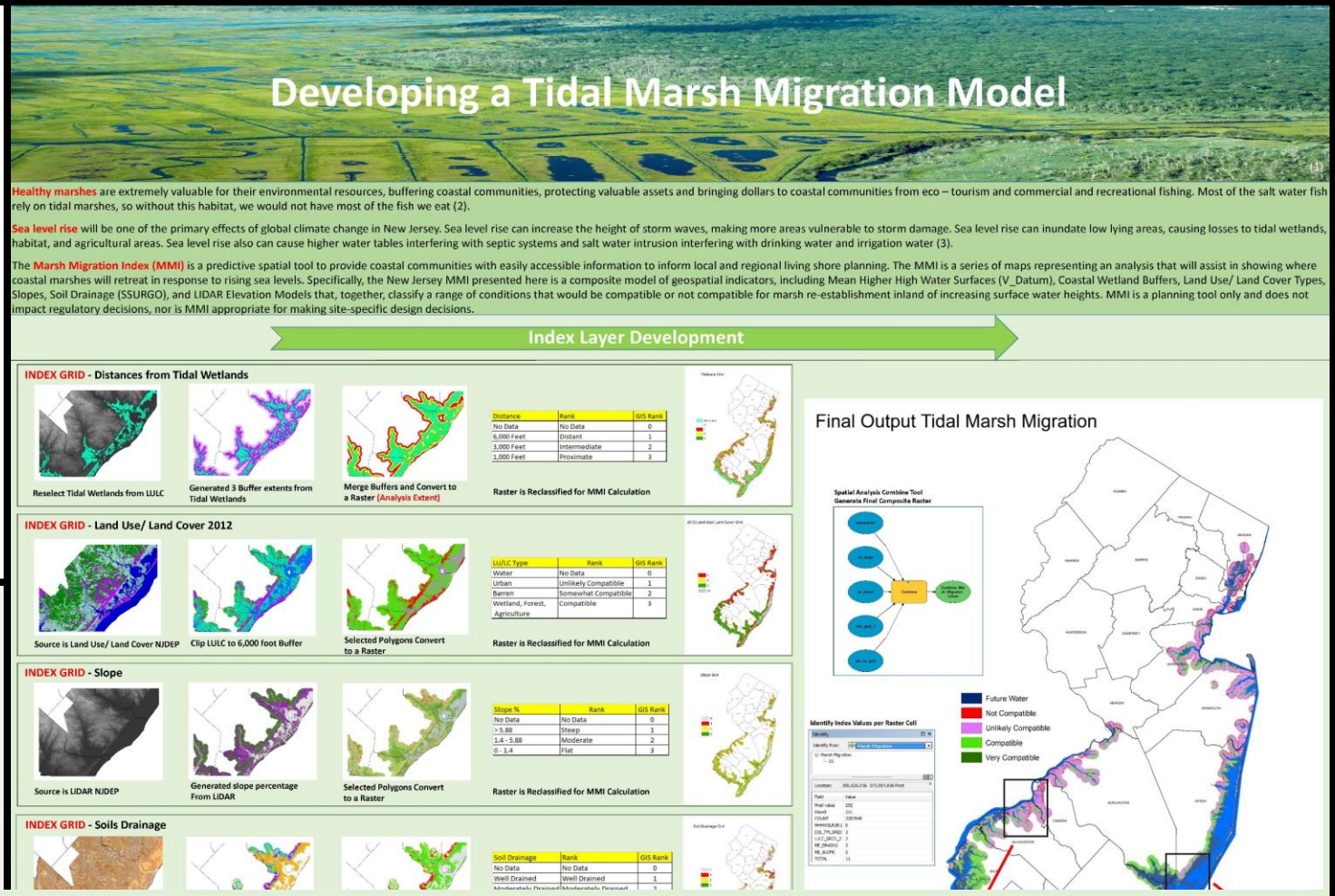
NJ Dept of Environmental Protection

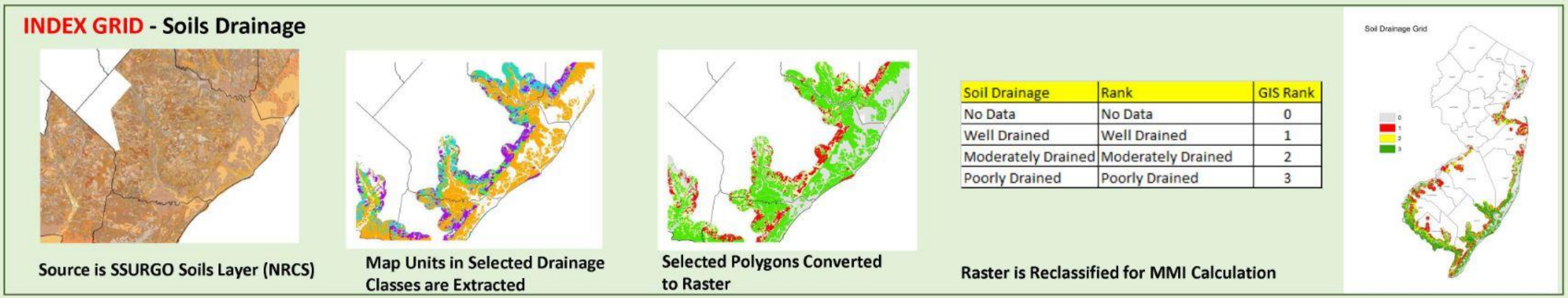
Climate Resilience Planning

Marsh Migration Index Map

SSURGO Soils were used for 1 Index layer:

Drainage - (Well Drained, Moderately Drained, Poorly Drained)





Soil Drainage	Rank	GIS Rank
No Data	No Data	0
Well Drained	Well Drained	1
Moderately Drained	Moderately Drained	2
Poorly Drained	Poorly Drained	3

Laurance S. Torok

Manager

NJ Dept of Environmental Protection

Bureau of Watershed Management

Division of Watershed Management

& Restoration

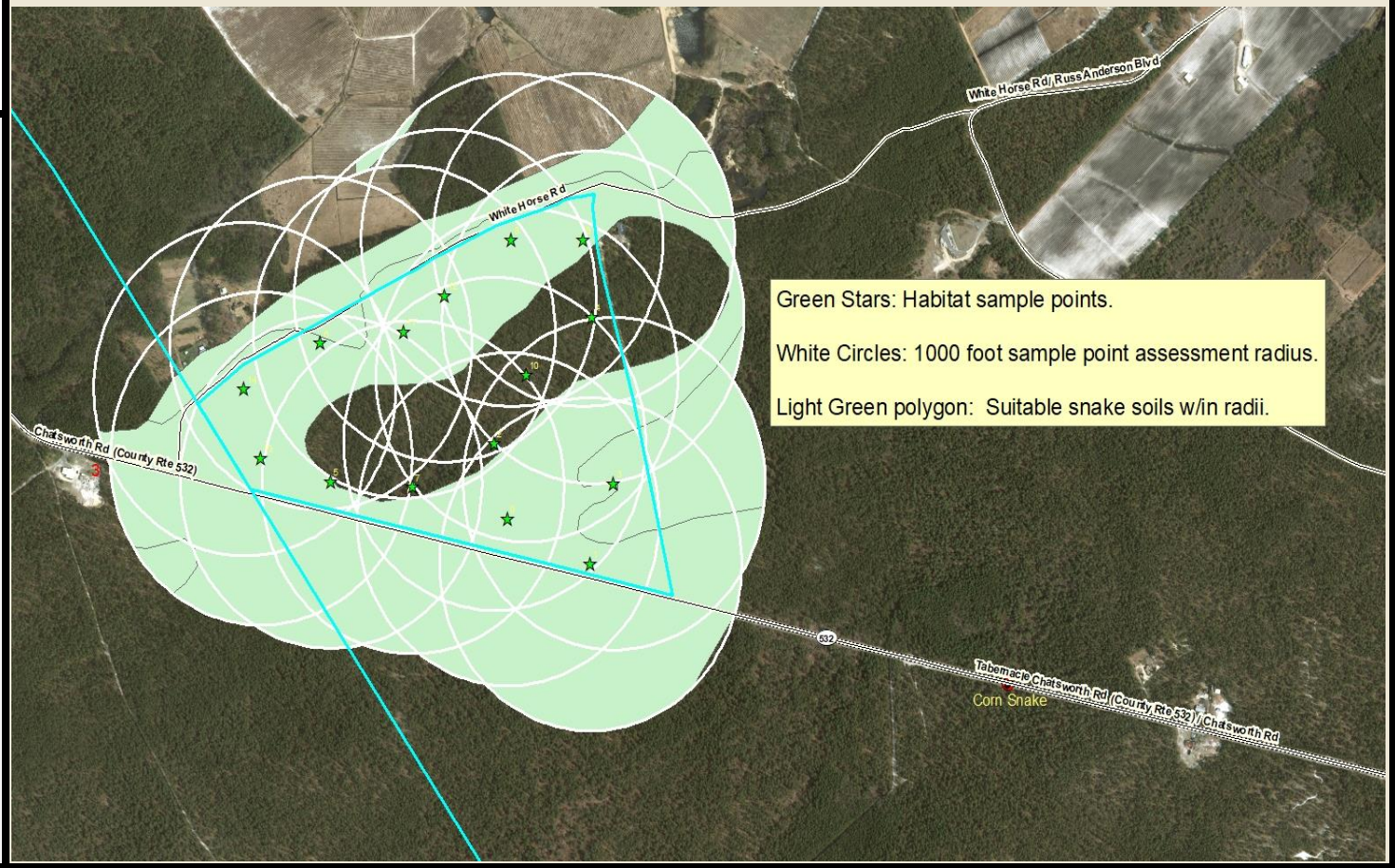
Use of soils mapping for Threatened and Endangered Species habitat analysis

- **Assess the potential of a site to feature critical nesting habitat for pine snakes**
- Assess the potential for longtail salamander presence based by soil type

Pine Snake Habitat Evaluation Model

Percentage and distribution of good soils (Lakehurst, Woodmansie or Lakewood soils) contained within a 1,000-ft radius of the sample point.

Score based on % of suitable habitat associated with each survey point totaled and then averaged for a single site value.



Laurance S. Torok

Manager

NJ Dept of Environmental Protection

Bureau of Watershed Management

Division of Watershed Management

& Restoration

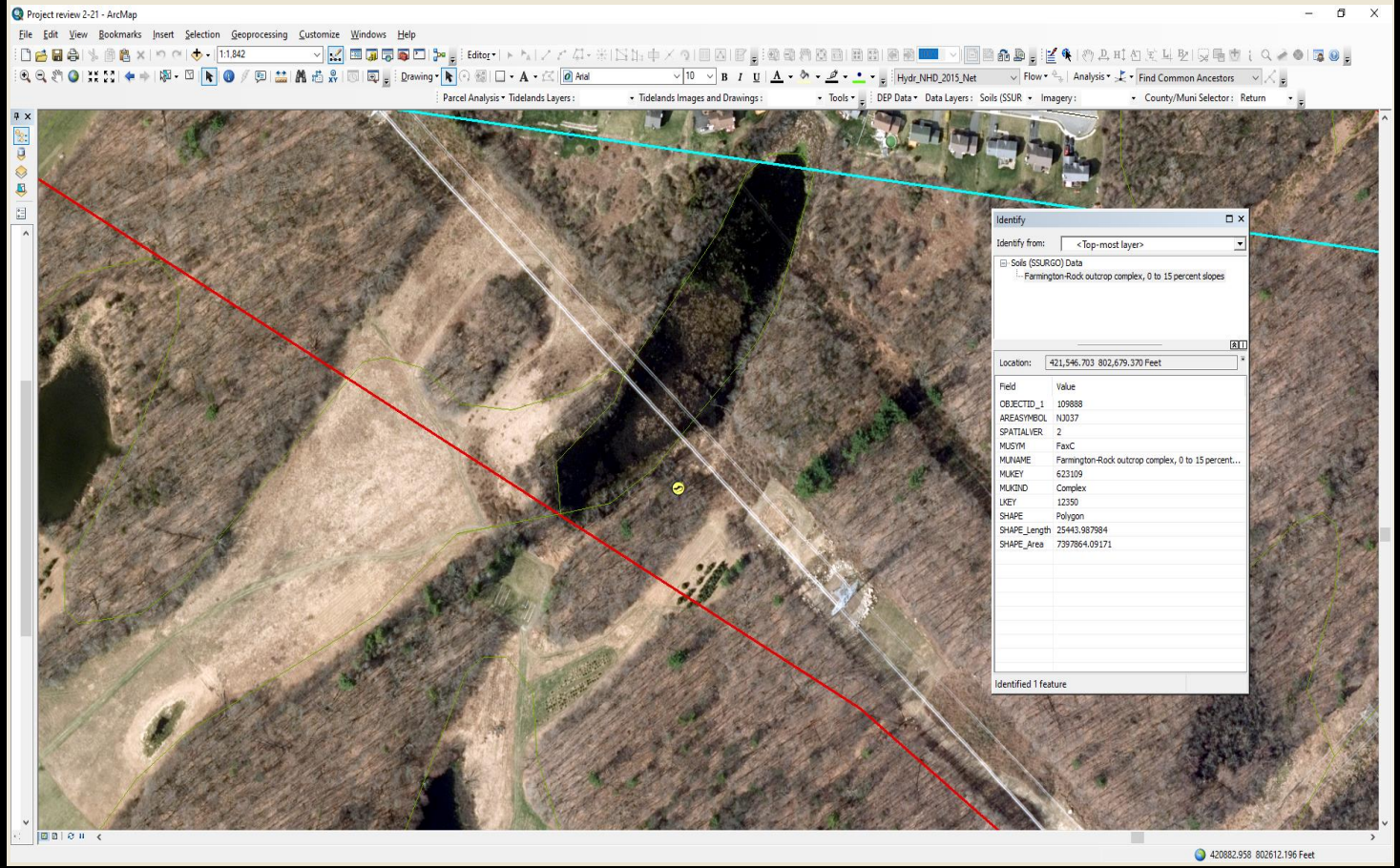
Use of soils mapping for Threatened and Endangered Species habitat analysis

- Assess the potential of a site to feature critical nesting habitat for pine snakes
- **Assess the potential for longtail salamander presence based by soil type**

Longtail Salamander Example

Ponds studied in Sussex County were characterized by their association with Kittatinny limestone, either in outcrops or boulders, widely varying water depths (5 – 6 feet in Spring, dry by mid-Summer), size (1.3 – 13.8 acres), and forested uplands.

Elsewhere, longtail salamanders occur in shale outcrop areas.



Mark French

GIS Specialist

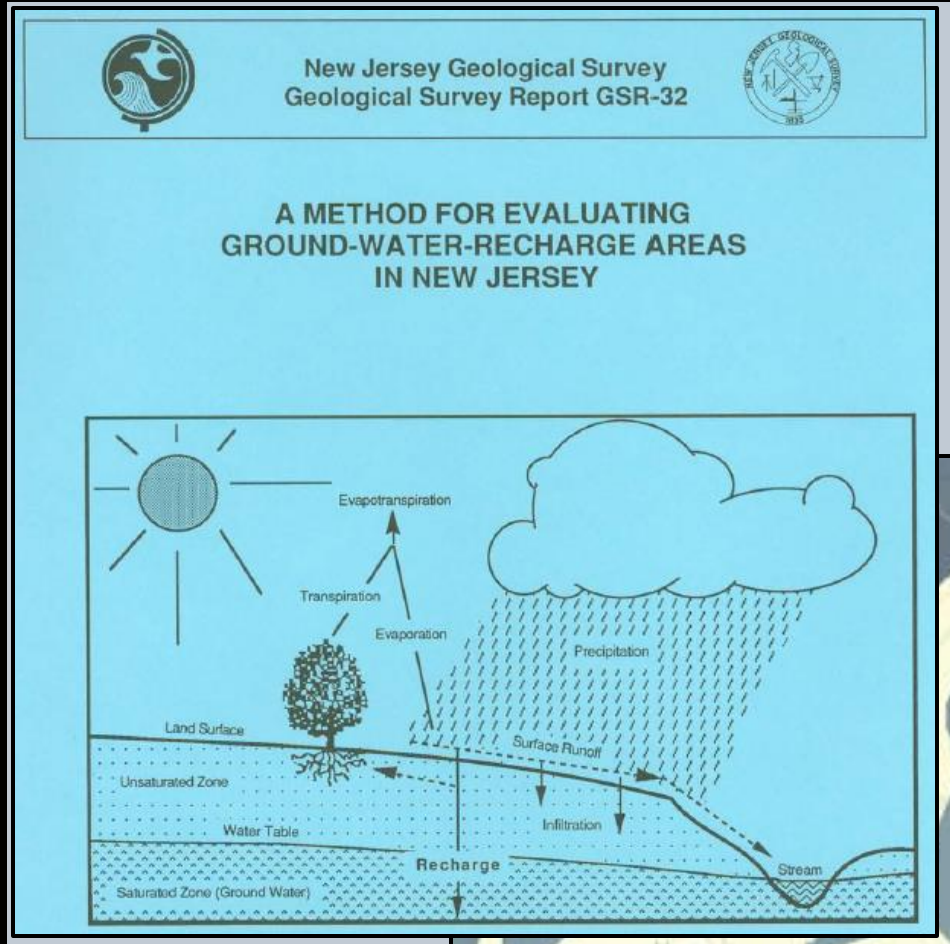
NJ Geological & Water Survey

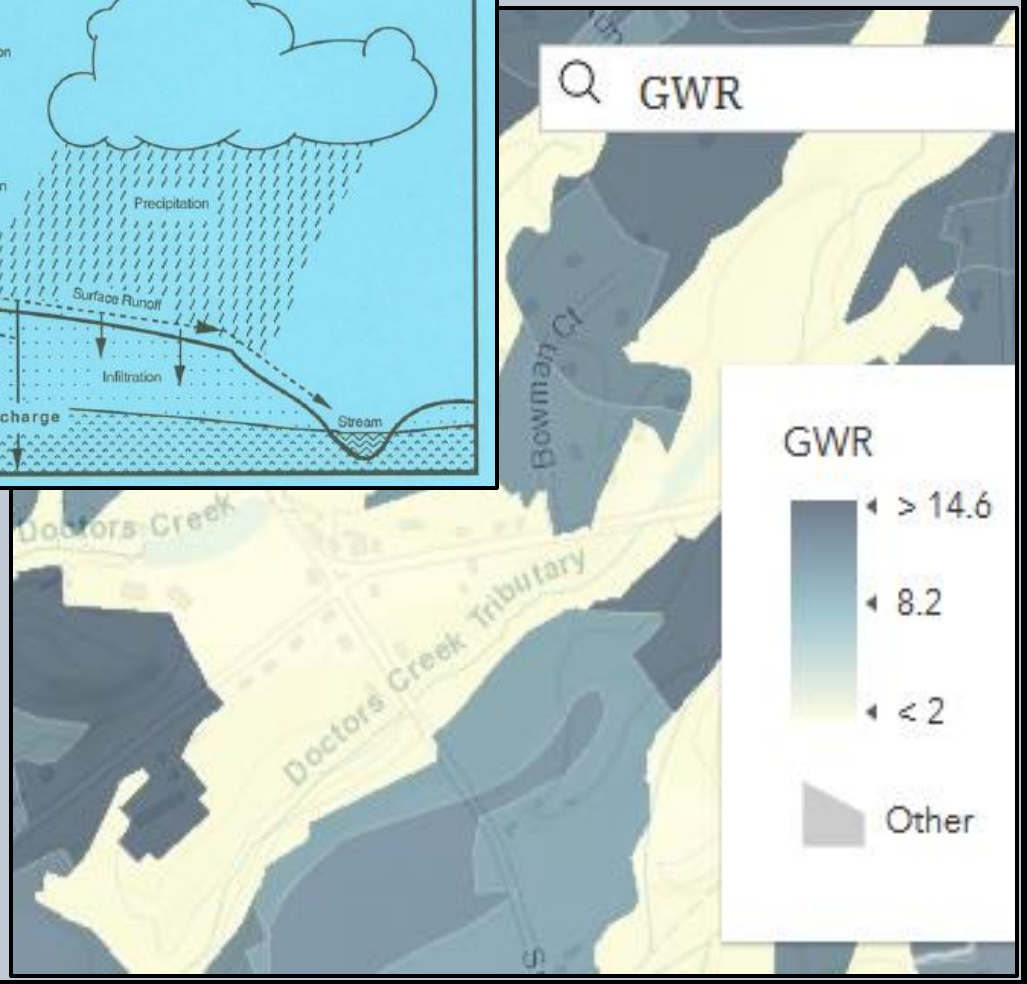
Bureau of Water Resources & Geosciences

Groundwater Recharge / Aquifer Recharge

- The groundwater recharge and aquifer recharge methodologies require **soil mapunit and hydrologic soil group**, land use/landcover and climate (average annual precipitation) data, to generate recharge curve numbers.

- A similar soil moisture budget/runoff project, in conjunction with the NJGWS Water Supply Planning group, is in its early stages and will utilize the same soils data as well as available water capacity to determine root zone water capacity.





Mark French

GIS Specialist

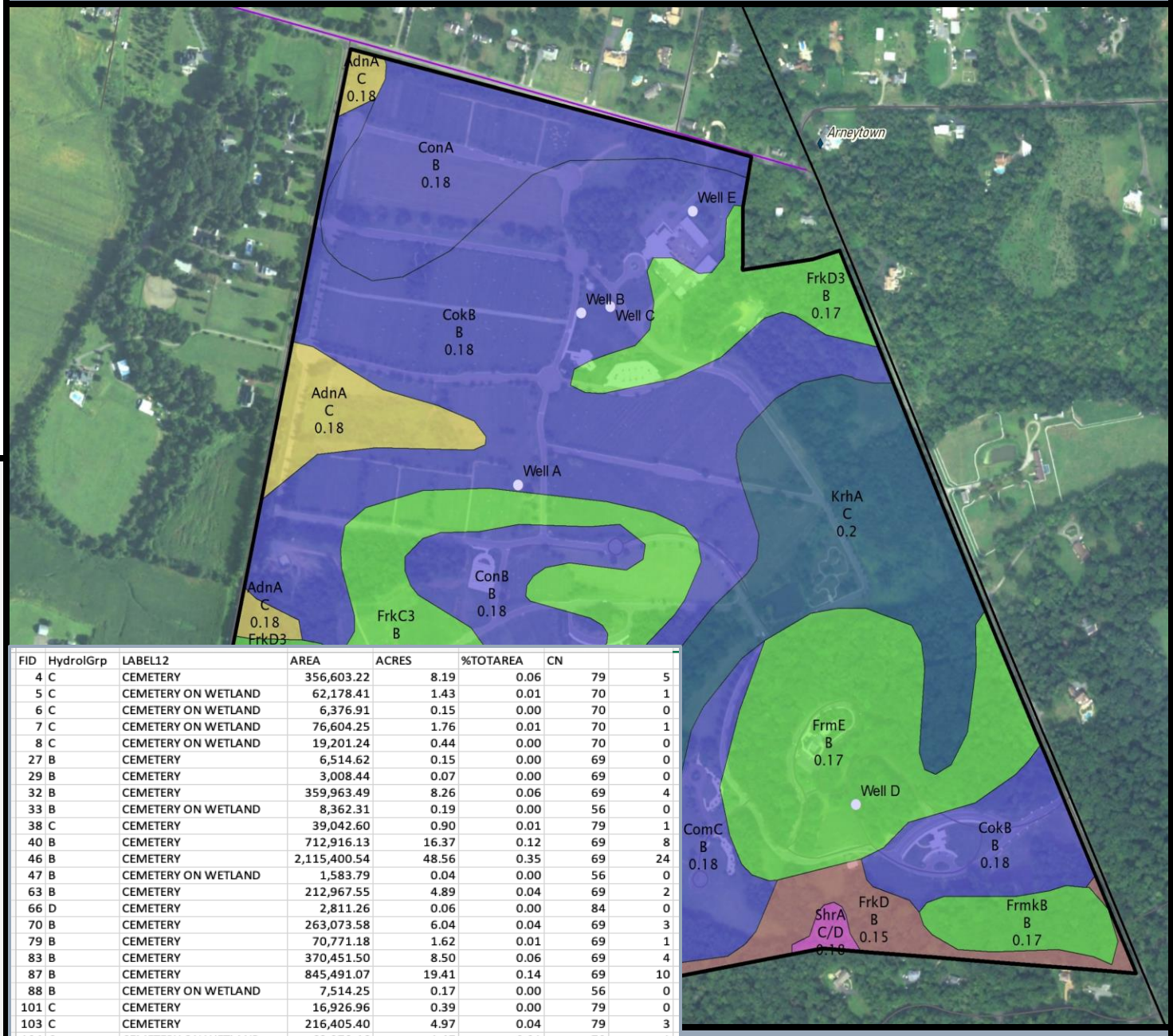
NJ Geological & Water Survey

Bureau of Water Resources & Geosciences

Water Allocation Permit Review

Map of Doyle Veteran's Cemetery water allocation review.

To evaluate runoff, Soil Data Viewer was used to generate the Hydrologic Soil Group and available water capacity to combine with land use/landcover data.



FID	HydrolGrp	LABEL12	AREA	ACRES	%TOTAREA	CN	
4	C	CEMETERY	356,603.22	8.19	0.06	79	5
5	C	CEMETERY ON WETLAND	62,178.41	1.43	0.01	70	1
6	C	CEMETERY ON WETLAND	6,376.91	0.15	0.00	70	0
7	C	CEMETERY ON WETLAND	76,604.25	1.76	0.01	70	1
8	C	CEMETERY ON WETLAND	19,201.24	0.44	0.00	70	0
27	B	CEMETERY	6,514.62	0.15	0.00	69	0
29	B	CEMETERY	3,008.44	0.07	0.00	69	0
32	B	CEMETERY	359,963.49	8.26	0.06	69	4
33	B	CEMETERY ON WETLAND	8,362.31	0.19	0.00	56	0
38	C	CEMETERY	39,042.60	0.90	0.01	79	1
40	B	CEMETERY	712,916.13	16.37	0.12	69	8
46	B	CEMETERY	2,115,400.54	48.56	0.35	69	24
47	B	CEMETERY ON WETLAND	1,583.79	0.04	0.00	56	0
63	B	CEMETERY	212,967.55	4.89	0.04	69	2
66	D	CEMETERY	2,811.26	0.06	0.00	84	0
70	B	CEMETERY	263,073.58	6.04	0.04	69	3
79	B	CEMETERY	70,771.18	1.62	0.01	69	1
83	B	CEMETERY	370,451.50	8.50	0.06	69	4
87	B	CEMETERY	845,491.07	19.41	0.14	69	10
88	B	CEMETERY ON WETLAND	7,514.25	0.17	0.00	56	0
101	C	CEMETERY	16,926.96	0.39	0.00	79	0
103	C	CEMETERY	216,405.40	4.97	0.04	79	3
104	C	CEMETERY ON WETLAND	63,978.46	1.47	0.01	70	1
110	B	CEMETERY	134,075.99	3.08	0.02	69	2
			5,972,223.16	137.10			70

Ariana Tsiattalos

Freshwater Wetland Ecologist

NJ Dept of Environmental Protection

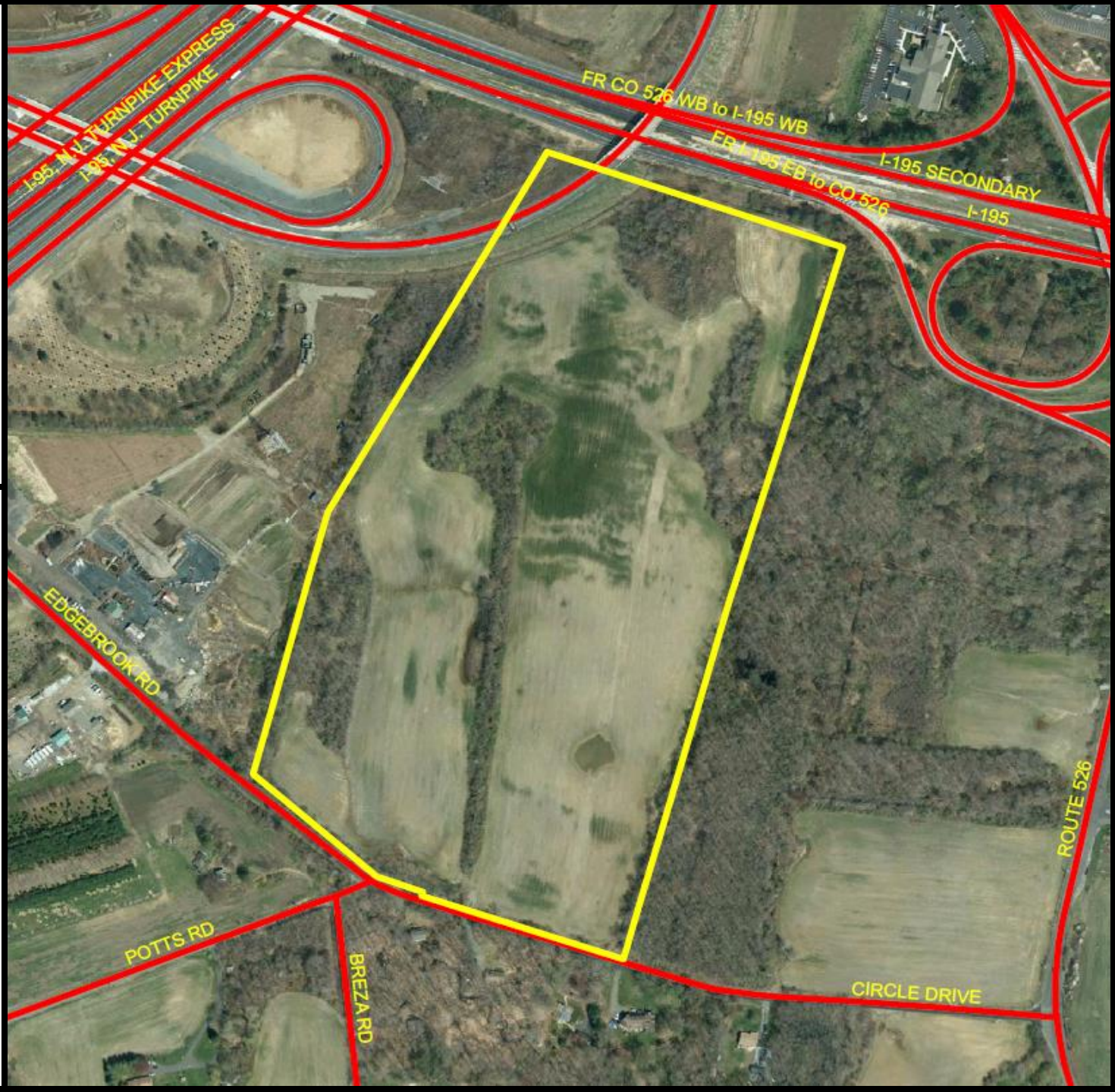
Division of Land Resource Protection

Assessment of presence of freshwater wetlands on lands subject to a proposed permit or wetland delineation application

Example of SSURGO database use during desktop review and results of field inspection for specific soils rated as hydric.

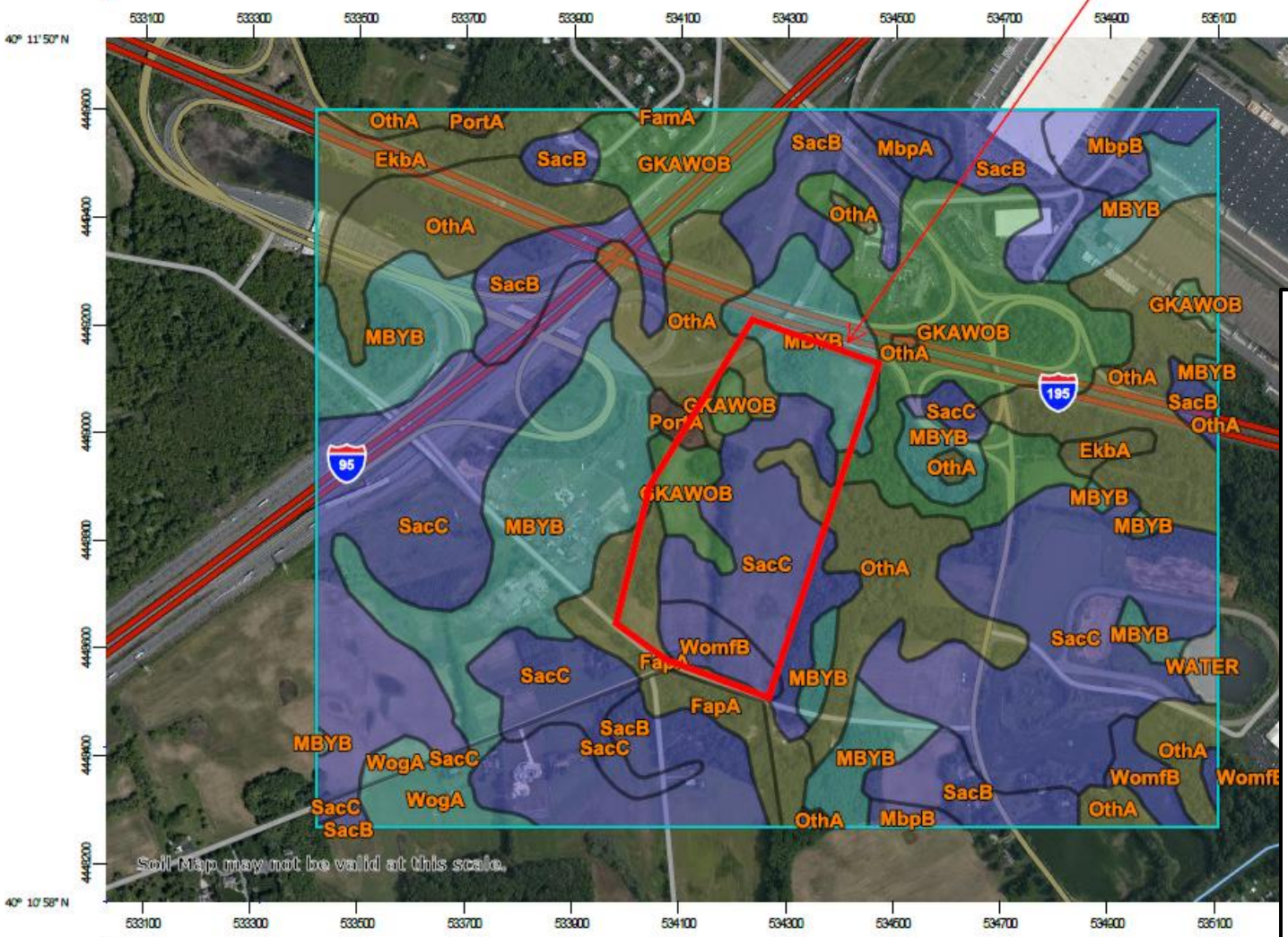
Circle Drive Development
Robbinsville, Mercer County

Lat/Long: 40.187877, -74.598287



Hydrologic Soil Group—Mercer County, New Jersey, and Monmouth County, New Jersey

Approximate Site Location



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

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

Soils rated as hydric, or include components rated as hydric: [**FapA, OthA, PortA, WomfB, and GKAWOB**]

Hydrologic Soil Group—Mercer County, New Jersey, and Monmouth County, New Jersey

MAP LEGEND

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

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:24,000.

Warning: Soil Map may not be valid at this scale.

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

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.

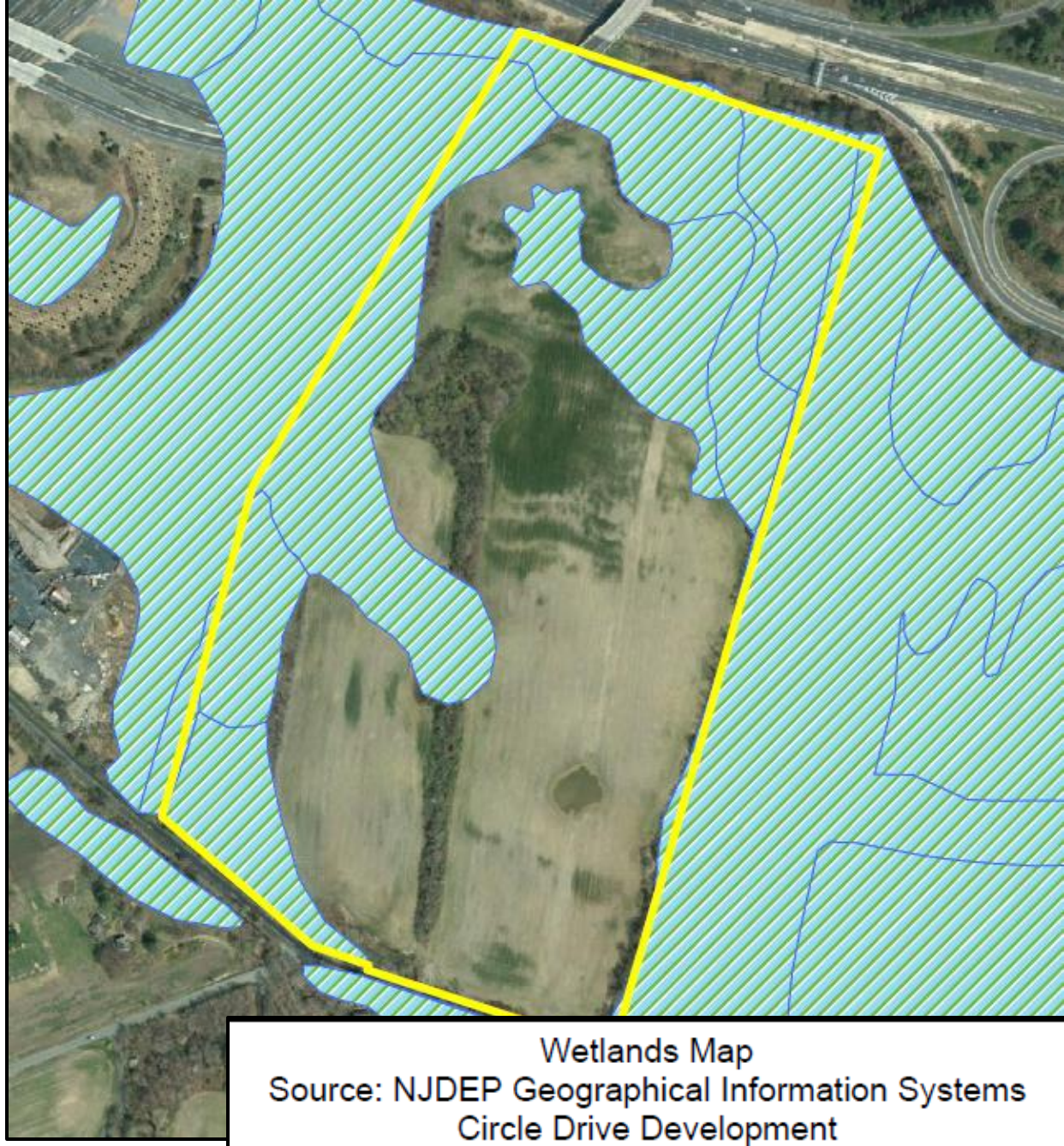
Soil Survey Area: Mercer County, New Jersey
Survey Area Data: Version 15, Sep 16, 2019

Soil Survey Area: Monmouth County, New Jersey
Survey Area Data: Version 13, Sep 16, 2019

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: May 2, 2019—Jul 9, 2019



Wetlands Map
Source: NJDEP Geographical Information Systems
Circle Drive Development
Block 38, Lot 1
Robbinsville Township, Mercer County, New Jersey

4.2 *Soil Survey*

The Natural Resource Conservation Service (NRCS) Web Soil Survey (Appendix A) indicates the property is underlain by seven (7) soil map units which are identified in Table 2 below with their corresponding drainage classes.

Table 2. Soil map units and drainage classes

Map unit symbol	Map unit name	Rating
FapA	Fallsington loams, 0 to 2 percent slopes, Northern Coastal Plain	Poorly drained
GKAWOB	Glassboro and Woodstown sandy loams, 0 to 5 percent slopes	Somewhat poorly drained
MBYB	Mattapex and Bertie loams, 0 to 5 percent slopes	Moderately well drained
OthA	Othello silt loams, 0 to 2 percent slopes, northern coastal plain	Poorly drained
PortA	Portsmouth variant silt loam, 0 to 2 percent slopes	Very poorly drained
SacC	Sassafras sandy loam, 5 to 10 percent slopes, Northern Coastal Plain	Well drained
WomfB	Woodstown-Fallsington sandy loams, 0 to 5 percent slopes	Moderately well drained

Description

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.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

OthA—Othello silt loams, 0 to 2 percent slopes, northern coastal plain

Description of Othello, Drained

Setting

Landform: Flats, depressions, swales
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Silty eolian deposits over fluviomarine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 10 to 20 inches
Frequency of flooding: None
Frequency of ponding: Rare
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Description of Othello, Undrained

Setting

Landform: Flats, depressions, swales, drainageways
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Silty eolian deposits over fluviomarine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 0 to 10 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.6 inches)

Interpretive groups

Hydrologic Soil Group: C/D
Hydric soil rating: Yes

FapA—Fallsington loams, 0 to 2 percent slopes, Northern Coastal Plain

Description of Fallsington, Undrained

Setting

Landform: Flats, drainageways, depressions, swales
Landform position (three-dimensional): Talf, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Loamy fluviomarine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.01 to 1.98 in/hr)
Depth to water table: About 0 to 10 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.3 mmhos/cm)
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Description of Fallsington, Drained

Setting

Landform: Swales, depressions, flats
Landform position (three-dimensional): Dip, talf
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Loamy fluviomarine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.01 to 1.98 in/hr)
Depth to water table: About 10 to 20 inches
Frequency of flooding: None
Frequency of ponding: Rare
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.3 mmhos/cm)
Available water capacity: Moderate (about 8.2 inches)

Interpretive groups

Hydrologic Soil Group: C/D
Hydric soil rating: Yes

PortA—Portsmouth variant silt loam, 0 to 2 percent slopes

Description of Portsmouth, Thin Surface

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.3 inches)

Interpretive groups

Hydrologic Soil Group: B/D
Hydric soil rating: Yes

WomfB—Woodstown-Fallsington sandy loams, 0 to 5 percent slopes

Description of Woodstown

Setting

Landform: Low hills
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old alluvium and/or sandy marine deposits

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.7 inches)

Interpretive groups

Hydrologic Soil Group: B
Hydric soil rating: No

Description of Fallsington

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy fluviomarine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.6 inches)

Interpretive groups

Hydrologic Soil Group: B/D
Hydric soil rating: Yes

GKAWOB—Glassboro and Woodstown sandy loams, 0 to 5 percent slopes

Description of Glassboro

Interpretive groups

Hydrologic Soil Group: A/D

Hydric soil rating: No

Description of Woodstown

Interpretive groups

Hydrologic Soil Group: B

Hydric soil rating: No

Map Unit Composition

Minor components: 15 percent (3 components)

1. Mullica, rarely flooded

Hydric soil rating: Yes

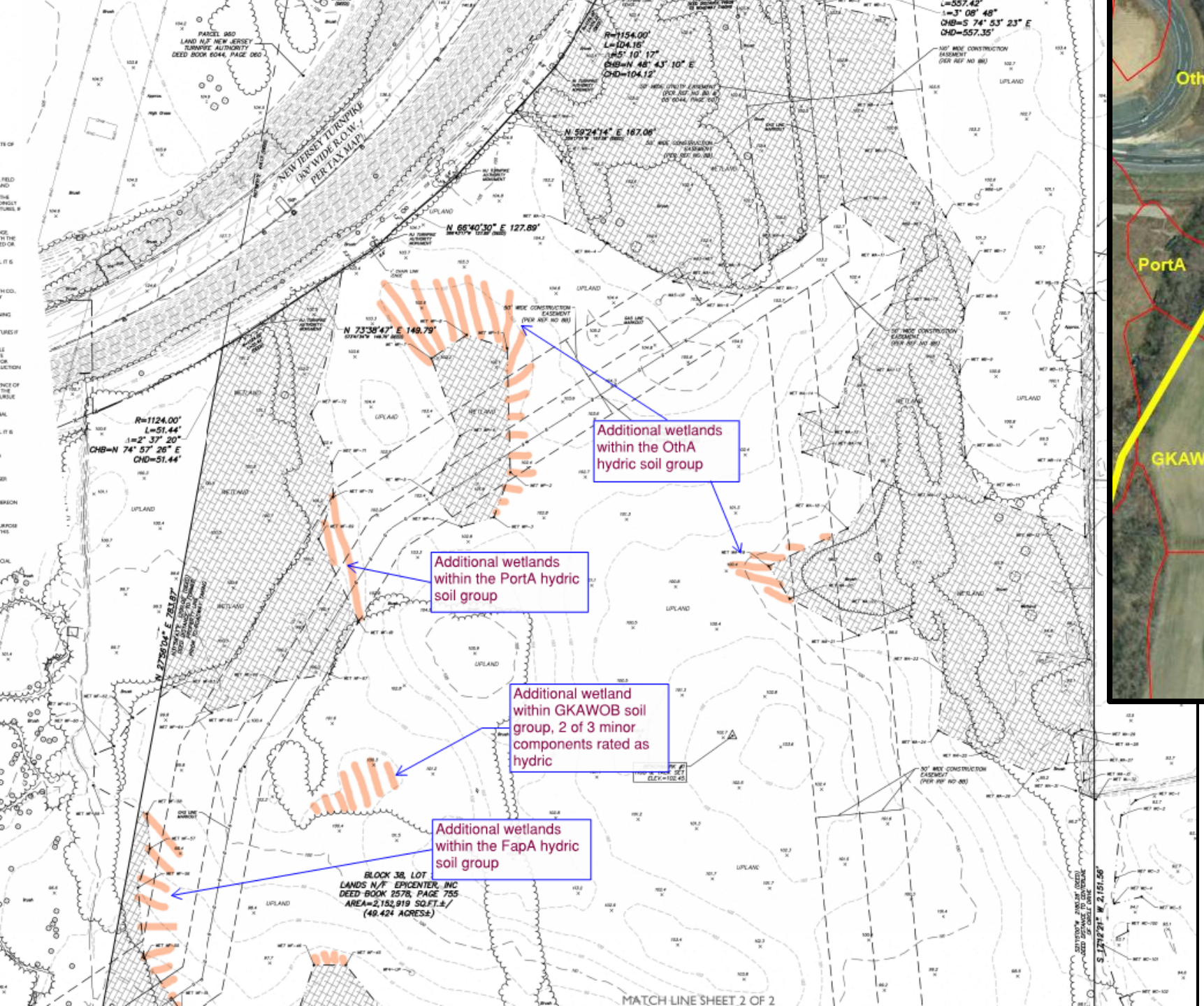
2. Downer

Hydric soil rating: No

3. Fallsington

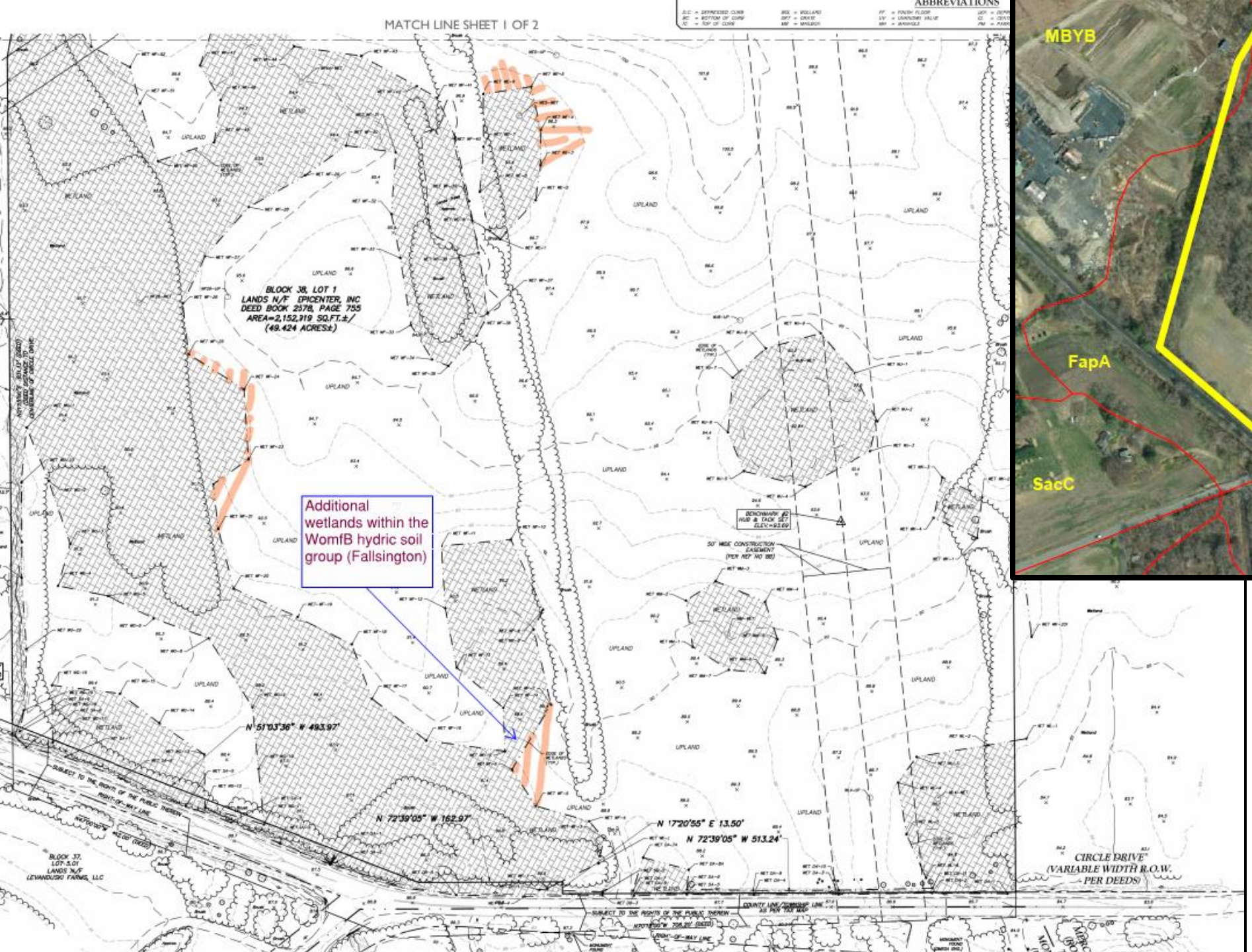
Hydric soil rating: Yes

Note: Minor component soils may also be indicative of potential Hydric soils.



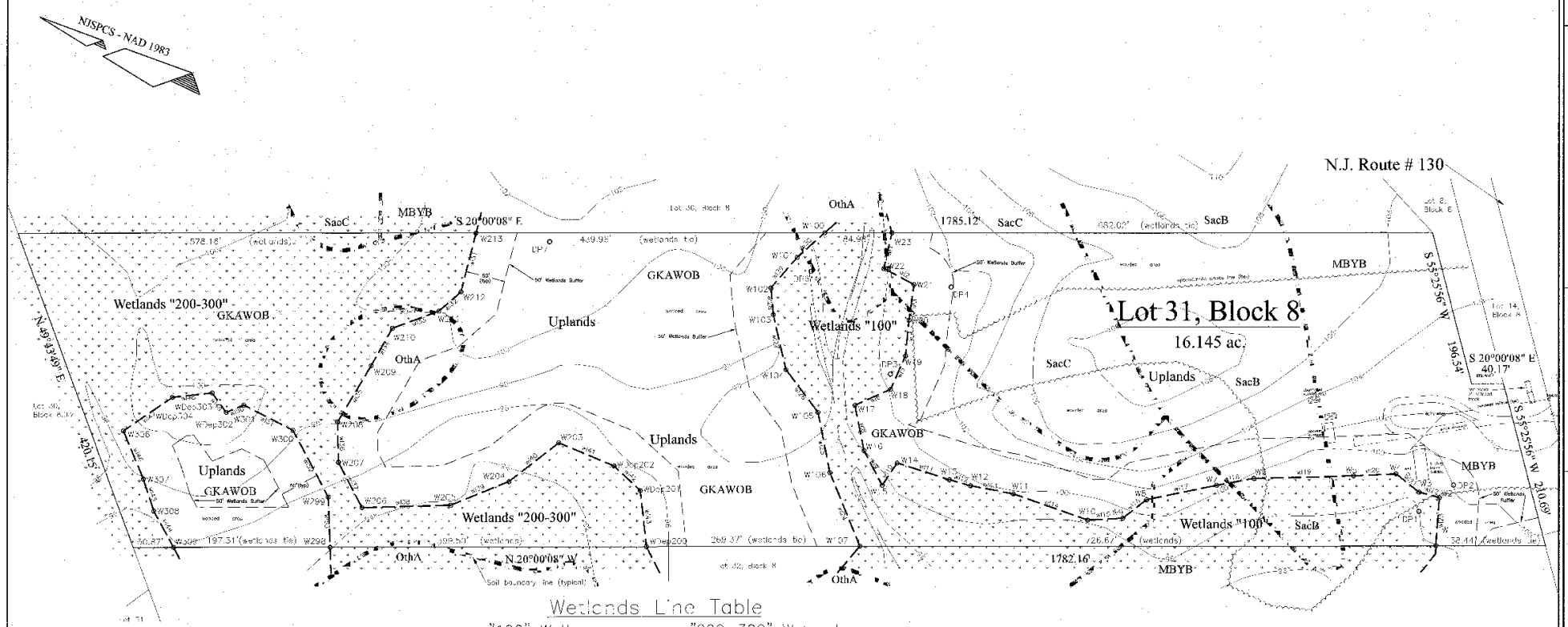
Proposed wetland delineation survey

Hashed in orange are additional wetland areas identified during field inspection



Proposed wetland delineation survey

Hashed in orange are additional wetland areas identified during field inspection



Wetlands Line Table

"100" Wetlands

Line	Bearing	Distance
wl1	N 82°59'45" E	46.12'
wl2	N 67°53'20" E	43.12'
wl3	N 78°03'01" E	45.29'
wl4	N 75°30'48" E	45.05'
wl5	N 85°58'26" W	45.95'
wl6	S 15°5[illegible]'[illegible]4" E	49.42'
wl7	N 58°38'07" E	58.60'
wl8	N 42°07'05" E	48.97'
wl9	N 75°55'23" W	33.73'
wl10	N 02°21'51" W	69.04'
wl11	N 03°47'[illegible]3" W	27.87'
wl12	N 39°46'52" W	5[illegible].75'
wl13	N 06°42'58" W	99.25'
wl14	S 22°52'06" E	14.49'
wl15	N 57°44'5[illegible]" W	38.33'
wl16	N 31°22'[illegible]2" W	89.99'
wl17	N 30°22'41" W	48.18'
wl18	N 21°[illegible]'[illegible]8" W	125.44'
wl19	N 22°28'[illegible]5" W	53.71'
wl20	N 18°2[illegible]'57" E	36.65'
wl21	N 0[illegible]°55'02" W	26.67'
wl22	N [illegible]°05'38" E	60.91'
wl23	S 47°24'[illegible]5" W	100.08'
wl24	S 58°7'[illegible]1" W	[illegible]7.34'
wl25	S 32°56'[illegible]3" W	67.01'
wl26	S 58°58'46" W	71.10'
wl27	S 64°37'53" W	33.56'
wl28	N 69°[illegible]'1[illegible]" W	51.05'
wl29	N 61°41'31" W	46.41'

"200-300" Wetlands

Line	Bearing	Distance
wl31	N 81°26'37" E	78.21'
wl32	S 60°52'20" E	38.97'
wl33	S 39°56'25" E	82.6[illegible]'
wl34	S 80°21'05" E	5[illegible].03'
wl35	S 78°56'26" E	82.07'
wl36	N 68°51'03" E	50.98'
wl37	N 42°26'53" E	6[illegible].1[illegible]'
wl38	N 2[illegible]°26'05" W	112.[illegible]5'
wl39	N 2[illegible]°51'02" W	79.14'
wl40	N 57°32'50" W	79.49'
wl41	N 62°40'11" E	75.37'
wl42	N 22°41'03" E	45.38'
wl43	N 63°43'04" E	71.06'
wl44	S 4[illegible]°18'59" W	52.40'
wl45	S 52°05'03" W	42.04'
wl46	S 47°19'04" W	65.5[illegible]'
wl47	N 54°13'33" W	74.6[illegible]'
wl48	N 26°07'04" W	50.64'
wl49	N 54°13'18" E	30.15'
wl50	N 72°13'38" W	23.95'
wl51	N 07°14'32" E	69.82'
wl52	N 4[illegible]°57'49" E	94.38'
wl53	N 67°51'37" E	63.15'

Legend:

- Intermediate Resource Value Wetlands
- W100 — Wetlands Limit Line & Flag Number
- DP3 — Wetlands Boring Location & Number
- 100 — Existing Topographic Contour

Soil Types

		Area	
GKAWOB	Glassboro and Woodstown Sandy Loams, 0-5 %	10.037 ac	(62.2 % of tract)
MBYB	Mattapex and Bertie Loams, 0-5 %	2.298 ac	(14.2 % of tract)
OthA	Othello Silt Loams, 0-2 %	0.650 ac	(4.0 % of tract)
SacB	Sassafras Sandy Loam, 2-5 %	1.737 ac	(10.8 % of tract)
SacC	Sassafras Sandy Loam, 5-10 %	1.423 ac	(8.8 % of tract)

Reference Plans:

"Preliminary & Final Site Plan for Tom's Self Storage lands situate Township of Washington Mercer County, New Jersey" sheets 1-8 of 8, dated November 27, 1990, last revised April 3, 1991, scale 1"=60' and prepared by Driscoll Patel, Inc. Hamilton, N.J., Frederick A. Driscoll, NJPE& S # 19093.

Notes:

1. Wetlands Delineated by Nautilus Environmental Group, LLC and field located by Princeton Junction Engineering, P.C.

2. Existing topography shown hereon per Reference Plans.

3. This plan is NOT based on a boundary survey of the subject property. All existing features are from various sources and are approximate.

3. Total Wetlands = "100" 89,599 s.f.
"200-300" 145,699 s.f.
235,298 s.f. 5.40 acres

Graphic Scale

Scale 1" = 60'

per NJDEP review letter 11/[illegible]/2020
per NJDEP review letter 10/[illegible]/2020
Rev Non Exempt

PJE

Princeton Junction Engineering, P.C.
Professional Engineers, Land Surveyors and Planners
P.O. Box 610 - 53 North Post Road
Princeton Junction, New Jersey 08550
Telephone: 609.799.1906 Facsimile: 609.799.1524 mail@pjeinc.com

P. Gerring Brown
Gerring G. Brown
Kevin H. Perry
Kevin M. Dixon

FEB-15 No. 24027
PBG No. 24027
PHP No. 32543
PGB No. 27184

D. Geoffrey Brown
NJ Professional Engineer & Land Surveyor License No. 24027
Date: 11/23/20

Wetlands Location Plan
of Lot 31, Block 8, for
Loreain Tolle
Robbinsville Township * Mercer County * New Jersey

Date: April 21, 2020
Scale: 1" = 60'
Drawn: MK
Check: GD

Job#: Y200325
Dwg: Wetlands
View: plan

File #

Sheet 1 of 1

Douglas M. Schleifer

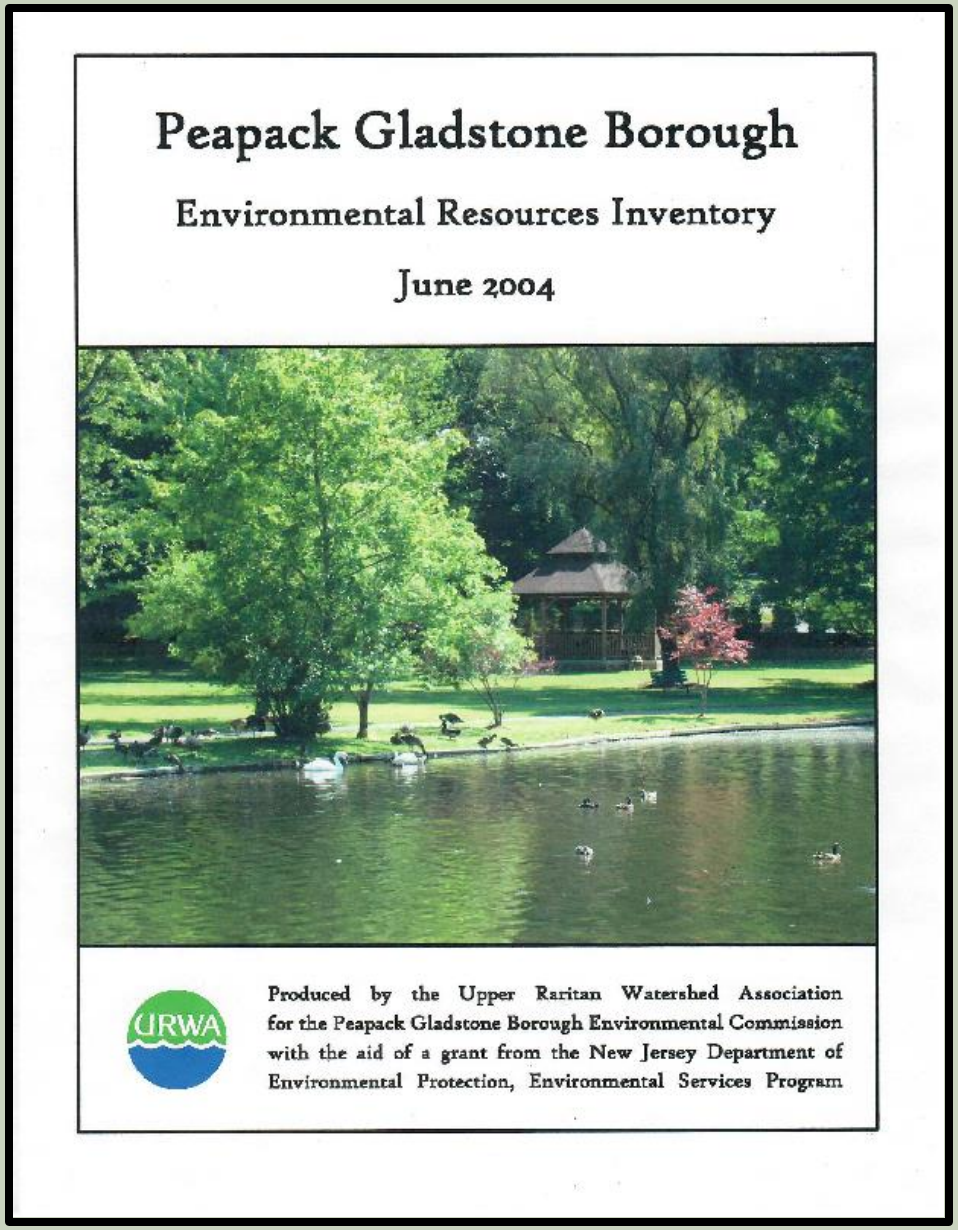
GIS Director

Upper Raritan Watershed Association

Environmental Resources Inventory
Peapack-Gladstone Borough

ERI elements derived from the SSURGO database:

- Soil ratings for local roads and streets
- Soil ratings for dwellings with basements
- Soil ratings for septic tank absorption fields
- Soil ratings for drainage



Peapack Gladstone Borough

Environmental Resources Inventory

June 2004

Produced by the Upper Raritan Watershed Association for the Peapack Gladstone Borough Environmental Commission with the aid of a grant from the New Jersey Department of Environmental Protection, Environmental Services Program

Douglas M. Schleifer

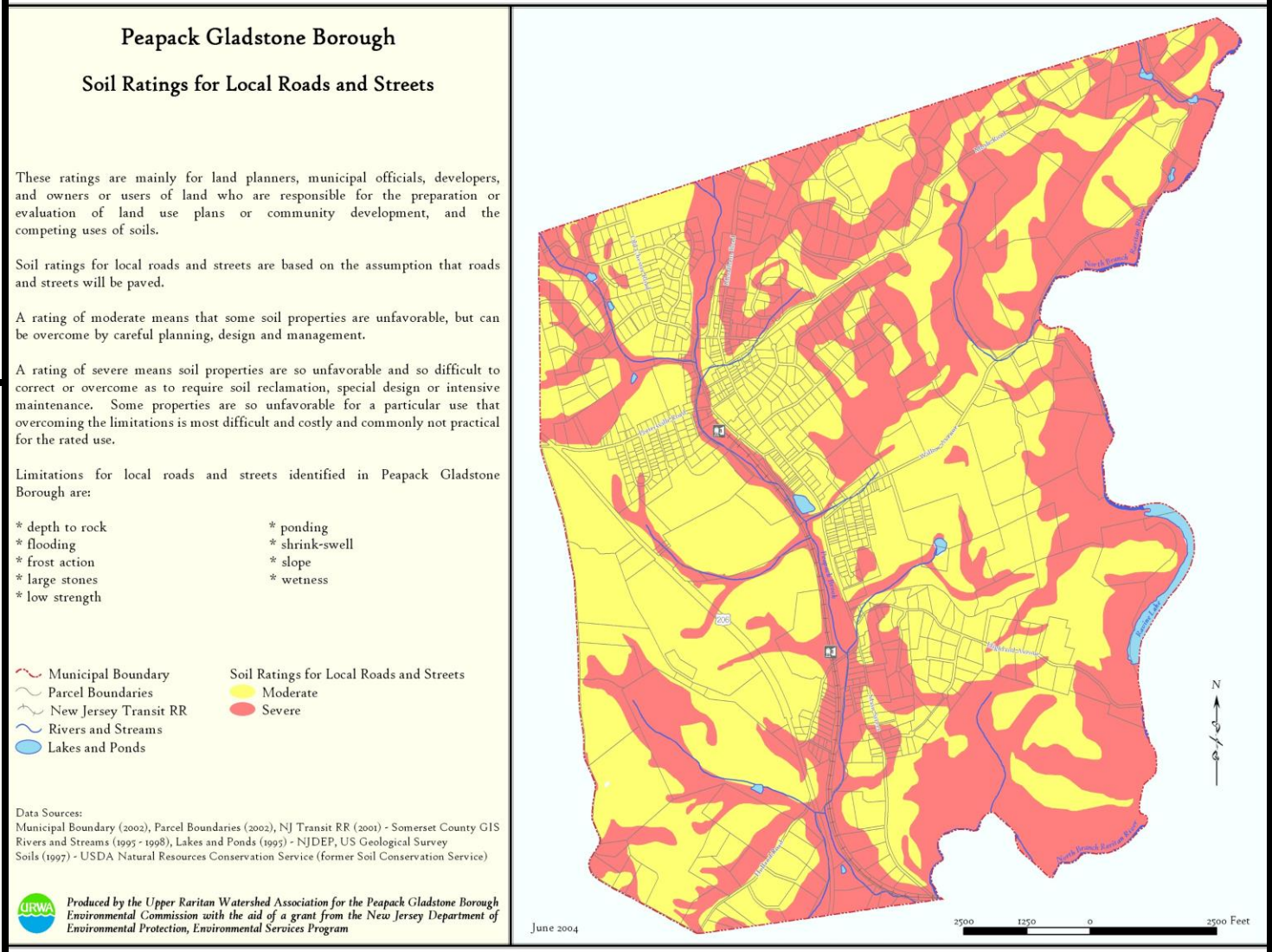
GIS Director

Upper Raritan Watershed Association

Environmental Resources Inventory
Peapack-Gladstone Borough

ERI elements derived from the SSURGO database:

- **Soil ratings for local roads and streets**
- Soil ratings for dwellings with basements
- Soil ratings for septic tank absorption fields
- Soil ratings for drainage



Douglas M. Schleifer

GIS Director

Upper Raritan Watershed Association

Environmental Resources Inventory
Peapack-Gladstone Borough

ERI elements derived from the SSURGO database:

- Soil ratings for local roads and streets
- **Soil ratings for dwellings with basements**
- Soil ratings for septic tank absorption fields
- Soil ratings for drainage

Peapack Gladstone Borough

Soil Ratings for Dwellings with Basements

These ratings are mainly for land planners, municipal officials, developers, and owners or users of land who are responsible for the preparation or evaluation of land use plans or community development, and the competing uses of soils.

Soil ratings for dwellings with basements are based on the properties of undisturbed soils. These ratings are for dwellings of three stories or less.

A rating of slight means soil properties are generally favorable for the rated use, or in other words, limitations are minor and easily overcome.

A rating of moderate means that some soil properties are unfavorable, but can be overcome by careful planning, design and management.

A rating of severe means soil properties are so unfavorable and so difficult to correct or overcome as to require soil reclamation, special design or intensive maintenance. Some properties are so unfavorable for a particular use that overcoming the limitations is most difficult and costly and commonly not practical for the rated use.

Limitations for dwellings with basements identified in Peapack Gladstone Borough are:

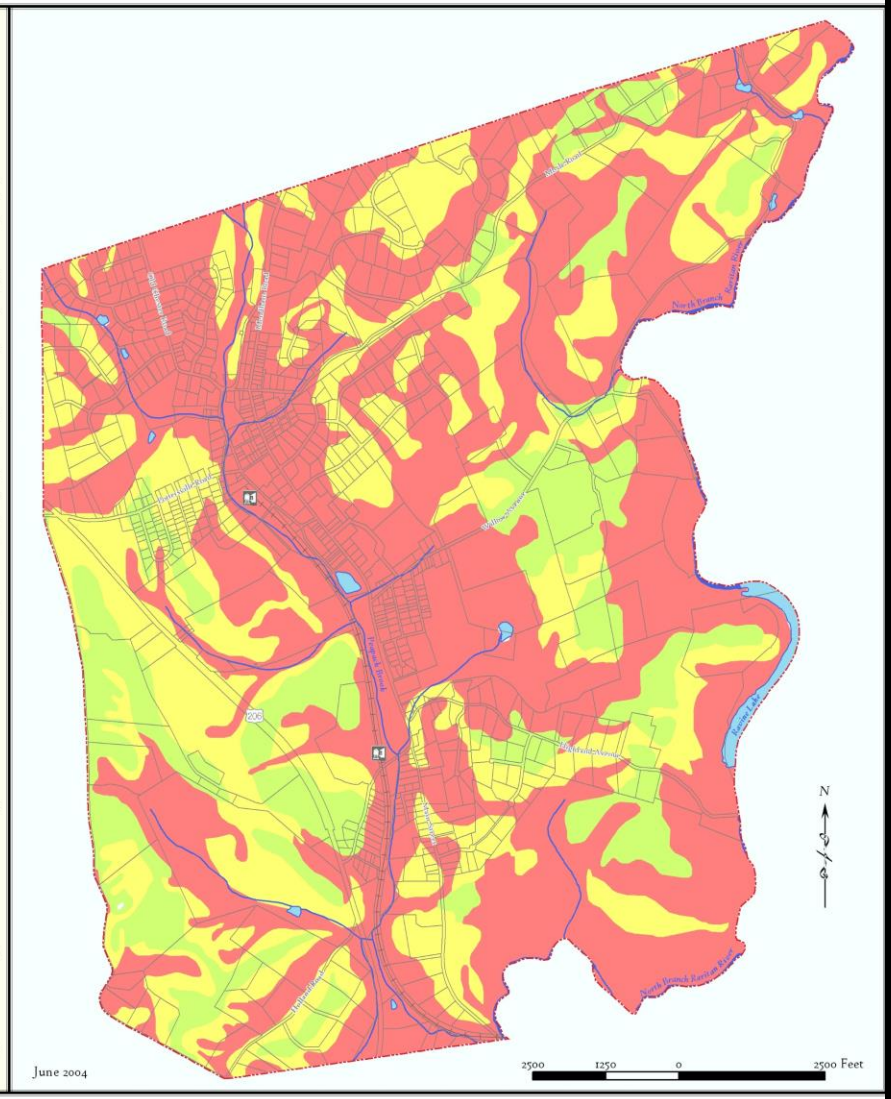
* depth to rock
* flooding
* large stones
* ponding
* shrink-swell
* slope
* wetness

Municipal Boundary
Parcel Boundaries
New Jersey Transit RR
Rivers and Streams
Lakes and Ponds

Soil Ratings for Dwellings with Basements
Slight
Moderate
Severe

Data Sources:
Municipal Boundary (2002), Parcel Boundaries (2002), NJ Transit RR (2001) - Somerset County GIS
Rivers and Streams (1995 - 1998), Lakes and Ponds (1995) - NJDEP, US Geological Survey
Soils (1997) - USDA Natural Resources Conservation Service (former Soil Conservation Service)

Produced by the Upper Raritan Watershed Association for the Peapack Gladstone Borough Environmental Commission with the aid of a grant from the New Jersey Department of Environmental Protection, Environmental Services Program



Douglas M. Schleifer

GIS Director

Upper Raritan Watershed Association

Environmental Resources Inventory
Peapack-Gladstone Borough

ERI elements derived from the SSURGO database:

- Soil ratings for local roads and streets
- Soil ratings for dwellings with basements
- **Soil ratings for septic tank absorption fields**
- Soil ratings for drainage

Peapack Gladstone Borough

Soil Ratings for Septic Tank Absorption Fields

These ratings are mainly for land planners, municipal officials, developers, and owners or users of land who are responsible for the preparation or evaluation of land use plans or community development, and the competing uses of soils.

Soil ratings for septic tank absorption fields are derived from requirements of the New Jersey Department of Health based on the Realty Improvement and Sewerage Facilities Act, Chapter 199. Soil ratings for septic tank absorption fields are considered applicable for residences on normal lot sizes, but not for public buildings or trailer parks.

A rating of moderate means that some soil properties are unfavorable, but can be overcome by careful planning, design and management.

A rating of severe means soil properties are so unfavorable and so difficult to correct or overcome as to require soil reclamation, special design or intensive maintenance. Some properties are so unfavorable for a particular use that overcoming the limitations is most difficult and costly and commonly not practical for the rated use.

Limitations for septic tank absorption fields identified in Peapack Gladstone Borough are:

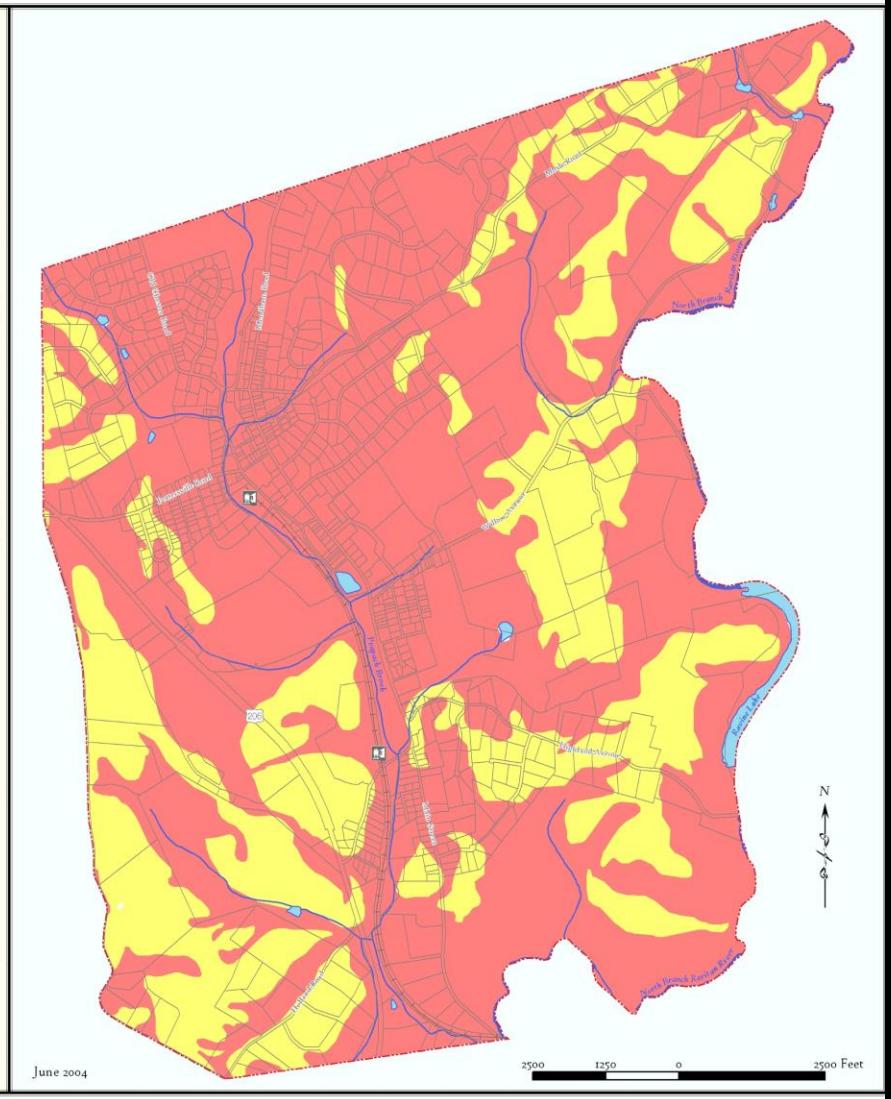
* depth to rock
* flooding
* percs slowly
* ponding
* poor filter
* slope
* wetness

Municipal Boundary
Parcel Boundaries
New Jersey Transit RR
Rivers and Streams
Lakes and Ponds

Soil Ratings for Septic Tank Absorption Fields
Moderate
Severe

Data Sources:
Municipal Boundary (2002), Parcel Boundaries (2002), NJ Transit RR (2001) - Somerset County GIS
Rivers and Streams (1995 - 1998), Lakes and Ponds (1995) - NJDEP, US Geological Survey
Soils (1997) - USDA Natural Resources Conservation Service (former Soil Conservation Service)

Produced by the Upper Raritan Watershed Association for the Peapack Gladstone Borough Environmental Commission with the aid of a grant from the New Jersey Department of Environmental Protection, Environmental Services Program



Douglas M. Schleifer

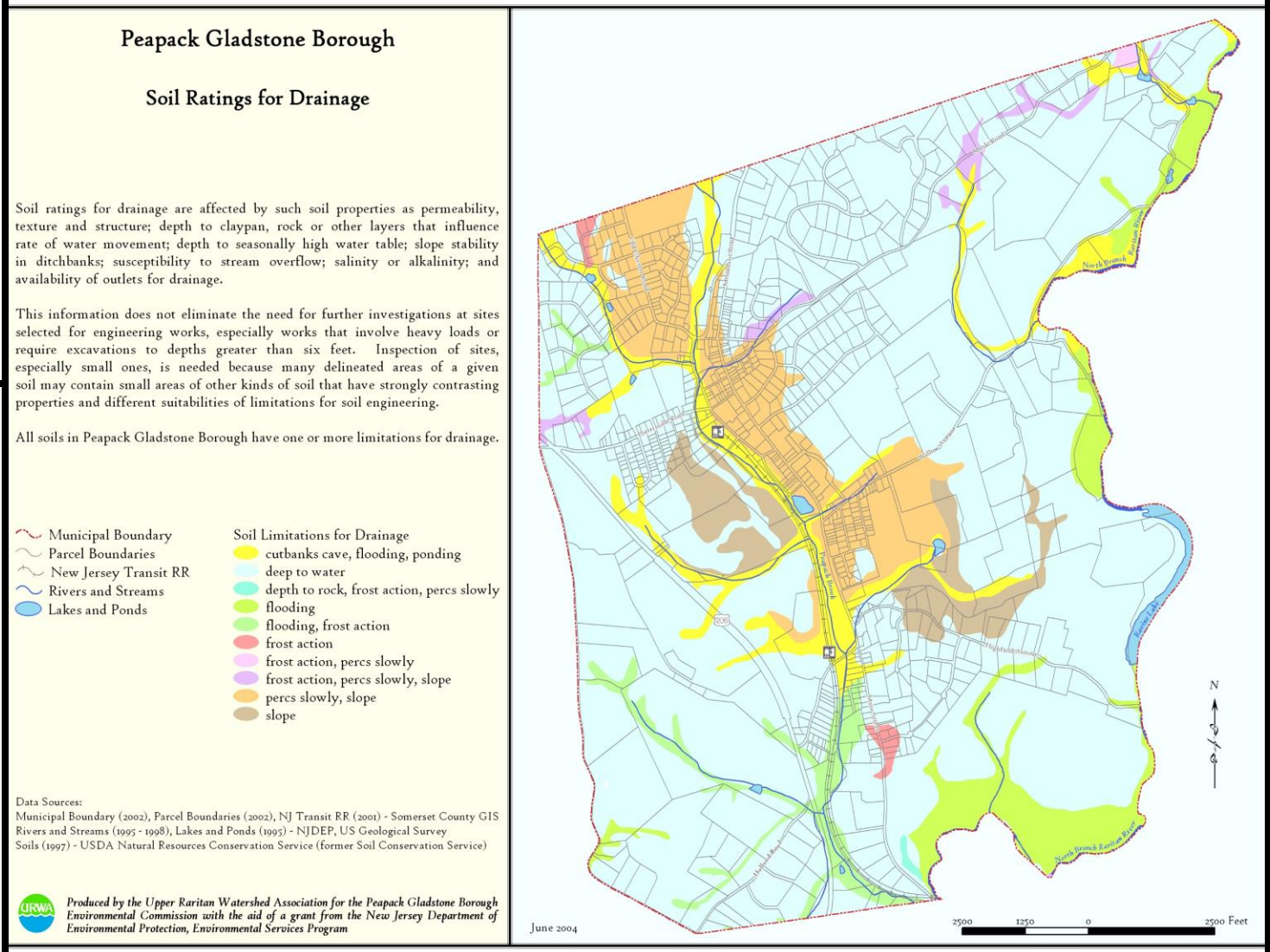
GIS Director

Upper Raritan Watershed Association

Environmental Resources Inventory
Peapack-Gladstone Borough

ERI elements derived from the SSURGO database:

- Soil ratings for local roads and streets
- Soil ratings for dwellings with basements
- Soil ratings for septic tank absorption fields
- **Soil ratings for drainage**



Douglas M. Schleifer

GIS Director

Upper Raritan Watershed Association

Riparian Areas
Raritan Basin Watershed Management Project

Constituent data for riparian areas:

- Surface water
- Wetlands and wetland transition areas
- Special flood hazard and flood prone areas
- Wildlife migration routes
- Alluvial and hydric soils

SURFACE WATER AND RIPARIAN AREAS OF THE RARITAN RIVER BASIN

A Technical Report for the Raritan Basin Watershed Management Project

New Jersey Water Supply Authority

Final Report: September 2002

Douglas M. Schleifer

GIS Director

Upper Raritan Watershed Association

Riparian Areas
Raritan Basin Watershed Management Project

Constituent data for riparian areas:

- Surface water
- Wetlands and wetland transition areas
- Special flood hazard and flood prone areas
- Wildlife migration routes
- Alluvial and hydric soils

RIPARIAN METHODOLOGY

A Methodology for Defining and Assessing Riparian Areas in the Raritan River Basin

New Jersey Water Supply Authority, for the Raritan Basin Watershed Management Project

June 2000

Douglas M. Schleifer

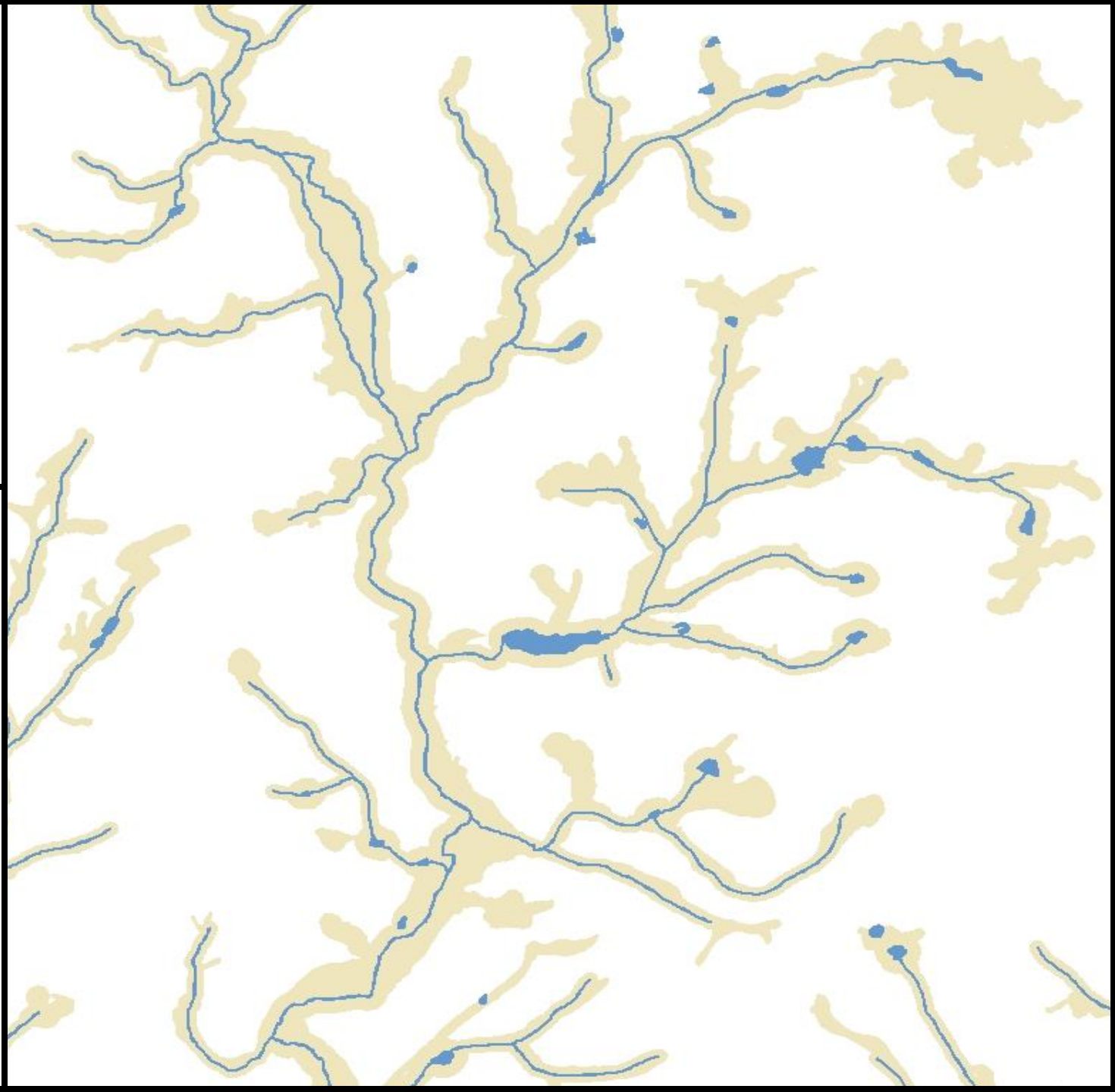
GIS Director

Upper Raritan Watershed Association

Riparian Areas
Raritan Basin Watershed Management Project

Constituent data for riparian areas:

- **Surface water**
- **Wetlands and wetland transition areas**
- **Special flood hazard and flood prone areas**
- **Wildlife migration routes**
- **Alluvial and hydric soils**



Douglas M. Schleifer

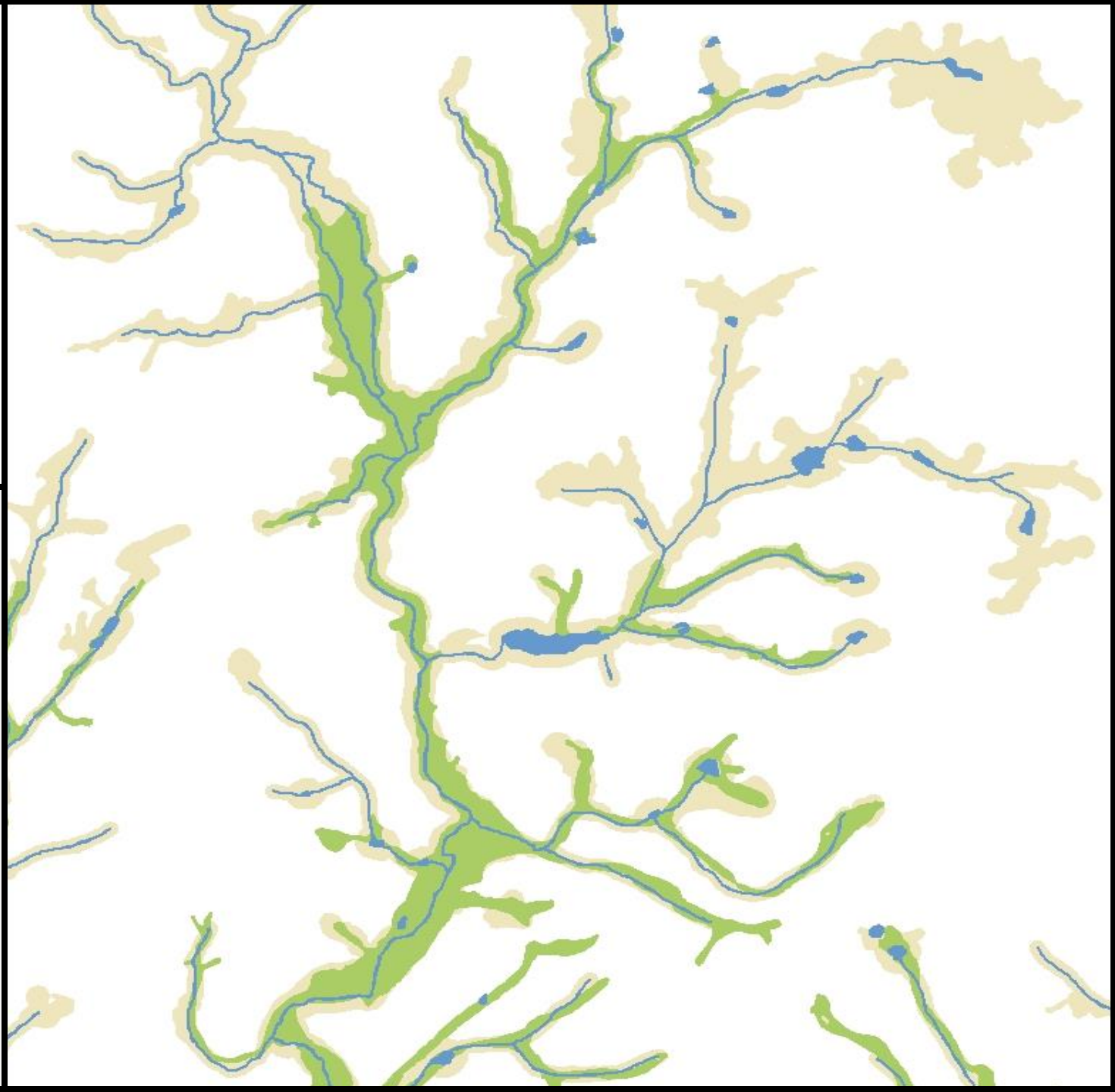
GIS Director

Upper Raritan Watershed Association

Riparian Areas
Raritan Basin Watershed Management Project

Constituent data for riparian areas:

- Surface water
- Wetlands and wetland transition areas
- Special flood hazard and flood prone areas
- Wildlife migration routes
- **Alluvial** and hydric **soils**



Douglas M. Schleifer

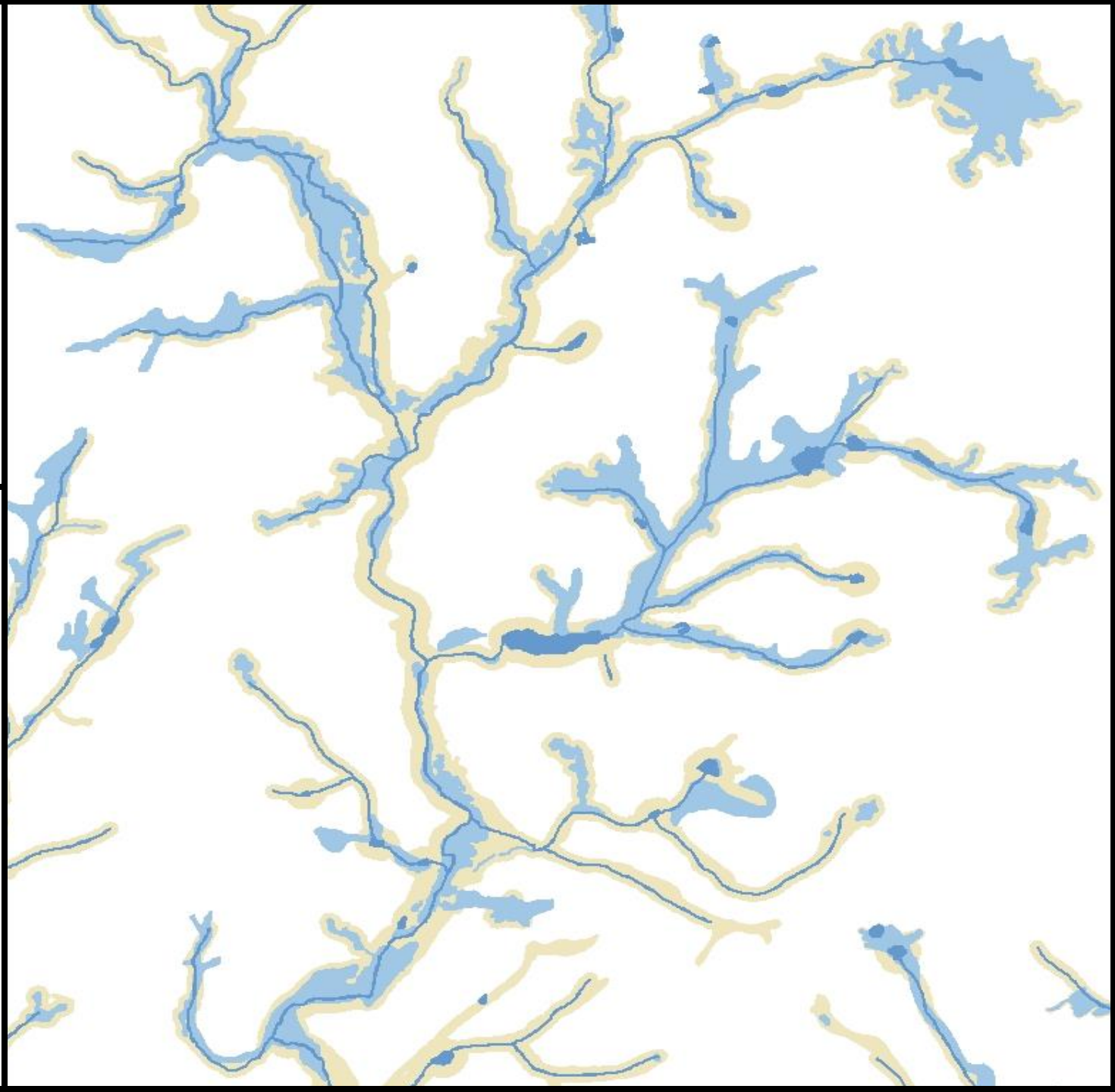
GIS Director

Upper Raritan Watershed Association

Riparian Areas
Raritan Basin Watershed Management Project

Constituent data for riparian areas:

- Surface water
- Wetlands and wetland transition areas
- Special flood hazard and flood prone areas
- Wildlife migration routes
- Alluvial and **hydric soils**



Douglas M. Schleifer

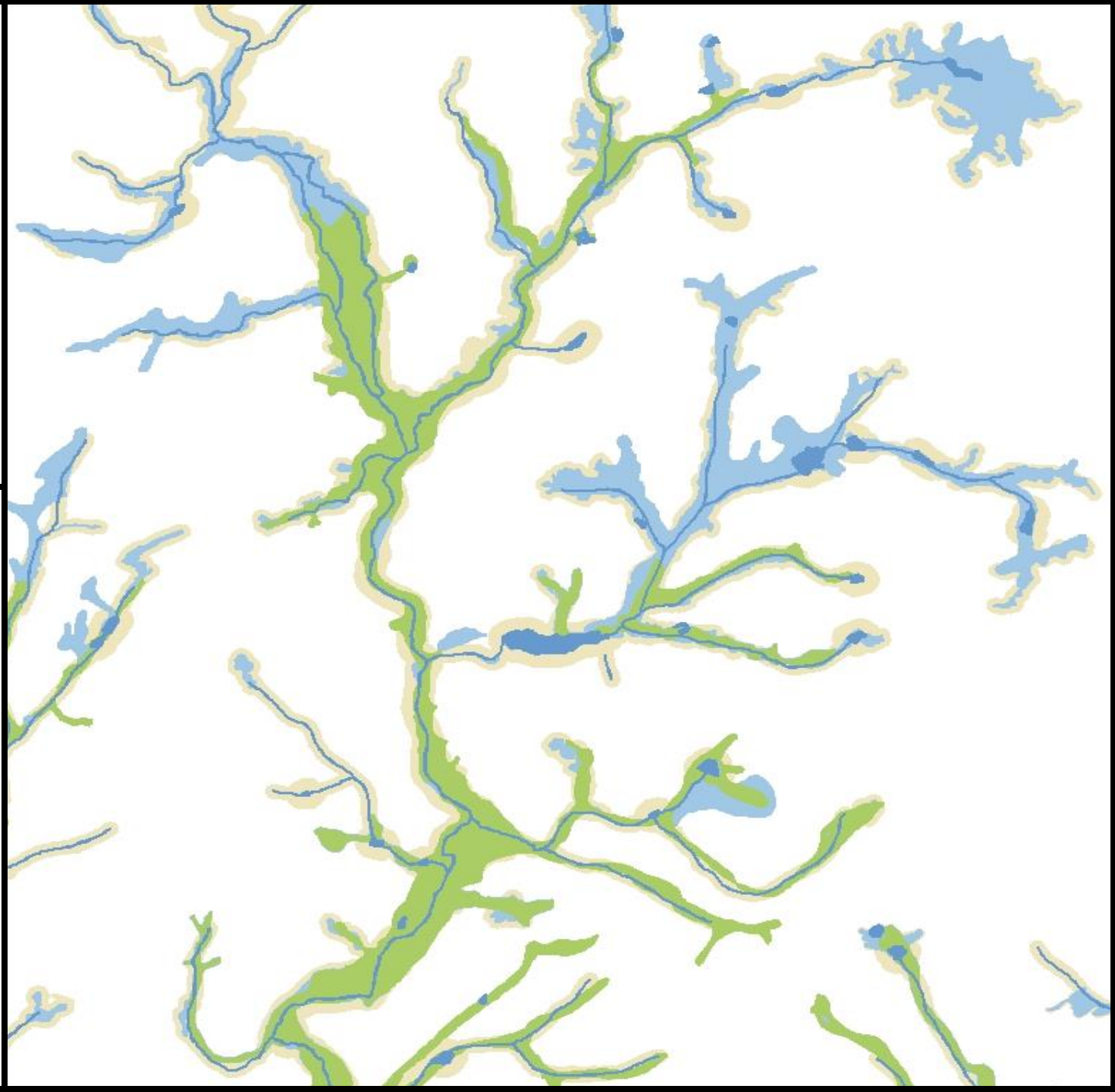
GIS Director

Upper Raritan Watershed Association

Riparian Areas
Raritan Basin Watershed Management Project

Constituent data for riparian areas:

- Surface water
- Wetlands and wetland transition areas
- Special flood hazard and flood prone areas
- Wildlife migration routes
- **Alluvial and hydric soils**



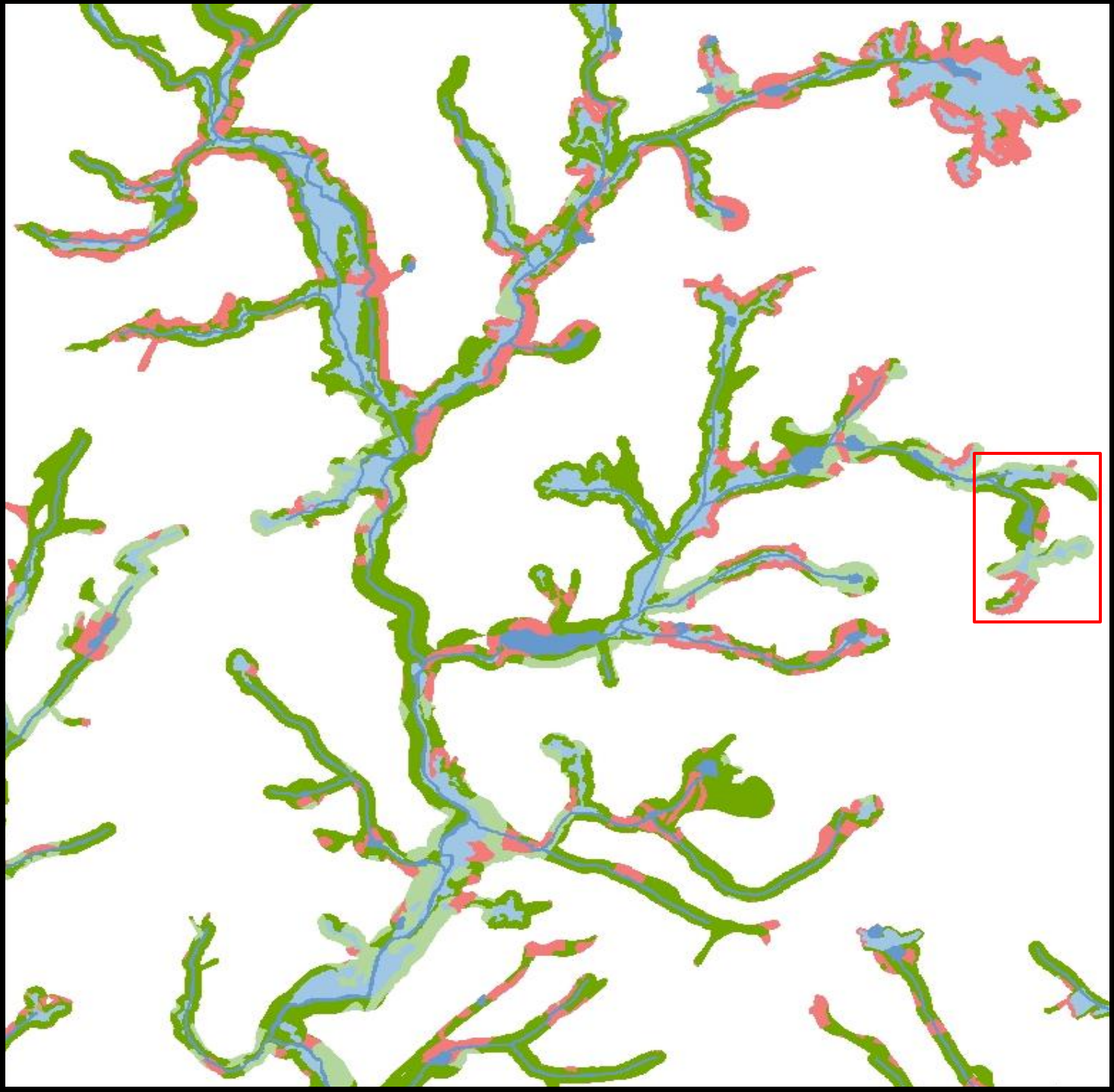
Douglas M. Schleifer

GIS Director

Upper Raritan Watershed Association

Riparian Areas
Raritan Basin Watershed Management Project

Change detection of land use/landcover between 1986 and 1995



Douglas M. Schleifer

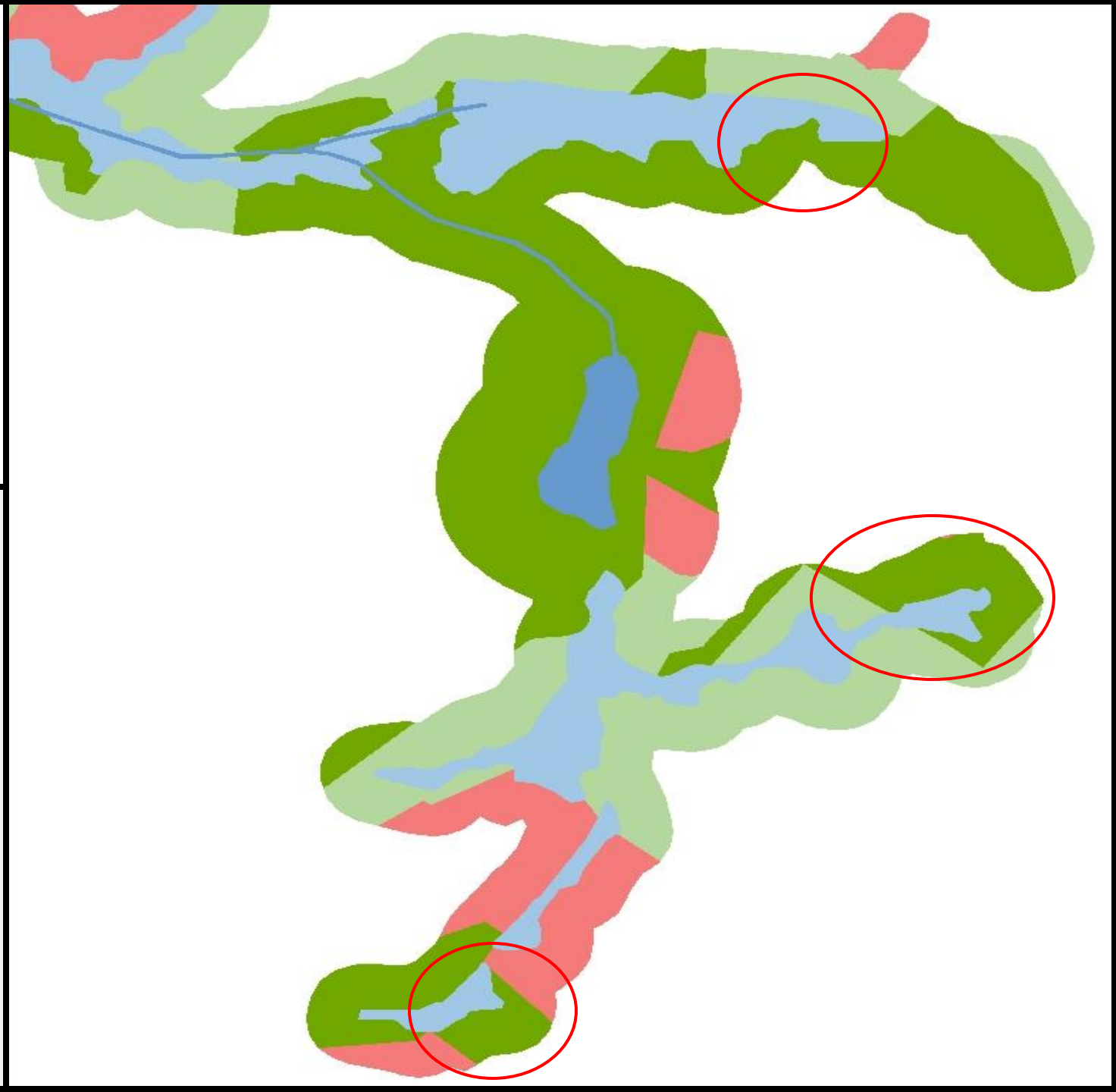
GIS Director

Upper Raritan Watershed Association

Riparian Areas
Raritan Basin Watershed Management Project

Land use/landcover 1986

- AGRICULTURE
- BARREN LAND
- FOREST
- URBAN
- WATER
- WETLANDS



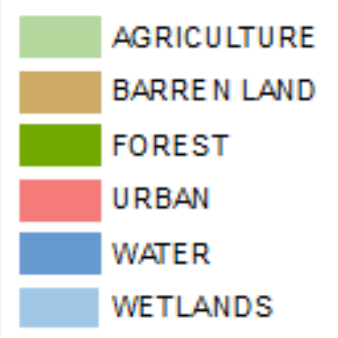
Douglas M. Schleifer

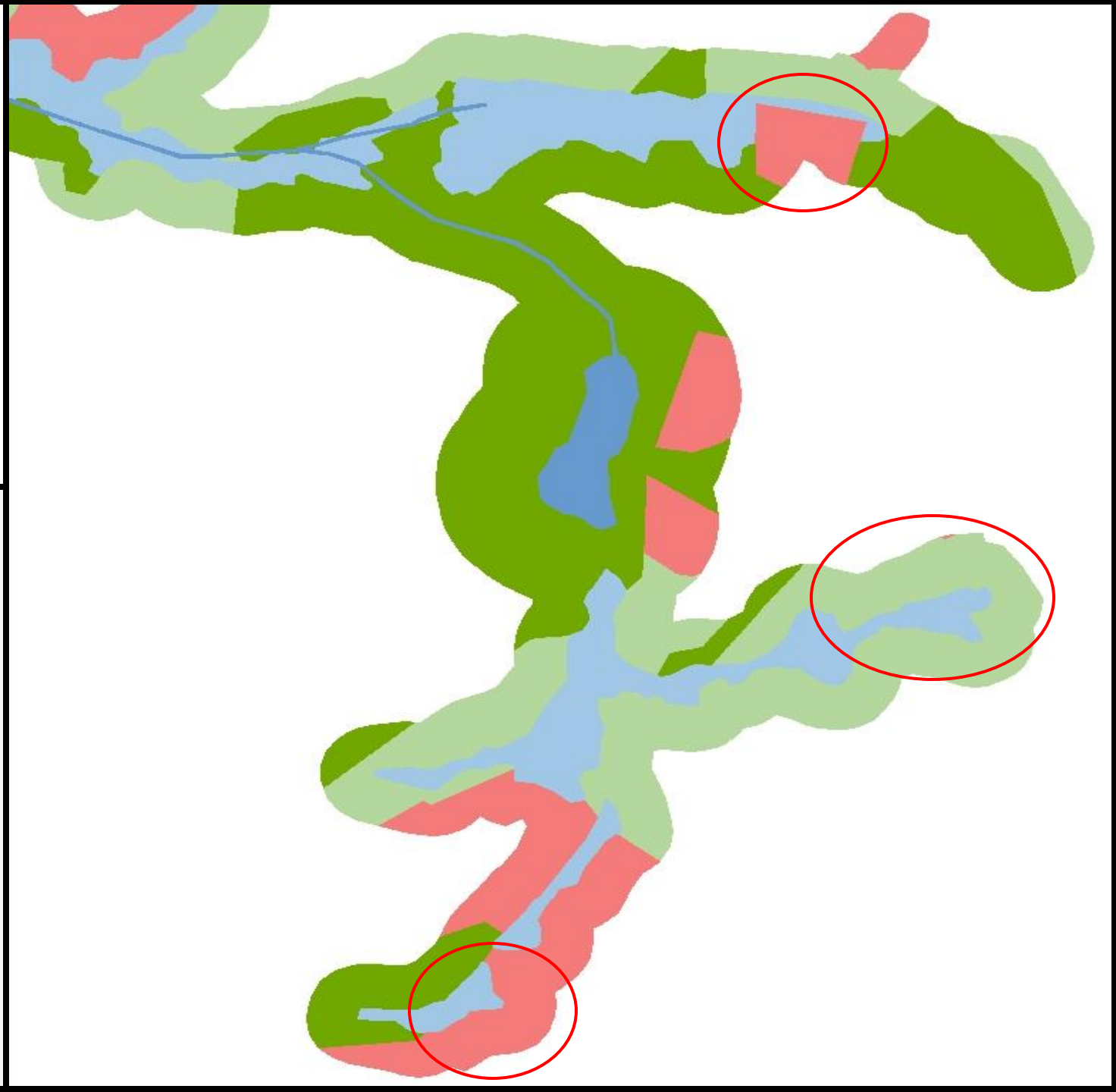
GIS Director

Upper Raritan Watershed Association

Riparian Areas
Raritan Basin Watershed Management Project

Land use/landcover 1995





Douglas M. Schleifer

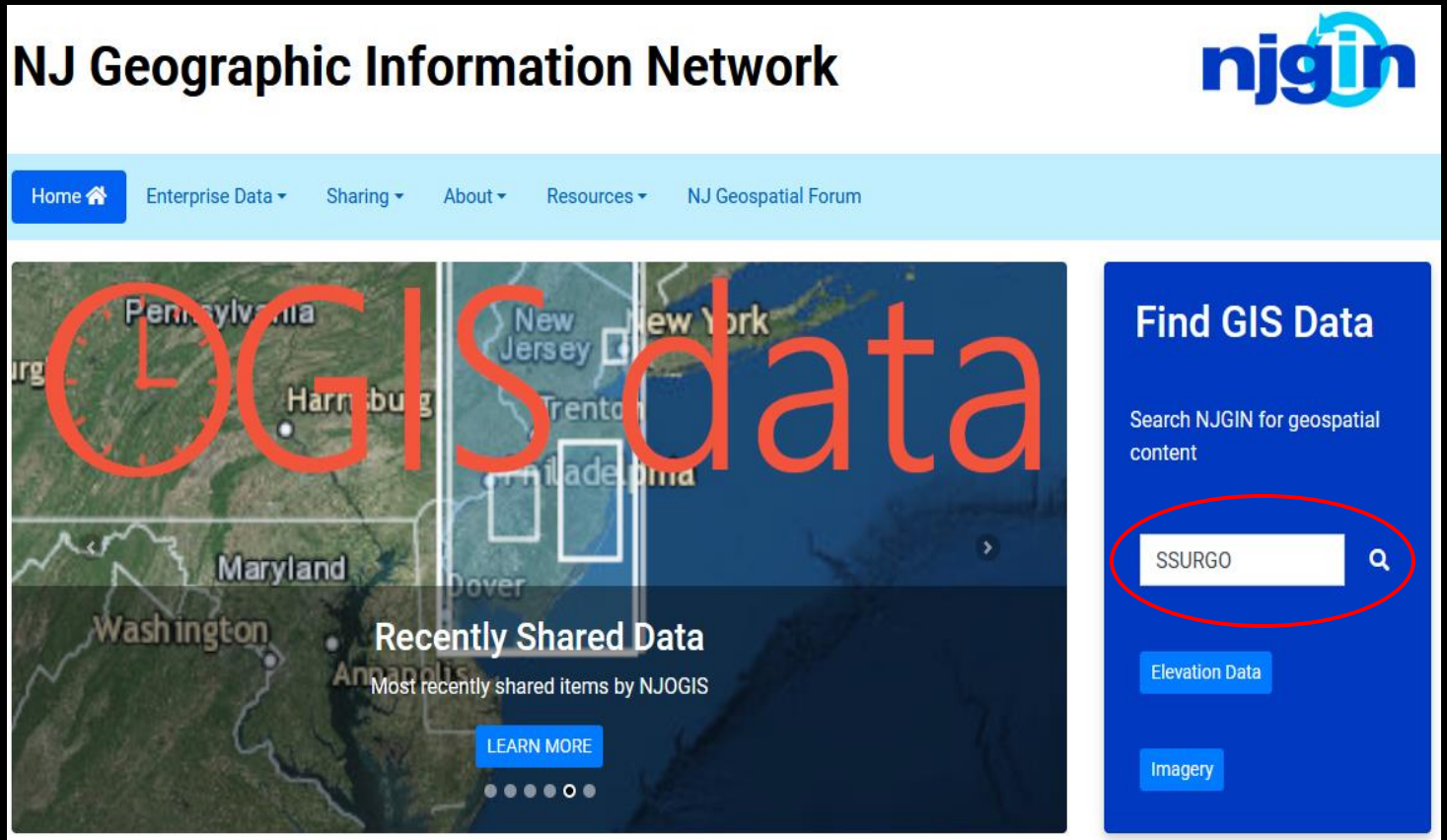
Manager

NJ Office of Information Technology

Office of GIS

Instructions for downloading the SSURGO database

- **NJGIN home page search**
- NJGIN Open Data site search
- Open Data item
- Instructions for download
- USDA NRCS Geospatial Data Gateway



Douglas M. Schleifer

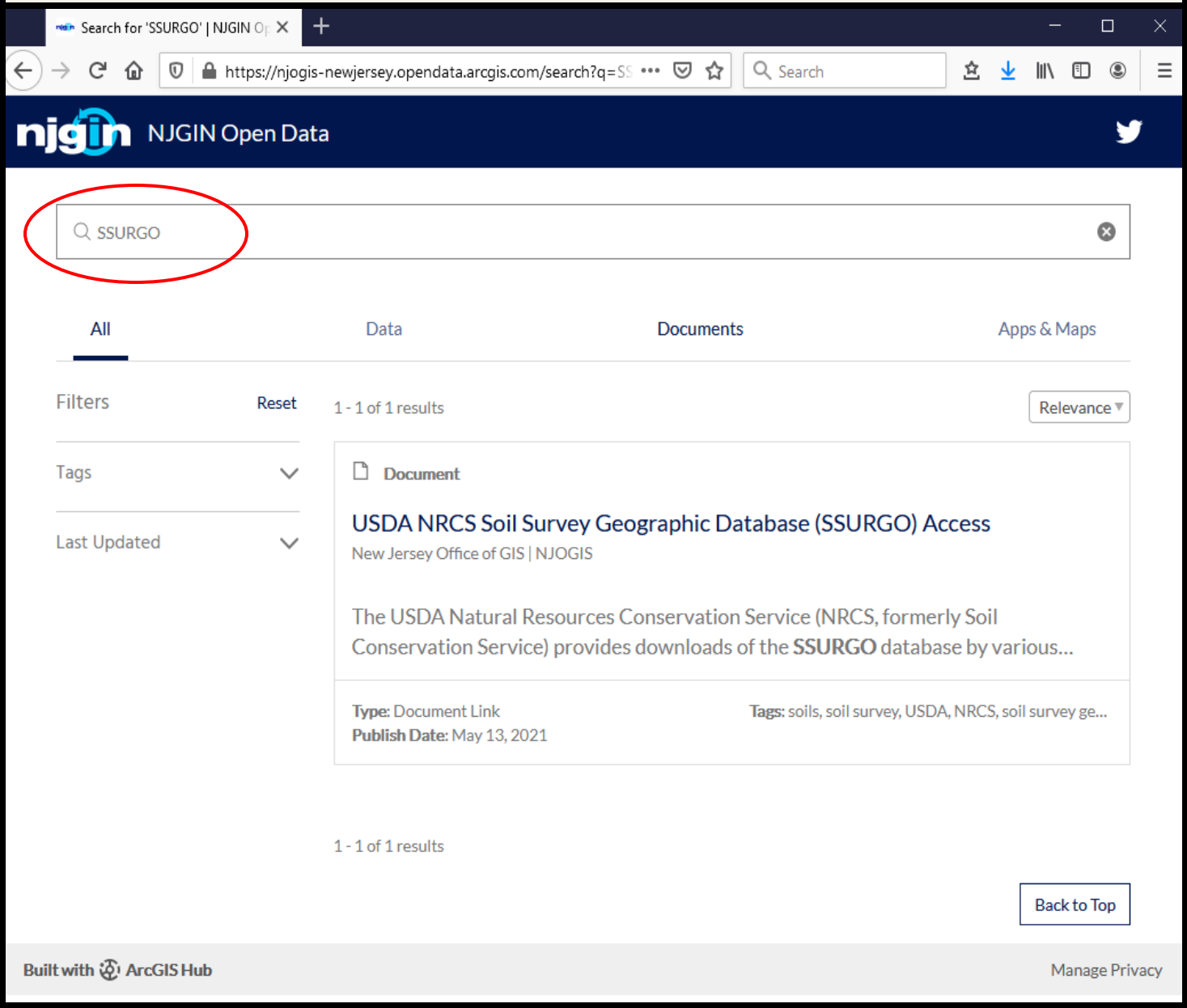
Manager

NJ Office of Information Technology

Office of GIS

Instructions for downloading the SSURGO database

- NJGIN home page search
- **NJGIN Open Data site search**
- Open Data item
- Instructions for download
- USDA NRCS Geospatial Data Gateway



Douglas M. Schleifer

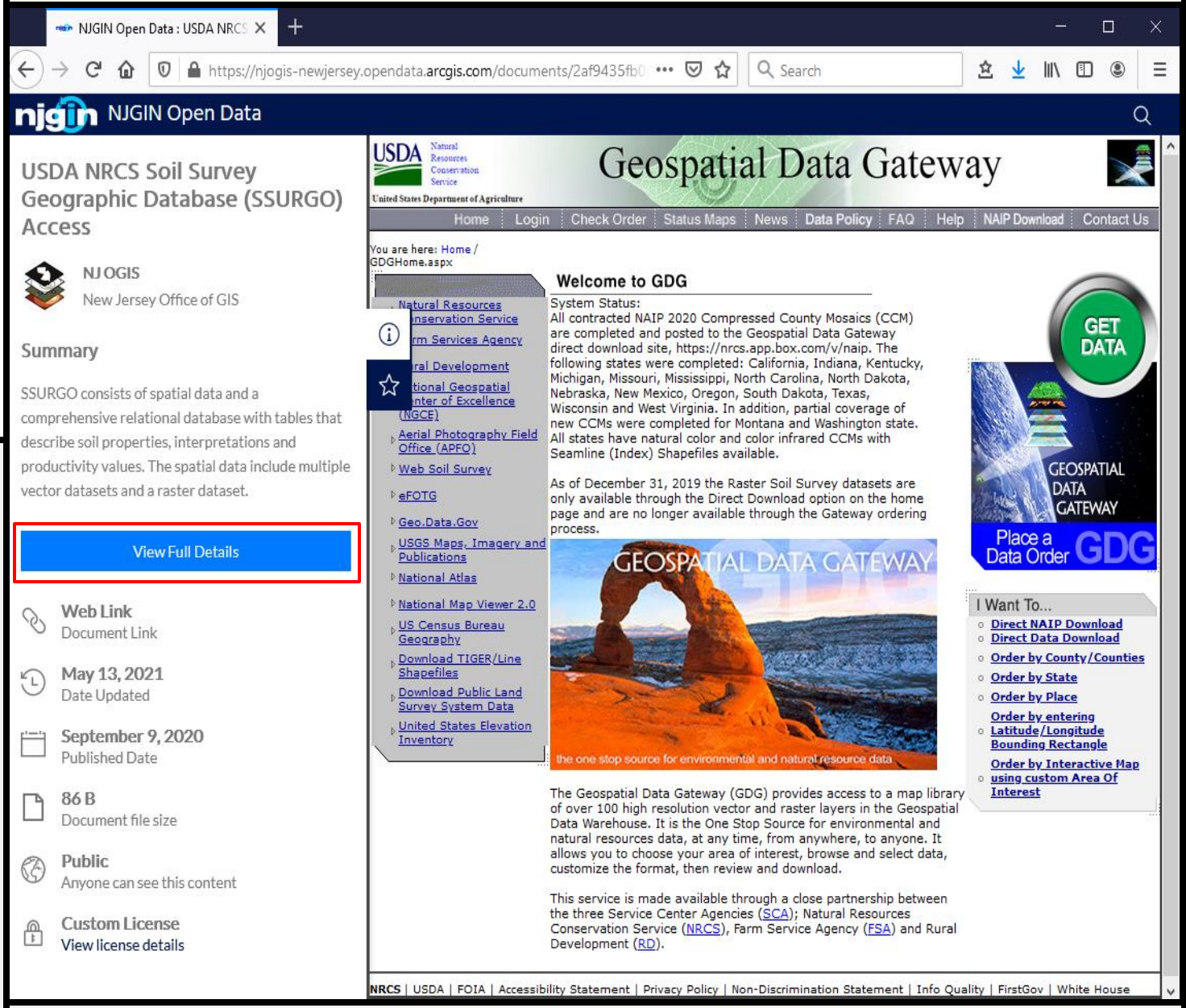
Manager

NJ Office of Information Technology

Office of GIS

Instructions for downloading the SSURGO database

- NJGIN home page search
- NJGIN Open Data site search
- **Open Data item**
- Instructions for download
- USDA NRCS Geospatial Data Gateway



Douglas M. Schleifer

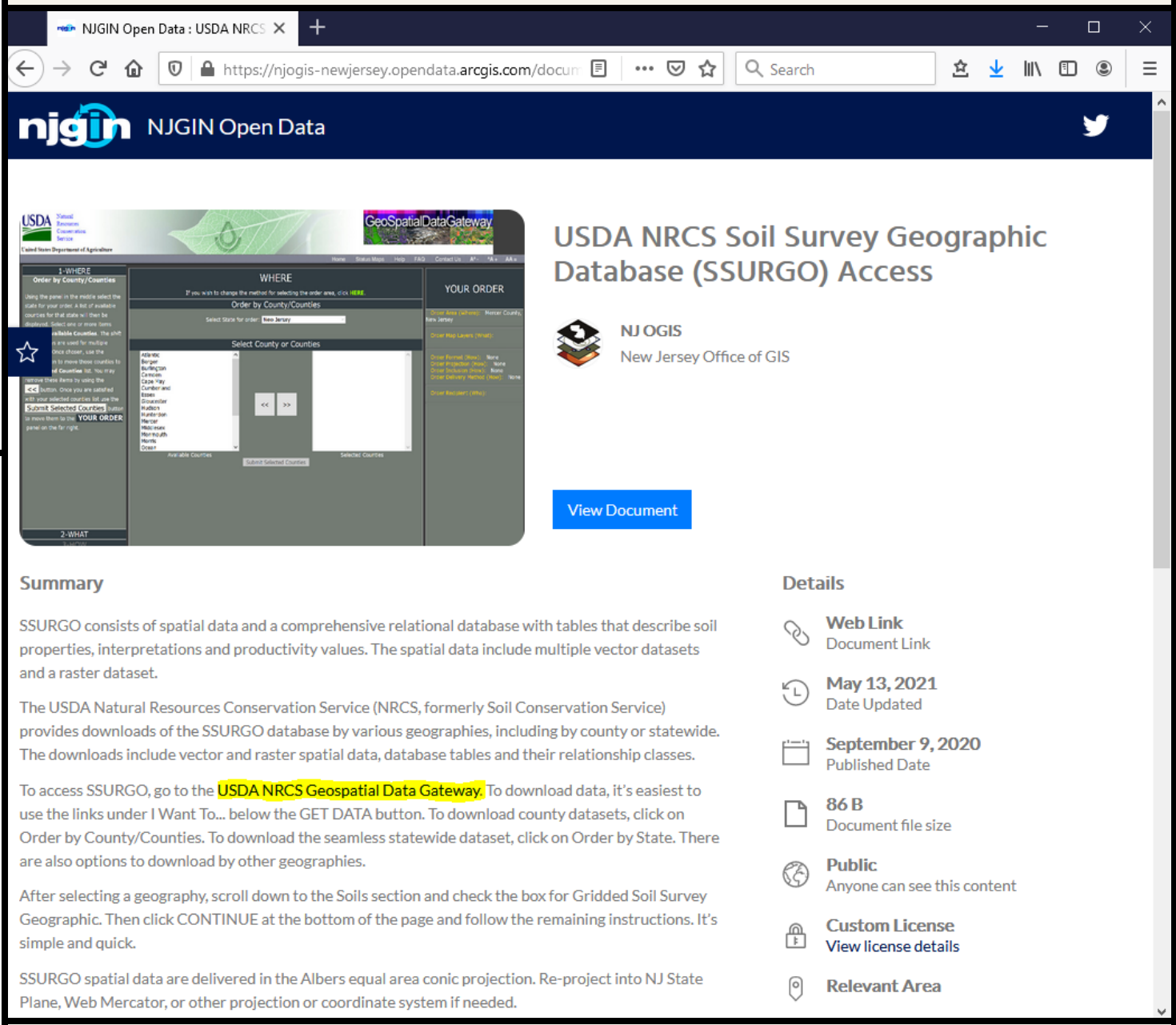
Manager

NJ Office of Information Technology

Office of GIS

Instructions for downloading the SSURGO database

- NJGIN home page search
- NJGIN Open Data site search
- Open Data item
- **Instructions for download**
- USDA NRCS Geospatial Data Gateway



Douglas M. Schleifer

Manager

NJ Office of Information Technology

Office of GIS

Instructions for downloading the SSURGO database

- NJGIN home page search
- NJGIN Open Data site search
- Open Data item
- Instructions for download
- **USDA NRCS Geospatial Data Gateway**