



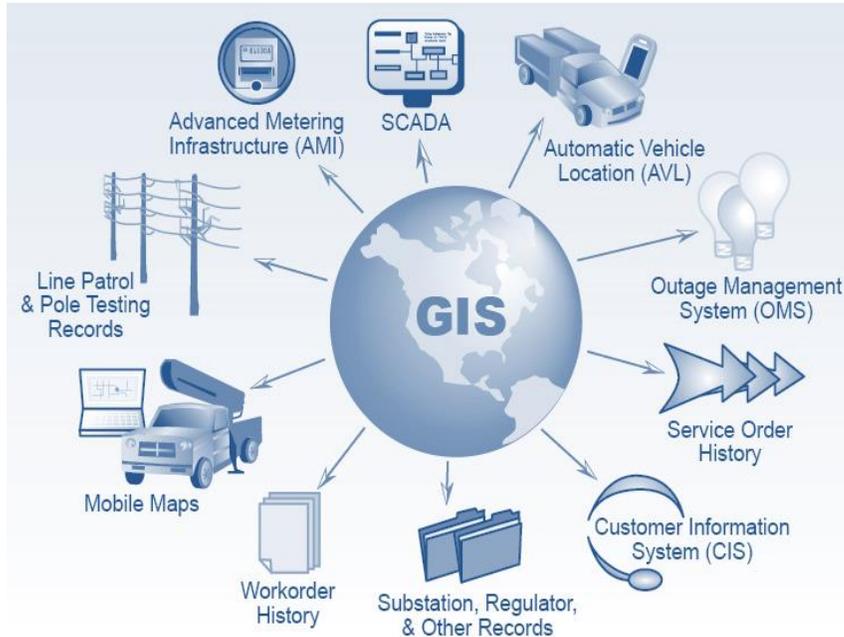
# Geographic Information System (GIS)

## Board of Supervisors Information Technology Committee Meeting

Brendan Ford,	GIS Applications and Systems Administrator
Gregory Thomas,	GIS Data Manager
Michael Liddle,	GIS Customer Services Supervisor
Judy Doldorf,	Public Safety GIS Coordinator

May 8, 2018

# Overview of Geographic Information Systems (GIS)



- In 1985, Fairfax County decided to implement GIS technology. Over next 10 years, planning and reorganization of county mapping functions, eventually centralized in DIT.
- GIS is a specialized, critical foundational and increasingly prevalent technology platform, supporting a wide variety of County business processes, information and analytical needs
- Delivers high quality geo-spatial views, curated data, innovative analytical applications and products, mapping, web and mobile services
- DIT provides GIS platform, applications software, guidance, training, and assistance

FFX GIS includes over 1,400 data layers, applications and maps

GIS website: <https://www.fairfaxcounty.gov/maps>

# Geographic Information Systems (GIS) Features

- **Planimetric** Features visible on aerial imagery. Examples are buildings, parking lots, driveways, sidewalks, etc.
- **3D** Three dimensional views allows seeing images as if actually viewing in real life.
- **Oblique photography** Pictures taken from 45 degree angles from out of the **side** of an aircraft. Used extensively by Tax Administration to assist assessing added features and home values.
- **Aerial Imagery** Pictures taken from a camera on the **belly** of an airplane looking directly down.
- **Vector data** All data layers showing distinct features such as parcels, zoning districts, jurisdictional boundaries, etc.



My Neighborhood

Lord Fairfax Land Grant

Road Maintenance

53 Web GIS Applications for the Public

680,000 cumulative views of all public apps

## High Use Public GIS Web Applications

<b>Trail Buddy</b>	125,406
<b>Historical Imagery Viewer</b>	66,916
<b>Planning &amp; Zoning Viewer</b>	41,735
<b>Zoning District Analyzer</b>	41,278
<b>Map Wizard</b>	33,168
<b>Deer Management Program</b>	27,177
<b>Bike Fairfax</b>	52,907
<b>Street Light Reporter</b>	28,700
<b>Road Maintenance</b>	24,043
<b>Embark Richmond Highway</b>	23,700
<b>Leaf Collection Areas</b>	16,200
<b>FEMA Special Flood Hazard Areas</b>	15,443
<b>Watershed Viewer</b>	14,550

## GIS Data Then & Now

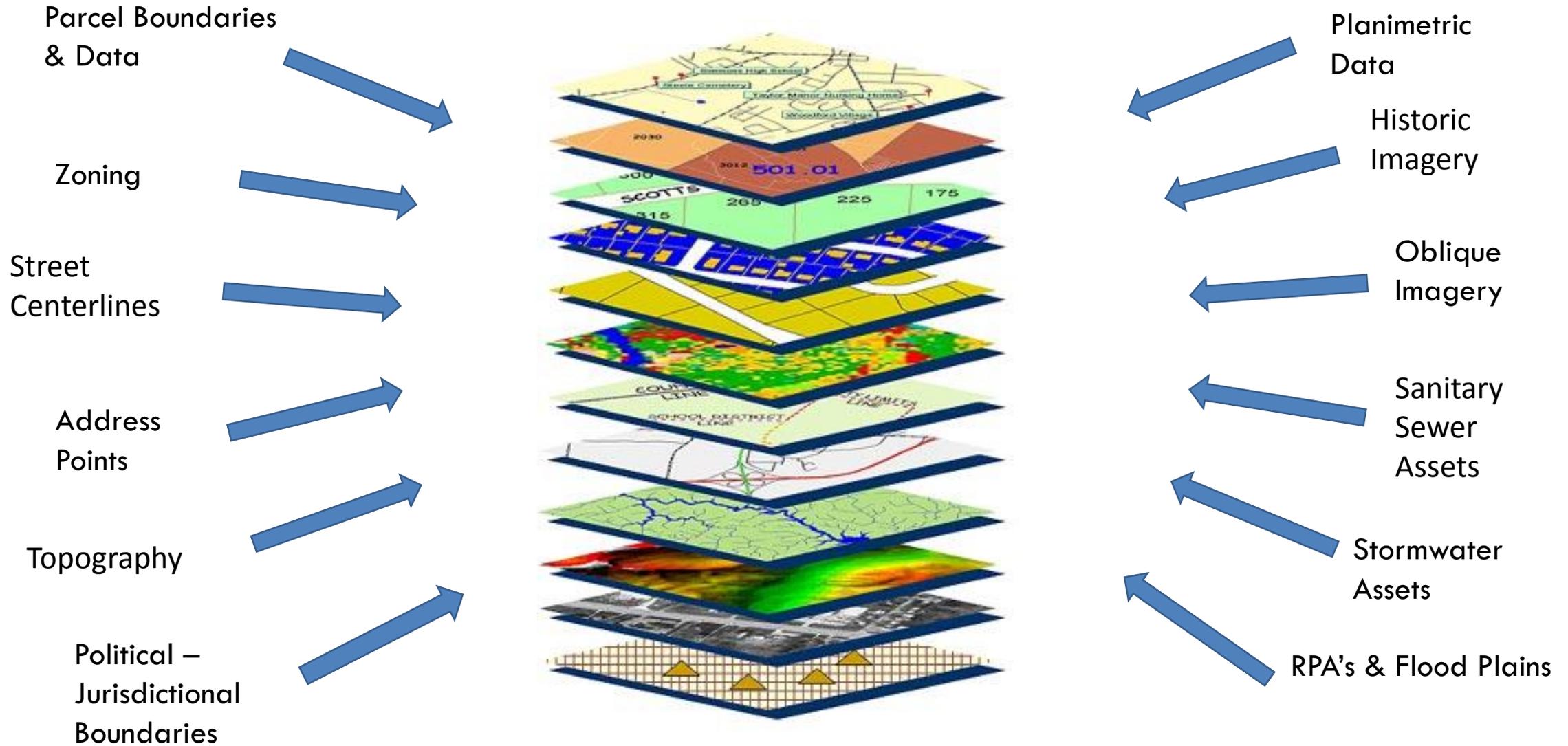
Data	1999	2018
# of GIS Layers	>60	>1,400
Planimetric Features	3,800,000	>17,000,000
Total Structures	257,300	>275,000
Total Data	< 1 TB	19TB

## GIS Data Today

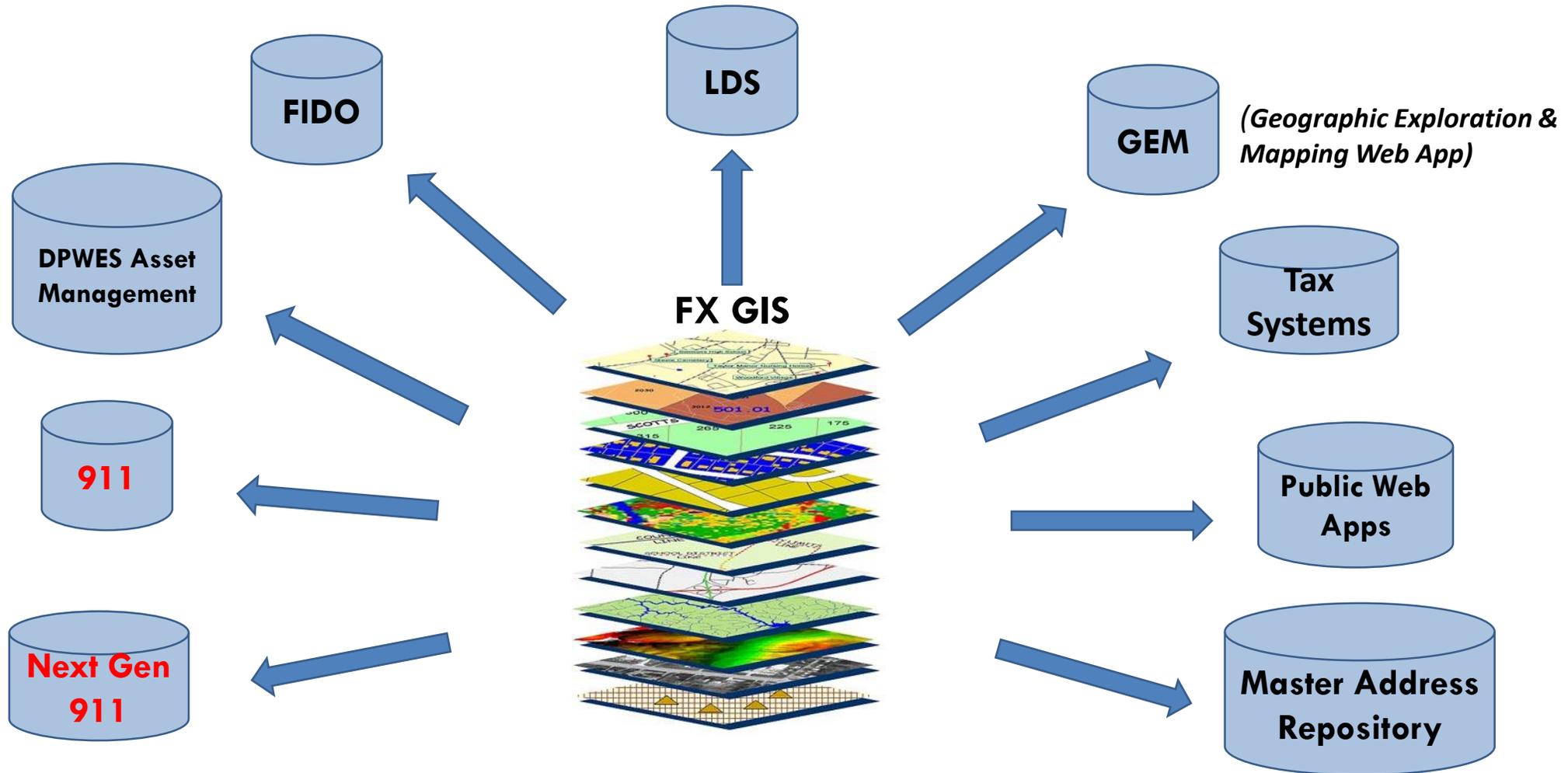
- 2 ft. Contour Lines: 42,575 miles
- Perennial Streams: > 860 miles
- Detailed Shoreline: 118 miles
- Layers from neighboring jurisdictions: > 200
- 17 Years of Digital Imagery

2017	2007	1997	Coming Soon
2015	2005	1990	
2013	2003	1980	
2011	2002	1972	
2009	2001	1953-4	

# Example: Contents of GIS Data Warehouse



# Major County Systems Use GIS



Addresses are inherently spatial – GIS is key

# Agency Owned Data Layers

Agency	Layers
DPWES - Wastewater Division	42
Fairfax County Fire and Rescue	37
Fairfax County Police	14
Fairfax County Schools	12
Fairfax County Sheriff	2
Fairfax County Water	2
Health and Human Services	24
Health Department	1
Housing and Community Development	14
Land Development Services	22
Libraries	4
Office of Community Revitalization	13
Office of Public Affairs	2
Park Authority	32
Voter Registrar	35
World Police and Fire Games	7

Agency	Layers
County Executive's Office	37
Department of Code Compliance	5
Department of Emergency Operations	5
Department of Family Services	5
Department of Management and Budget	1
Department of Planning and Zoning	35
Department of Public Safety Communications	1
Department of Tax Administration	2
Department of Transportation	69
DIT-GIS	422
DPWES - Capital Facilities Division	21
DPWES - Maintenance Division	6
DPWES - Stormwater Division	144

## Agency GIS Usage - Select Stats 2016

Agency	# of Users	ARC GIS Usage Time (hours)
DPWES Wastewater Management	103	67,083
DPWES-Maintenance and Stormwater Management	49	34,301
Department of Information Technology - GIS	21	30,545
Department of Planning and Zoning	63	15,859
DPWES Capital Facilities	42	12,984
Department of Transportation	53	10,887
DPWES Land Development Services	41	9,919
Park Authority	80	8,988
Department of Information Technology	20	8,391
Fire and Rescue	21	5,914
DPWES-Stormwater Planning Division	38	5,662
Department of Neighborhood and Community Services	11	3,901
Fairfax County Police Department	28	3,119
Department of Public Safety & Communications	2	3,079
Department of Information Technology - Training	15	2,203
DPWES-Urban Forest Management Division	16	1,689

## Select County Agencies' Staff Accomplishments across GIS Lifetime



19 Years of GIS Excellence Awards  
Presented by the  
FAIRFAX COUNTY BOARD OF SUPERVISORS

Over **600** noteworthy agency  
GIS projects submitted since  
GIS Award Program  
launch in 1999.

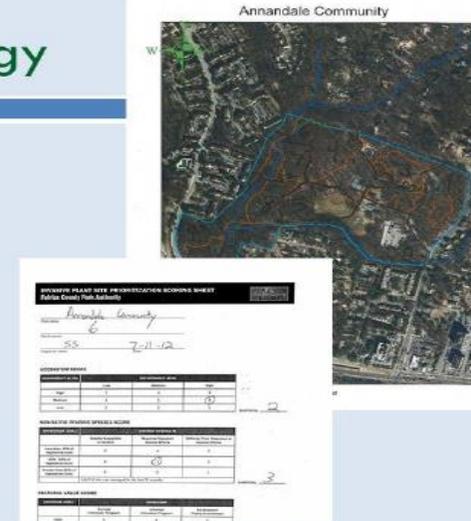
# Select Submissions from Previous Years

## Non-Native Invasive Assessment Prioritization

- ❑ NNIAP
  - ❑ 3 Categories:
    - Ecosystem Score
    - Non-Native Invasive Species Score
    - Cultural Score
  - ❑ Total Scores Range from 3 to 16
  - ❑ Determines where to spend limited funding

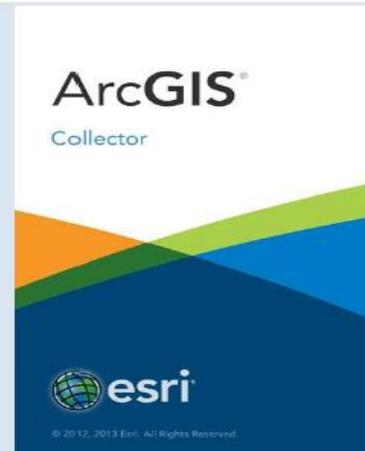
## Old Methodology

- ❑ Paper Map & Score Sheet
- ❑ Hand draw boundaries
- ❑ Create GIS data back at the office
- ❑ Time spent manually entering the information and creating polygons
- ❑ Introduces Error

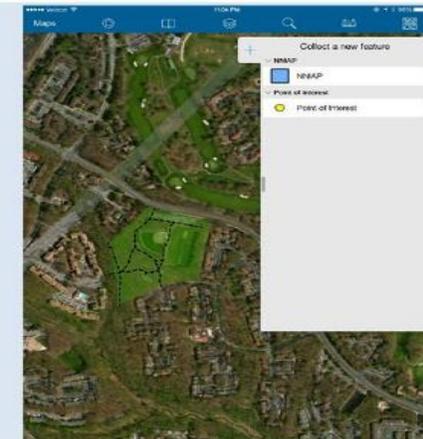


## New Methodology: Collector

- ❑ New Technology
- ❑ Syncs w/ Remote Server
- ❑ Ready to go GIS Data
- ❑ No need to transfer or convert
- ❑ Works with Existing Datasets
- ❑ iOS & Android

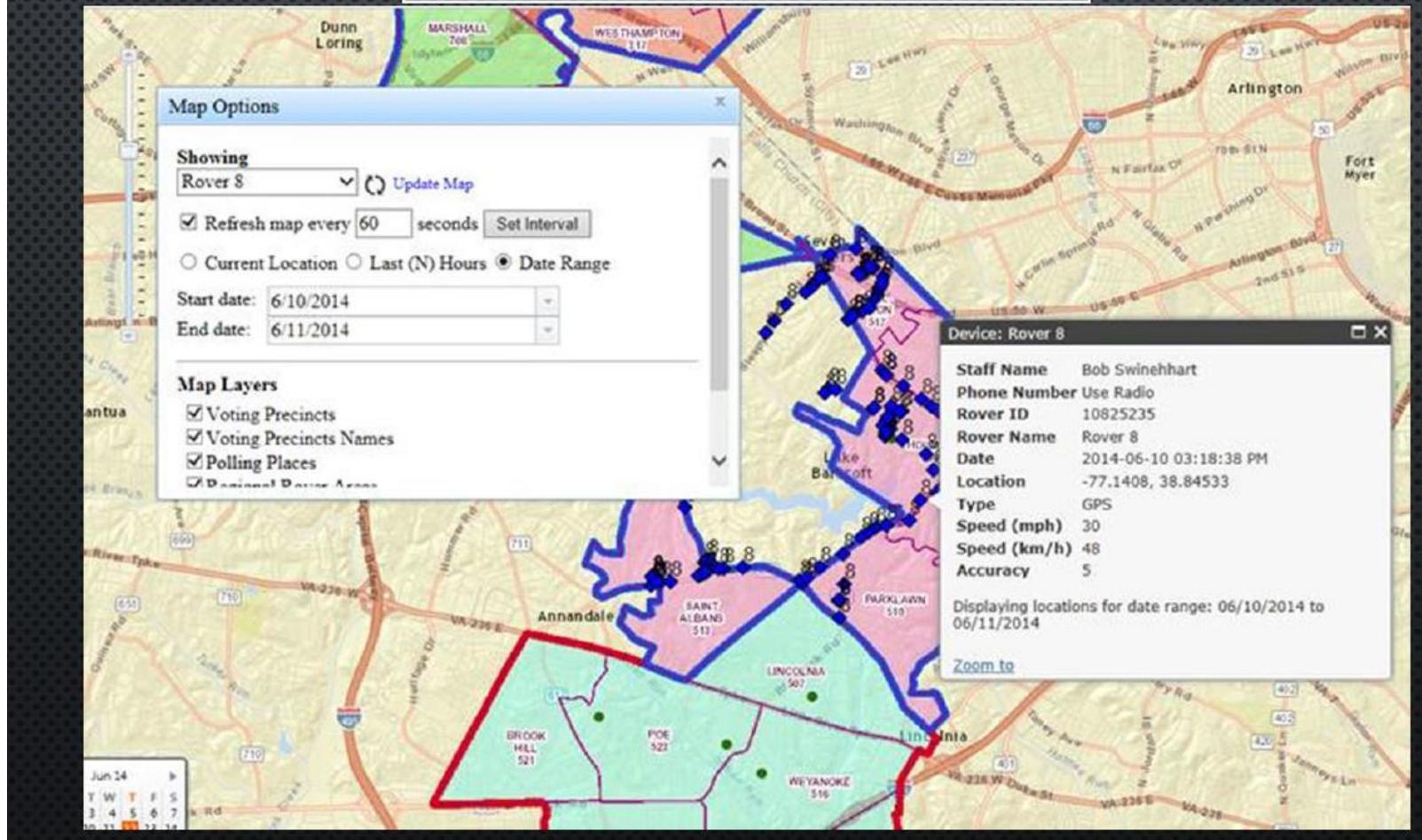


- ❑ Data entry
  - ❑ Enter it once!
  - ❑ Form reduces incorrect data entry
- ❑ Location Accuracy
  - ❑ Surveyor actually knows where they are in a park
- ❑ Ease of use
  - ❑ Users don't need to be GIS pros



# 2014 Elections – Mobile GIS provided better elections rover response

THE ELECTIONS ROVER TRACKING APPLICATION  
SHOWING ROVER 8 ACTIVITY WITH POP-UP AND  
MAP OPTIONS DISPLAYED.



# HUMAN SERVICES RESOURCE GUIDE

## USE OF ARCGIS TO ACCESS HUMAN SERVICES IN FAIRFAX COUNTY

The Human Services Resource Guide (HSRG) is an online database that contains information about human services available in Fairfax County. It contains 2,000 services provided by 400 nonprofit and government agencies.

Geographic mapping enhancements provide a level of self-sufficiency for service recipients and aid county agencies, service providers, community partners, and residents of Fairfax County in easily locating community resources and navigating the human services system.

This tool allows Coordinated Services Planning staff in the Department of Neighborhood and Community Services to provide referrals to services to assist county residents with emergency needs and access to other important services including:

- Food
- Shelter
- Financial assistance
- Children's services
- Clothing
- Language (ESL/ESOL) classes
- Primary and behavioral healthcare

Additional services are also available for specific populations such as older adults, veterans, domestic violence survivors and the homeless. Each service record includes a map and directions link to the service provider's location.

The mapping feature uses ESRI online geocoding and mapping services, base maps and ArcGIS API to locate and display HSRG service locations with contact information.

The HSRG is accessible on the county's public website to anyone in need of services.

### One-Touch Queries

### Targeted Search Options

For a more targeted search, type a search term into the field below and click on the appropriate search button.

Service Search
Keyword Search

Organization Search
Classification Search

Basic Needs Map Search

Access resources within 1/2, 1, or 5 mile radius of a single address. Ability to choose from five basic needs categories allows for easy filtering.

User can view a list of resources, a summary of service information and click through to view full service details and eligibility.

- 1 Enter address and proximity**
- 2 Select service(s) needed**
- 3 View search results; click through to the database for more information**

WWW.FAIRFAXCOUNTY.GOV/HSRG

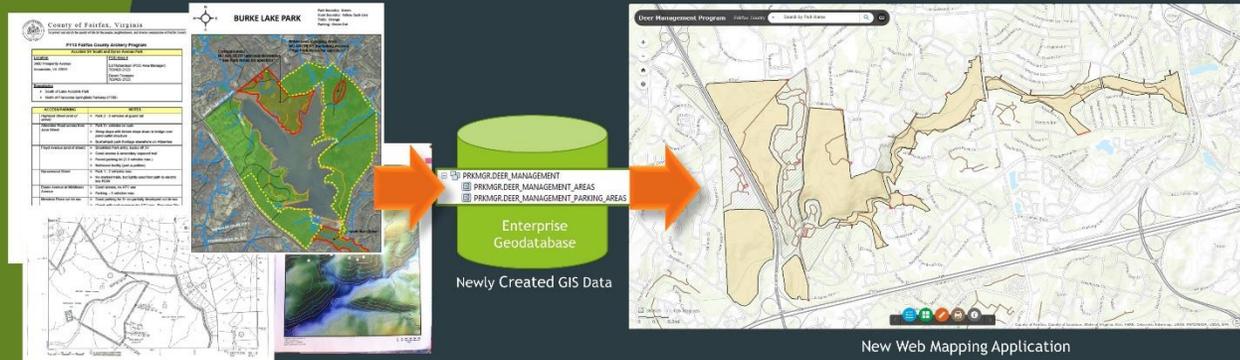


# Fairfax County Deer Management - A Web Mapping Application

Fairfax County Park Authority & Fairfax County Police Department



From paper forms and maps, to a sleek and easy-to-use application



Examples of old documents provided to the Hunters

## Background

The Fairfax County Deer Management Program is implemented each year to manage the abundant local white-tailed deer population (*Odocoileus virginianus*). The primary objective of the Fairfax County Deer Management Program is deer population control on public parklands. Management actions reflect a variety of interests: protecting human health and safety, reducing environmental damage, conserving biodiversity and maintaining healthy deer herds. The program is implemented by the Fairfax County Police Department (FCPD) in collaboration with the Fairfax County Park Authority (FCPA) and Northern Virginia Regional Park Authority (NVRPA).

Archery is the primary deer management tool used in Fairfax County to help manage high density deer herds. Archery has been shown to be a safe and effective deer management tool to control deer populations on public lands in Fairfax County and other high-density jurisdictions. Qualified bowhunters with superior skill, ethics, and experience are able to efficiently and discreetly hunt deer in areas where firearm use is restricted or prohibited, or not an effective or sustainable deer management tool.

## Problem

As the archery program has expanded over time, it has become increasingly difficult to effectively communicate the locations of approved hunting and parking areas on FCPA and NVRPA property. FCPD and FCPA staff received many requests in regards to very specific locations:

*"Is the gravel parking lot off of Poplar Tree road an approved parking location?"*

*"Is the Northeastern section of Rocky Run Stream Valley near Stringfellow Road an approved hunting location?"*

*"Can we park at old man Johnson's driveway and then enter the park?"*

**Public Feedback**

*"The maps looks awesome and is very helpful. Nice work to everyone involved!!!!"*

*"You have done a great job on the maps."*



Visit the Fairfax County Geoportal  
<http://www.fairfaxcounty.gov/maps/geoportal.htm>



Scan to View Web App By Park Authority Staff (J. Roberson, K. Sinclair & K. Auer) and Police Dept. Staff (K. Edwards & E. Powell)

## Solution

In order to reduce the staff time required to answer these questions, we determined a new web mapping application was the best approach to effectively communicate archery information to the public. We created GIS data where none had previously existing based off of the old paper forms and maps. The approved hunting areas and the approved parking areas data are managed through the county's enterprise geodatabase and served up using ArcGIS Server. When FCPD and FCPA staff need to make an adjustment to an area, they can easily update the data and the change is immediately reflected in the public facing web application. The web application works on desktops and mobile devices, allowing for reference while in the field, which is a great feature for the hunters.

## GIS Mapping for the Dulles Suburban Center

### Updated GIS Products for the Comprehensive Plan, for Staff and BOS Analysis, and for Community Outreach

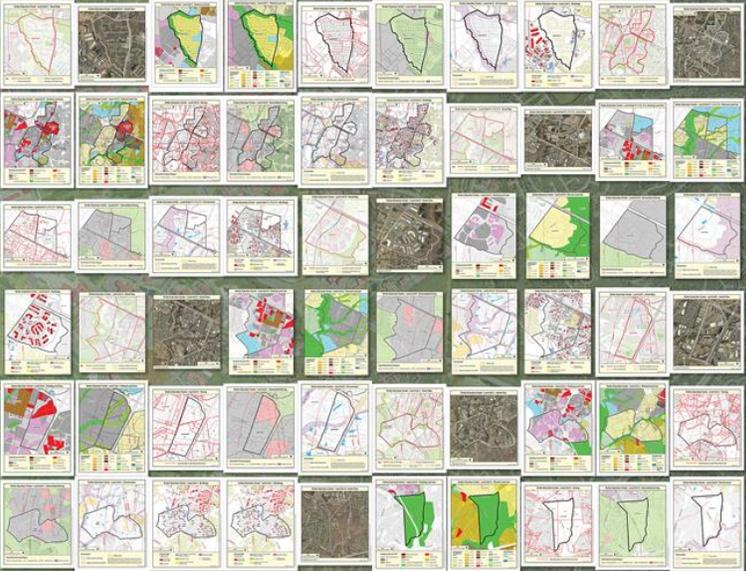
Over 150 special-purpose maps their supporting databases have been developed to date in the course of this BOS-authorized Land Use Study

These maps were constructed for use in Comprehensive Plan text, which appears on the Web and in print publications





The maps below are just a few of those developed for use in community meetings and staff analysis



DPZ submission for GIS Day 2017



# GIS and Public Safety

## Department of Public Safety Communications

GIS data is used in the 911 /Computer Aided Dispatch (CAD) system supporting 400,000 9-1-1 calls and 500,000 non emergency calls

- CAD uses GIS to optimize vehicle dispatch and provide situational awareness. 9-1-1 GIS Maps

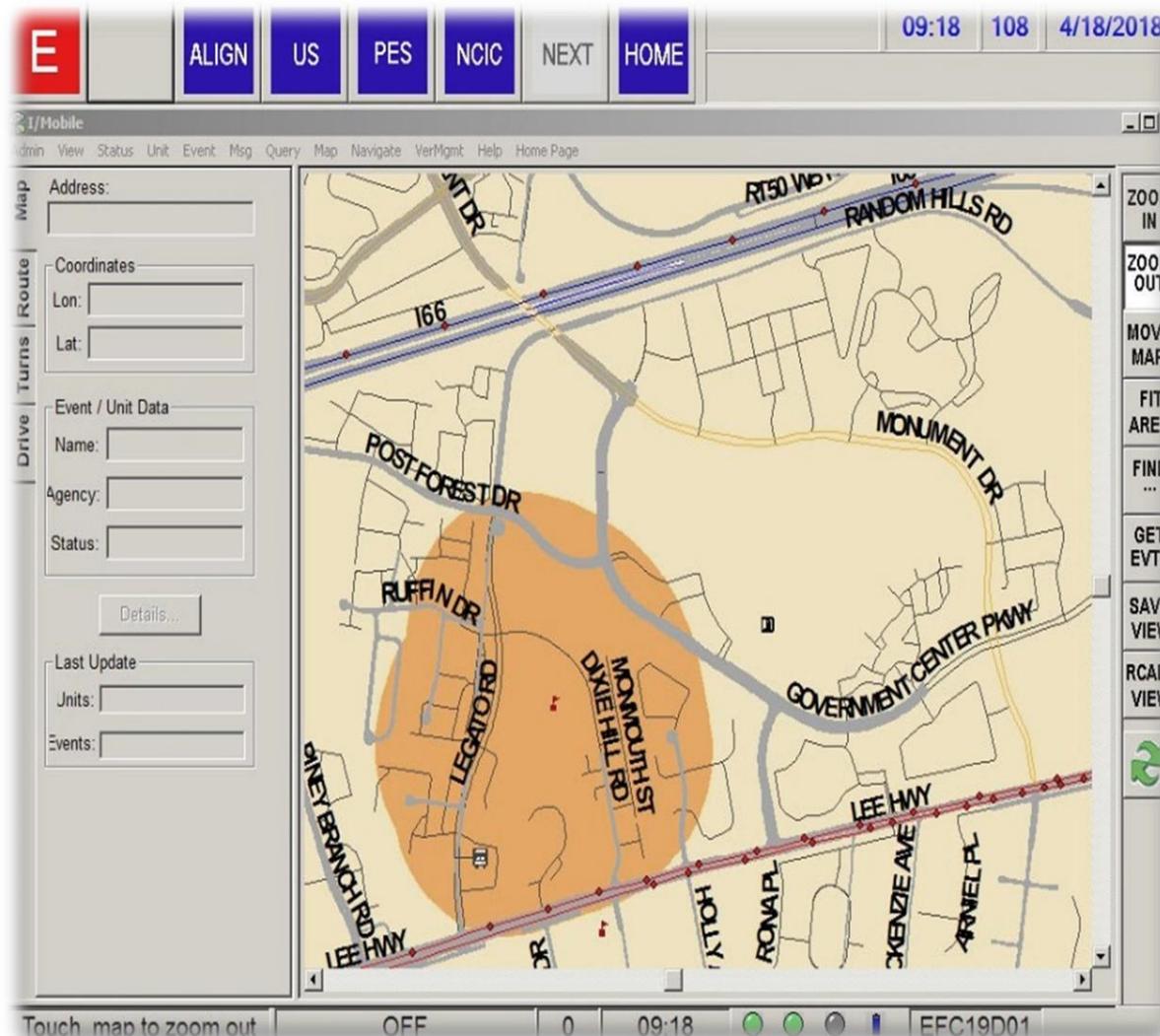
- Locate the INCIDENT
- Get to the INCIDENT



- Coordinated with neighboring jurisdictions to provide centerline data for the 911 /CAD system.

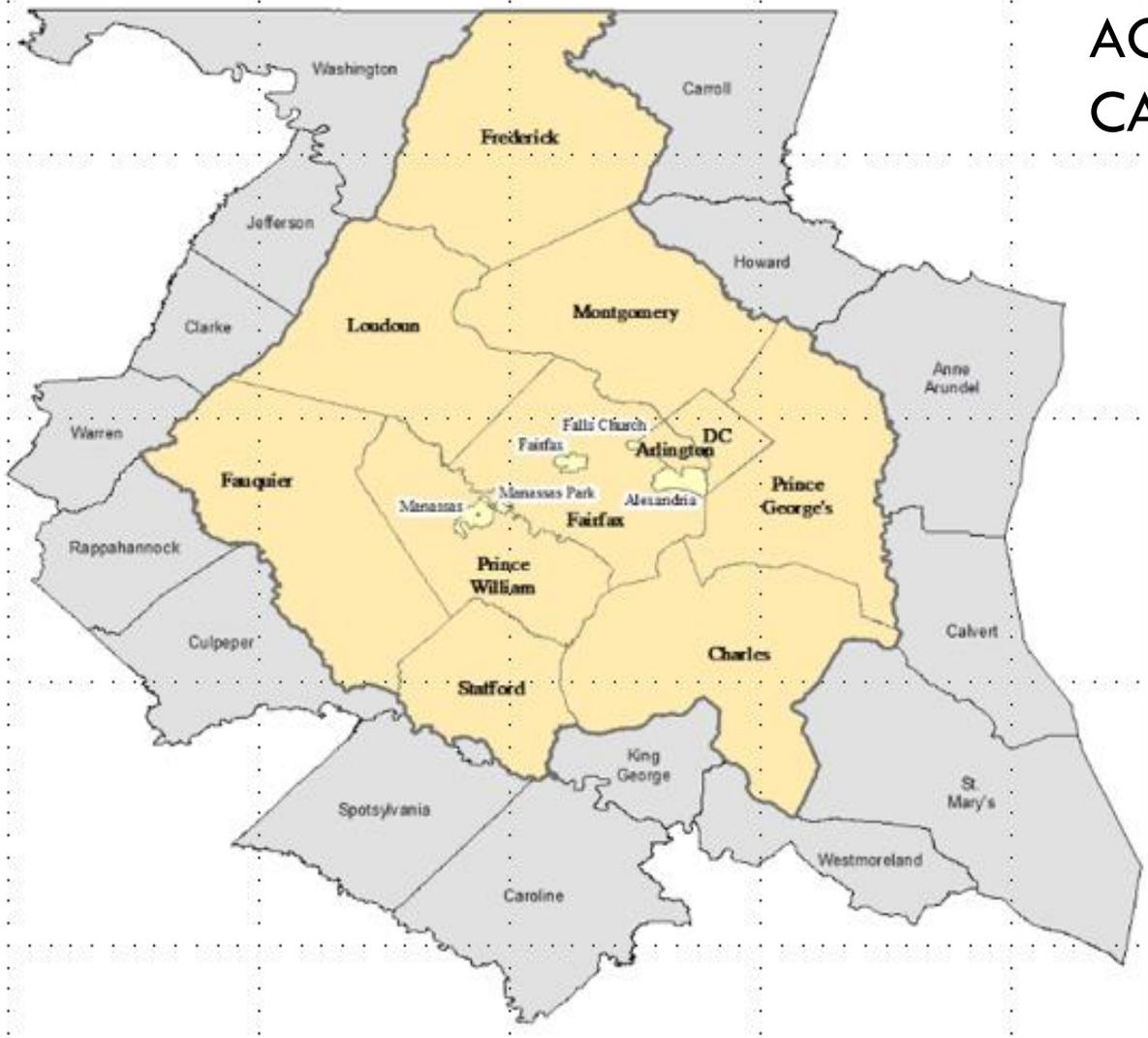
## Emergency Operations Center (EOC):

- GIS staff provide 24x7 support to the EOC when activated to develop incident maps for situational awareness



# GIS & PUBLIC SAFETY

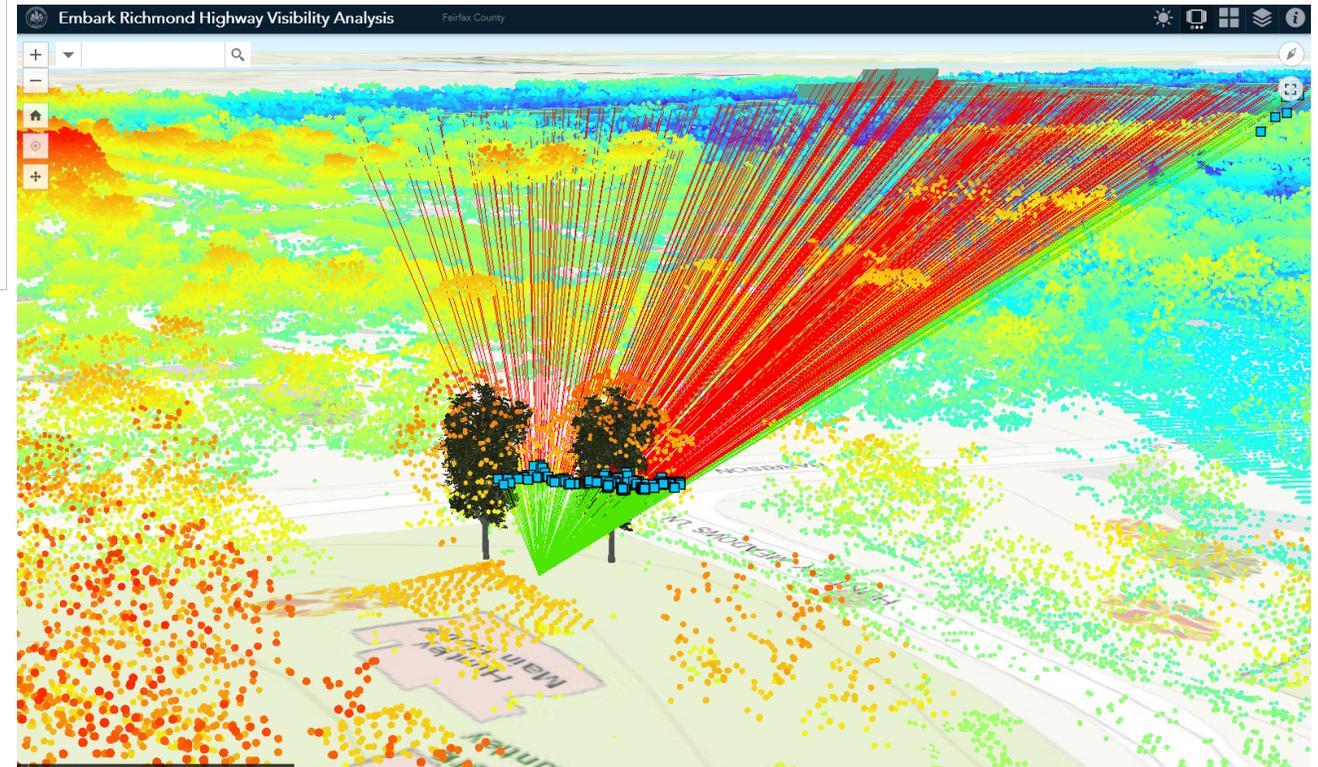
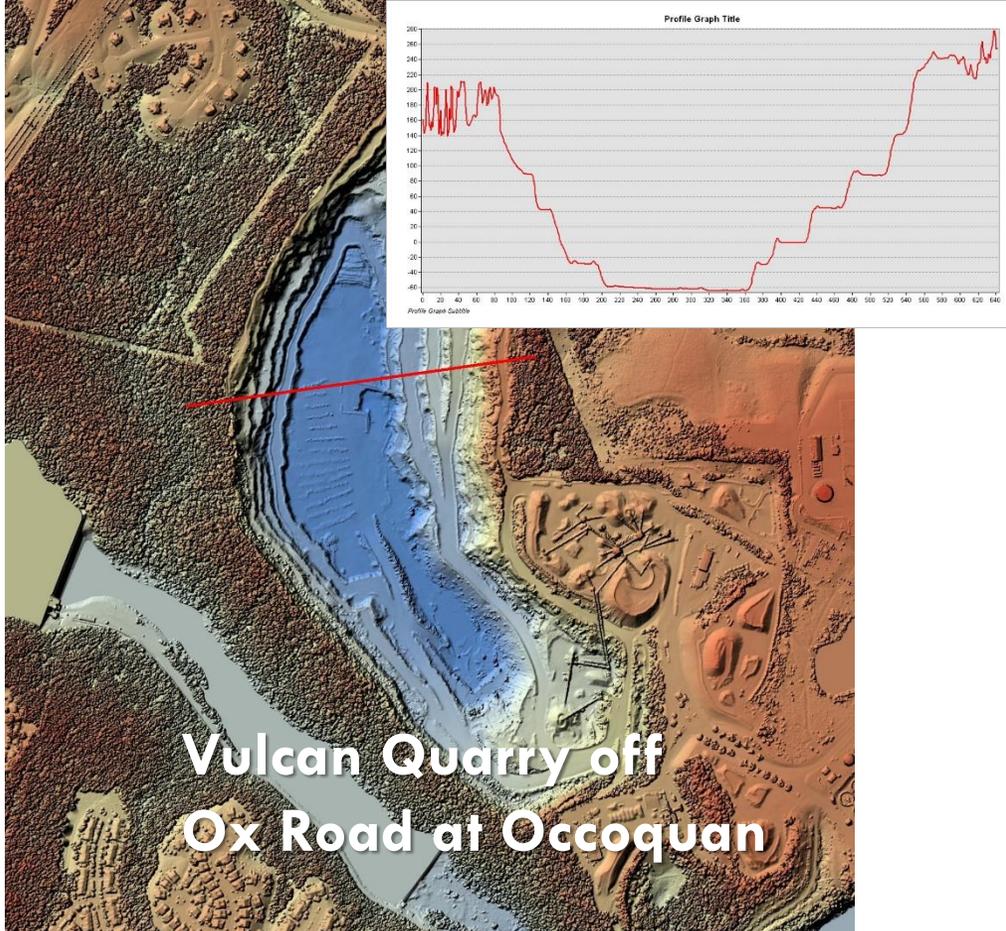
20+ LOCAL JURISDICTIONS  
ACROSS THE NATIONAL  
CAPITAL REGION



Advancement with GIS  
directing 9-1-1 calls to the  
correct responding jurisdiction  
Public Safety Answering Point  
(PSAP) Center

# What's next?

**LIDAR** gives dramatic improvement in surface detail



**Viewshed Analysis:** from Historic Huntley Villa to Proposed Embark development sites.

# What's Next?



**PLUS system**



**Collaboration:**

Digital Plan Review

GIS is an essential component

Multi-Agency 9 core agencies

**Supports:**

**Economic Success Strategic Plan**



## GIS - Near Term Activities

- Implement more powerful web-based GIS tool for the public – similar to what is available to county staff
- Training is available for your staff:
  - **Virtual** training sessions via Go To Meeting
  - **Office** visit hands on assistance staff on a range of applications
  - **Hands on** training at the Government Center

# Questions

