Delaware Communities Envision their Future Growth – Using ArcGIS and CommunityViz®

Presented by:
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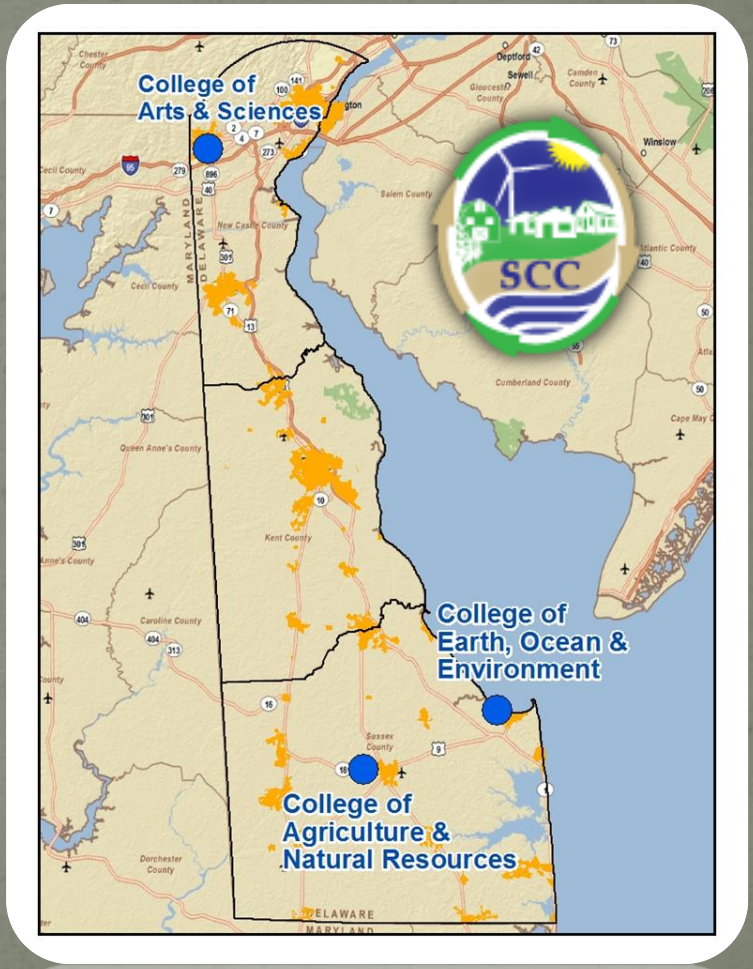
November 19, 2012

Overview

- UD Sustainable Coastal Community (UD-SCC) Initiative
- Federal Government Involvement
- Growth Planning Process in Delaware
- Public Engagement Tools for Growth Planning
  - UD-SCC Community Land Use Model
  - Wordle
  - "weTable" GIS-participatory tool
  - 3D Visual Representation on Google Earth
  - UD-SCC Growth Planning Community Interactive Website
- Bridgeville-Greenwood Master Plan & Implementation
- Chesapeake Watershed Implementation Plan
- UD-SCC Community Land Use Model – Version 2
- Coming Full Circle

Sustainable Coastal Community Initiative (SCC)

- Three college initiative within the University of Delaware
- An approach to address growth, land use, and environmental impacts in southern Delaware
- Ed Lewandowski, Coastal Community Development Specialist, Marine Advisory Service



Federal Government Involvement

- EPA Model - comparison to their model; validation of formula; Acceptance
- Funding NFWF
  - Bridgeville/Greenwood in Sussex County, Delaware

Easygrants ID: 29567
National Fish and Wildlife Foundation – Chesapeake Bay Small Watershed Grants 2011, Full Proposal (Activity 1
Title: Bridgeville Master Plan-A Regional Land Use Effort
Organization: Town of Bridgeville

Grant Request Information

Title of Project
Bridgeville Master Plan-A Regional Land Use Effort

Total Amount Requested	$ 75,000.00
Matching Contributions Proposed	$ 37,500.00
Proposed Grant Period	10/15/2011 - 10/15/2012

Project Description
The Town of Bridgeville, DE in cooperation with various partners will develop a regional master plan, with model ordinances and pattern book to meet the Bay Pollution Diet.

Project Abstract
The Town of Bridgeville, in partnership with the University of Delaware Sustainable Coastal Communities Initiative, Delaware Office of State Planning Coordination, and Department of Natural Resources and Environmental Control propose to develop a comprehensive master planning and outreach initiative tailored to rural towns and citizens focused on sustainable growth principles to meet the goals of the Chesapeake Bay TMDL and to be a model community in the Chesapeake Bay Watershed. Delaware communities located in the Chesapeake Bay will need to make significant reductions in nutrients and sediment if they wish to grow in the future. This initiative will focus on engaging residents and stakeholders using a multi-media approach, identifying and addressing urban nutrient sources to meet the TMDL at a local level, an develop a plan that will allow for future growth in this community in a sustainable way.

Organization and Primary Contact Information

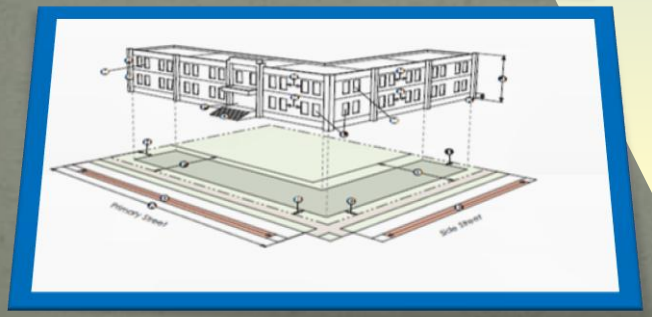
Organization	Town of Bridgeville
Organization Type	State or Local Government
Organization Web Address	www.townofbridgeville.net
Organization Phone	
Street Line 1	
City, State, Country Postal Code	Bridgeville, Delaware, North America - United States
Region (if international)	
Organization Congressional District	
Tax Status	Under Review - State/local Government Agency
Tax ID	516000028
Primary Contact	Mr. Meritt Burke
Position/Title	Town Manager
Street Line 1	101 North Main Street

Growth Planning Process in Delaware

Understanding the Layers of Land Use Planning in Delaware

Comprehensive Land Use Plan

Master Plan

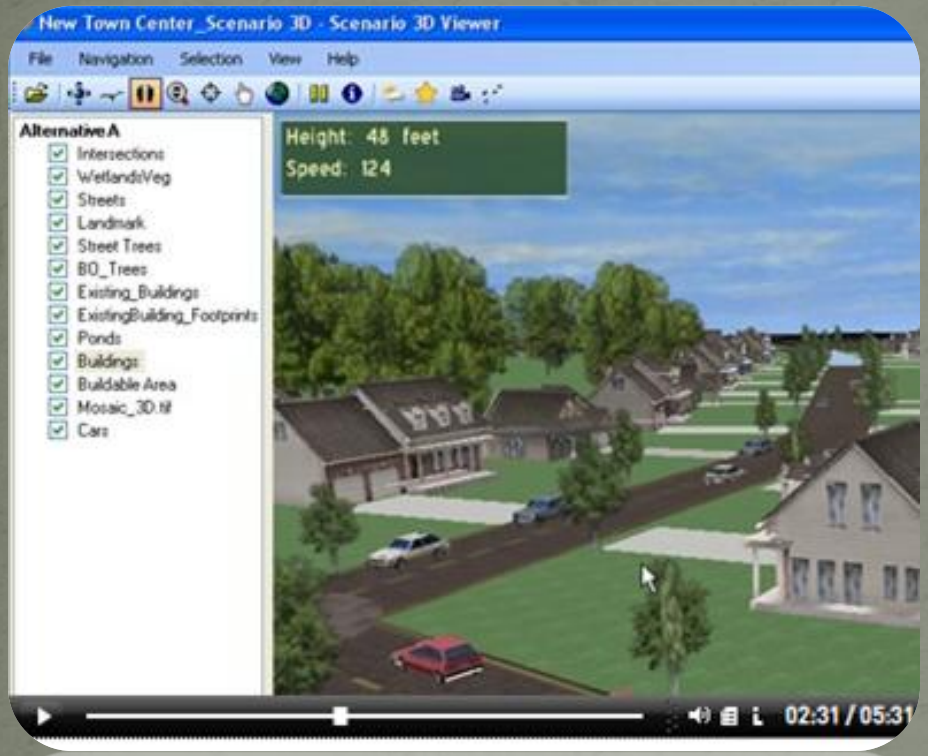


Site Plan

The Master Plan

- **Master Plans address issues that transcend the local level**
  - growth and development
  - transportation
  - property rights
  - affordable housing
  - air and water quality
  - agricultural district planning
- **Master Plans cross jurisdictions at a sub-regional level**

Implementation of the Master Plan



Scenario 3D example from Placeways, LLC website

- **State Agency Action**
  - **DNREC Infrastructure**
  - **DelDOT – TAZ Model**
  - **Technology transfer to State and local agencies**
- **Plan Application to Parcel**
  - **Take preferred scenario overlay – spatial join to parcel boundaries for TDR and rezoning**
- **Enhancement efforts**
  - **weTable**
  - **Time-scope analysis**
  - **Greater detailed 3D visualization**

Public Engagement
Tools for Growth Planning

UD-SCC Community Land Use Model

Community Viz® Land Use Designer

SIMPLY – A tool for public involvement in land use decisions

Regional Approach: *Public Involvement*

1. **Visualization tool used for performing growth planning**

2. **"Paints" a picture of the community's values and interests**

3. **Land use capacity model representing;**
   a) **community character**
   b) **a set of land use designations that do not represent zoning, political boundaries, or ownership**
   c) **form-based transect approach**

4. **Build-out and demographic impacts analysis – geospatial visualization**

Regional Approach: *Public Involvement*

Stakeholders* Assessment

- Assign Regional Study Area Boundary
- Review Existing Land Use using Model**
- Compare Existing LU to Jurisdictions' Comprehensive Plan Scenarios
- Develop Alternate Growth Scenarios using *weTable;* run Build-Out; Compare
- Present Scenarios to Public

Public Deliberation/Feedback

- Attend Growth Scenarios Visualization Workshop (s)
- Identify Community Values
- Perform *weTable* exercise
- Deliberate Benefits, Costs, Consequences of Growth Scenarios
- Select Preferred Scenario
- Provide Feedback to Jurisdictions

** State Agencies, Local Officials, Business & Civic Leaders, Developers, NGO's*

***UD-SCC Community Land Use Model using ArcGIS/CommunityViz ®*

Benefits of the UD-SCC Model

- Stakeholder interests → visualized and analyzed
- Public Engagement → deliberates and makes land use choices
- Community Character & Values → identified and represented
- "On-the-fly" impact analysis → identifies consequences
- "What-if" process → provides implementation options
- Iterative tradeoff & visualization process → leads to consensus
- Scalable Model → at State, Local, and Regional Planning

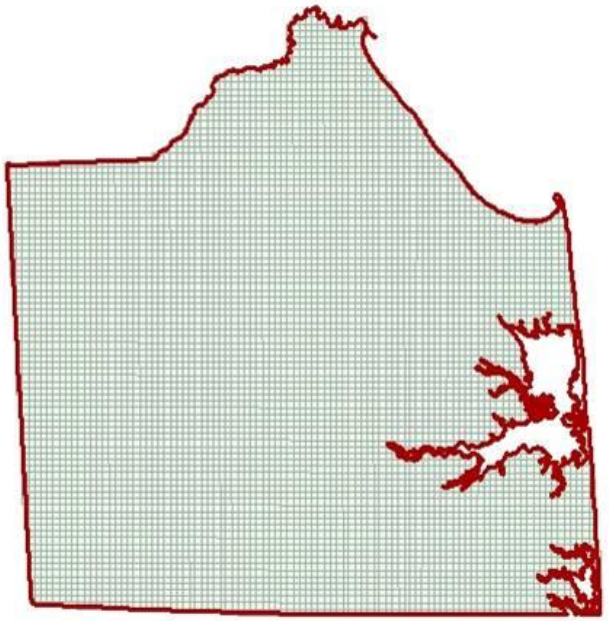
The Model Components

1. 100-acre Grid from Fishnet application
2. Custom LU transects (Smart Growth & SC)
3. Baseline: Existing LU Scenario
4. CommunityViz® LU Designer & "Paint" tool – assign density parameters
5. Build-Out Analysis with geographic constraints
6. Results Validation
7. Alternate Scenario Development ("what if's")
8. Scenario Comparative Analysis

CommunityViz® is an extension of ESRI's ArcGIS

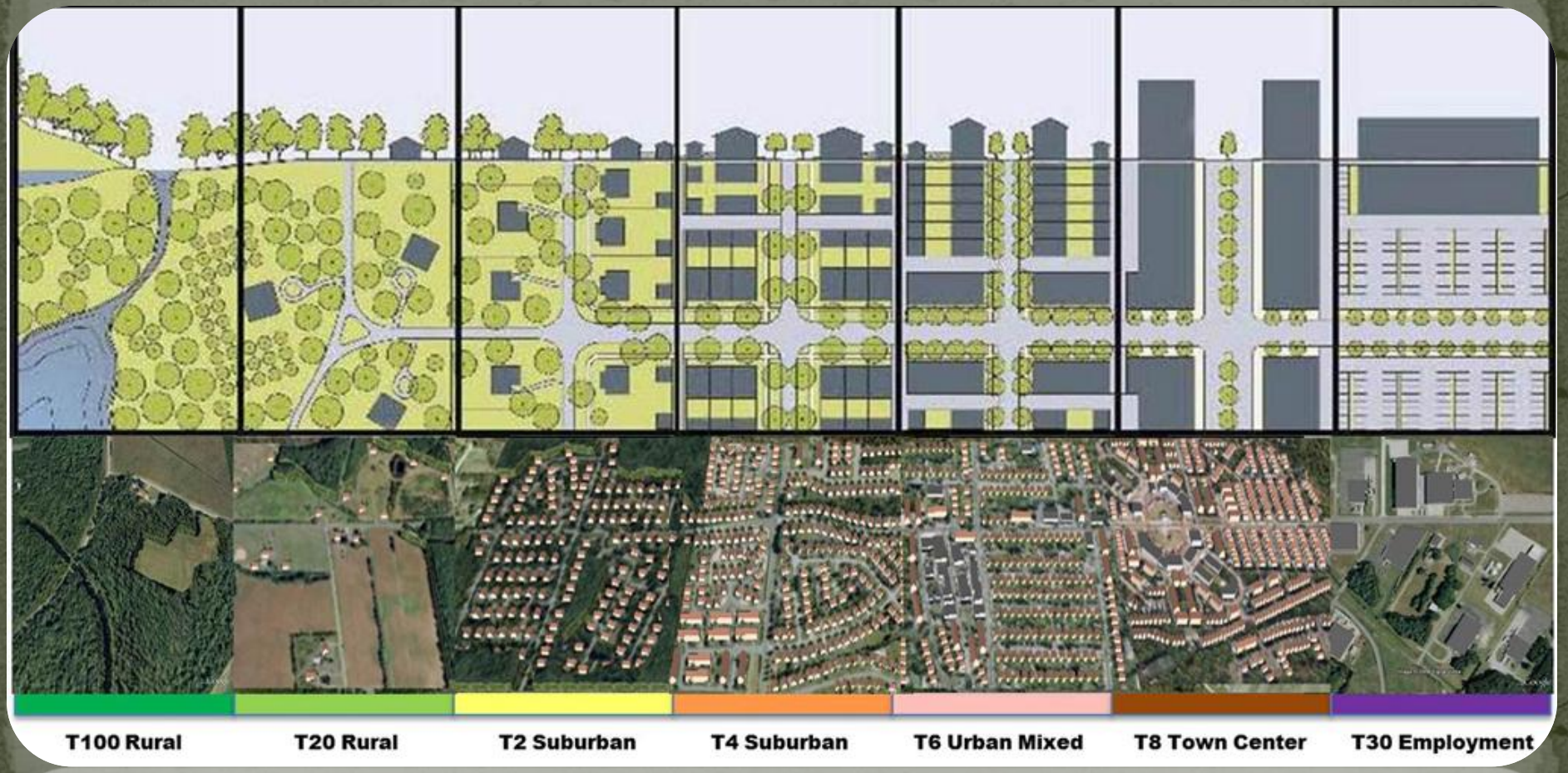
Sussex County Grid – 938 Square Miles Our "100 Acre Wood"

- **Each square represents 100 acres**
- **Sussex County development projects averaged 100 acres**
- **Used fishnet to create 100-acre-grid vector file**



Sussex County, De.

Smart Growth Transect Planning



Sources: UD-SCC Community Land Use Model

Data Layers

Federal Partners:
USGS, NRCS, USF, USDA, EPA, USFW, DOT, etc.
State of Delaware:
Office of State Planning Coordination
- Aerials
- Comprehensive Land Use Plans

DNREC – Division of Watershed Stewardship
- Drainage / Tax Ditches
- Storm-Water
- Wetlands
- Water Quality Monitor
- Sea-Level Rise
- Conservation Districts
- Non-Point Source Program

DNREC – Division of Water
- Wastewater / Septic Systems
- Source Water Protection

DNREC – Division of Parks and Recreation
- State Lands
- Natural Areas / Habitat

DNREC – Division of Air and Waste
- Underground Storage Tanks
- Air Quality Monitoring

Del-Dot
- Roads
- Dams

Data Layers

State of Delaware:

DDA – Delaware Forest Services

- Urban Tree Canopy
- Erosion and Sediment Permitting
- State-wide Forest Assessment
- State Lands
- Forest Buffers
- Forest Legacy Program

DDA – Ag-Lands Preservation Program

- Preserved Agricultural Lands

DDA – Nutrient Management Program

- CAFO's / AFO's
- Manure Transport
- Irrigated / Non-Irrigated Lands

Public Service Commission

- Certificate of Public Conveyance and Necessity (CPCN)

County and Local Governments

- 911 Structure Information
- Waste Water Information
- Building Permits

Land Use Types

RESIDENTIAL COMMUNITIES

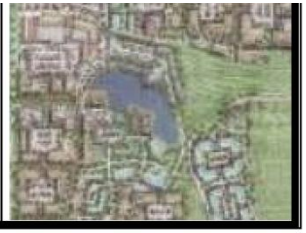
RESIDENTIAL COMMUNITIES

					3D Image

MIXED USE COMMUNITIES

Legend	Land Use Type	Density Characterization	Description	Land Use Picture (Click)	3D Image (Click)
	Urban Mixed "T6"	**Category:** MIXED USE **Residential Density:** 6 Dwelling Units/Acre **Ratio:** 70% Residential 30% Commercial **Commercial:** 300,000 SQFT	Traditional Neighborhood Development (TND): community with a mix of medium residential housing, business, retail and commercial establishments. Form-based, compact pattern of development with planned open spaces. Includes single family homes, multi-family homes (townhouses, villas,		

COMMERCIAL (Retail, Civic, Institutional, Planned Industrial)

Legend	Land Use Type	Density Characterization	Description	Land Use Picture (Click)	3D Image (Click)
	Employment Center "T30"	**Category:** COMMERCIAL **Residential Density:** none **Commercial:** 200,000 SQFT	Business parks, utilities, transportation, civic spaces/government centers, planned industrial and institutional land use. No residential. Examples: Ross Business Park, SC Airport, Indian River Power Plant, Chicken Processing Plants, Bridgeville Commerce, Delaware Technical and Community College, Merck/Intervet.		
	High Density Mixed "T16"	**Category:** MIXED USE **Residential Density:** 16 Dwelling Units/Acre **Ratio:** 90% Residential 10% Commercial **Commercial:** 50,000 SQFT	High Density residential community with neighborhood business including professional offices and neighborhood retail. Majority residential. Form-based, compact pattern of development. Examples: Planned high density land use.		
			Peninsula, Henlopen Acres, Paynters Mill, and moderate density coastal communities.		

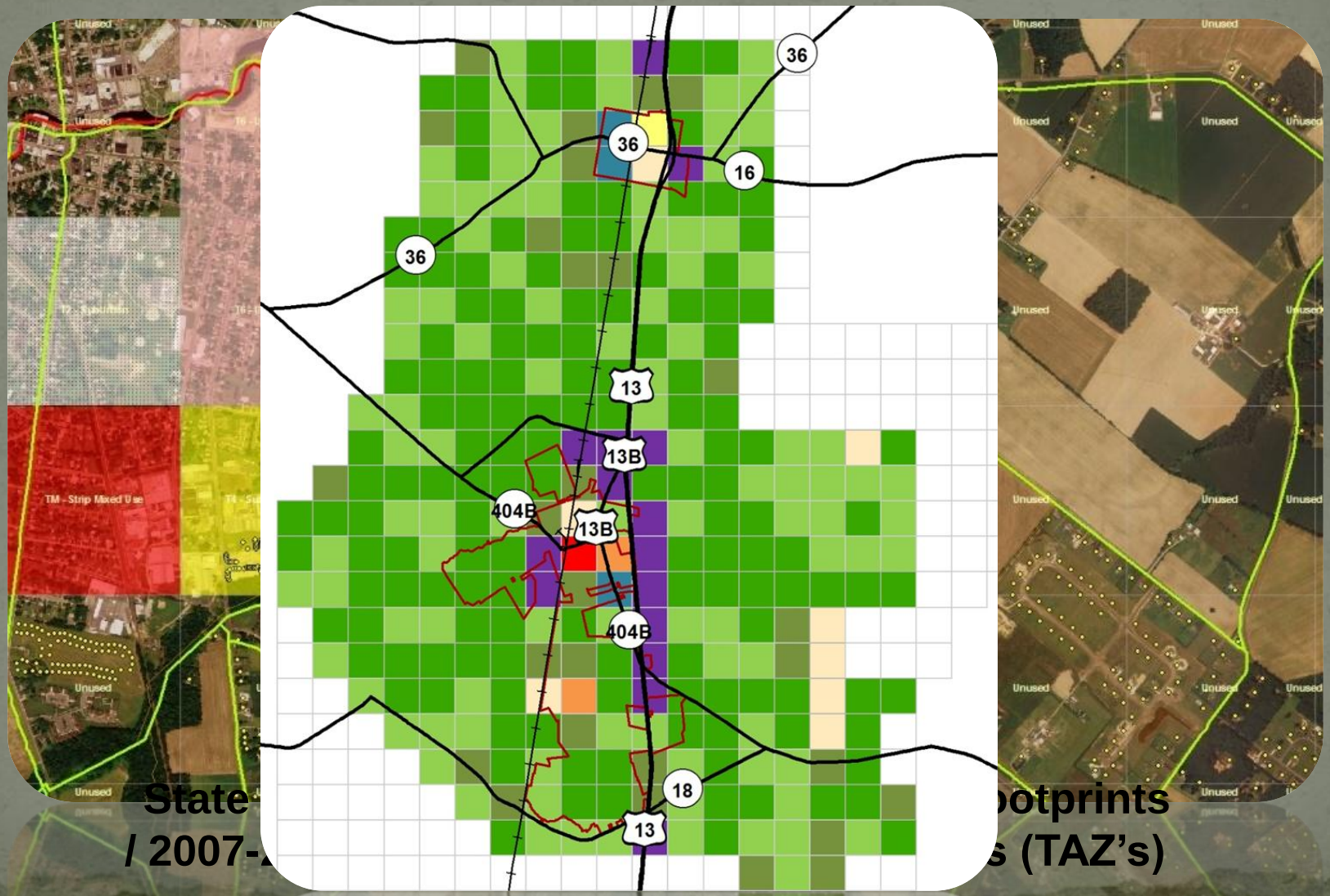
industrial and institutional land use. No residential. Examples: Ross Business Park, SC Airport, Indian River Power Plant, Chicken Processing Plants, Bridgeville Commerce, Delaware Technical and Community College, Merck/Intervet.

Density Parameters & Assumptions

	A	B	C	D	F	I	K	L	N	O	P	R	S	T
1	LAND USE DESIGNATION (TILE CODE)	T100A - RURAL	T20A - RURAL	T5A - RURAL	T1 - RURAL VILLAGE	T2 - SUBURBAN	T4 - SUBURBAN	T4 - MIXED SUBURBAN	T6 - URBAN MIXED	T8 - TOWN CENTER	T12 - URBAN MIXED	TM - STRIP MIXED USE	T-30K - EMPLOYMENT	T-200K-RETAIL
2	TILES KEYED TO 2008 SUSSEX COUNTY LAND USE PLAN WITH ZONING DISTRICT EQUIVILANT TILE LABELS IN ()	RURAL - PROTECTED				RURAL - LOW DENSITY (AR-1 and AR-2)		ESDA/DEVELOPING (MIXED RESIDENTIAL)	TOWN CENTER	MUNICIPALITIES	Milford Comp Plan	HIGHWAY COMMERCIAL	(PLANNED INDUSTRIAL)	
3	COMMUNITY TYPE	Preserved rural, open space, critical resources	Rural areas, agriculture	Rural areas & Hamlets	Village Town	Residential only Subdivision	Residential Only Subdivision	Village TND	Village Town	Municipalities/Towns High density residential	High Density Residentia SF	Existing land use designation to	Small business establishments	Community or Regional
4	BUILDING USE													
5	COMMUNITY EXAMPLES													
6	RESIDENTIAL DENSITY													
7	DENSITY – Dwelling Units per Acre													0
8	DENSITY – Dwelling Units/100A GROSS - maximum build-out													0
9	Density - Dwelling Units/100A (Oc x Row 9) (WINTER)													0
10	Density - Dwelling Units/100A - (Development Capacity = Row 24 x (SUMMER)													0
11	Density - DU Range for Existing													0
12														
13	FLOOR AREA - Total SQ FT													
14	SQFT - NONRESIDENTIAL per Tile (													800,000
15	FAR - NONRESIDENTIAL (based on													0.18
16	SQFT - RESIDENTIAL													n/a
17	MIXED USE													No
18	MIXED USE PERCENTAGE (Single Use Buildings)													n/a
19	MIXED USE BUILDINGS ?													n/a
20	MIXED USE-% Floor Area (Residential:NonRes.)													n/a
21														
22	BUILD EFFICIENCY													
23	BUILD EFFICIENCY (allowance for r stormwater mgmt, setbacks, sidev (SUMMER)													80%
24	LAND USE EFFICIENCY - discount fo seasonal housing													0%
25	NET EFFICIENCY (Composite) = Build Efficiency - LU Efficicency (W													80%
26														
27														

40	DEMOGRAPHIC INFORMATION				
41					
42	RESIDENTIAL				
43	Residents/DU (Persons per Household)	2.45	2.45	2.45	2.41
44	Children/DU (%)	0.70	0.70	0.70	0.60
45	Tax Rate/DU (Average)	85	85	85	85
46	Water Use/DU (Daily Household Water Use)	300	300	300	300
47	Wastewater/DU	300	300	300	300
48	Vehicle Trips Per Day (VTD)/DU (Household Vehicle Trips per Day)	10	10	10	10
49					
50	COMMERCIAL				
51	Commercial Space Per Employee (sq ft) (Floor Area per Employee)	0	0	0	900
52	Commercial - EE VTD	0	0	0	20
53	Commercial - EE Water Use	0	0	0	25
54	Commercial - EE Wastewater	0	0	0	20
55	Commmercial Tax Rate (SC Market Value per SQ FT)	0	0	0	20
56	Employees per Feature (For SC Growth Plan per 100A Tile)	0.54	2.70	7.50	10
57					

Used Community Viz® to "Paint" & Validate the Study Area – creating an Existing Land Use Base



State / 2007-… …ootprints …s (TAZ's)

UD-SCC Model Variables & Assumptions

- Density
- Nonresidential Square Footage
- Mixed Use Percentage
- Build Efficiency Percentage
- Land Use Efficiency Percentage (Vacancies)
- Constraints
  - "Out-of-Play" from *Strategies for State Policies and Spending*
  - Excellent recharge areas
  - Wetlands / Buffers along streams
  - Sending and receiving Transfer of Development Rights
  - Other unbuildable areas

Community Values Identification

Values Transfer to Land Use

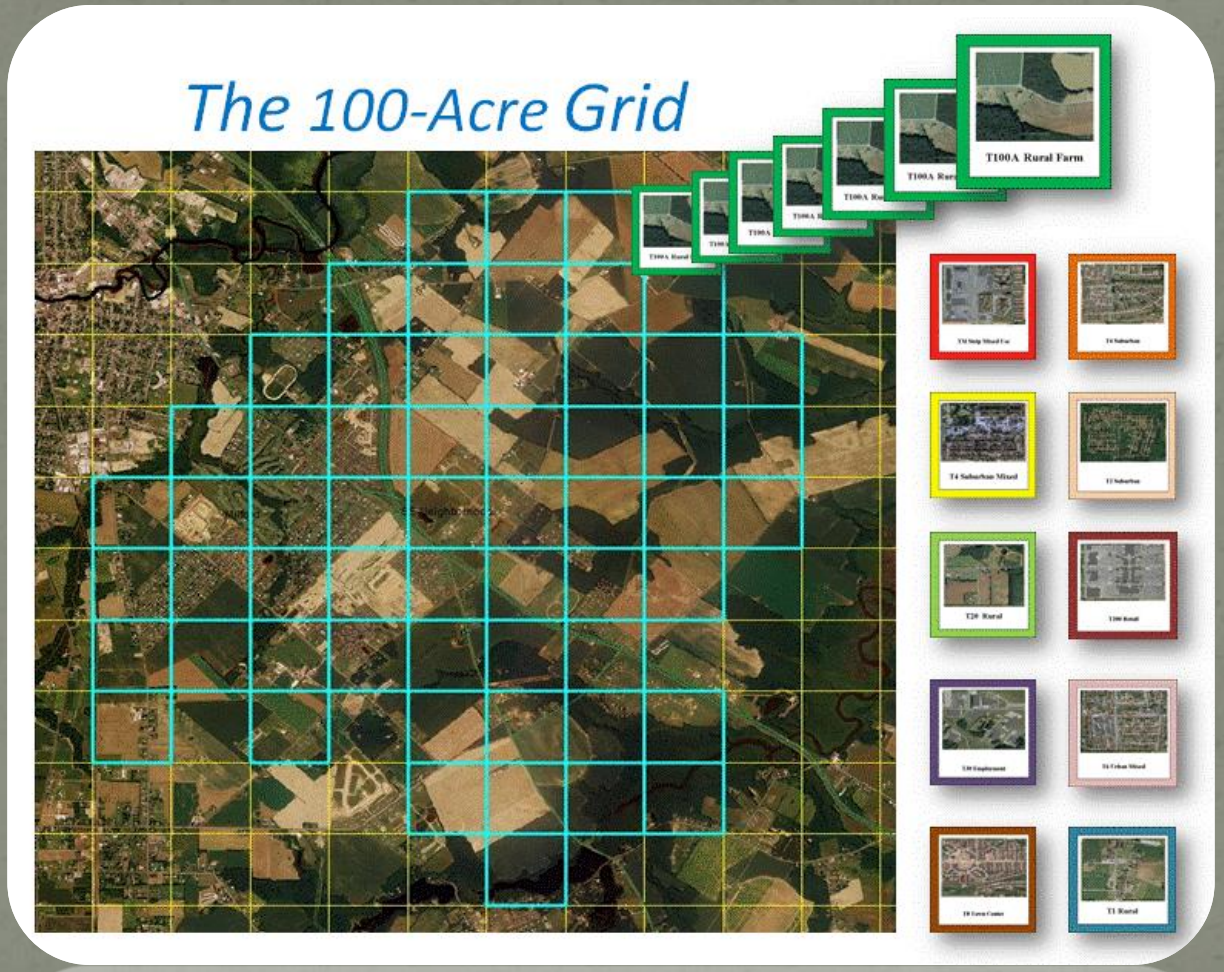
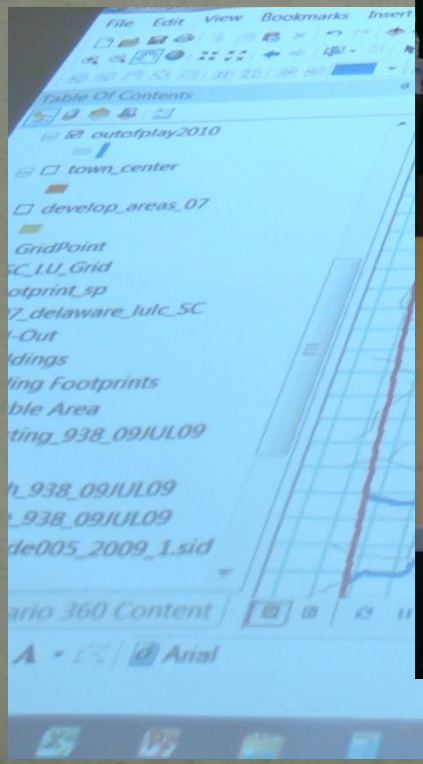
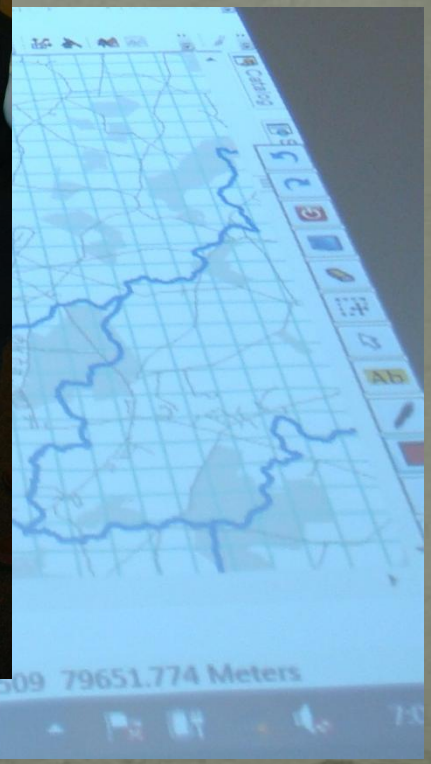



Table
No. 3

The weTable

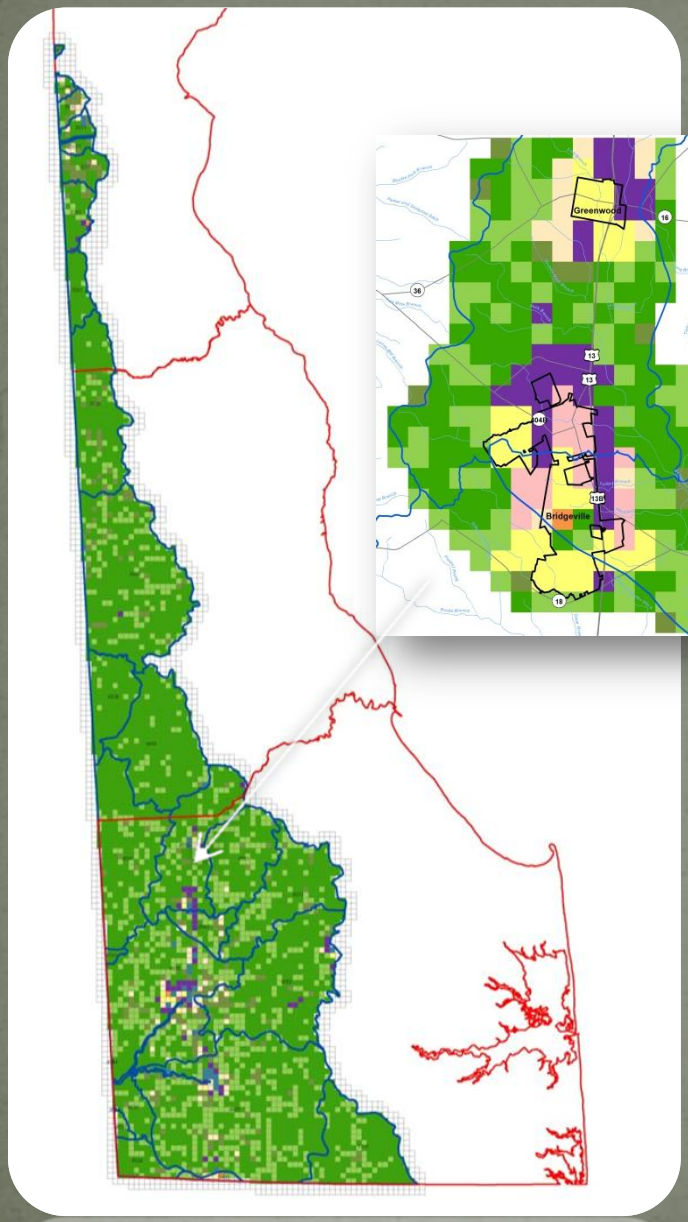
- **Ideal Tool for Community Land Use Planning Projects**
- **A Tool for Participatory GIS – Texas Coastal Watershed Program**

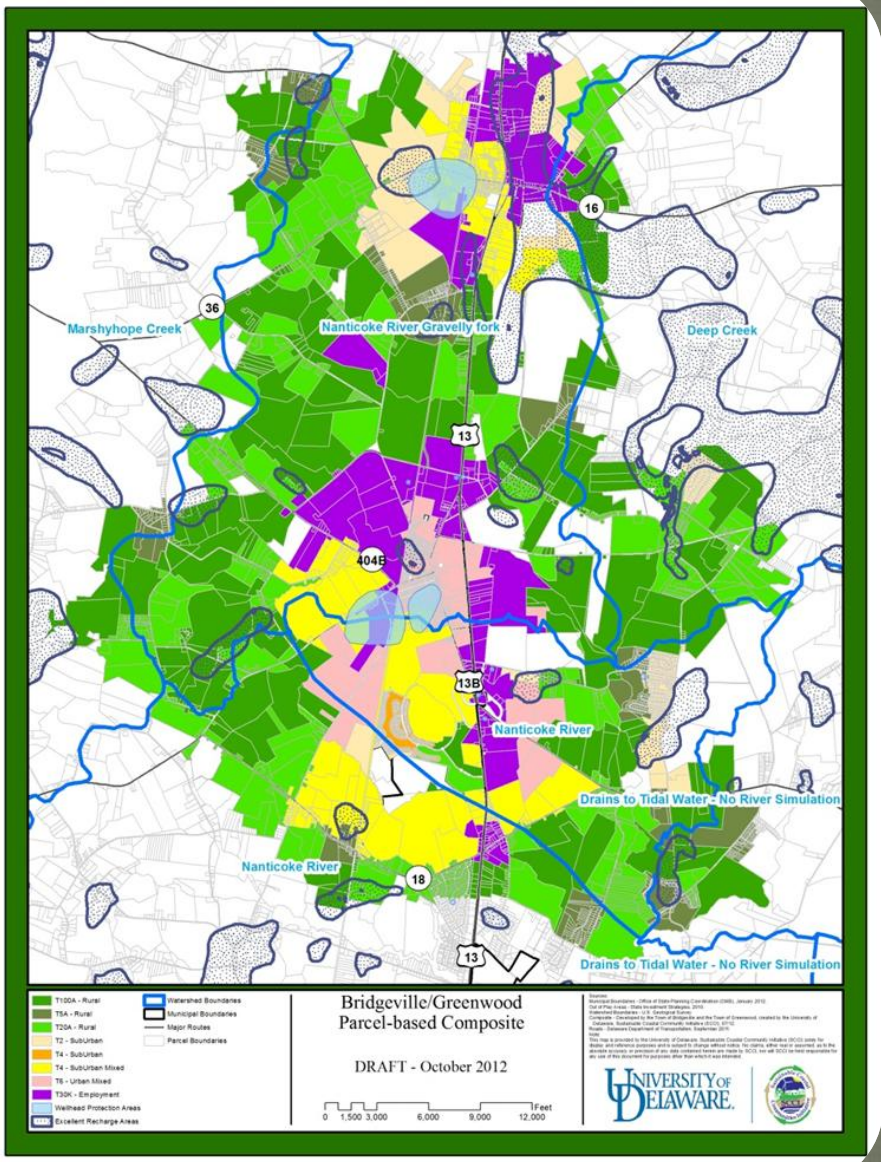




Bridgeville-Greenwood Master Plan & Implementation

Meeting the Chesapeake Watershed Implementation Plan (WIP)


Greenwood
Bridgeville
16
36
13
13A
404
13B
18


Marshyhope Creek
Nanticoke River Gravelly fork
Deep Creek
Nanticoke River
Drains to Tidal Water - No River Simulation
Nanticoke River
Drains to Tidal Water - No River Simulation
16
36
13
404B
13B
18
T10DA - Rural
T5A - Rural
T20A - Rural
T2 - SubUrban
T4 - SubUrban
T4 - SubUrban Mixed
T6 - Urban Mixed
T3DK - Employment
Wellhead Protection Areas
Excellent Recharge Areas
Watershed Boundaries
Municipal Boundaries
Major Routes
Parcel Boundaries
Bridgeville/Greenwood
Parcel-based Composite
DRAFT - October 2012
0 1,500 3,000 6,000 9,000 12,000
Feet
UNIVERSITY OF DELAWARE

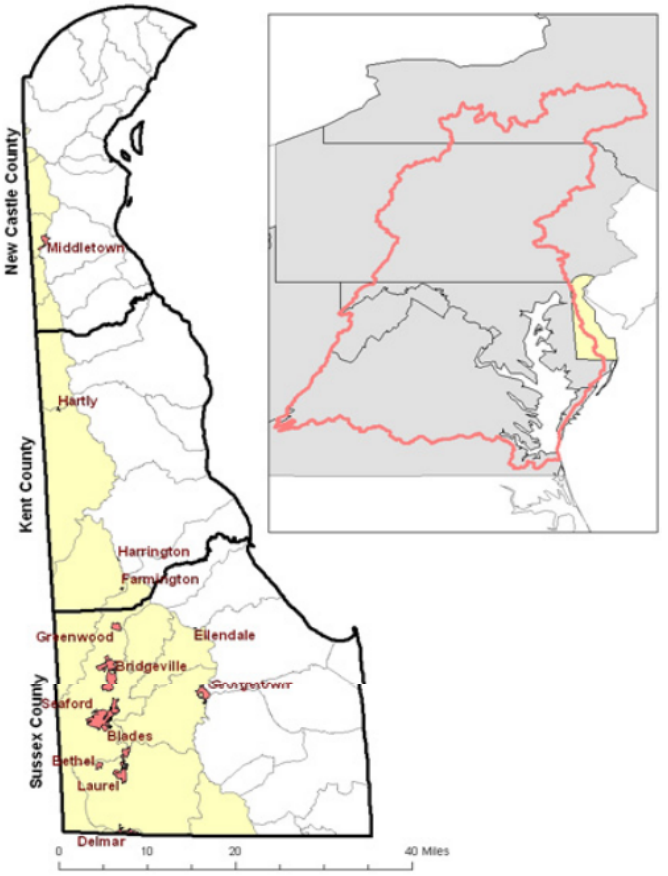
Chesapeake Watershed Implementation Plan

Delaware's Chesapeake Bay Watershed Implementation Plan (WIP)

ADVISORY: Delaware's Final Phase II WIP is available for review

Delaware is among six Chesapeake Bay Watershed states – along with Maryland, Virginia, West Virginia, Pennsylvania, and New York – and the District of Columbia committed to a federal-state initiative to develop a pollution "diet" that will help restore the water quality of the Bay and its tidal waters by 2025.

The Bay and many streams that drain to the Bay from each state suffer from excess pollution and must be cleaned up. The Environmental Protection Agency is leading the effort by developing a Total Maximum Daily Load (TMDL) for nutrients and sediment for the Chesapeake Bay and its tidal branches. A TMDL is the maximum amount of a pollutant that a body of water can receive and still meet water quality standards that protect humans and aquatic life. Delaware has already established State TMDLs for impaired waters in the Chesapeake, but this EPA TMDL will call for additional reductions.



Areas of Delaware (yellow portion of state map) within the Chesapeake Bay Watershed - which spans Maryland, Virginia, West Virginia, Pennsylvania, and New York, and the District of Columbia (as shown on the smaller map).

As part of the TMDL, each jurisdiction is required to develop a Watershed Implementation Plan (WIP) that details how load goals will be achieved and maintained into the future. This work is being done in three phases. Draft Phase I WIPs were due to EPA on September 1, 2010 and final plans were turned in on November 29, 2010. Phase II WIPs in draft and final forms were due to EPA by December 15, 2011 and March 30, 2012, respectively. Phase III WIPs must be received by EPA in 2017. With each successive WIP, the detail of load goals and actions to achieve those goals will become increasingly more specific.

Delaware's WIP work is being led by an Interagency Workgroup made up of representatives from DNREC; Delaware Department of Agriculture; Department of Transportation; Office of State Planning Coordination; County Conservation Districts; U.S. Department of Agriculture agencies; U.S. Geological Survey; and other stakeholders such as representatives from the farming and development communities. Nine subcommittees were formed to address: agriculture; stormwater; wastewater; land use and comprehensive plans; restoration; public lands; funding; information technology; and communications.

WIP Phases

Delaware's Phase I WIP was finalized November 2010 and was used to develop the EPA TMDL that was released December 2010.

Phase II work occured in 2011 and early 2012. The Phase II WIP provides additional details about the partner organizations who will implement portions of the WIP, specifies when actions will occur, and identifies the resources necessary for success. Additionally, some of the implementation goals identified in the Phase I WIP have been parsed down to a smaller scale, such as at the County level. Finally, the Phase II plan establishes implemenation goals for 2017, which is when 60 percent of the necessary nitrogen, phosphorus, and sediment goals must be achieved.

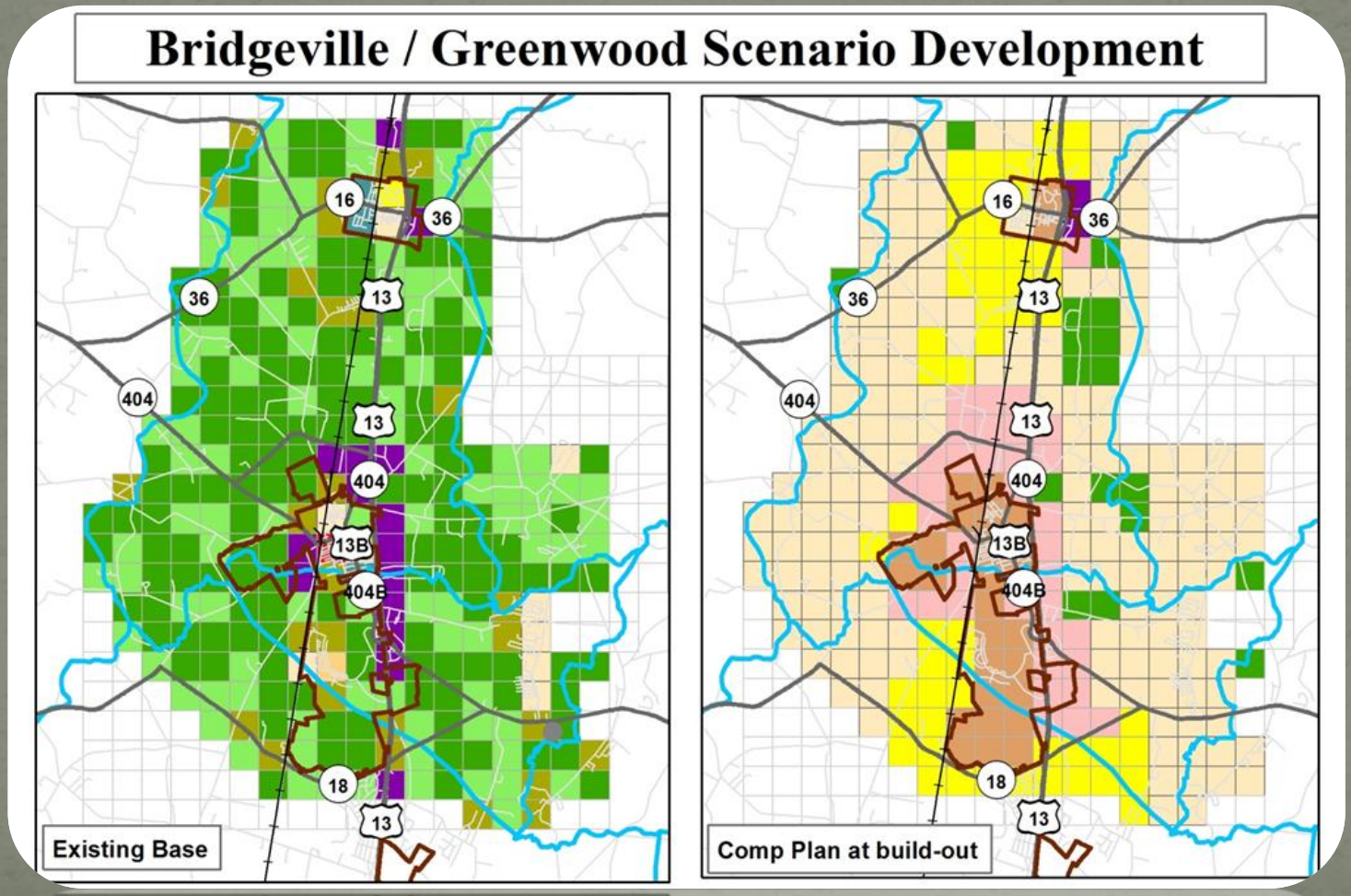
More WIP Information

A brochure, **Delaware's Role in Cleaning Up Our Chesapeake Waterways**, is available for addressing frequently asked questions about the Delaware WIP.

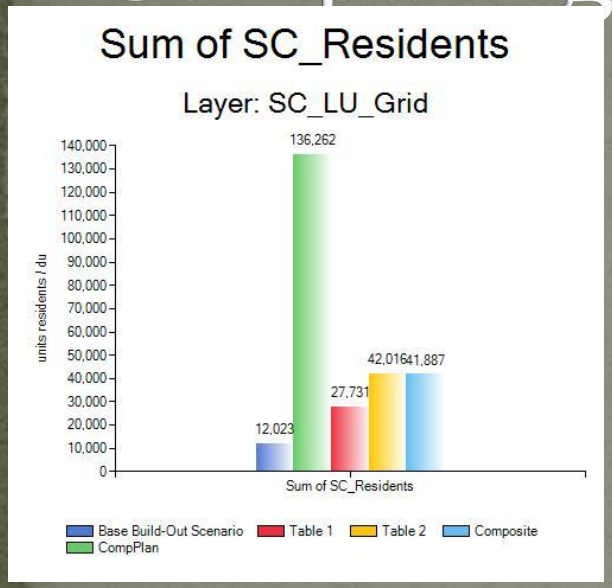
Our Waters, Our Towns, Local Governments' Role in the WIPs

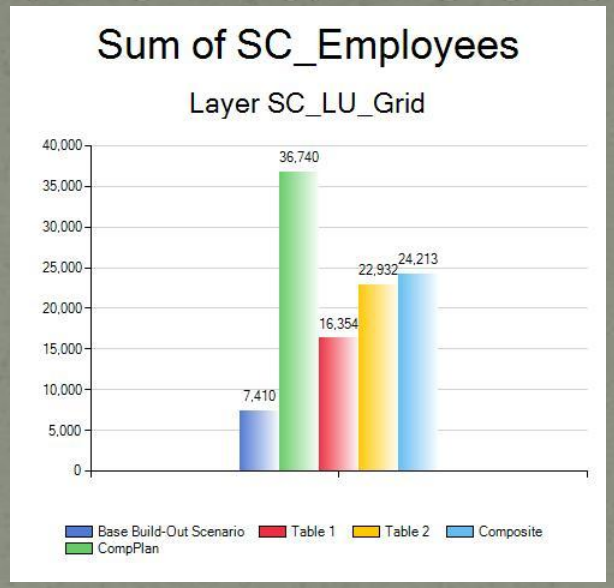
EPA Expectations and Consequenses

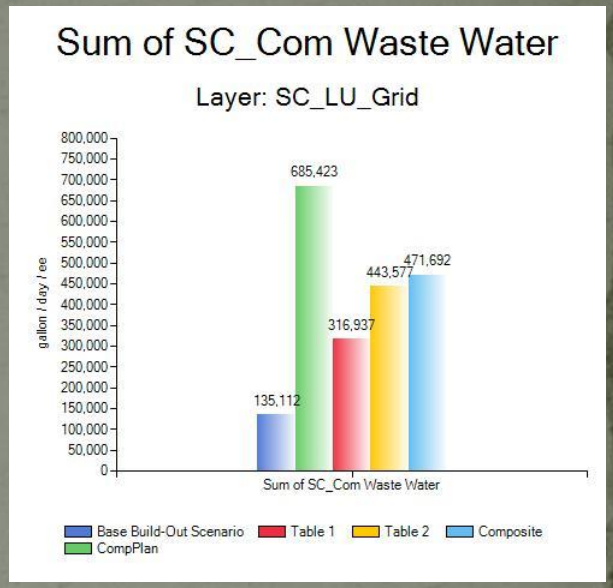
Existing Land Use and Comprehensive Plan

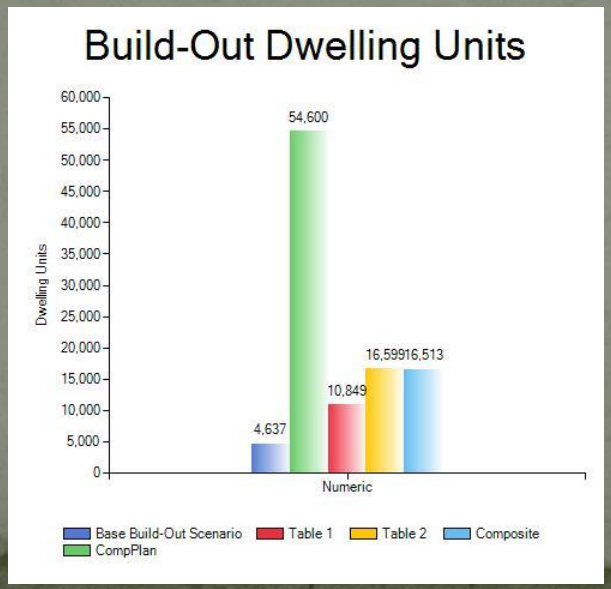


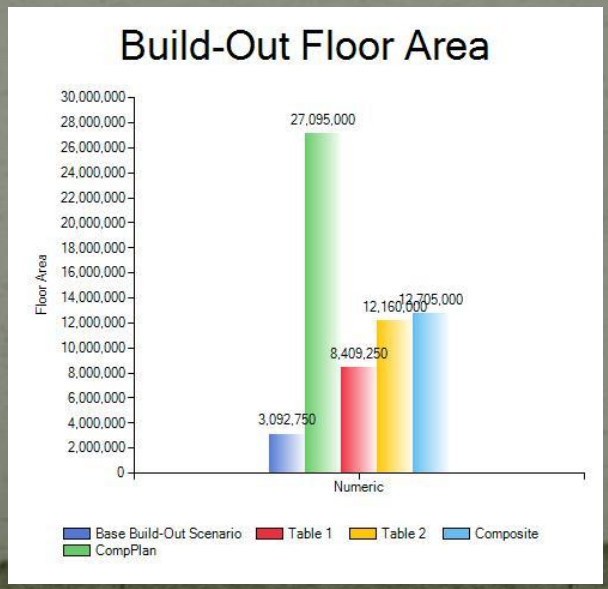
Comparing the Numbers



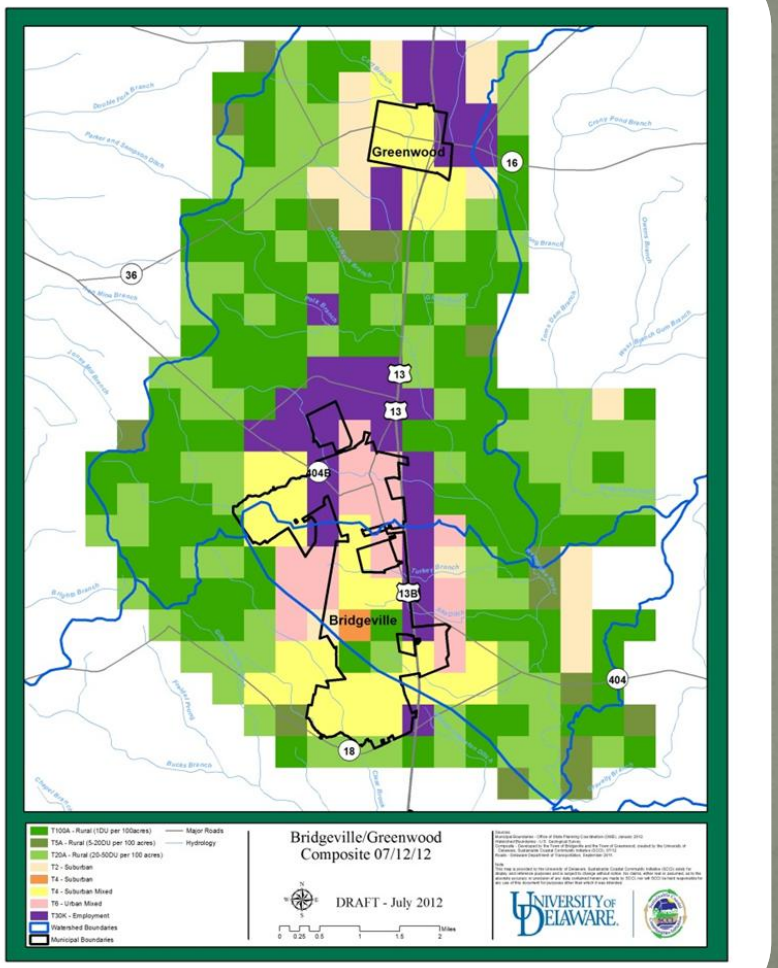


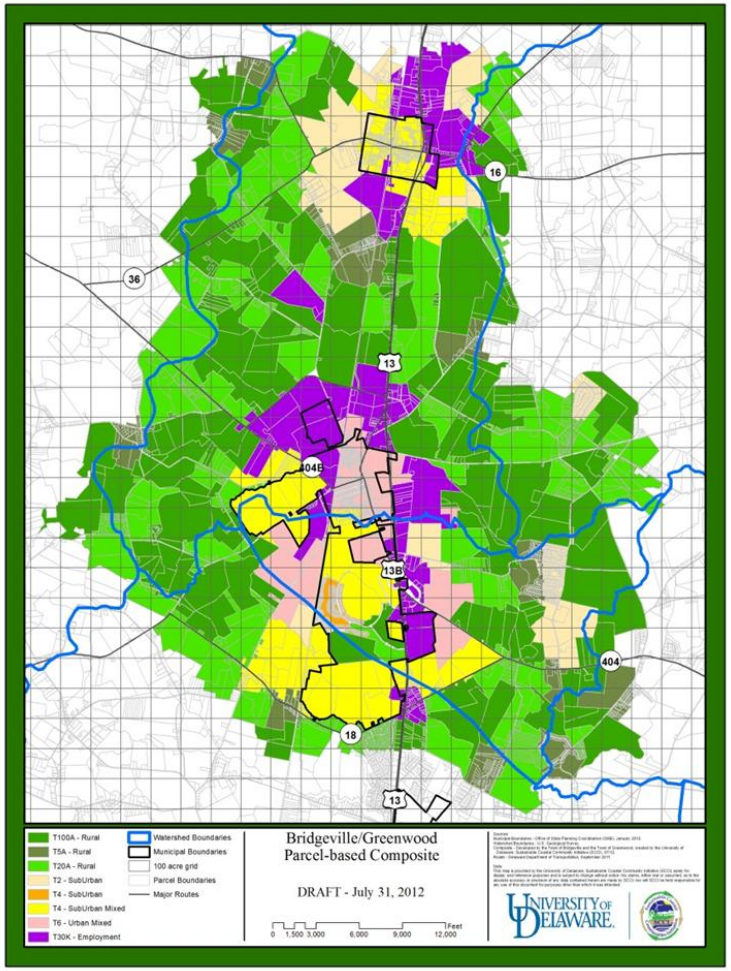






Master Plan Scenario Implemented



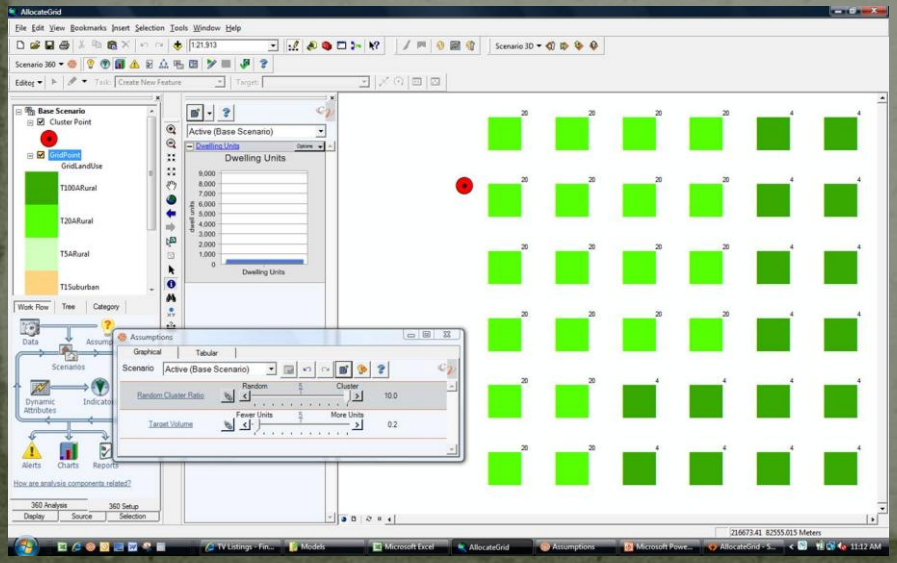


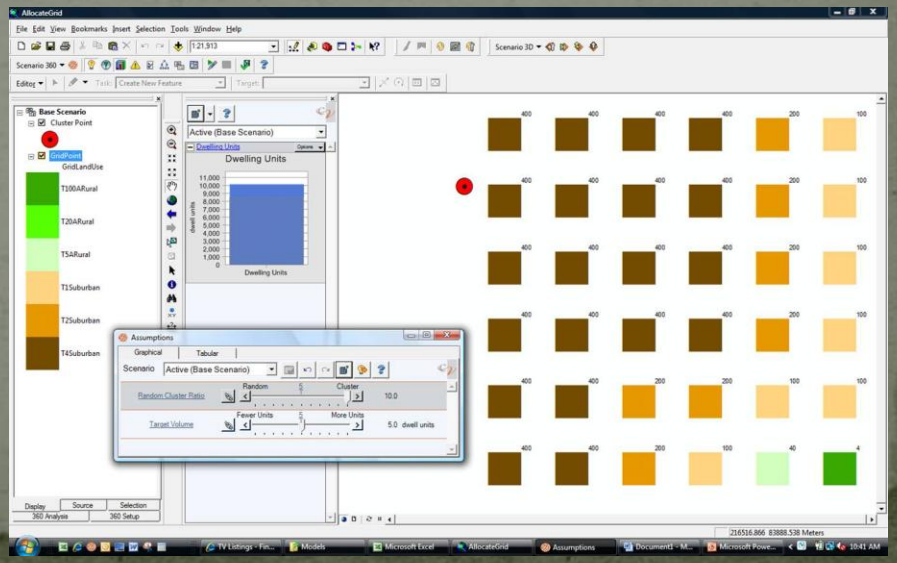
UD-SCC Community Land Use Model – Version 2

Customization & Allocation Application

- Sussex County Dwelling Units
  - Overlap Most ([Attribute: Buildable Area: Numeric Dwelling Units])
- Sussex County Residents
  - [Attribute: SC_LU_Grid:SC_NumDwellingUnits] *

[Attribute:SC_LU_Grid : LU Residents per DU]





Coming Full Circle

Some Larger Questions:

- Define Land Use Density?
- May local data such as Forests be used?
- How will Delaware's model speak with EPA's larger model?

Work still needed to be done:

- In Delaware, the need to inventory and refine data to avoid duplication and inaccuracies.
- Update key data that was used in the initial Bay Modeling efforts ?

Any questions?

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