GIS for Water, Wastewater and MS4 Mapping

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Objectives

- Define GIS and the components of GIS
- Understand the benefits of GIS
- Identify different options for GIS data creation and collection
- Identify how to acquire GIS software and training
- Understand the basics for creating a water, wastewater and MS4 inventory in GIS

Geography

What is Geography?

<u>Merriam-Webster</u>

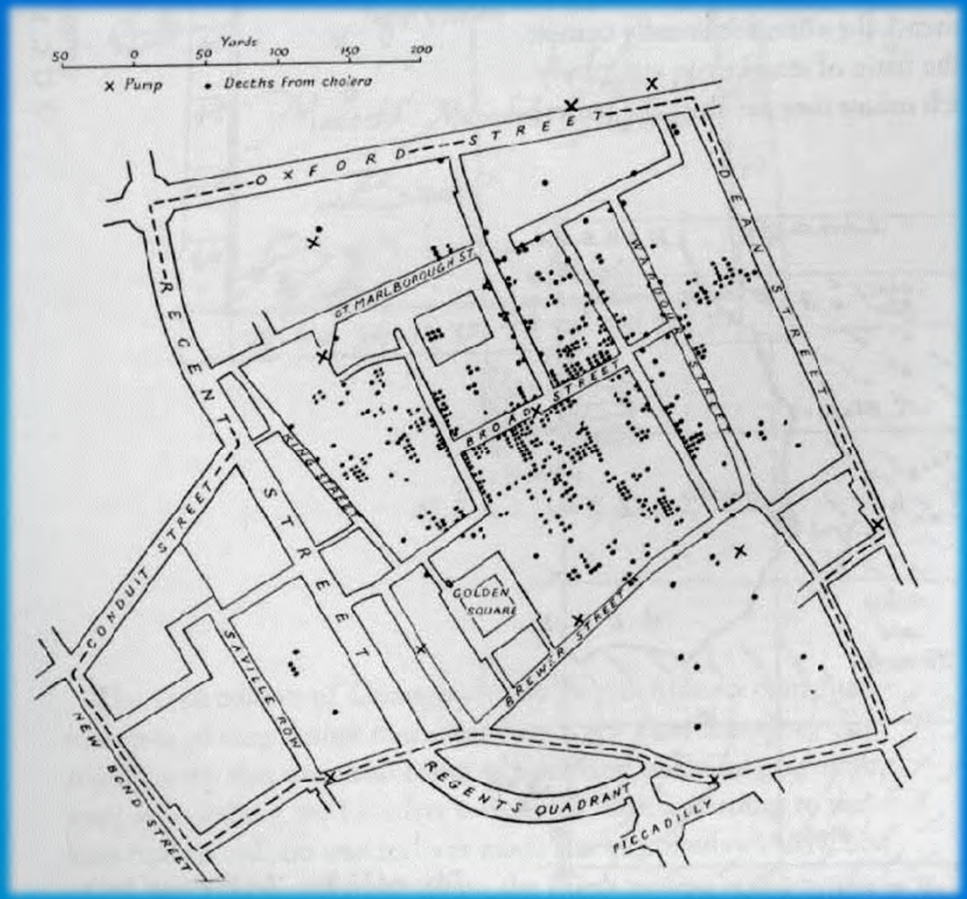
"A science that deals with the description, distribution, and interaction of the diverse physical, biological and cultural features of the earth's surface"

<u>Association of American Geographers (AAG)</u>

"The science of place and space"

Geography, Mapping, Analysis

Linking Information to reveal patterns:



Map Source: esri.com

Geography, Mapping, Analysis

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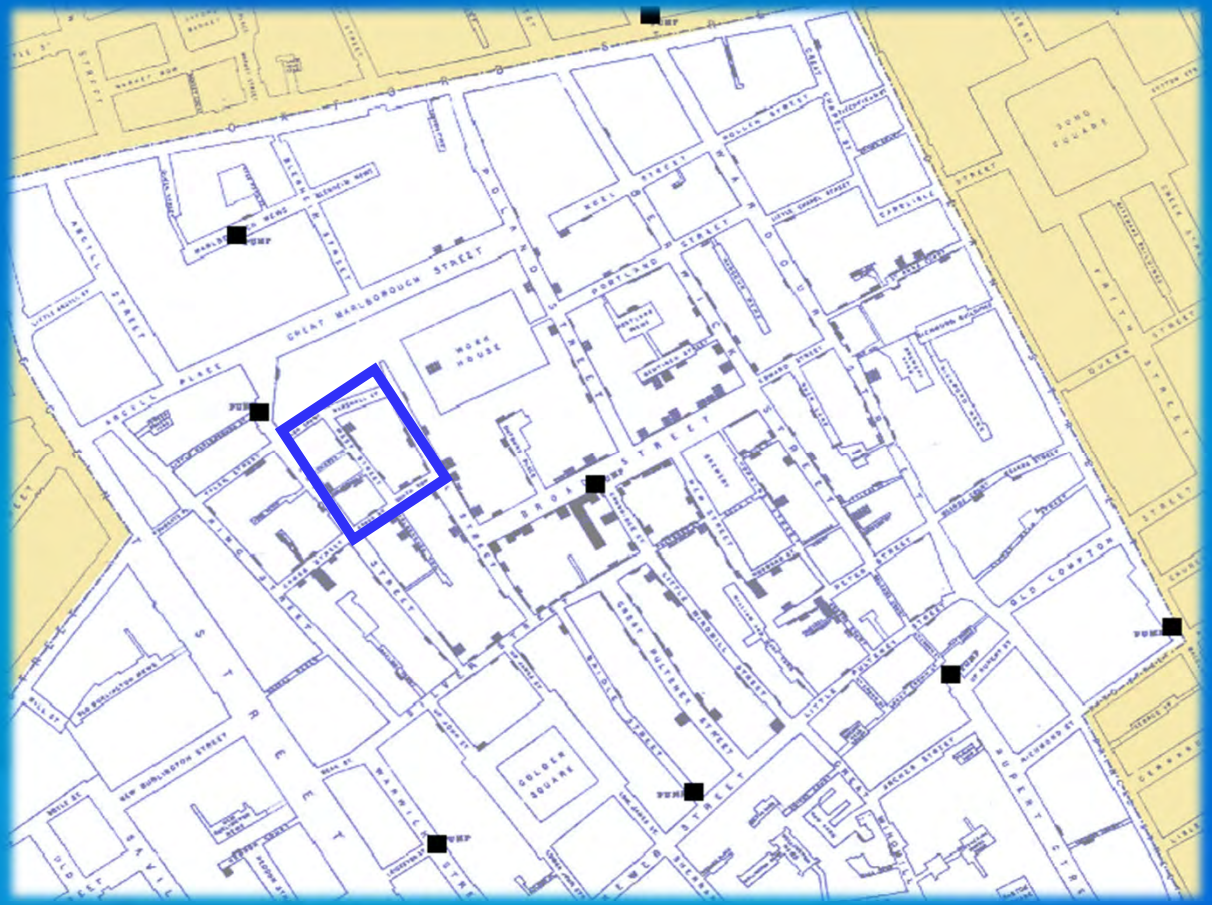

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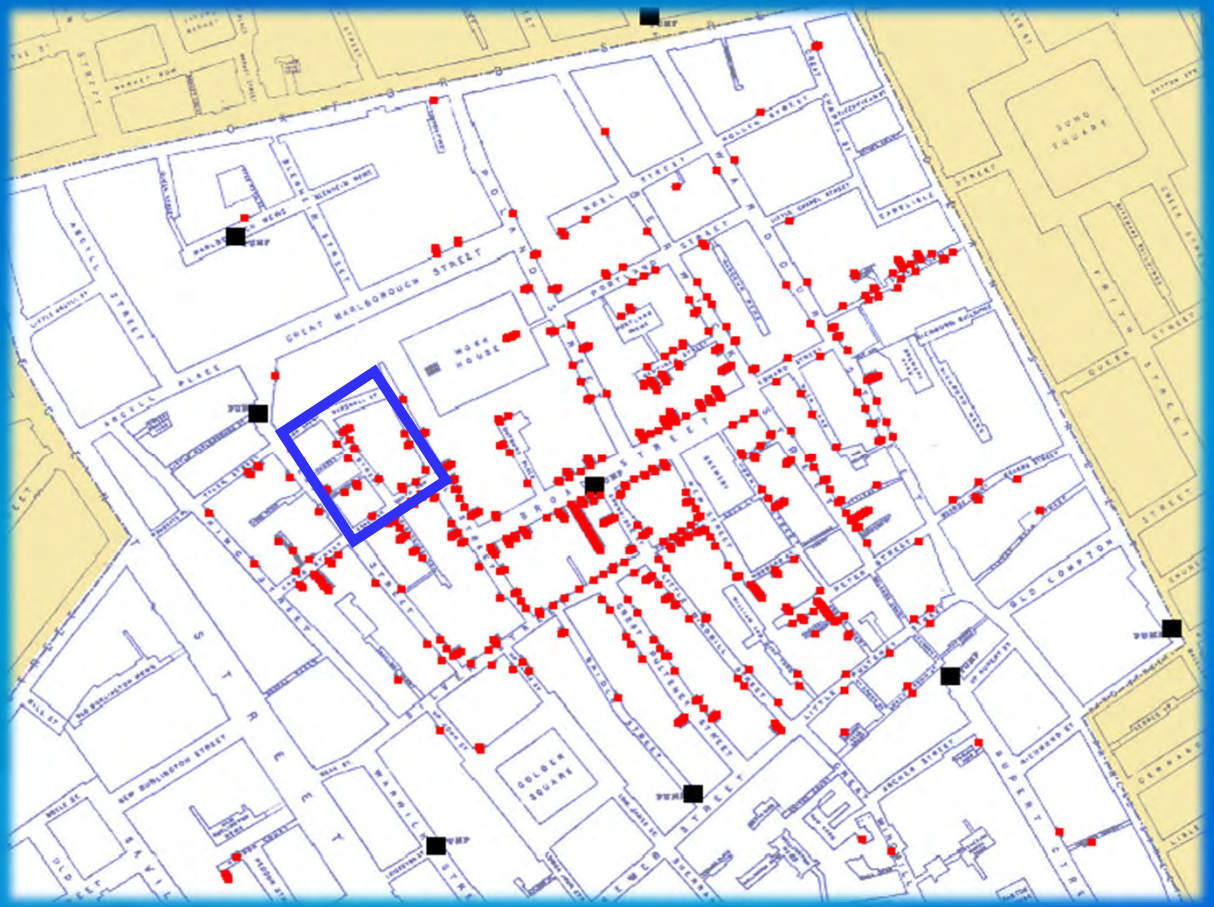

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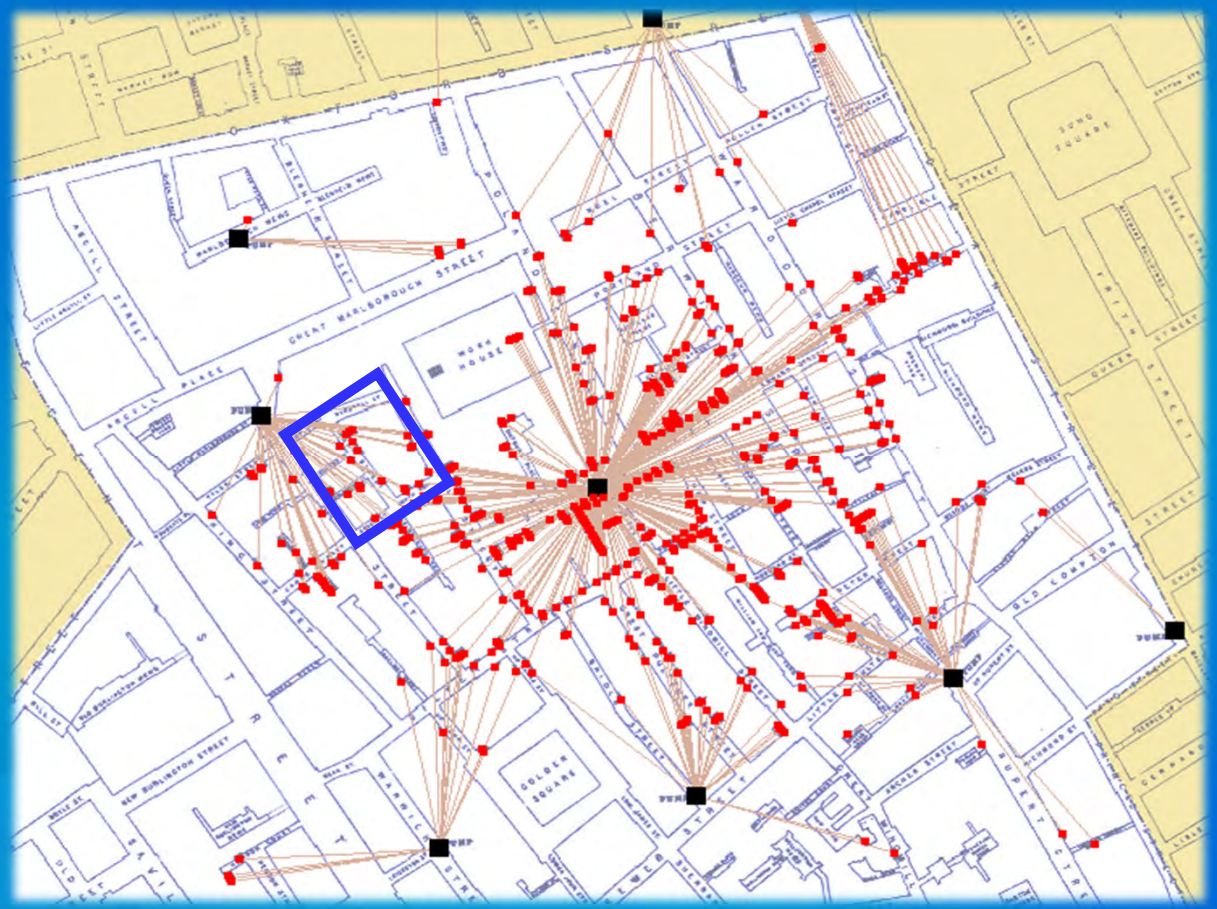


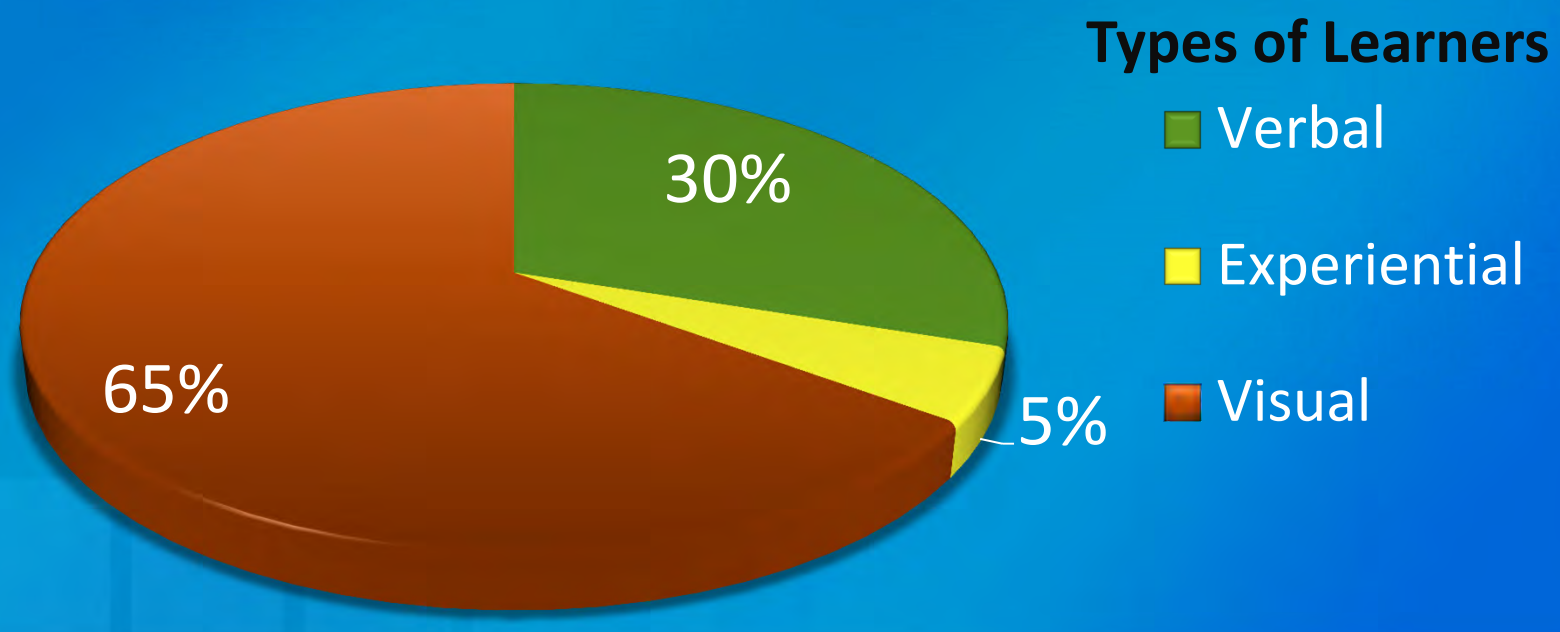
Map Source: esri.com

What is Spatial Data?

- Location, shapes and sizes of data
  - How? What? Where?
- Scale of data
  - Local to Global
- Data presentation of spatial data
  - Words, charts, tables, maps

What is GIS?

A Geographic Information System (GIS) links spatial data and attribute information together which enables an individual to visualize patterns, relationships, and trends.



Source: Social Science Research Network

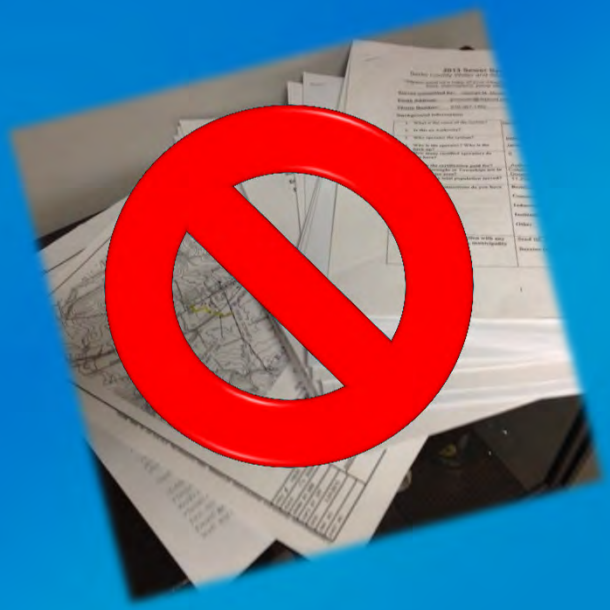
Components of GIS

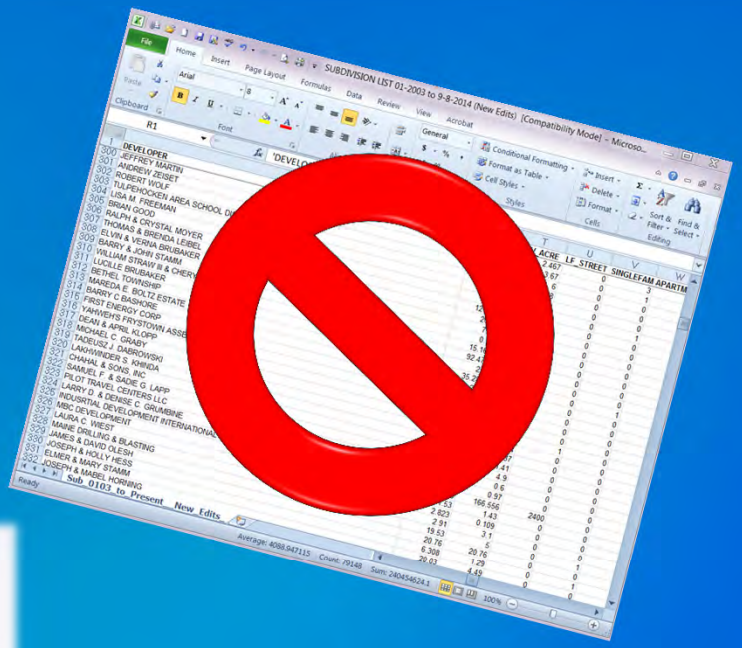
1. Hardware
2. Software
3. Data
4. Methods
5. People

esri.com

Benefits of GIS

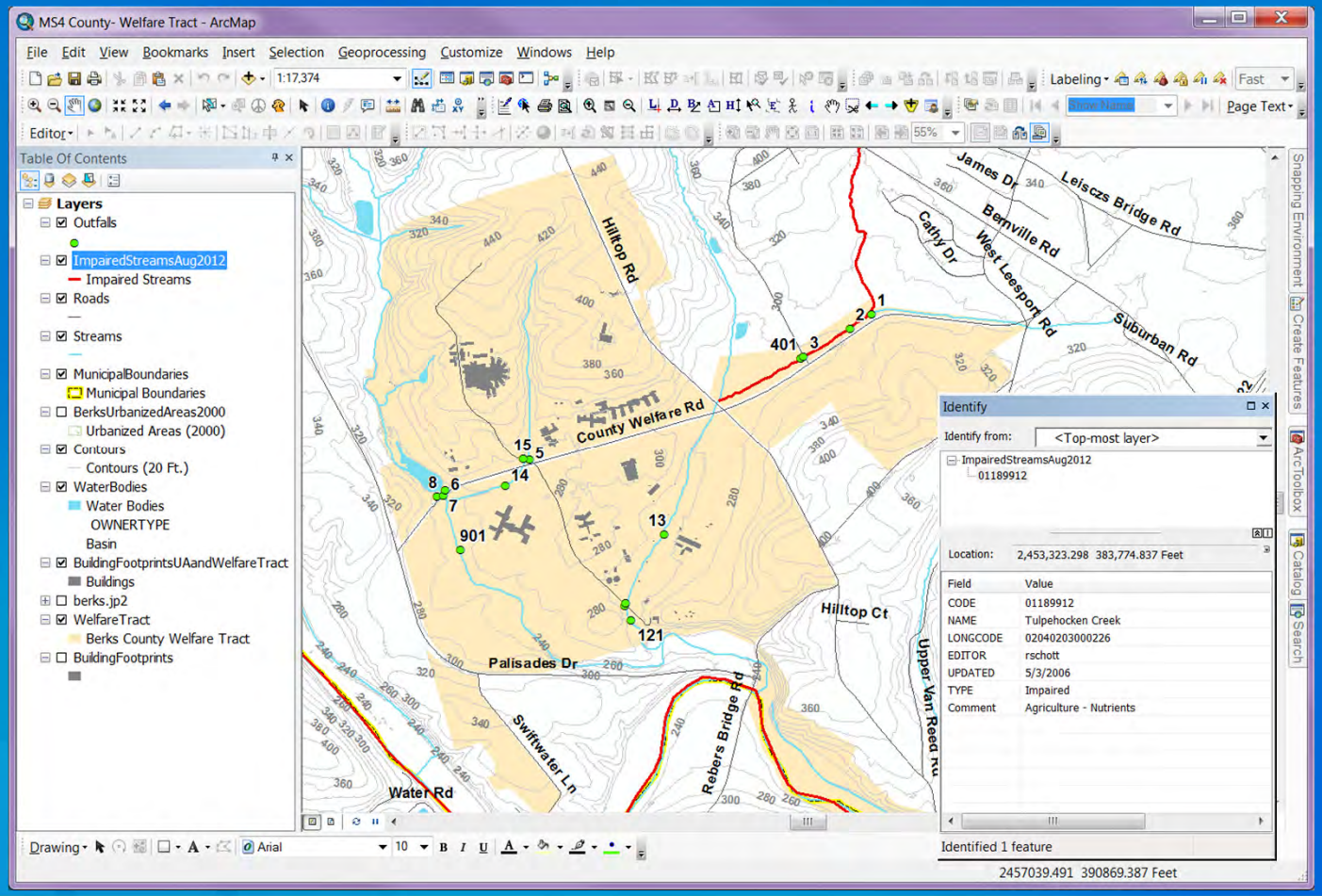
- Easy to interpret





Benefits of GIS

- More than just a pretty map



Benefits of GIS

- Efficient
  - Saves money!
- Easy to manage data
  - Automate a process
  - Update data with a click of a button
- Helps users make more informed decisions
  - Quick queries
  - Ability to layer data
- Operating your own GIS puts <u>YOU</u> in control

Where to find GIS Data

- Databases
  - Excel, Access, Surveys
- Online
  - County Government, PASDA, PADEP, U.S. Census Bureau, USDA NRCS, DCNR
- Digital and paper maps
  - Words, charts, tables, aerial imagery

Collecting GIS Data

- Mobile Devices
  - GPS, smart phones, tablets
- Heads-up digitizing
  - Plans, imagery
- GIS interns
  - HUGE money-saver

GIS Software

- Open Source GIS
  - Quantum GIS (QGIS), Geographic Resources Analysis Support System (GRASS), Open Source Software Image Map (OSSIM), gvSIG
- Proprietary GIS
  - GeoMedia by Hexagon Geospatial
  - ArcGIS by ESRI

Basic

Standard

Advanced

ArcGIS for Desktop

ArcGIS for Desktop Basic	ArcGIS for Desktop Standard	ArcGIS for Desktop Advanced
(includes ArcGIS Online)	(includes ArcGIS Online)	(includes ArcGIS Online)
Single License: $1,500	Single License: $7,000	Price varies depending on your organization; call 1-800-447-9778
Visit Store →	Concurrent License: $7,000	
Concurrent License: $3,500	Call 1-800-447-9778	

www.esri.com/products

- Possible grant opportunities
  - www.esri.com/grants

Pricing as of October 6, 2016

Source: www.esri.com/software

ArcGIS for Desktop Specs

- Certified for Windows Operating Systems
- Apple computer running Windows OS
  - Must use BootCamp, Parallels or VMWare
- Computer hardware requirements must be taken into consideration

ArcGIS Training

Photo: theresidualentrepreneur.com

- Online
  - www.esri.com/training
- Instructor-Led
  - www.esri.com/training
- Other
  - Seminars, Webinars, MOOCs, Videos, Lessons, Books, Technical Certification via ESRI

Creating an Inventory- MS4

- A previous MS4 Workshop held by PADEP indicated that mapping is an essential foundation for many requirements in the permit

- PADEP also indicated that mapping was an area that needed improvement

Source: PADEP

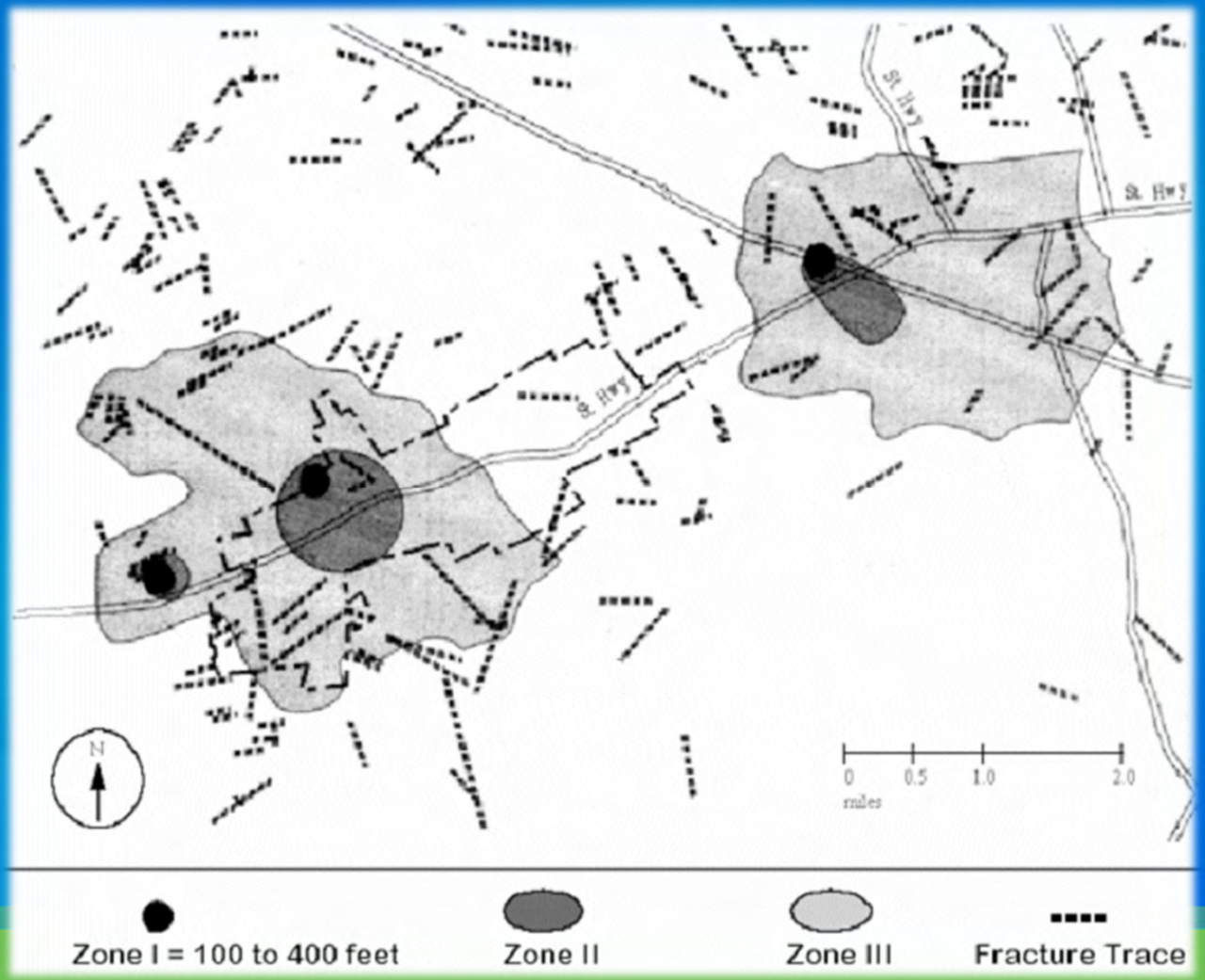
GIS Data for MS4

- Basins
- Inlets
- Piping
- Swales
- Catch Basins
- Channels
- Outfalls
- Zoning ✓
- NWI ✓
- Roads ✓
- Watershed Boundaries ✓
- Municipal Boundaries ✓
- Land Use ✓
- Urbanized Areas ✓
- Community Facilities ✓
- Streams ✓
- Water Bodies ✓
- Impaired Waters ✓
- Water Service Area ✓
- Hydric Soils ✓

GIS Mapping for MS4

Creating an Inventory- Water

- Wellhead Protection Program



Map Source: PADEP

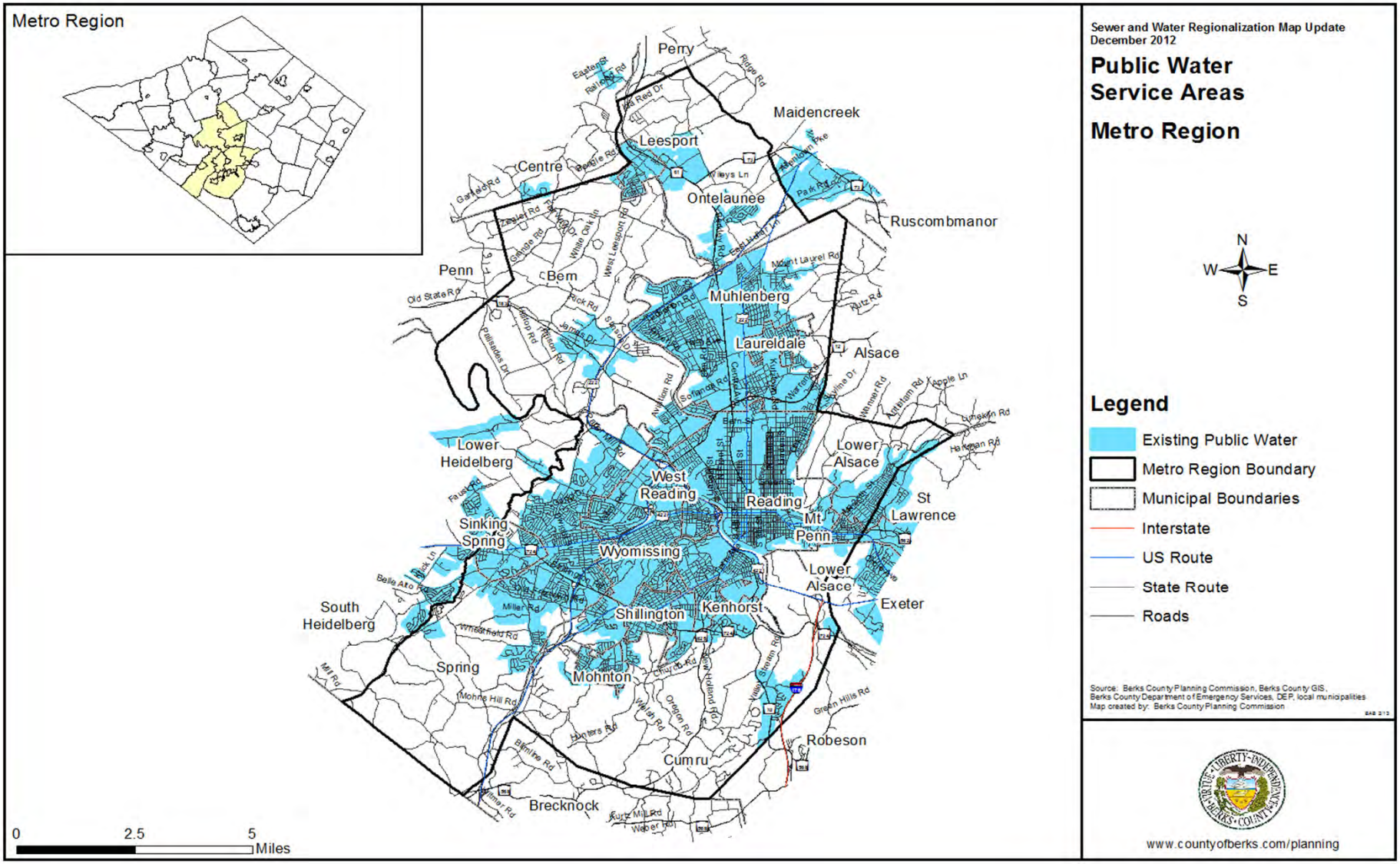
Creating an Inventory- Water

- PaWARN
  - Mapping all water resources in case of a natural or human-caused emergency
- Water Reports
  - Monitoring sites

GIS Data for Water

- Water Storage ✓
- Wellheads
- Pumping Stations ✓
- Water Plants ✓
- Water Service Areas ✓
- Water Lines ✓
- Water Treatment Plants ✓
- Municipal Boundaries ✓
- Tax Parcels ✓
- Streams ✓
- Water Bodies ✓
- Floodplain ✓
- NWI ✓

GIS Mapping for Water



Creating an Inventory- Wastewater

- Act 537 Plans
  - Mapping future developments, land use, on-lot system study area
- Chapter 94 Report
  - Digitize tables in GIS

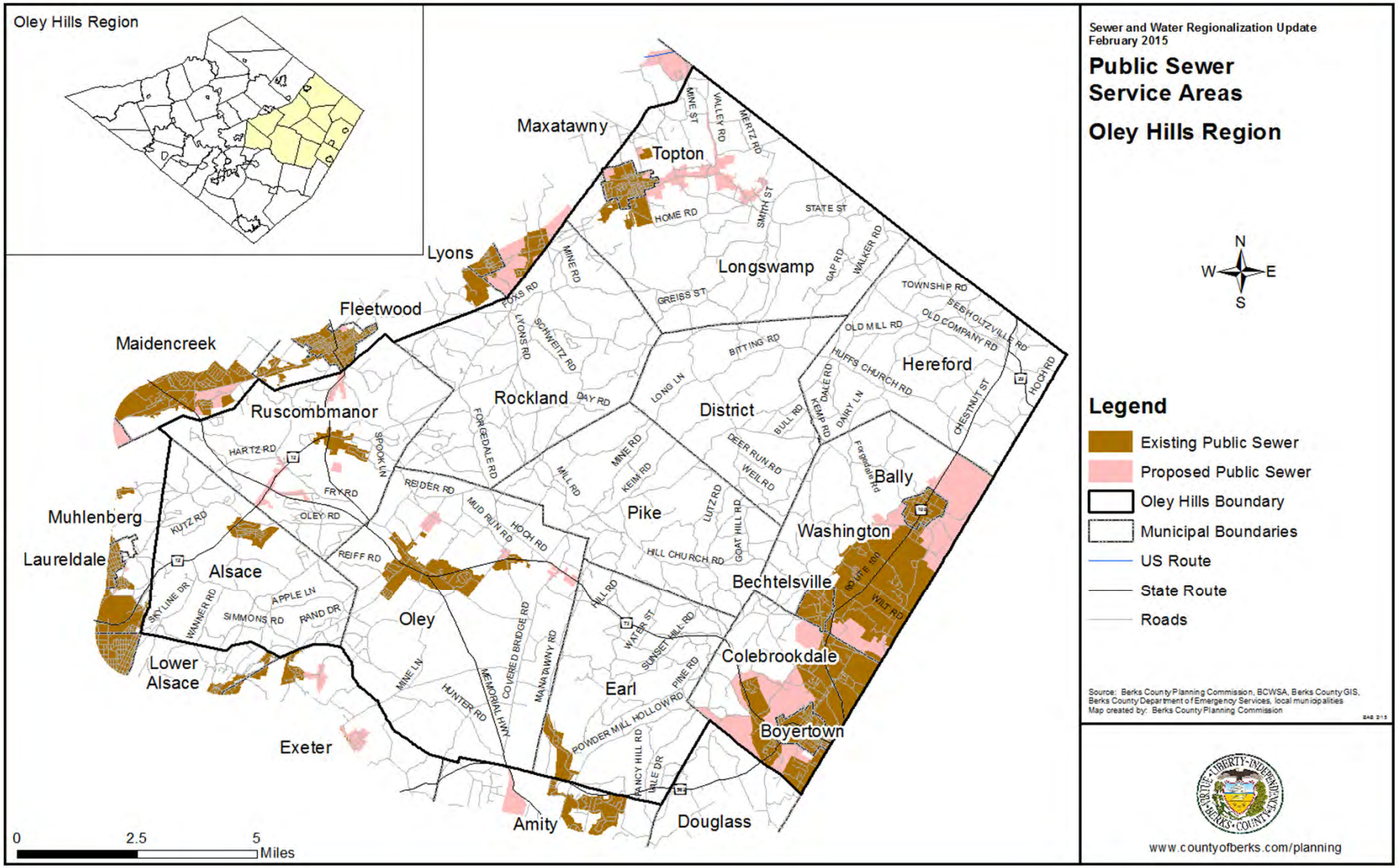
Collection System As-Built Summary

DS MH	US MH	Main Size (in) /Type	Length (C to C - ft)	Number of Laterals	Street
38	39	8" SDR 35	241	0	Easement
38	38A	8" SDR 35	264	0	Easement
38A	18	8" SDR 35	291	0	Row/Bricker Rd.
39	40	8" SDR 35	232	3	Easement
40	41	8" SDR 35	284	0	Easement
41	42	8" SDR 35	322	0	Easement
42	43	8" SDR 35	305	0	Easement
43	44	8" SDR 35	212	0	Easement
44	45	8" SDR 35	169	0	Easement
45	46	8" SDR 35	273	0	Easement
46	59	8" SDR 35	209	3	Twp. Road Lion Lane
46	47	8" SDR 35	202	1	Easement
47	48	8" SDR 35	35	1	Easement
48	49	8" SDR 35	251	1	Easement
49	50	8" SDR 35	223	1	Easement/Twp. Rd./Borough Rd. (East Ave.)
50	51	8" SDR 35/C-900	398	9	East Ave.
51	60	8" SDR 35	262	3	Cleveland Ave.
51	52	8" SDR 35	198	2	East Ave.
52	53	8" SDR 35	136	1	East Ave./Main St.
53	54	8" SDR 35	208	1	Oak St.
54	55	8" SDR 35	191	1	Oak St.
55	56	8" SDR 35	246	1	Oak St./Talbert
56	57	8" SDR 35	310	3	Talbert Rd.
57	58	8" SDR 35	201	3	Talbert Rd.
56	65	8" SDR 35	111	3	Talbert Rd.
55	64	SDR 35/C900	266	3	Washington St.
54	61	8" SDR 35	127	1	Borough Alley
61	62	8" SDR 35	340	10	Alley/Dietrich Ave.
62	63	8" SDR 35	130	3	Dietrich Ave.
18	20	8" SDR 35	334	2	Bricker Rd. /Walnut St.
20	21	SDR 35/C900	396	3	Walnut St.
21	22	8" SDR 35	142	0	Walnut St.
22	23	SDR 35/C900	126	1	Walnut St.
23	24	SDR 35/C900	39	1	Walnut St.
23	25	C900/8" SDR 35	120	2	Borough Alley

GIS Data for Wastewater

- Wastewater Service Areas ✓
- Pumping Stations ✓
- Wastewater Lines ✓
- Force Main
- Land Preservation Easements ✓
- Soils ✓
- WWTP ✓
- Municipal Boundaries ✓
- Tax Parcels ✓
- Streams ✓
- Water Bodies ✓
- Floodplain ✓
- NWI ✓

GIS Mapping for Wastewater



New Geospatial Tool

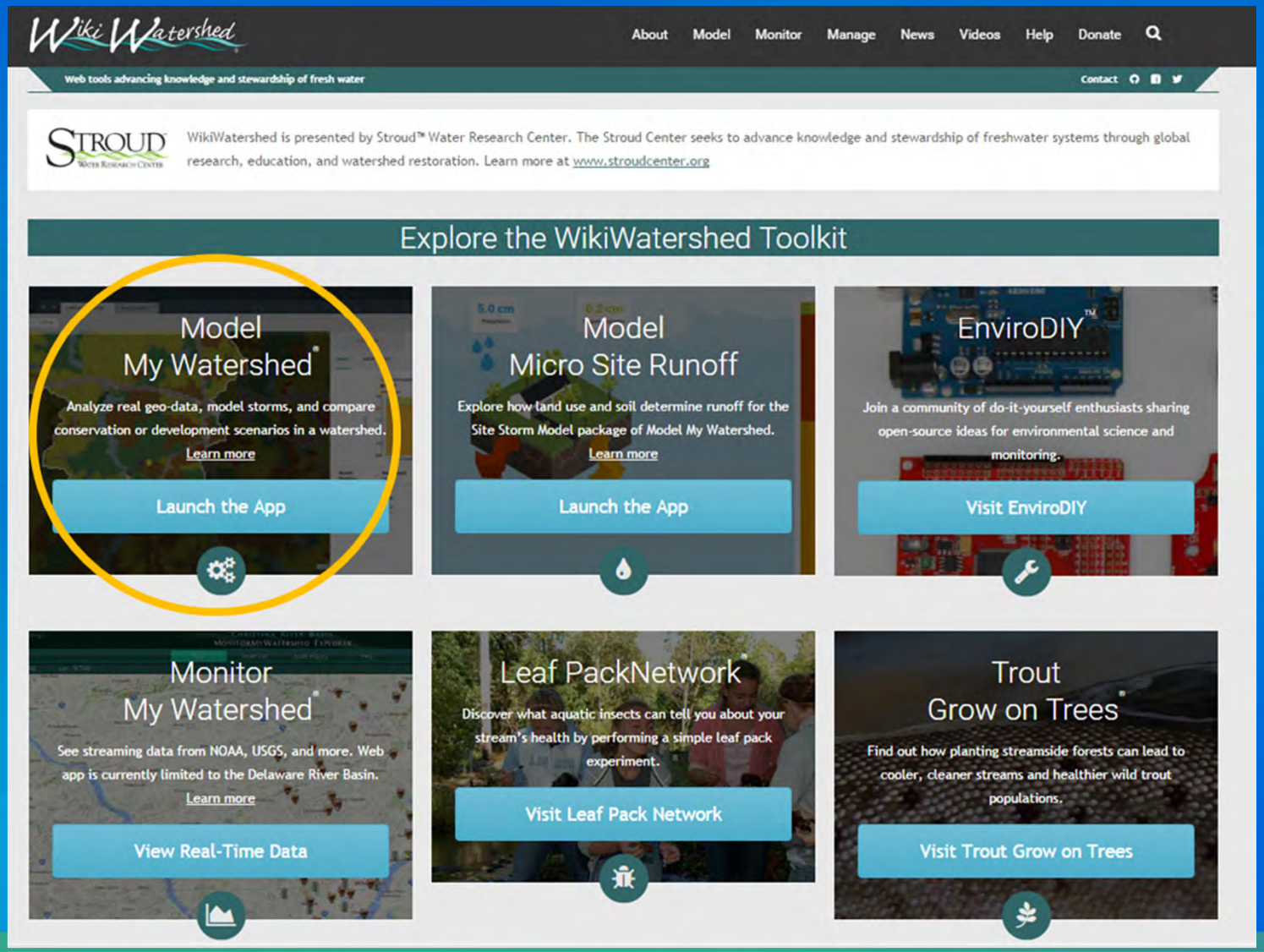
- Web toolkit created by Stroud™ Water Research Center for enhancing knowledge and stewardship of fresh water

- Toolkit offers:
  - Rapid visualization of watershed data
  - Advanced geospatial analysis capabilities
  - Science-based predictions of human impacts on stormwater runoff and water quality

www.wikiwatershed.org

Source: PADEP, Stroud™ Water Research Center

New Geospatial Tool



Source: PADEP, Stroud™ Water Research Center

www.wikiwatershed.org

Contact Information

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