Overview of GIS Products for Storm Water and Drainage Applications

Daniel Ngoroi, CMS-RS, GISP

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WOOLPERT

GIS?

- Capture
- Store
- Manipulate
- Analyze
- Manage
- Present

GIS?

- Vector Data
  - Points, lines, polygons
- Raster
  - Imagery
    - Airborne (UAS), space-based or terrestrial
- 3D Data
  - 3D models, Lidar
    - Airborne, mobile or terrestrial lidar

Why?

- Inventory
  - Power of integration
- Management
  - Effective communication tool
  - Save time and money
- Analysis
  - Decision support framework

Applications?

- Remote Sensing
  - LULC
  - Soil moisture
  - Meteorological data
- DEM
  - 3D Visualization
  - Slope calculations
  - Watershed delineation
  - Sewershed delineation
  - Water distribution system modeling

Applications?

- GPS
  - Surveying
  - Fleet management
- Internet & Web Apps
  - Data integration
  - Dissemination
  - Management
- Mapping
  - Thematic mapping
  - Spatial analysis
  - Buffering

Applications?

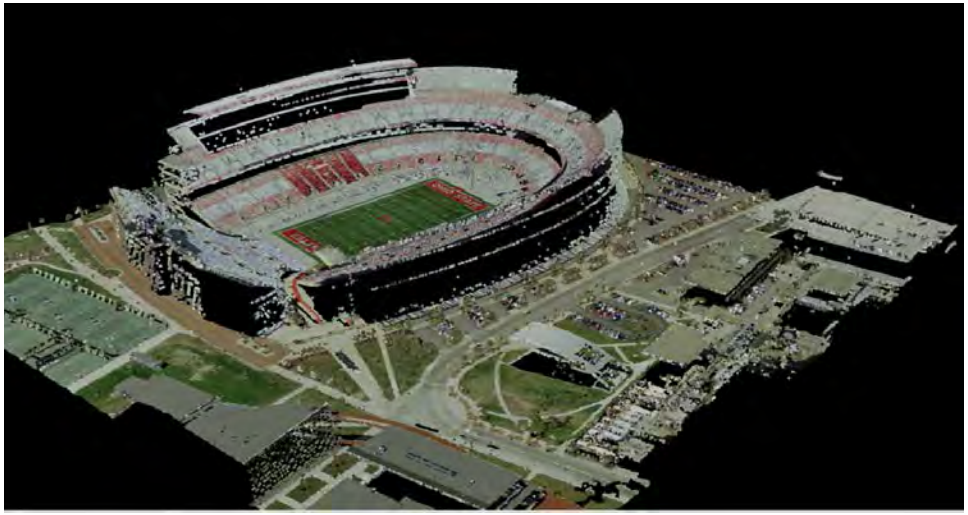
- Monitoring
  - Rainfall data
  - Flow-monitoring
  - Monitoring infrastructure
  - NPDES permitting
- Modeling
  - Runoff estimation
  - Demographic estimation
  - Land use estimation
  - Watershed modeling

Applications?

- AM/FM/GIS Applications
  - Automated mapping
  - Facilities management
- Maintenance
- Security planning & vulnerability assessment

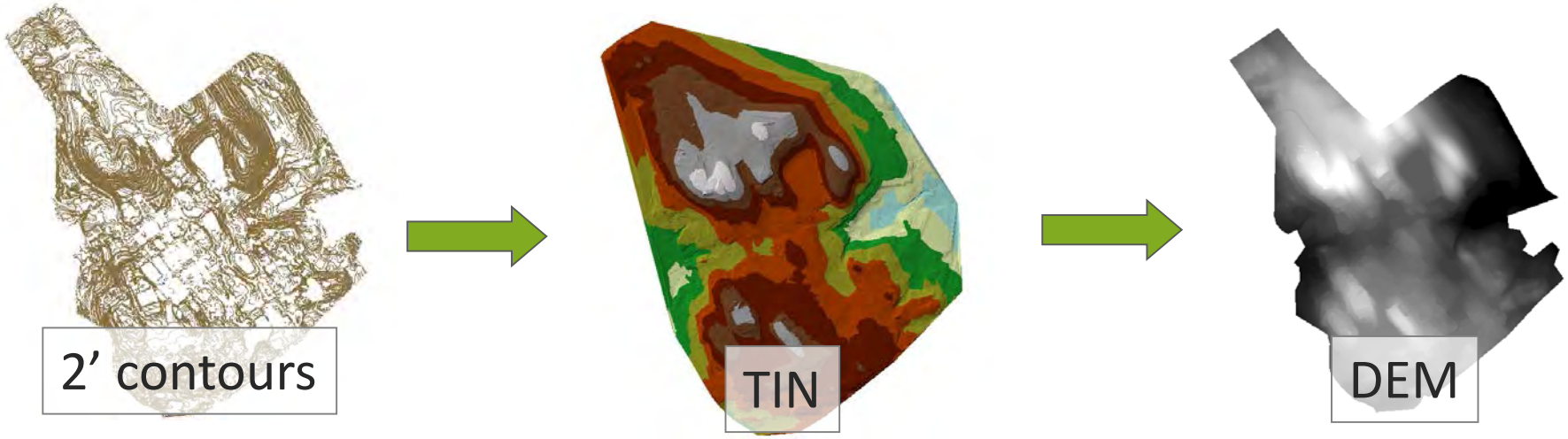
Analysis

- Lidar

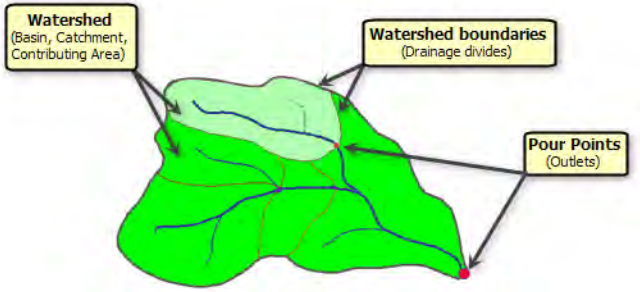


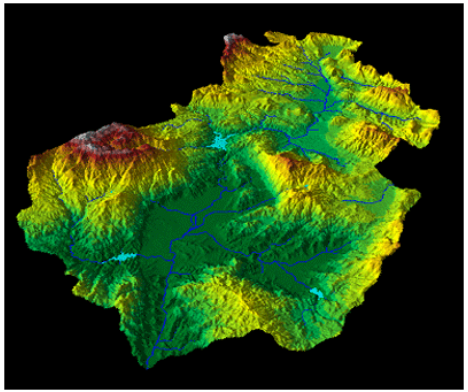
Analysis - Topography

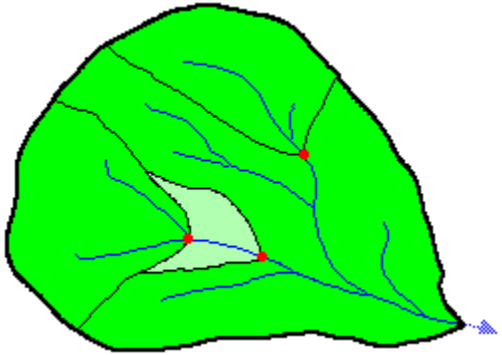
- Lidar product used to model topography
  - DEM
  - Contours

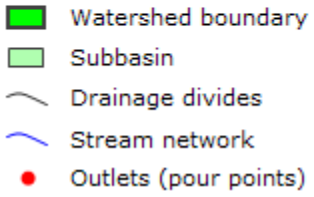


Understanding Drainage Systems





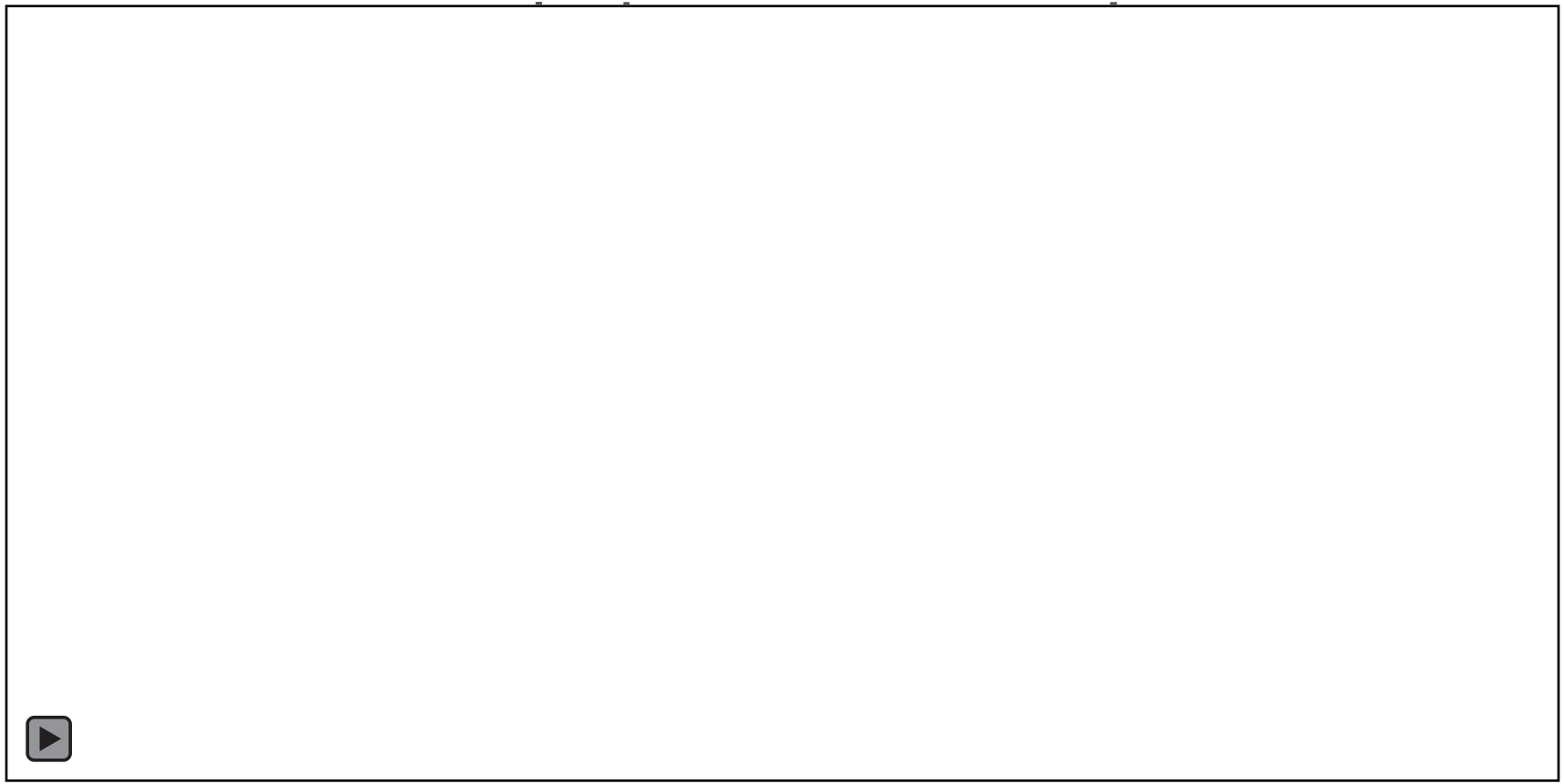




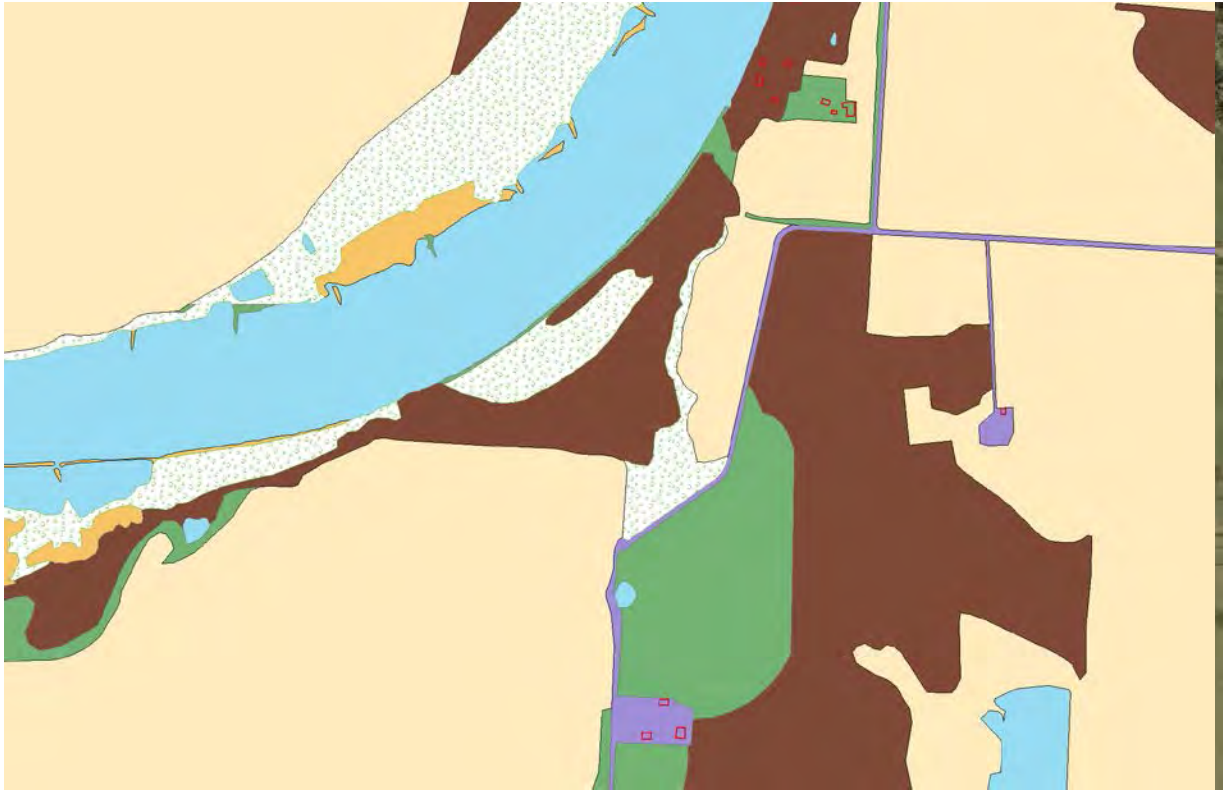
Analysis - Topography

- Drainage system simulation

Analysis - Topography



Land Use / Land Cover



Analysis – Impervious Surfaces

- Impervious surfaces
  - roads
  - buildings
  - parking lots
  - sidewalks
  - other paved surfaces

Analysis – Impervious Surfaces

- Billing
- Maintenance of storm water utilities
- TMDL calculations

Analysis – Impervious Surfaces

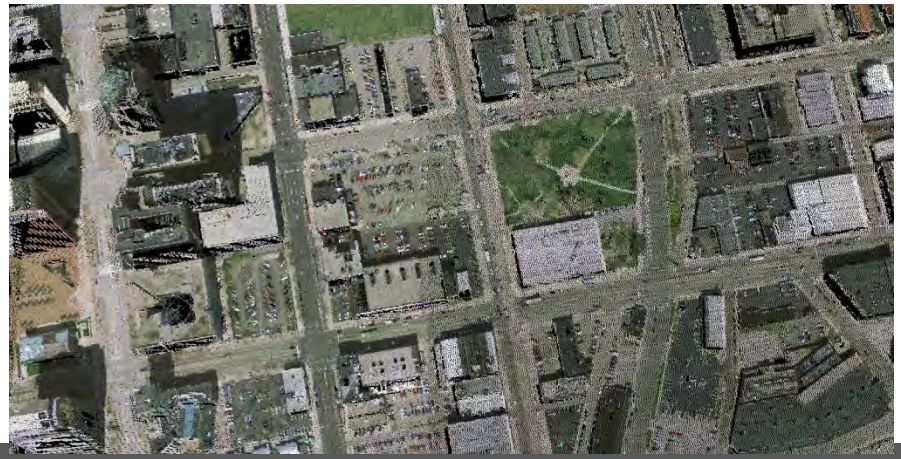
- Traditional mapping methods
  - Photogrammetric techniques (3D capture)
  - Heads-up digitizing (2D capture)

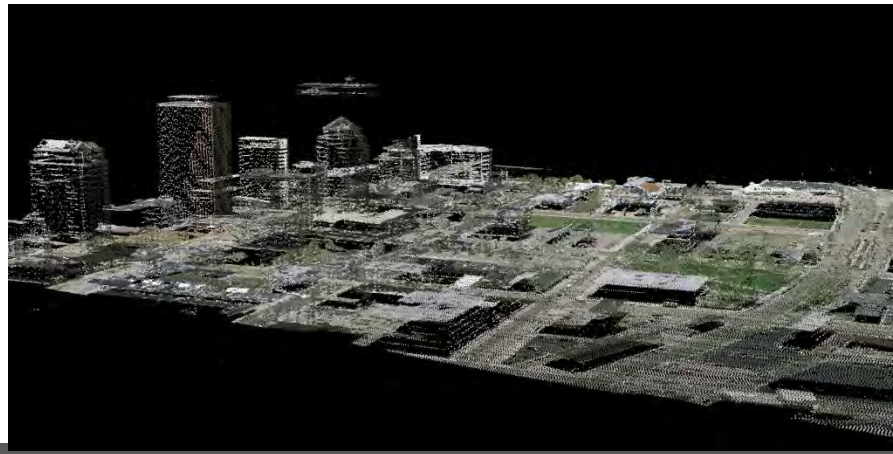
Analysis – Impervious Surfaces

- In Ohio
  - OSIP Imagery

Analysis – Impervious Surfaces

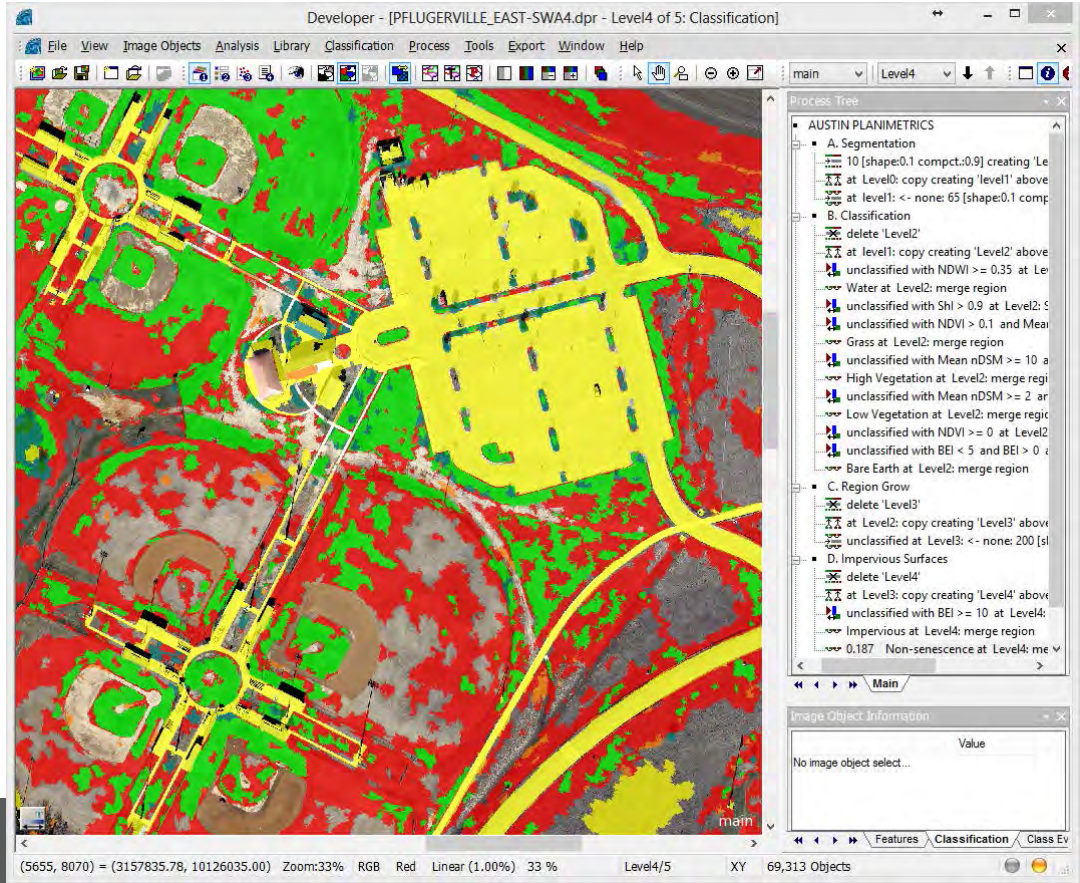
- In Ohio
  - OSIP Lidar



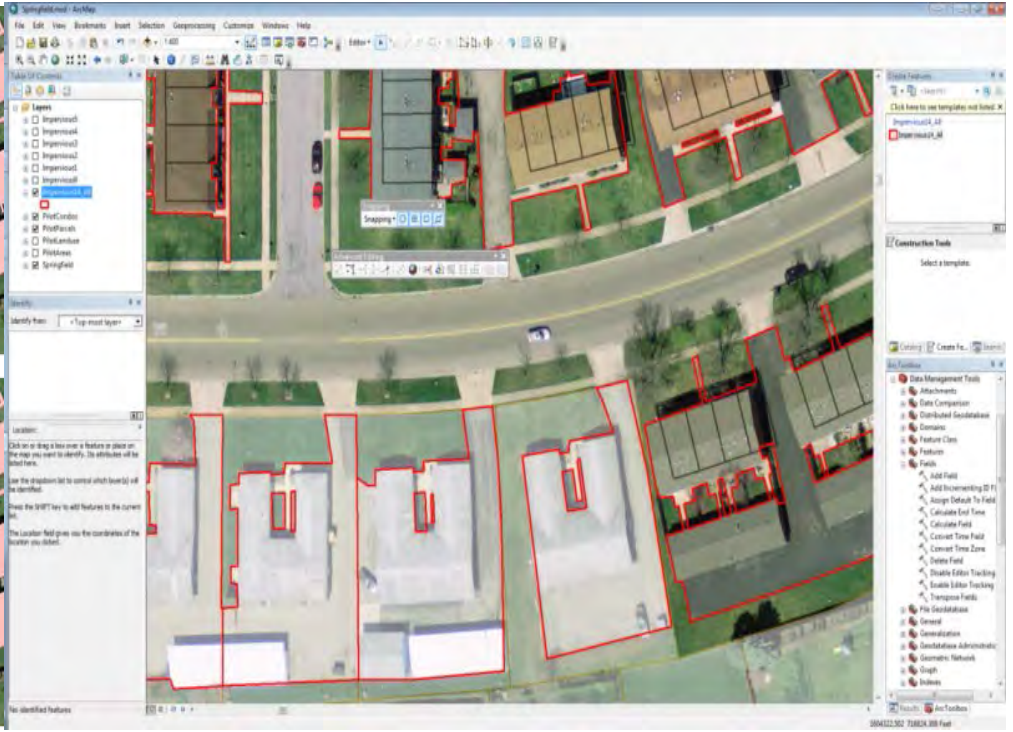


Analysis – Impervious Surfaces

- Mapping



Analysis – Impervious Surfaces



Analysis – Impervious Surfaces

Analysis – Impervious Surfaces

- Parcel cleanup
- Parcel-impervious polygons intersection

Analysis – Impervious Surfaces

- Parcel area: 38,286 sq. ft.

Parcel_Tag	Parcel	Estimate Sq. Ft.	Percent
1103883	4030369	Common Property	
1103906	4037334	3029	18%
1103908	4037335	3939	24%
1103909	4037336	3697	22%
1103911	4037337	3228	19%
1103912	4037338	2719	16%
		16612	100%

Analysis – Impervious Surfaces

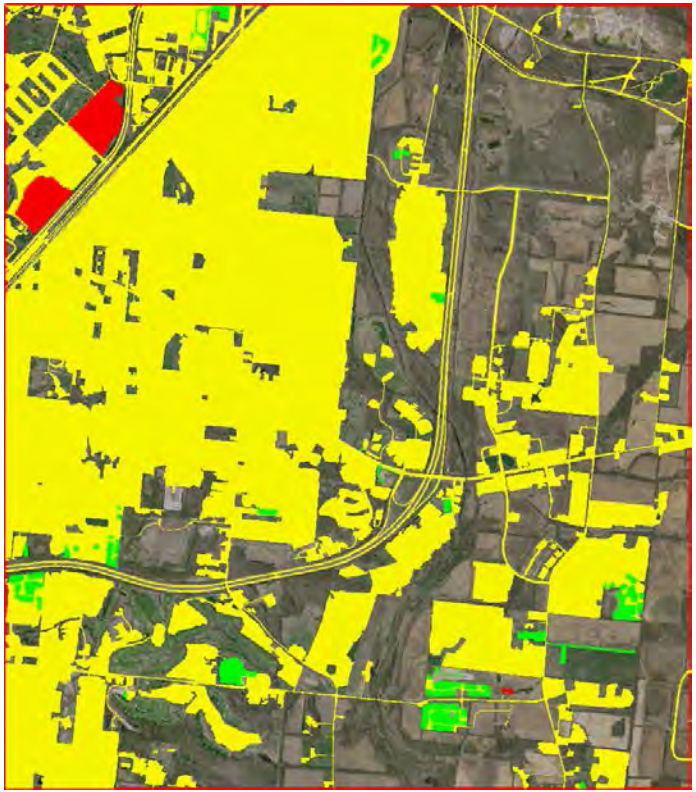
- Impervious area calculation

Common Property	Building	Total Impervious Area
10,575.34 sq. ft.	6,281.28 sq. ft.	16,856.62 sq. ft.

- Breakdown of impervious area by parcel

Parcel_Tag	Parcel	Percent	Impervious Area Sq. Ft.
1103906	4037334	18%	3,073.60
1103908	4037335	24%	3,997.00
1103909	4037336	22%	3,751.44
1103911	4037337	19%	3,275.53
1103912	4037338	16%	2,759.04
Total Impervious Area (Sq. Ft.)			16,856.62

Analysis – Change Detection



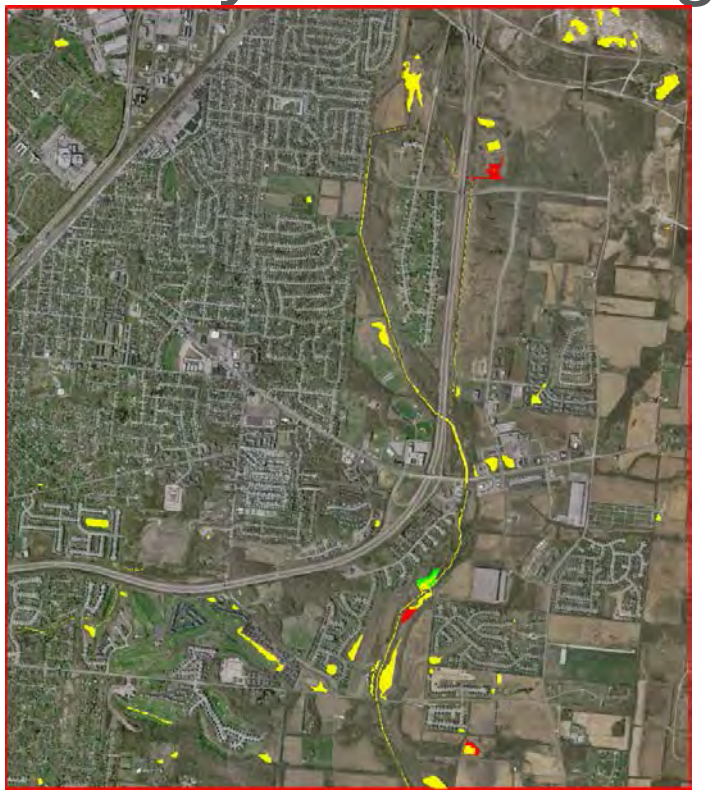
Developed Change

Percent

- -100.000000
- -99.999999 - -80.000000
- -79.999999 - -60.000000
- -59.999999 - -40.000000
- -39.999999 - -20.000000
- -19.999999 - 0.000000
- 0.000001 - 20.000000
- 20.000001 - 40.000000
- 40.000001 - 60.000000
- 60.000001 - 80.000000
- 80.000001 - 100.000000

* positive denotes increase
* negative denotes decrease

Analysis – Change Detection



Aquatic Change
Percent

- -100.000000
- -99.999999 - -80.000000
- -79.999999 - -60.000000
- -59.999999 - -40.000000
- -39.999999 - -20.000000
- -19.999999 - 0.000000
- 0.000001 - 20.000000
- 20.000001 - 40.000000
- 40.000001 - 60.000000
- 60.000001 - 80.000000
- 80.000001 - 100.000000

* positive denotes increase
* negative denotes decrease

Analysis – Change Detection

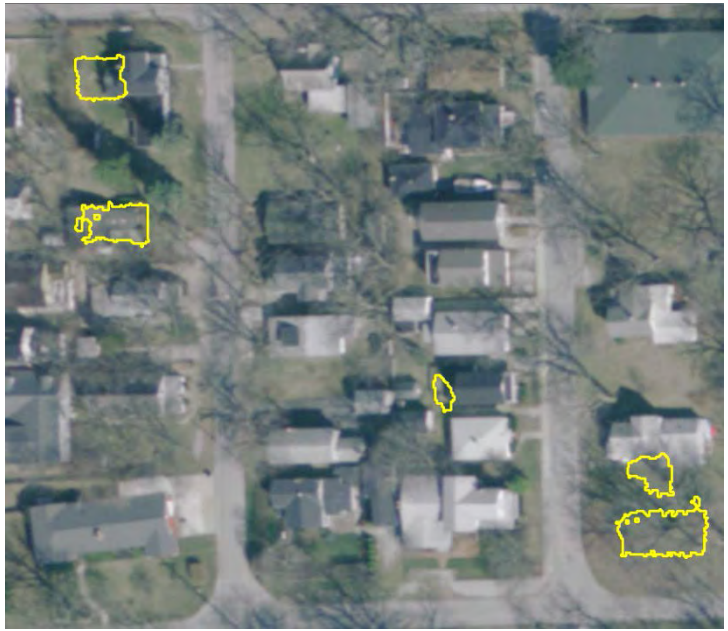
Category	Area (2008) ft^2	Area (2011) ft^2	Percent Change	Change ft^2	Change mi^2
Aquatic	3,826,177.99	3,665,593.56	-4.38%	-160,584.43	-0.0058
Developed	161,573,515.55	162,740,288.79	0.72%	1166773.24	0.0419
Mining	2,262,813.83	2,265,737.30	0.13%	2923.47	0.0001
Woodland	64,452,883.03	66,842,256.96	3.57%	2389373.93	0.0857
Open Area	117,884,611.89	114,485,876.44	-2.97%	-3398735.45	-0.1219

Analysis – Change Detection

2006

2011

Analysis – Change Detection



2006

2011

Analysis – Change Detection

Summary

- GIS products can find use in:
  - Inventory
  - Management
  - Analysis

Question & Comments