CITY OF HAMPTON LAND COVER ANALYSIS

Using 2009 Virginia Base Mapping Aerial Imagery for Water Quality Loading Predictions and Stormwater Billing

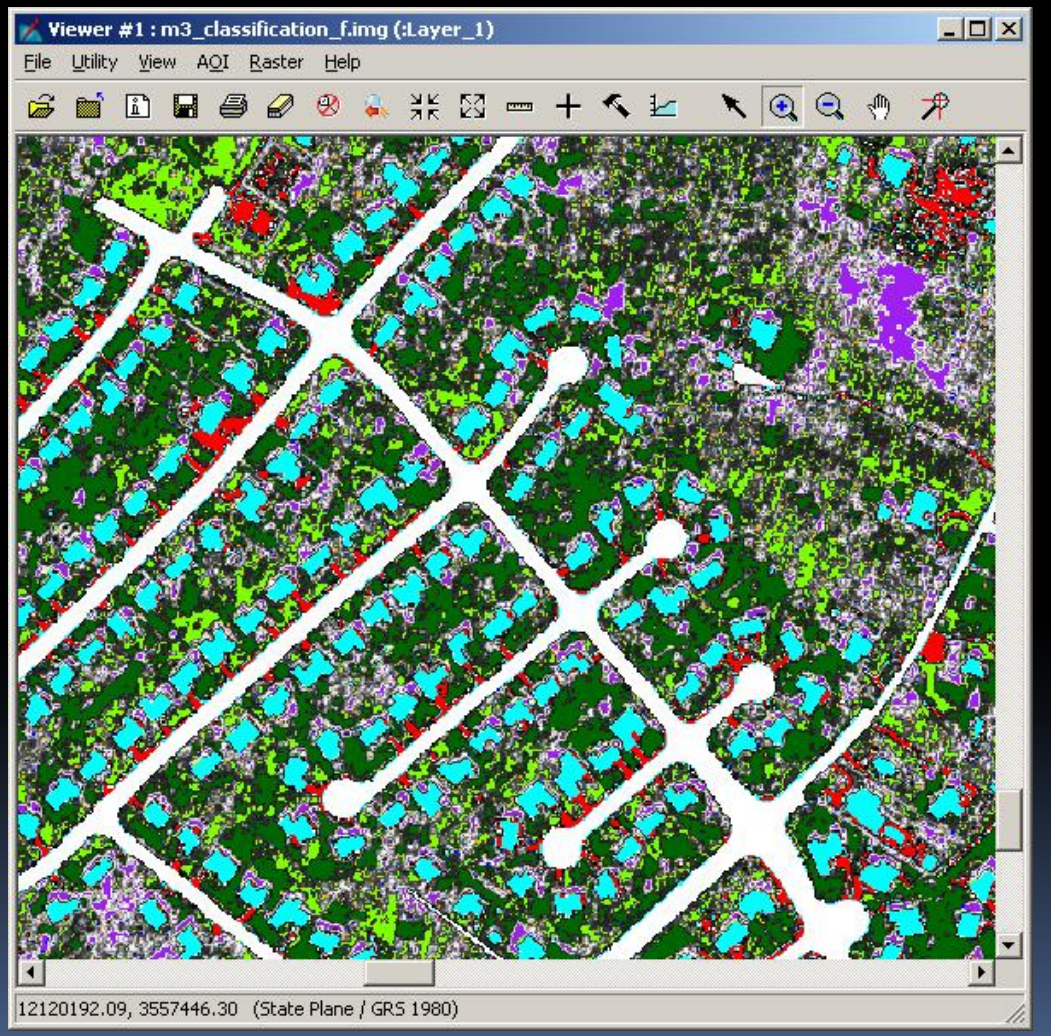
HRPDC Presentation March 4, 2011

Process Overview

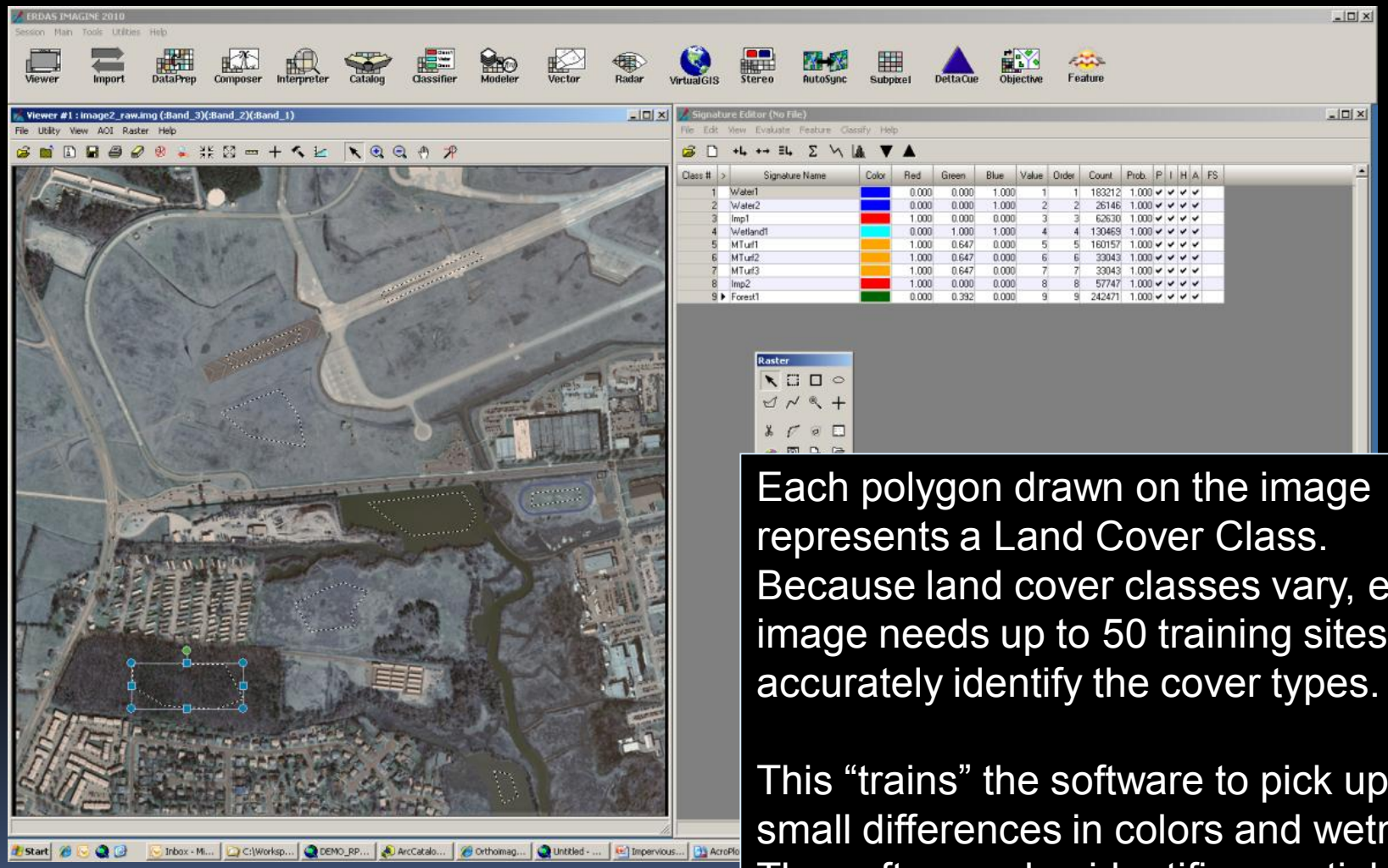
- 2009 4-Band VBMP Aerial Photography (JPEG 2000 format)
- Existing City GIS Planimetric Data
  - Pavement, Parking, Buildings
- 6 Land Cover Classes Developed
  - Impervious, forest, managed turf, water, wetlands, "other"
  - "Other" included shadows, hard packed soil, some bare soil, *Bermuda gras*s (more on this later)

Image Classification Steps

- Image Adjustment
- ERDAS Imagine
- Assigning pixels to a class (supervision)
- Correcting topology
- Combining polygons



Train the Software



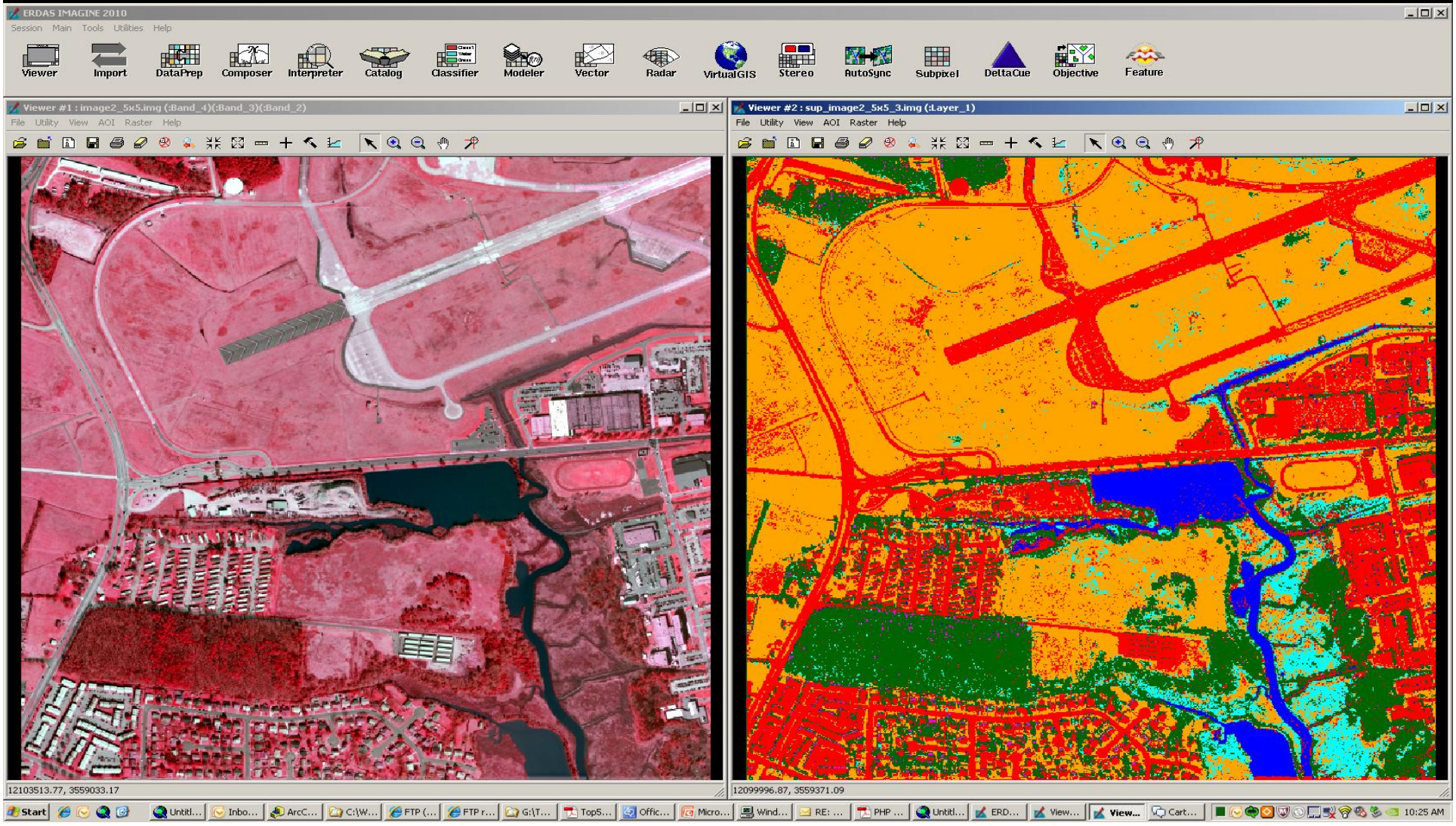
Each polygon drawn on the image represents a Land Cover Class. Because land cover classes vary, each image needs up to 50 training sites to accurately identify the cover types.

This “trains” the software to pick up small differences in colors and wetness. The software also identifies spatial patterns.

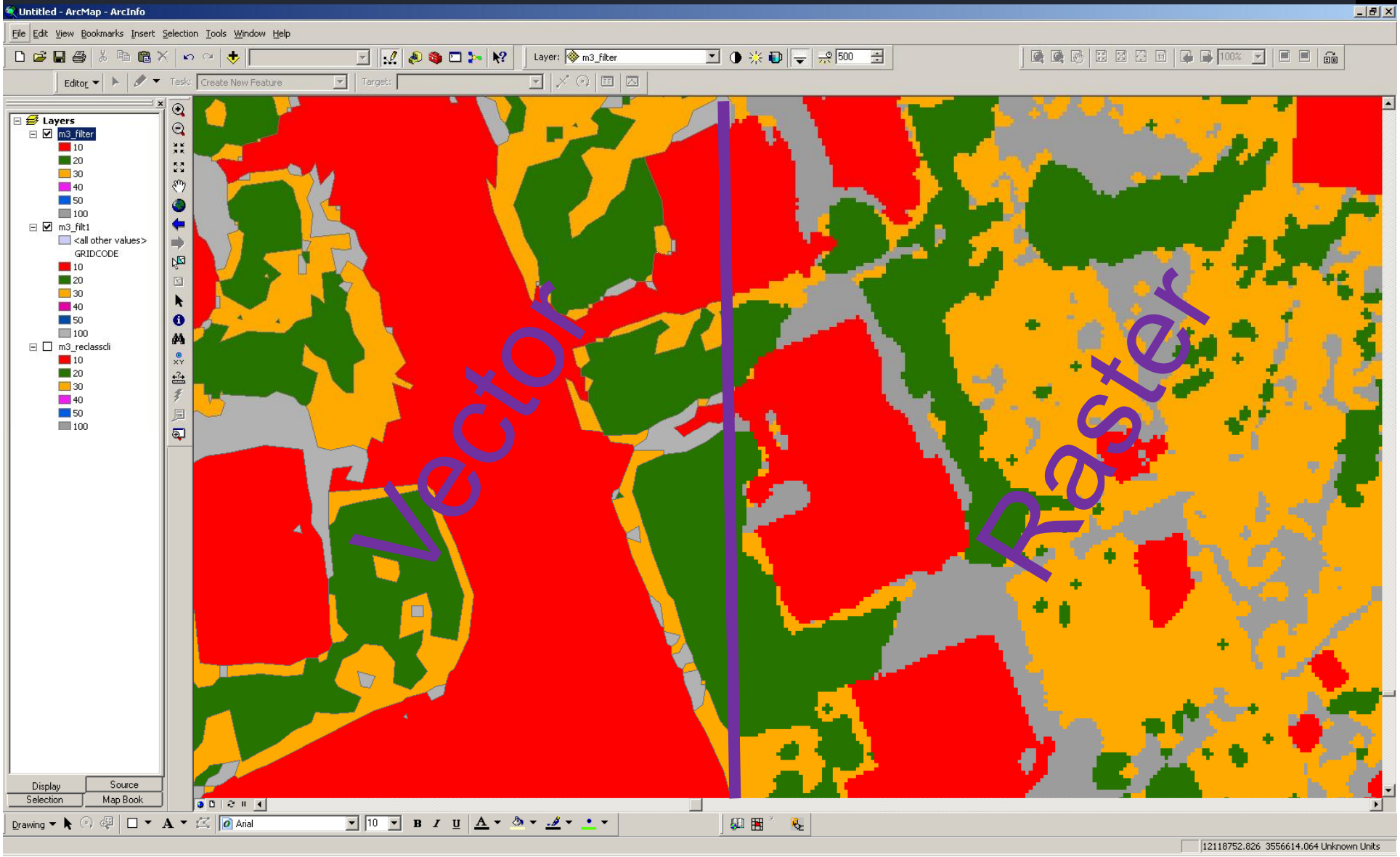
Native vs Classified Images

Native Image Format

Classified Image



Convert to Vector Polygons



Data Clean-up

- Vector polygons allow for ease of editing, also smoothes jagged edges from Image data
- Editing performed to clean up small one pixel areas known as “sliver polygons”
- Classified data are also overlaid on the original image to determine true value of “other” areas. Classification of these areas is a manual process.

We now know that…

- Hampton has approximately:
  - 10,100 acres of impervious area (31%)*
  - 7,100 acres of forested area (21%)*
  - 9,100 acres of managed turf (27%)*
  - 2,100 acres of open water (Back River, Mill Creek, Hampton River make up vast majority)
  - 1,900 acres of marshland (6%)*
  - 4,200 acres of "other" (mostly forested/managed turf) – undergoing further classification (13%)*

* Percentages do not include water area within Hampton

Limitations

- Land Cover data are only as good as the source images
- Shadows, trees over roadways, extremely wet yards, "Leaf-off" winter conditions
- Detail is good, but can be detrimental to classification process
  - 1 pixel of concrete in a grass field
  - Single tree in landscaped yard

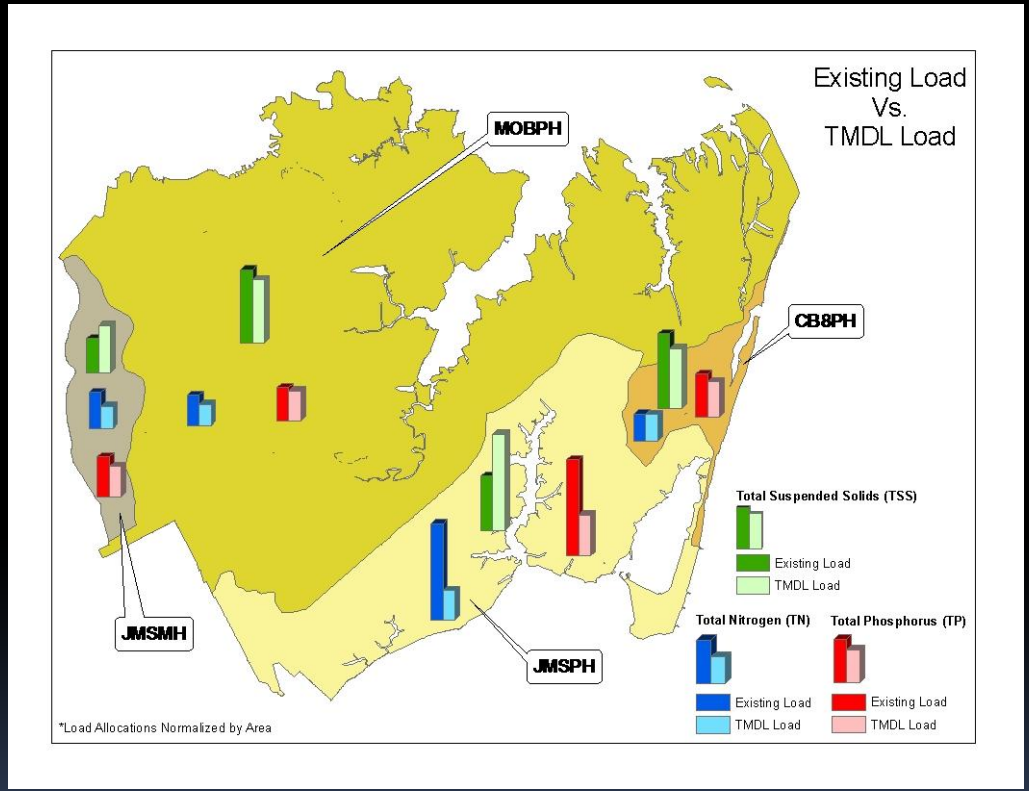
Bermuda Grass "Issue"

Dormant Bermuda grass as "Other" or "Impervious"

NEXT STEPS:

Pollutant Loading Estimation

- Using Virginia Runoff Reduction method (impervious, managed turf, forested area by watershed / sub-watershed to calculate N and P loadings)



Stormwater Billing Review

- Reviewing the calculated ERU value for each parcel in the City (>45,000) to validate the billing database.
- To date, have reviewed 60 accounts (approximately 500 parcels) and found $125,000 of uncollected revenue.

- Of the 60 accounts evaluated:
  - 32% ERU overcalculated >5%
  - 32% ERU within 5% of actual impervious
  - 36% ERU undercalculated

City of Hampton Impervious Area Determination

Kimley-Horn and Associates, Inc.

1 in = 300 ft

Hampton Training School for Nurses (Sentara)

Parcel ID	Owner	Impervious (Sq Ft)	ERU (City Supplied)	ERU (Calculated)
7001308	HAMPTON TRAINING SCHOOL NURSES	88312.40	38	36.36
7001647	HAMPTON TRAINING SCHOOL NURSES	17.07	0	0.01
7001649	HAMPTON TRAINING SCHOOL NURSES	781356.26	0	321.68
7001651	HAMPTON TRAINING SCHOOL NURSES	27463.80	0	11.31
7001705	No Data	472125.32	No Data	194.37
13000751	HAMPTON TRAINING SCHOOL NURSES	25914.03	10	10.67
TOTALS		1395188.89	48.00	574.39

Aerial Photography: 2009 VBMP
Parcel Data: City of Hampton

Author: PJC

Creation Date: Jan 11, 2011

Current ERU = 48
($2,645/yr)

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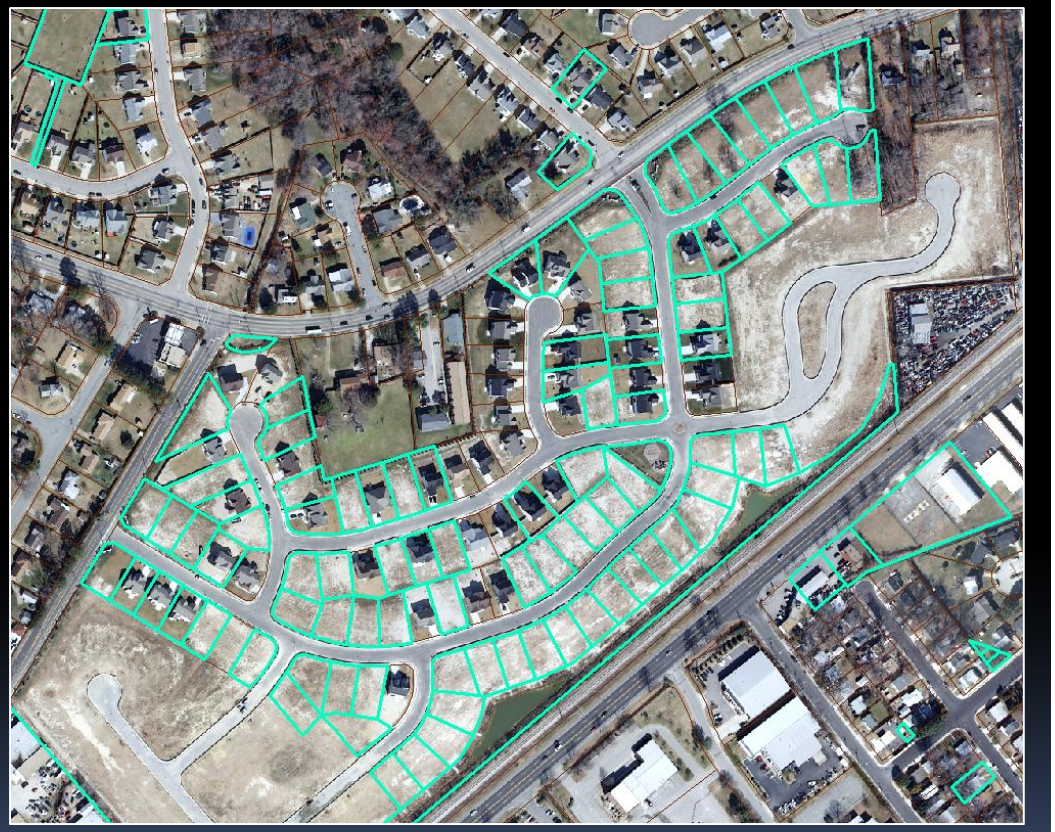
Calculated ERU = 574.39 ($31,627/yr)

Net Change = $28,982.40

Recalculation of ERU value for residential properties

- ERU to be calculated from all developed residential parcels with ≤ 4 units/acre.
- Initial study reviewed 2,200 parcels in 1996



THANK YOU!!