Internet-based Geospatial Planning Tools for Watershed scale Storm water Management

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&
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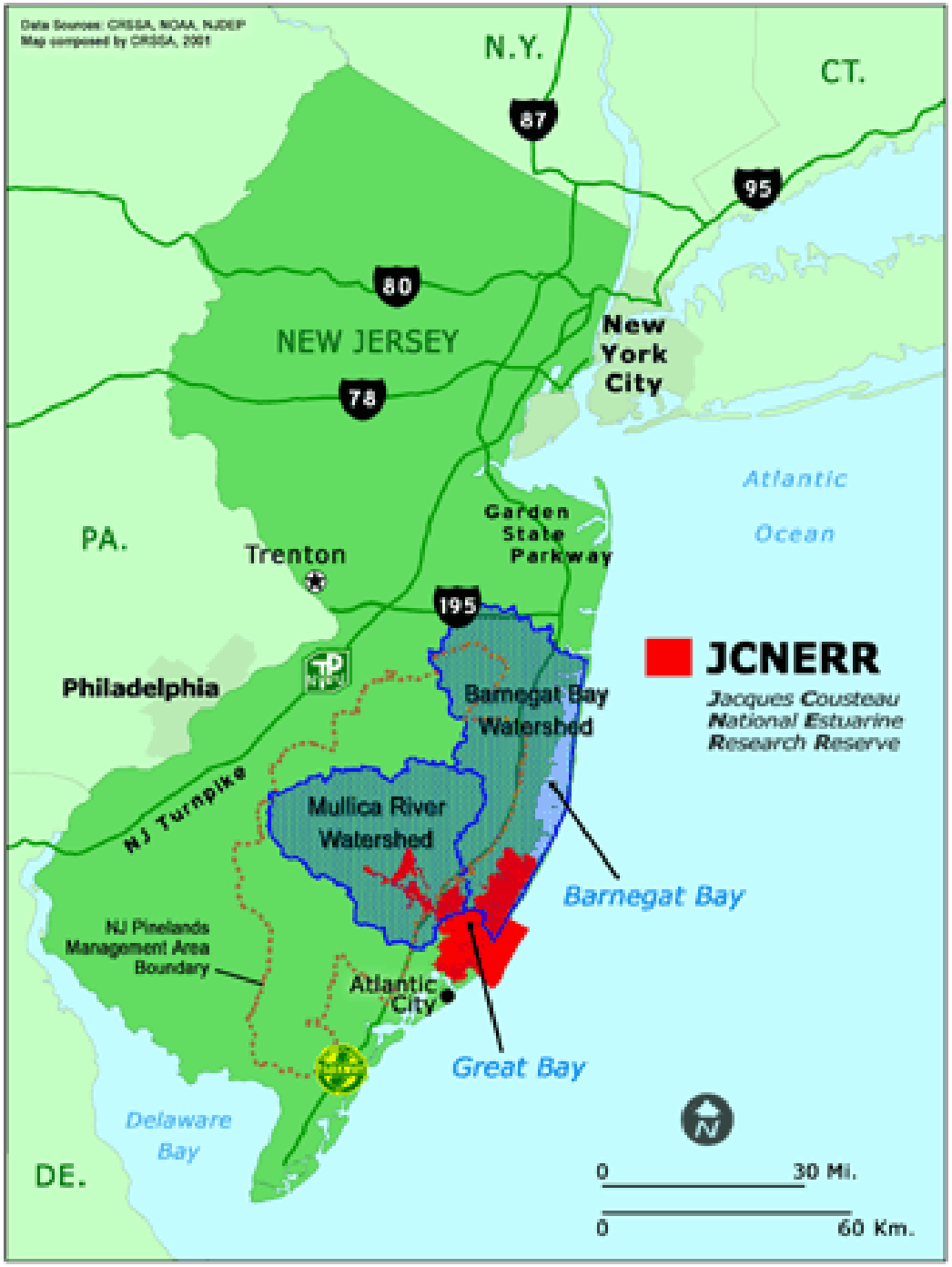
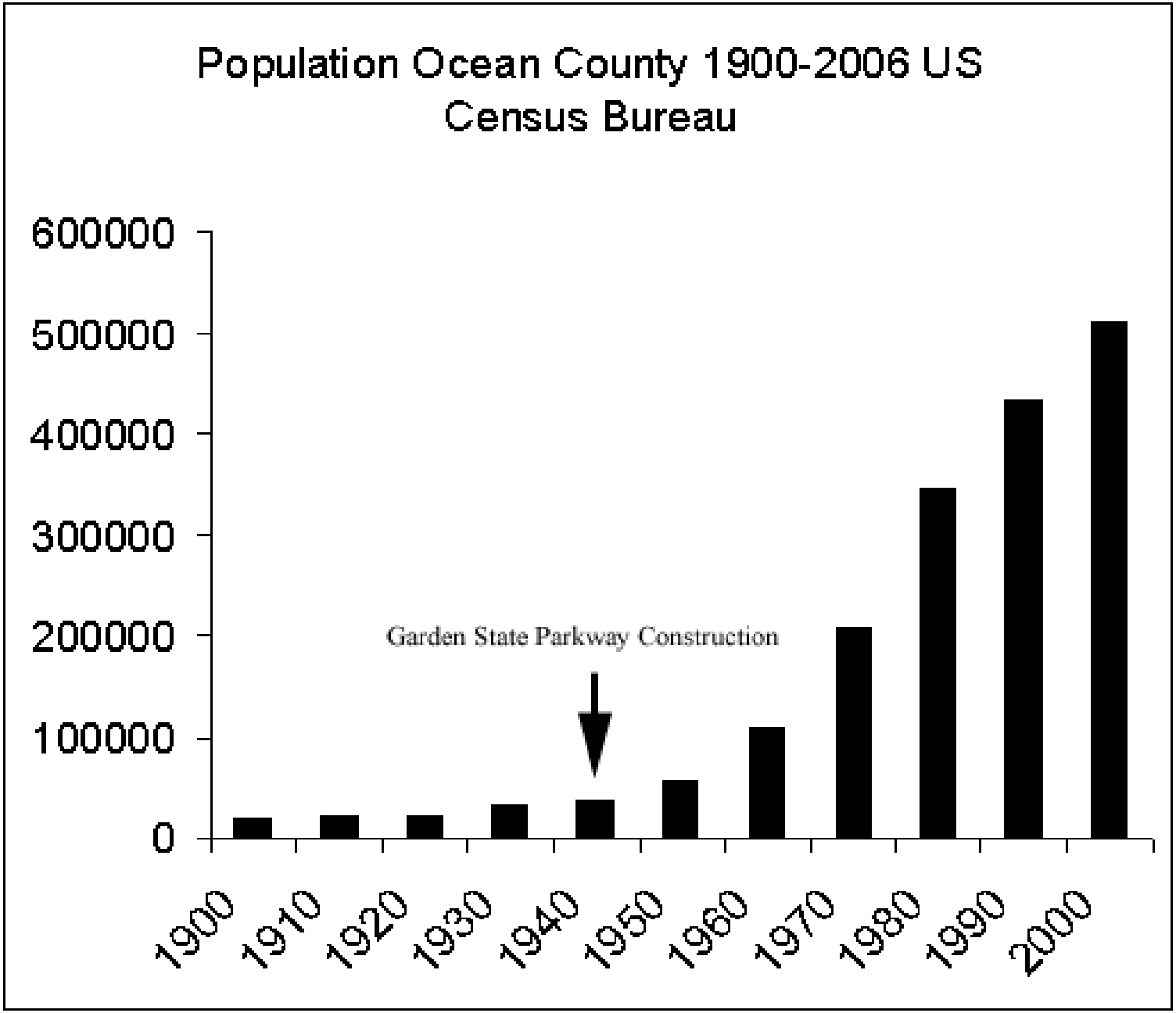
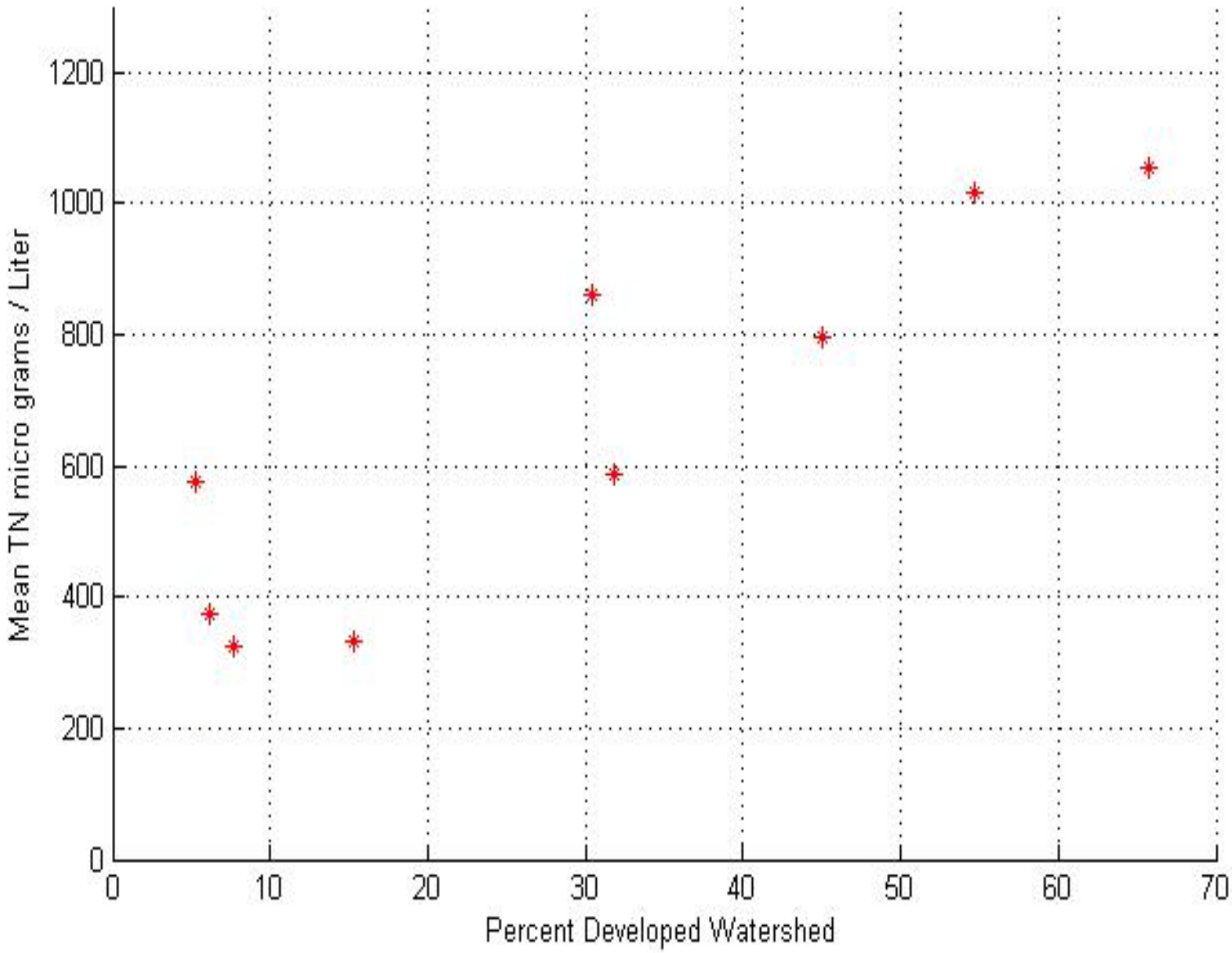
Rutgers University.


Data Sources: CRSSA, NOAA, NJDEP
Map compiled by CRSSA, 2001
N.Y.
CT.
87
95
80
NEW JERSEY
New York City
78
Atlantic Ocean
Garden State Parkway
PA.
Trenton
195
JCNERR
Jacques Cousteau National Estuarine Research Reserve
Philadelphia
Barnegat Bay Watershed
NJ Turnpike
Mullica River Watershed
Barnegat Bay
NJ Pinelands Management Area Boundary
Atlantic City
Great Bay
Delaware Bay
DE.
0
30 Mi.
0
60 Km.


Population Ocean County 1900-2006 US Census Bureau
600000
500000
400000
300000
200000
100000
0
Garden State Parkway Construction
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000

		2006 Land Cover				
		Urban	Agriculture	Barren	Forest	Wetland
1995 Land Cover	Urban	86,606	102	151	569	19
	Agriculture	215	950	43	110	2
	Barren	1,761	25	5,647	1,201	202
	Forest	13,278	246	2,171	140,535	64
	Wetland	1,012	32	179	51	88,594

Lathrop, R., and Haag, S., Assessment of Land Use Change and Riparian Zone Status in the Barnegat Bay and Little Egg Harbor Watershed: 1995-2002-2006. 2008: Technical report to the Barnegat Bay National Estuary Program.


Mean TN micro grams / Liter
Percent Developed Watershed
0
200
400
600
800
1000
1200
0
10
20
30
40
50
60
70

Hard Clam Stock (Celestino et al.)

1). Two thirds lost from 1986-2001 in Little Egg Harbor

Brown Tide Blooms (Gastrich et al., 2004)

1). High Number of Cells per/ml

2). Decreased Secchi depth values

3). Spatially explicit

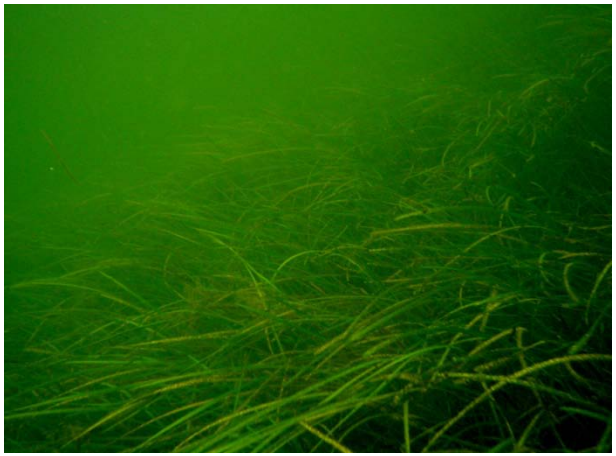
Seagrass bed loss (Lathrop et al. 2006b& Kennish et al. 2008)

1). 5184 ha of seagrass in Barnegat Bay ~ 75% of New Jersey's entire seagrass habitat.

2). 50-80% loss of seagrass biomass between 2004&2005 to 2006.

Macroalgal Growth (Kennish et al.)

1) Extensive drift communities of *Ulva lactuca.* cover and smother seagrass beds



CATERPILLAR

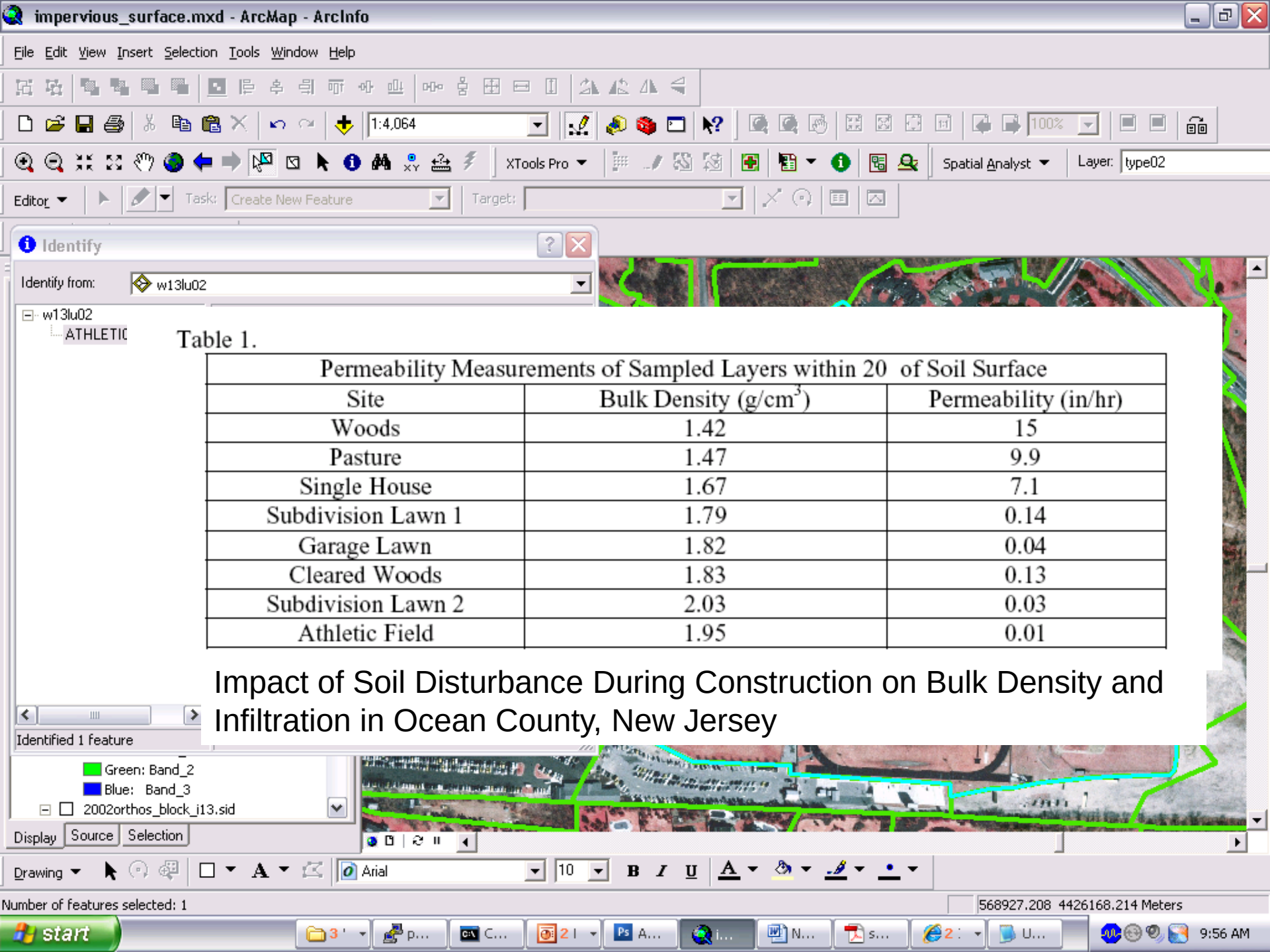


Table 1.

Permeability Measurements of Sampled Layers within 20 of Soil Surface		
Site	Bulk Density (g/cm^3)	Permeability (in/hr)
Woods	1.42	15
Pasture	1.47	9.9
Single House	1.67	7.1
Subdivision Lawn 1	1.79	0.14
Garage Lawn	1.82	0.04
Cleared Woods	1.83	0.13
Subdivision Lawn 2	2.03	0.03
Athletic Field	1.95	0.01

Impact of Soil Disturbance During Construction on Bulk Density and Infiltration in Ocean County, New Jersey

History of storm-water basins in NJ.

- In NJ original ordinances and resolution where created in the mid 70’s in Somerset County and Princeton Municipality.
  - Ordinances and resolutions were designed to make inflow equal outflow.
- Three types of basins were created
  - Detention = Basin with an outfall at the bottom designed to drain at the same rate as historical runoff.
  - Infiltration = No outlet structure water infiltrates into the soil
  - Retention = outlet structure at a specific height flat bottom.

History of storm-water basins Ocean County.

- Clean water act amendment of 1989 clean water act to include non-point source pollution.
- 2004 NJDEP passed the storm water management rules.

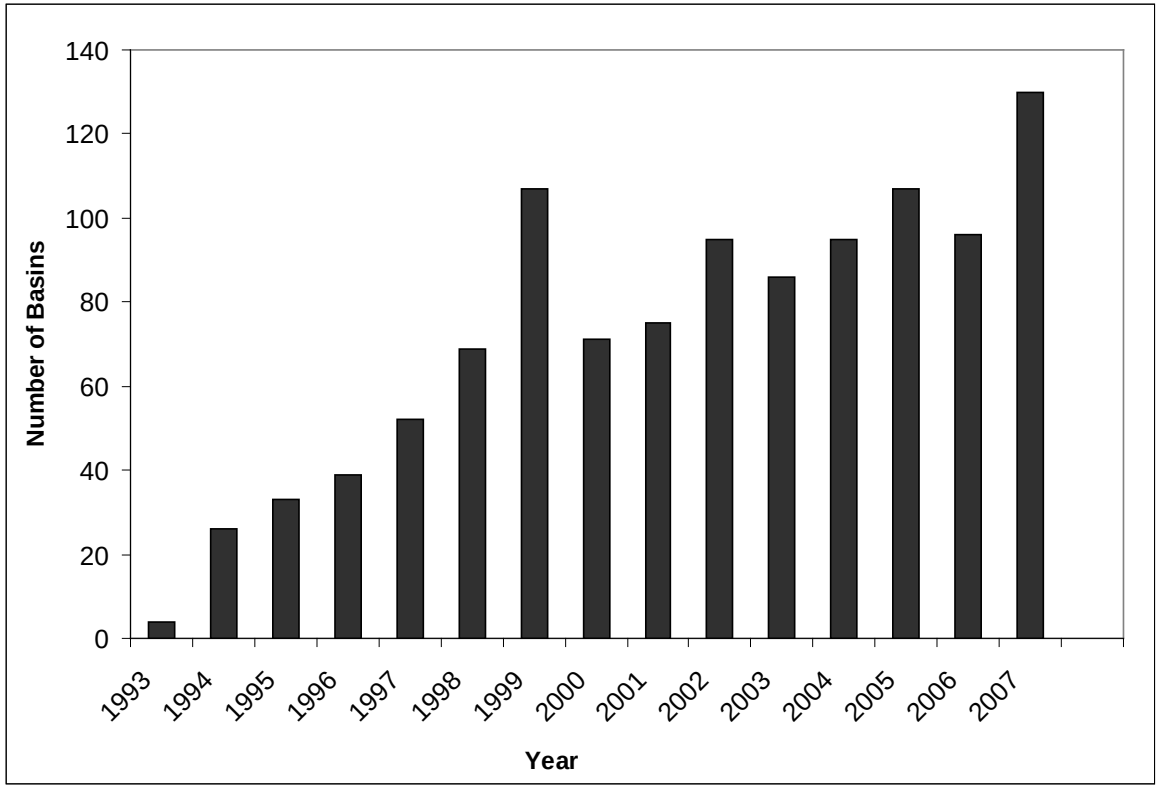


Figure 2. Individual effluent TN EMCs by BMP category

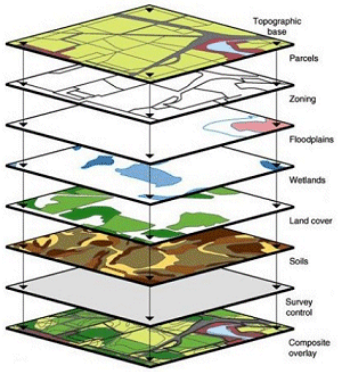
BMP Category		Number of BMPs	Median of Avg. Effluent (95% Confidence Interval)[1]			Significant Difference Between Average Influent and Effluent[2]	Median of Effluent EMCs (95% Confidence Interval)[1]			Significant Difference Between Influent and Effluent EMCs[2]
			Median	LCL	UCL		Median	LCL	UCL	
DB	Detention Basin	3	2.72	1.81	3.63	NO	2.52	2.10	3.04	YES[3]
GS	Biofilter	12	0.78	0.53	1.03	YES	0.65	0.60	0.70	YES
HD	Hydrodynamic Device	7	2.01	1.37	2.65	YES[3]	1.67	1.51	1.85	YES[3]
MF	Media Filter	7	0.76	0.62	0.89	YES	0.70	0.66	0.74	YES[3]
RP	Retention Pond	20	1.43	1.17	1.68	YES	1.25	1.18	1.32	YES
WB	Wetland Basin[4]	7	1.15	0.82	1.62	NO	1.21	1.14	1.28	NO
WC	Wetland Channel	3	1.91	0.69	4.81	NO	1.52	1.30	1.78	NO

1. Calculation of confidence interval based on McGill et al (1978), from the natural log of the quantiles.
2. Based on non-parametric analysis of difference in median values.
3. Indicates that effluent is significantly greater than influent.
4. Two studies were excluded due to apparent influent data quality issues.

http://bmpdatabase.org/BMPPerformance.htm

Moving forward

- How well are these basins working to reduce pollutant load?
- CICEET (Cooperative Institute for Coastal and Estuarine Environmental Technology)
- Where are these basins on the landscape?



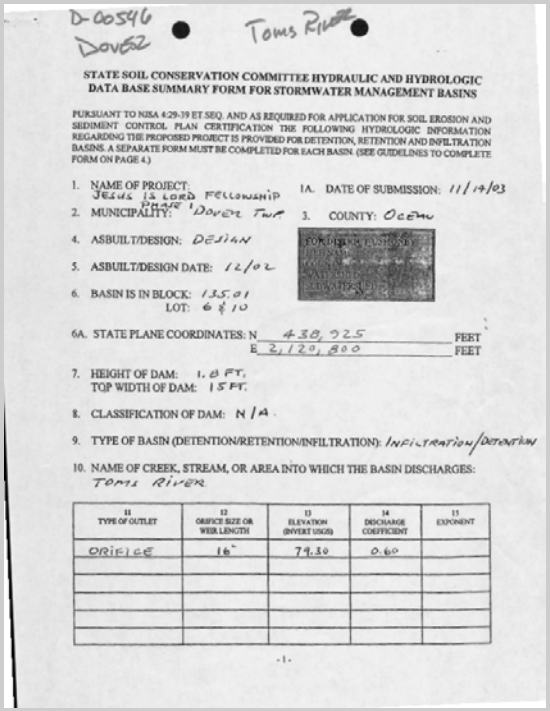
Data Input (historical basins)

- Volunteers from the JC NERR scanned in over 10,000 individual data sheets representing 1,700 stormwater basins.

- Out of these 1,148 basins were built or are being built.

Data extraction

- Automated text extraction from the forms



D-00546 Dover ● Toms River ●

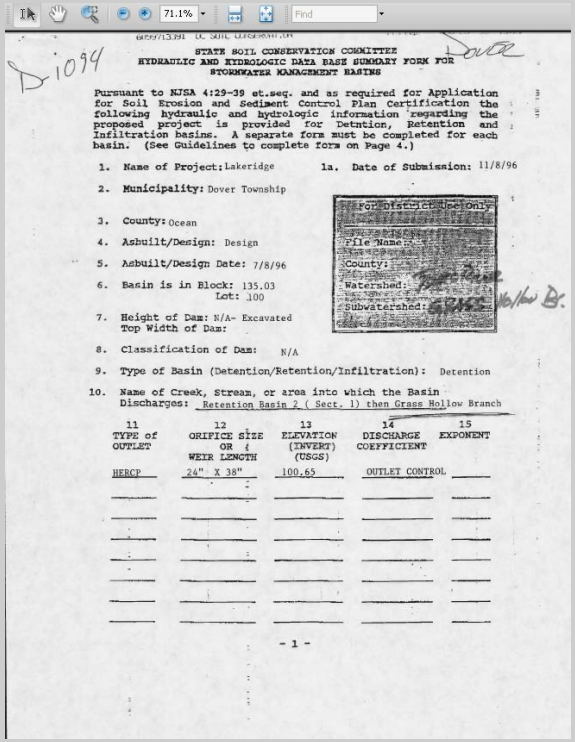
STATE SOIL CONSERVATION COMMITTEE HYDRAULIC AND HYDROLOGIC DATA BASE SUMMARY FORM FOR STORMWATER MANAGEMENT BASINS

PURSUANT TO NJSA 4:29-39 ET SEQ. AND AS REQUIRED FOR APPLICATION FOR SOIL EROSION AND SEDIMENT CONTROL PLAN CERTIFICATION THE FOLLOWING HYDROLOGIC INFORMATION REGARDING THE PROPOSED PROJECT IS PROVIDED FOR DETENTION, RETENTION AND INFILTRATION BASINS. A SEPARATE FORM MUST BE COMPLETED FOR EACH BASIN. (SEE GUIDELINES TO COMPLETE FORM ON PAGE 4.)

1. NAME OF PROJECT: Jesus is Lord Fellowship Phase 1
1A. DATE OF SUBMISSION: 11/14/03
2. MUNICIPALITY: Dover Twp
3. COUNTY: Ocean
4. ASBUILT/DESIGN: Design
5. ASBUILT/DESIGN DATE: 12/02
6. BASIN IS IN BLOCK: 135.01 LOT: 6 & 10
6A. STATE PLANE COORDINATES: N 438,925 FEET E 2,120,800 FEET
7. HEIGHT OF DAM: 1.8 FT. TOP WIDTH OF DAM: 15 FT.
8. CLASSIFICATION OF DAM: N/A
9. TYPE OF BASIN (DETENTION/RETENTION/INFILTRATION): Infiltration/Detention
10. NAME OF CREEK, STREAM, OR AREA INTO WHICH THE BASIN DISCHARGES: Toms River

11 TYPE OF OUTLET	12 ORIFICE SIZE OR WEIR LENGTH	13 ELEVATION (INVERT USGS)	14 DISCHARGE COEFFICIENT	15 EXPONENT
ORIFICE	16"	79.30	0.60	

-1-



D-1094 Dover

STATE SOIL CONSERVATION COMMITTEE
HYDRAULIC AND HYDROLOGIC DATA BASE SUMMARY FORM FOR
STORMWATER MANAGEMENT BASINS

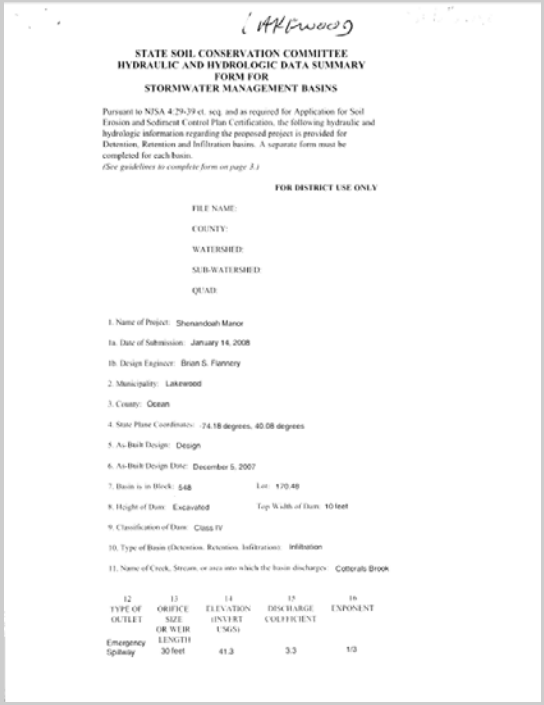
Pursuant to NJSA 4:29-39 et.seq. and as required for Application for Soil Erosion and Sediment Control Plan Certification the following hydraulic and hydrologic information regarding the proposed project is provided for Detention, Retention and Infiltration basins. A separate form must be completed for each basin. (See Guidelines to complete form on Page 4.)

1. Name of Project: Lakeridge
1a. Date of Submission: 11/8/96
2. Municipality: Dover Township
3. County: Ocean
4. Asbuilt/Design: Design
5. Asbuilt/Design Date: 7/8/96
6. Basin is in Block: 135.03 Lot: 100
7. Height of Dam: N/A- Excavated Top Width of Dam:
8. Classification of Dam: N/A
9. Type of Basin (Detention/Retention/Infiltration): Detention
10. Name of Creek, Stream, or area into which the Basin Discharges: Retention Basin 2 (Sect. 1) then Grass Hollow Branch

For District Use Only
File Name:
County:
Watershed:
Subwatershed:

11 TYPE of OUTLET	12 ORIFICE SIZE OR WEIR LENGTH	13 ELEVATION (INVERT) (USGS)	14 DISCHARGE COEFFICIENT	15 EXPONENT
HERCP	24" X 38"	100.65	OUTLET CONTROL	

- 1 -



Lakewood

STATE SOIL CONSERVATION COMMITTEE
HYDRAULIC AND HYDROLOGIC DATA SUMMARY
FORM FOR
STORMWATER MANAGEMENT BASINS

Pursuant to NJSA 4:29-39 et. seq. and as required for Application for Soil Erosion and Sediment Control Plan Certification, the following hydraulic and hydrologic information regarding the proposed project is provided for Detention, Retention and Infiltration basins. A separate form must be completed for each basin.
(See guidelines to complete form on page 3.)

FOR DISTRICT USE ONLY

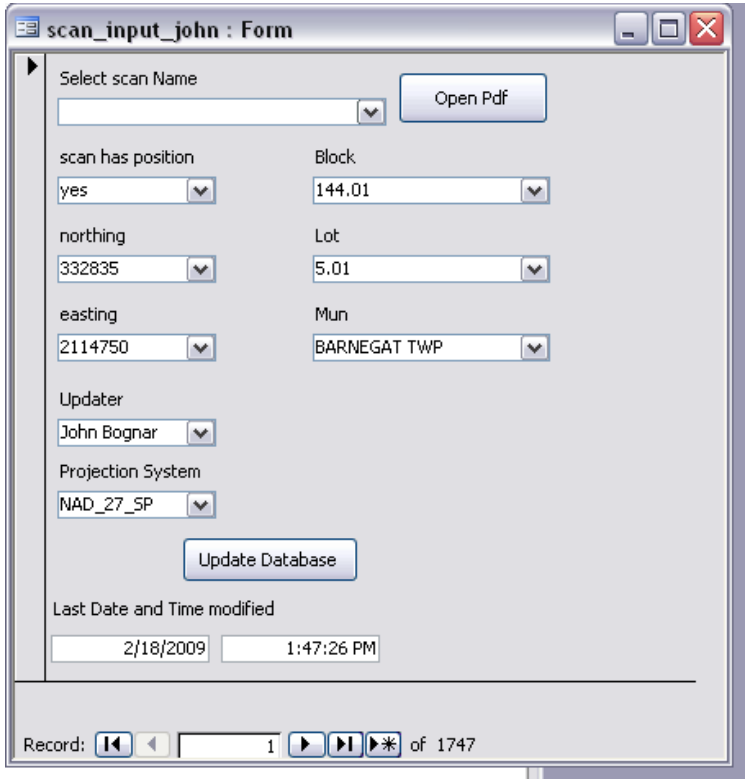
FILE NAME:
COUNTY:
WATERSHED:
SUB-WATERSHED:
QUAD:

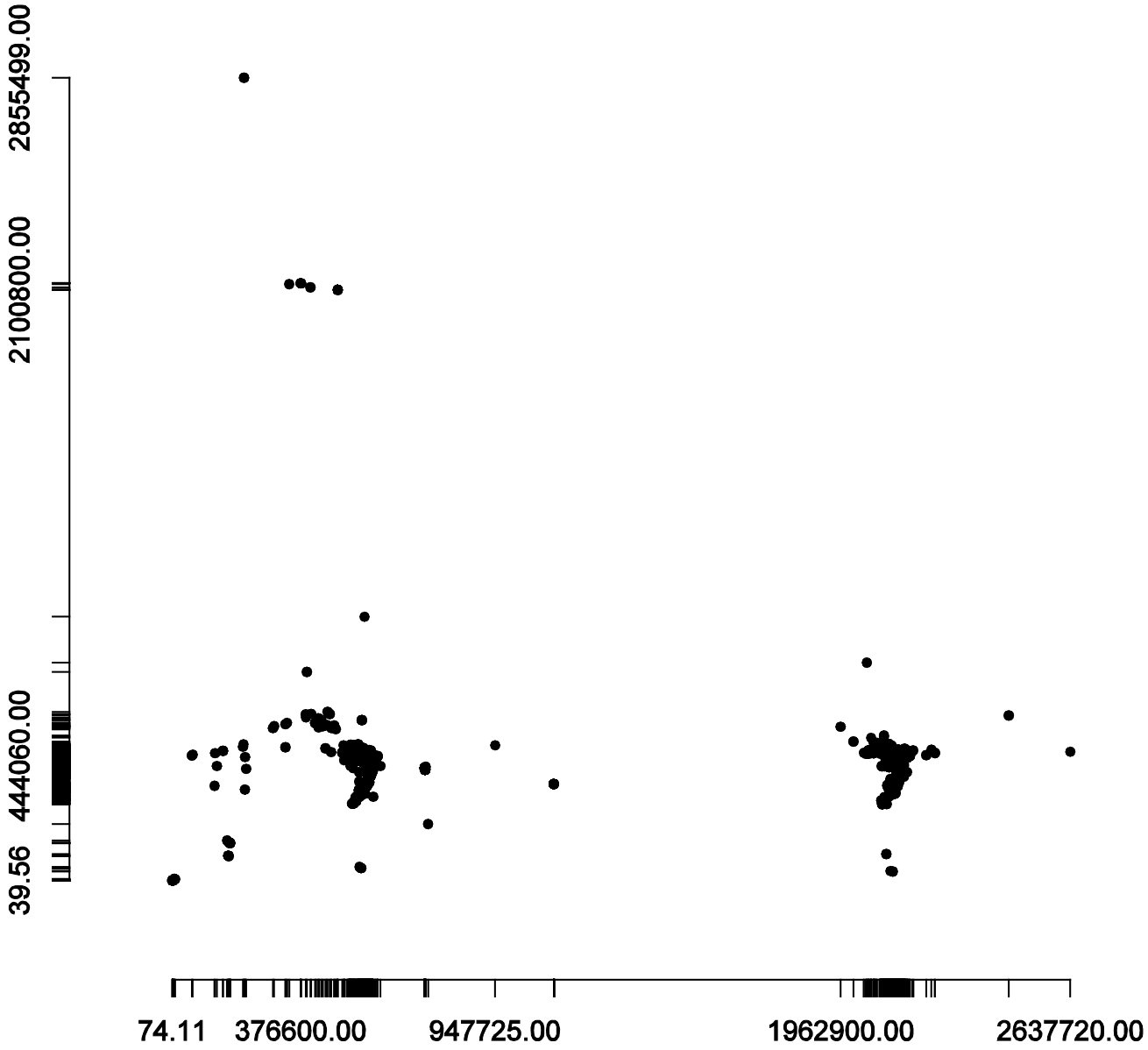
1. Name of Project: Shenandoah Manor
1a. Date of Submission: January 14, 2008
1b. Design Engineer: Brian S. Fannery
2. Municipality: Lakewood
3. County: Ocean
4. State Plane Coordinates: -74.18 degrees, 40.08 degrees
5. As-Built Design: Design
6. As-Built Design Date: December 5, 2007
7. Basin is in Block: 548 Lot: 170.48
8. Height of Dam: Excavated Top Width of Dam: 10 feet
9. Classification of Dam: Class IV
10. Type of Basin (Detention, Retention, Infiltration): Infiltration
11. Name of Creek, Stream, or area into which the basin discharges: Cottorals Brook

12 TYPE OF OUTLET	13 ORIFICE SIZE OR WEIR LENGTH	14 ELEVATION (INVERT USGS)	15 DISCHARGE COEFFICIENT	16 EXPONENT
Emergency Spillway	30 feet	41.3	3.3	1/3

Data extraction

- Microsoft Access (forms)
- Information included
  - Easting northing
  - Block lot
  - Municipality
  - Type of basin
    - Infiltration
    - Detention
    - Retention




2855499.00
2100800.00
444060.00
39.56
74.11
376600.00
947725.00
1962900.00
2637720.00

Parcel Matching

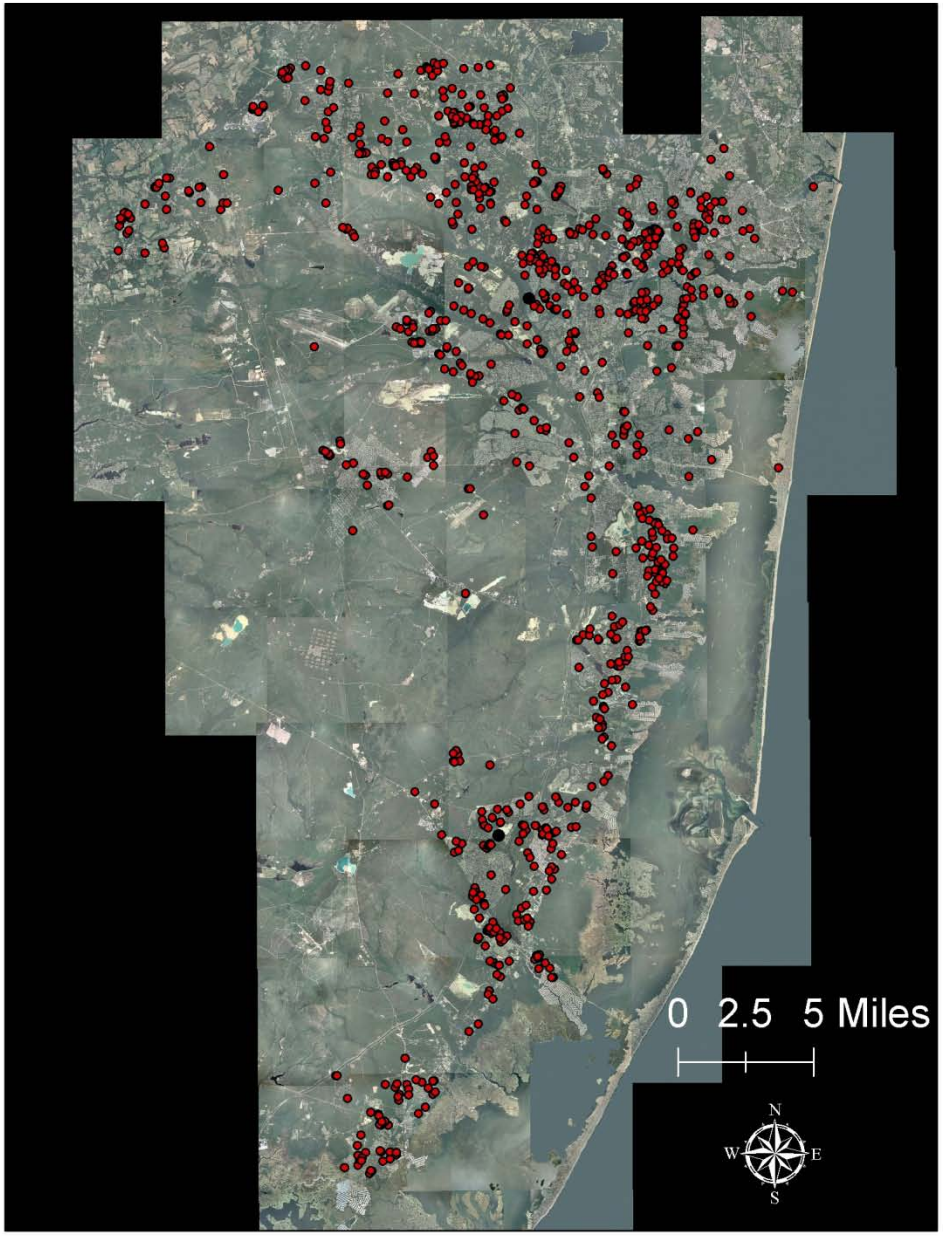
- Created an SQL (Standard Query Language) statement in access that would select the correct parcel block and municipality within Arc Map Ocean County Parcels GIS layer.

```
"[MUN] ='"+scans!municipality+'"  AND ( [BLOCK] = '"+scans!updated_block+'")
    AND ([LOT]='"+scans!updated_lot+'")"
```

Parcel Matching (issues and results)

- A number of issues became apparent.
  - Multiple basins in one parcel
  - Parcel block and lot have changed since basin information was collected.
  - No Matching Block or lot.

Results 907 basins where found on the ground


0 2.5 5 Miles
N
W
E
S

0 0.350.7 Miles
N
W
E
S

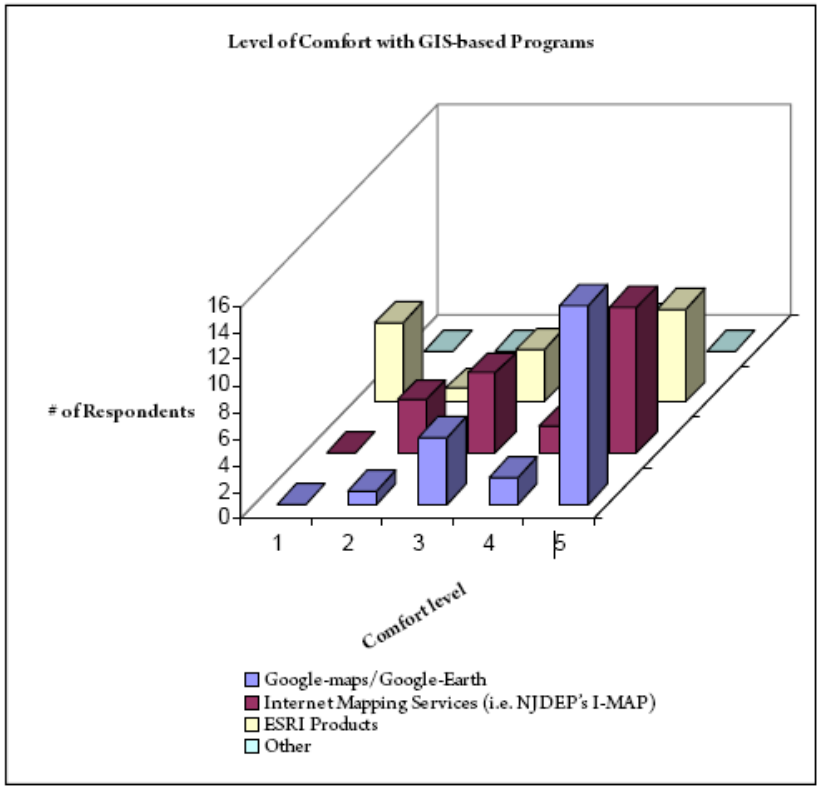
0 0.05 0.1 Miles

0 0.004 0.009 Mile
N
W
E
S

Taylor Ln
or Ln
© 2006

Taylor Ln
Taylor Ln

Respondent's Title	% of Respondents
Design engineer/Design consultant	47.6
Municipal Engineer	9.5
County Engineer	9.5
MUA staff	14.3
Municipal-level plan reviewer	9.5
County-level plan reviewer	14.3
Regional level plan reviewer	9.5
State level plan reviewer	4.8
Other	23.8



SWBMIS

News / Updates

Public Training Schedule

Application Demonstration 3/10/2008

Browse the Stormwater Database

Search the Database

View the 'Live' Projects Map

Submit a Stormwater Basin Application

Register for a User Account

Login to Submit an Application

Welcome to the Stormwater Basin MIS

In 1986 the New Jersey Department of Agriculture and its soil conservation districts recognized the value of the hydrologic and hydraulic site plan design data being submitted to districts for review under the New Jersey Soil Erosion and Sediment Control Act. With rapid development taking place state-wide, a plan was conceived to "capture" the stormwater management data with the intention of being able to knit together these pieces of information for comprehensive stormwater and watershed management modeling at the site and watershed levels. Important site plan design information was summarized on paper forms and maps and were submitted to districts as part of the certification process..

This website is still under construction.

For comments and suggestions, please contact Michael Mills at mmills@crssa.rutgers.edu.

Hydrologic and Hydraulic Database Summary Form: Project Site Location - Windows Internet Explorer

http://hydro.rutgers.edu/sw/Application/ProjectSite-Map.aspx#

zoom options | zoom to full extent | add project site | remove project site | reset map | map help

Latitude: Longitude: Continue

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Done | Internet | 100%

u/sw/Application/ProjectSite-Map.aspx#

oom to full extent | add project site | remove project site | reset map | map help

Add Project Site

Map

Cedar Bridge Rd

Old Manahawkin Cedar Bridge Rd

Old Manahawkin Cedar Bridge Rd

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Longitude:

Continue

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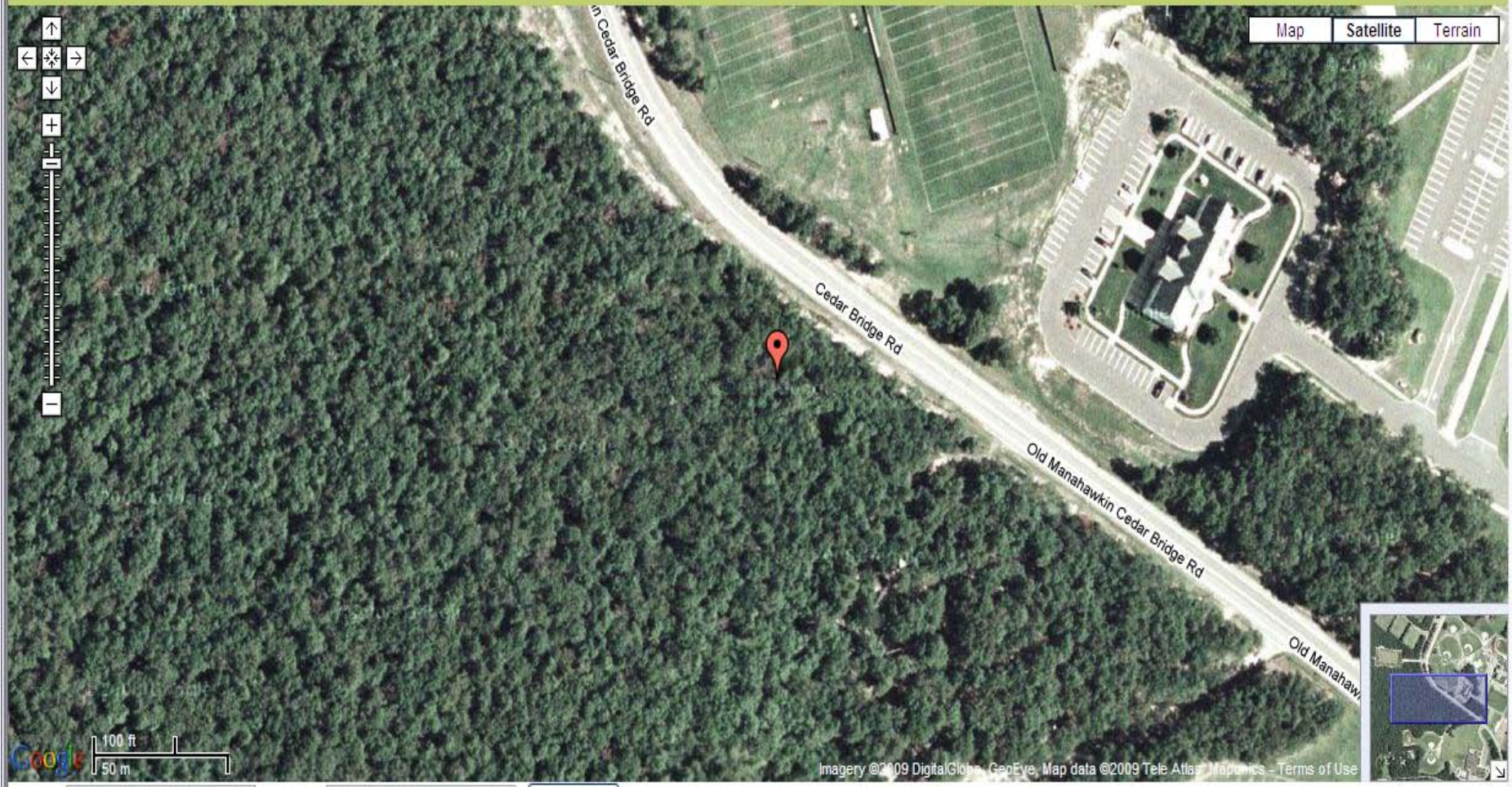
http://hydro.rutgers.edu/sw/Application/ProjectSite-Map.aspx#

zoom options | zoom to full extent | add project site | remove project site | reset map | map help



Latitude: 39.71112365575614 Longitude: -74.2589521408081 Continue

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http://hydro.rutgers.edu/sw/Application/ProjectSite-Map.aspx#

zoom options | zoom to full extent | add project site | remove project site | reset map | map help

Map | Satellite | Terrain

Please Be Patient.

Cedar Bridge Rd

Old Manahawkin Cedar Bridge Rd

100 ft

50 m

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Latitude: 39.71112365575614 Longitude: -74.2589521408081 Continue

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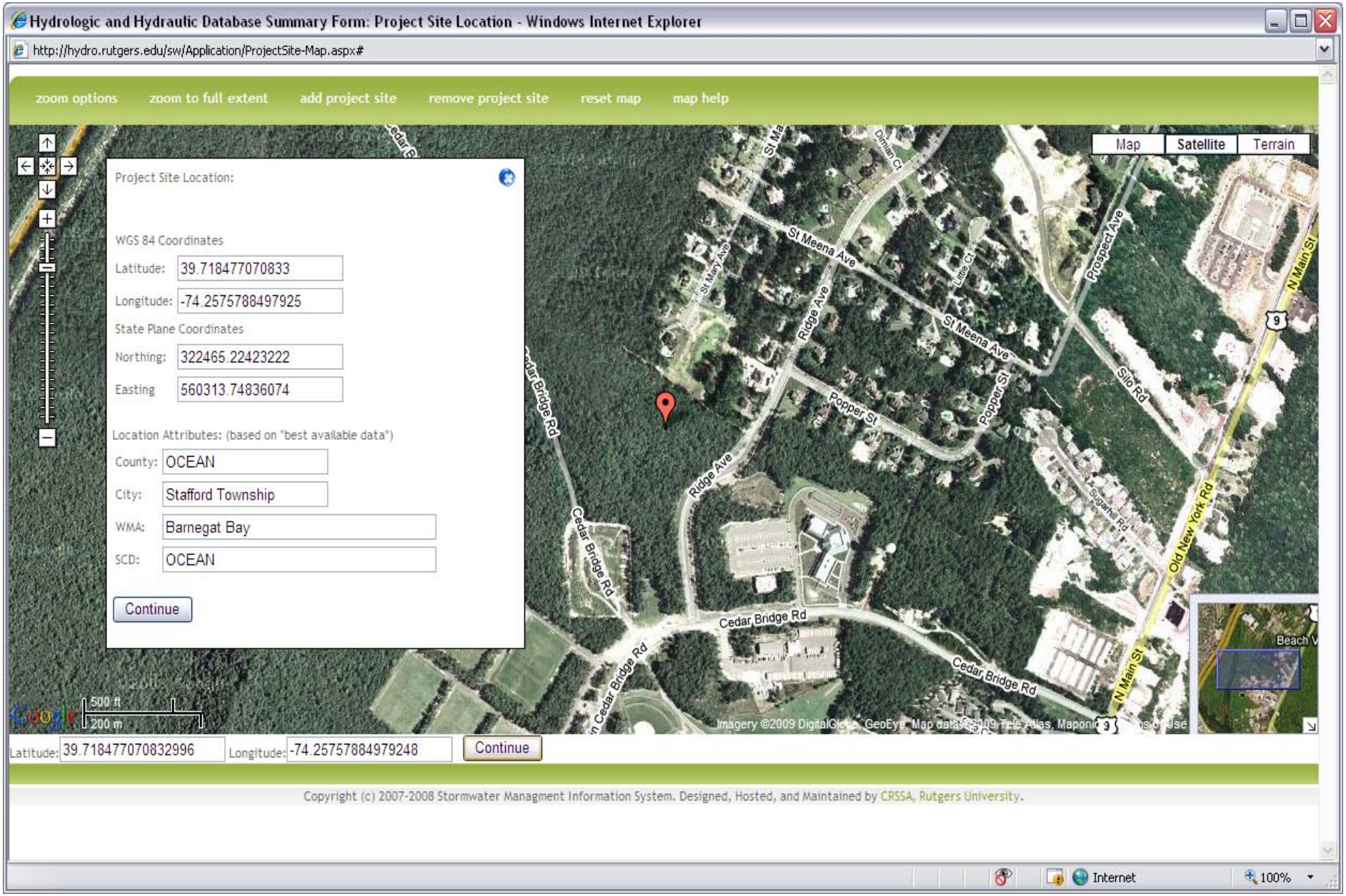
Hydrologic and Hydraulic Database Summary Form: Project Site Location - Windows Internet Explorer
http://hydro.rutgers.edu/sw/Application/ProjectSite-Map.aspx#
zoom options
zoom to full extent
add project site
remove project site
reset map
map help
Map
Satellite
Terrain
Project Site Location:
WGS 84 Coordinates
Latitude: 39.718477070833
Longitude: -74.2575788497925
State Plane Coordinates
Northing: 322465.22423222
Easting 560313.74836074
Location Attributes: (based on "best available data")
County: OCEAN
City: Stafford Township
WMA: Barnegat Bay
SCD: OCEAN
Continue
St Meena Ave
Ridge Ave
Popper St
Prospect Ave
Silo Rd
Cedar Bridge Rd
Old New York Rd
N Main St
Sugarhill Rd
Dimian Ct
Little Ct
St Mary Ave
500 ft
200 m
Latitude: 39.718477070832996
Longitude: -74.25757884979248
Continue
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http://hydro.rutgers.edu/sw/Application/Project-Site.aspx

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http://www.esajournals.org/... | HxH

Page | Tools

home user guidelines faq logout

Project Site Information

Project Name: New Basin wawa

Start Date: March / 4 / 2008

☐ Start date unknown.

County: OCEAN

Street Address: 14 green st

City: Eagleswood Township

Zipcode: 08318

Block: 14

Lot: 21

Site Coordinates

WGS 84 Lat / Long

Latitude: 39.6501121018637

Longitude: -74.2552185058594

State Plane

Northing: 297566.425711791

Easting 561045.602786159

Proposed Land Use Code: 1499

Urban Lands | Go

Stormwater Basins

Watershed Management Area:

Barnegat Bay

Soil Conservation District:

OCEAN

Comments for Site: (optional)

Continue

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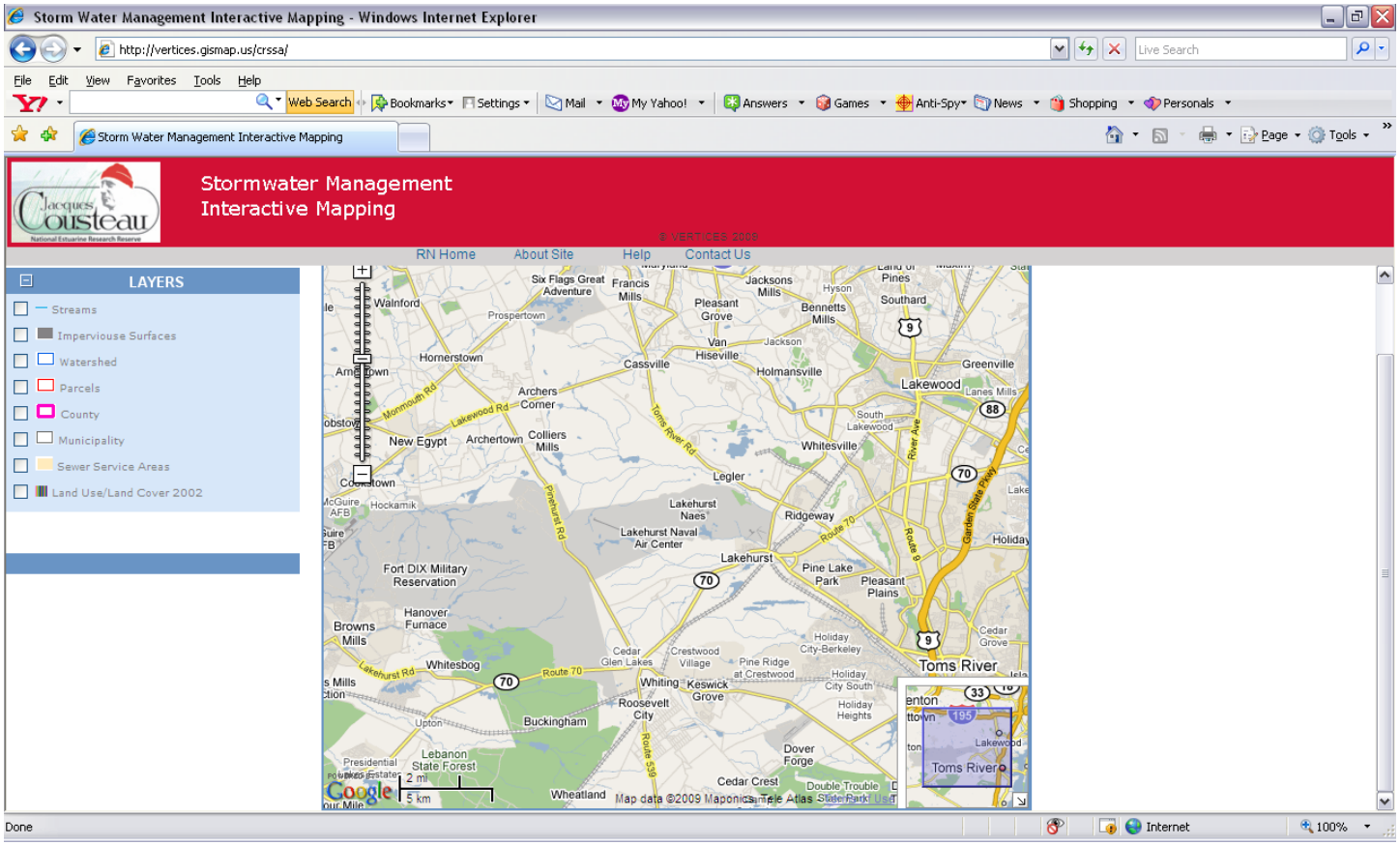

1). Category One or Trout associated waters
2). Wetlands, springs, seeps
3). Threatened & Endangered species habitats
4). Drinking water supplies
5). Culverts and bridges
6). Downstream receiving waters and watershed data

Summary

- Standardize the input of information for storm water basins in NJ.
- Create a geographic information system to compare storm water basins to other spatial datasets.
- Provide an intuitive graphical interface to display and analyze the final GIS dataset.