GIS EXCELLENCE AWARDS 2014

FAIRFAX COUNTY, VIRGINIA

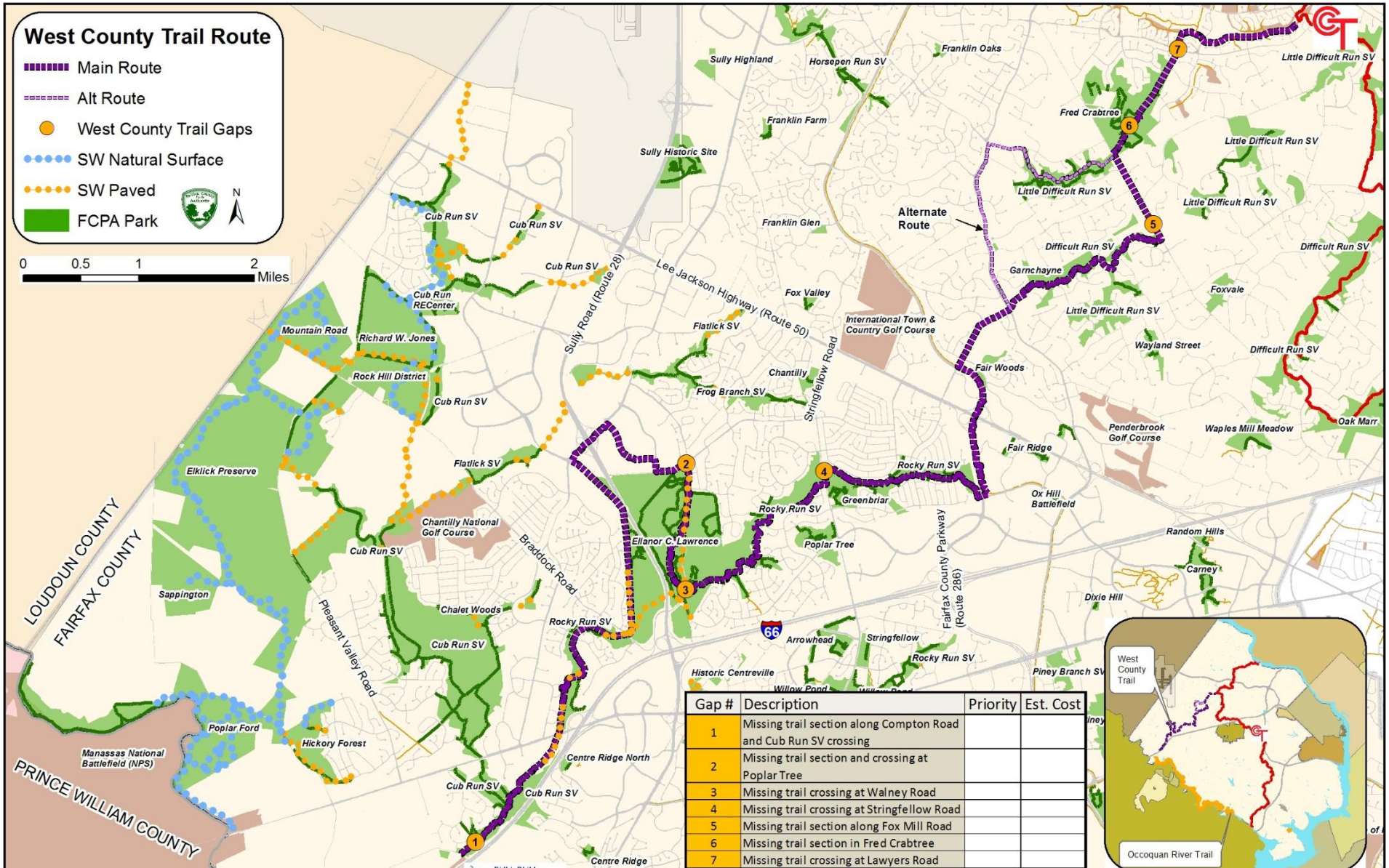
NOVEMBER 20, 2014

CARTOGRAPHIC CATEGORY

Third Place

West County Trail

Pat Rosend, Liz Cronauer
Fairfax County Park Authority



Gap #	Description	Priority	Est. Cost
1	Missing trail section along Compton Road and Cub Run SV crossing		
2	Missing trail section and crossing at Poplar Tree		
3	Missing trail crossing at Walney Road		
4	Missing trail crossing at Stringfellow Road		
5	Missing trail section along Fox Mill Road		
6	Missing trail section in Fred Crabtree		
7	Missing trail crossing at Lawyers Road		

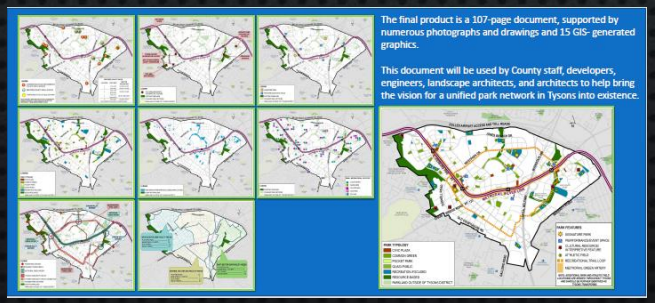
CARTOGRAPHIC CATEGORY

Second Place

Tysons Park System Concept Plan

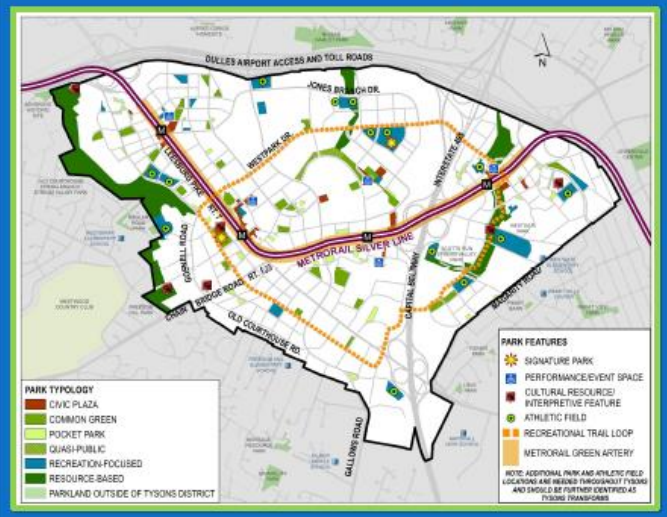
Gayle Hooper

Fairfax County Park Authority



The final product is a 107-page document, supported by numerous photographs and drawings and 15 GIS- generated graphics.

This document will be used by County staff, developers, engineers, landscape architects, and architects to help bring the vision for a unified park network in Tysons into existence.



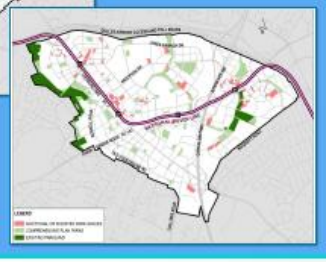
GIS has contributed extensively in the development of the ***Tysons Park System Concept Plan***. The concept plan is the outgrowth of two years effort by the Park Authority to establish a reference to guide the integration of park spaces in the redevelopment of Tysons.

Throughout the process, GIS was instrumental for the analysis of data and the understandable presentation of the results. The final guiding document required a series of clear, coordinated graphics to convey the many aspects of the future park network.

A range of graphics were developed throughout the course of this project including:

- Graphics for work sessions with citizen advisory group and County staff from a variety of departments;
- Analysis of GIS data on planned park spaces by type and district to evaluate achievement of goals;
- Evaluation of park service areas by park type to balance availability of park space across the Tysons district;
- Graphics for community outreach;
- Graphics for final product to convey the integration of all research in a manner that is clear and understandable and visually cohesive.

Early concepts for park types and placement generated data which helped evaluated how well the different park types were represented across the Tysons area.



GIS data helped to identify which park spaces had been removed from those shown in the 2010 Comprehensive Plan as well as note the new spaces that are recommended.

GIS data and graphics were a key element in advancement of the concept of a recreational trail loop across Tysons, identifying relation of the route to land use, planned park spaces and facilities, coordination with bike routes, and coordination with areas of potential development.

Buffers that define the service area for each park type helped evaluate the distribution park areas, helping assure that a variety of park spaces are available to all residents and workers in Tysons.

TYSONS PARK SYSTEM CONCEPT PLAN

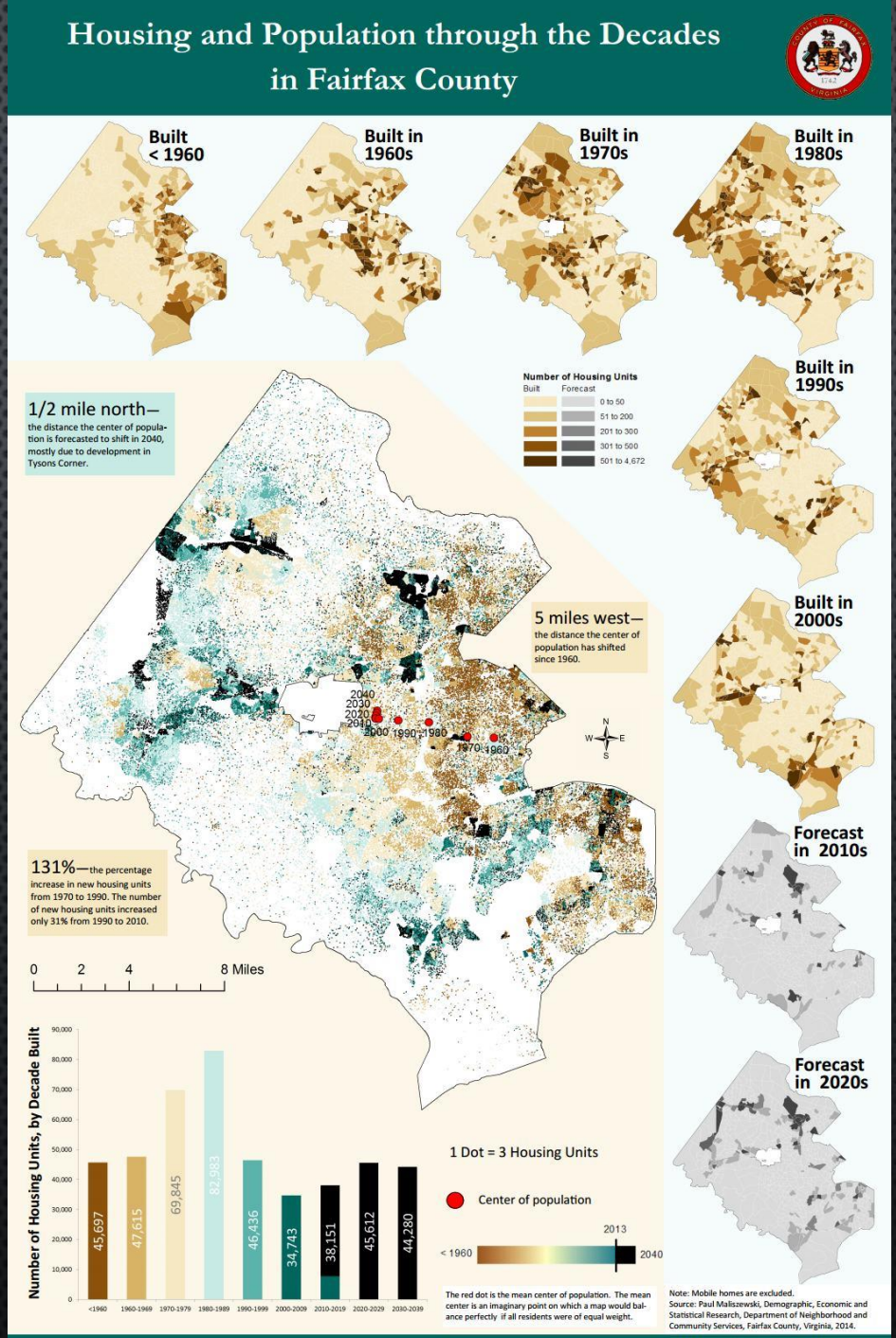
CARTOGRAPHIC CATEGORY

First Place

Housing and Population through the Decades in Fairfax County

Paul Maliszewski

Neighborhood and Community Services



ANALYTIC CATEGORY

Third Place

Targeting Accessible Waters for Volunteer Cleanups

John Burke

Stormwater Management Division of the Department of Public Works and Environmental Services

Targeting Accessible Waters for Volunteer Cleanups

John Burke, Ecologist (Watershed Planning and Assessment Branch)

Department of Public Works and Environmental Services – Stormwater Planning Division

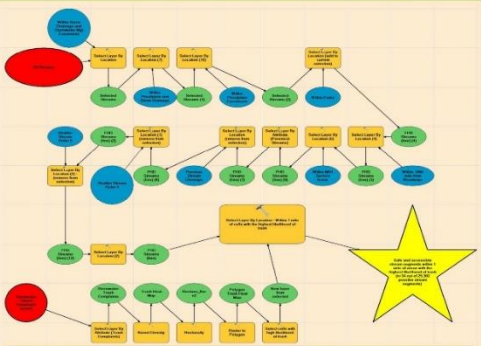
Objective

- Fairfax County is required by its Municipal Separate Stormwater Sewer System (MS4) permit to monitor and remove "floatables (trash)" from its streams.
- Volunteer groups assist the county, but the location and condition of many streams can make access for volunteer cleanups difficult or dangerous.
- This project determines which stream segments in Fairfax County are accessible to volunteers and also predicts which of those streams are most likely to have large amounts of trash.

What Stream Segment Characteristics Prohibit Volunteer Cleanups?

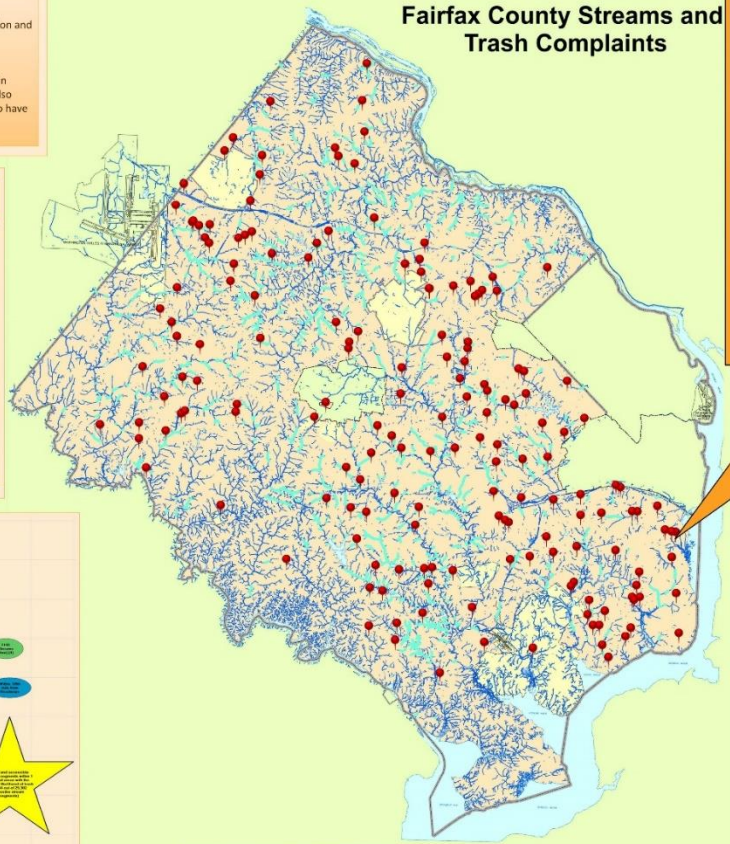
This model excludes streams segments with the following characteristics:

- Streams on **private property** or those which do not lie in a stormwater/floodplain easement or Fairfax County Park Authority Park.
- Streams **beyond 1/8 mile from a road**
- Streams that do not drain the **Municipal Separate Storm Sewer System (MS4)**
- Streams which **have been cleaned after 2004**
- Large streams with **potentially fast/deep water** and a **high likelihood of advanced stream bank destabilization** (Strahler Stream Order 4 or 5) and **Non-perennial** streams



- The path of tools initiated with the **"All Streams (red)"** layer describes the selection process for determining safe and accessible stream segments.
- The process for developing a kernel density heat map to estimate the likelihood of trash is outlined in the path initiated with **"Stormwater Citizen Complaints (red)."**

Fairfax County Streams and Trash Complaints

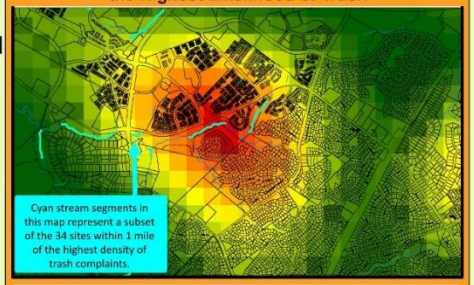


Citizen Trash Complaints 1984-2014

Candidate Stream Reaches for Stream Cleanups

Cyan colored stream segments in this map represent the 2,016 sites which permit safe and legal volunteer access.

Candidate Stream Reaches within 1 Mile of Areas with the Highest Likelihood of Trash



- This kernel density heat map was developed from the frequency of citizen trash complaints to predict the likelihood of trash in a given stream.
- The map was converted from raster to polygon, and stream segments within a 1 mile radius of the highest frequency cells (dark red) were targeted for a stream cleanup (cyan). Only stream segments which were found to have safe and legal access for volunteers were considered.

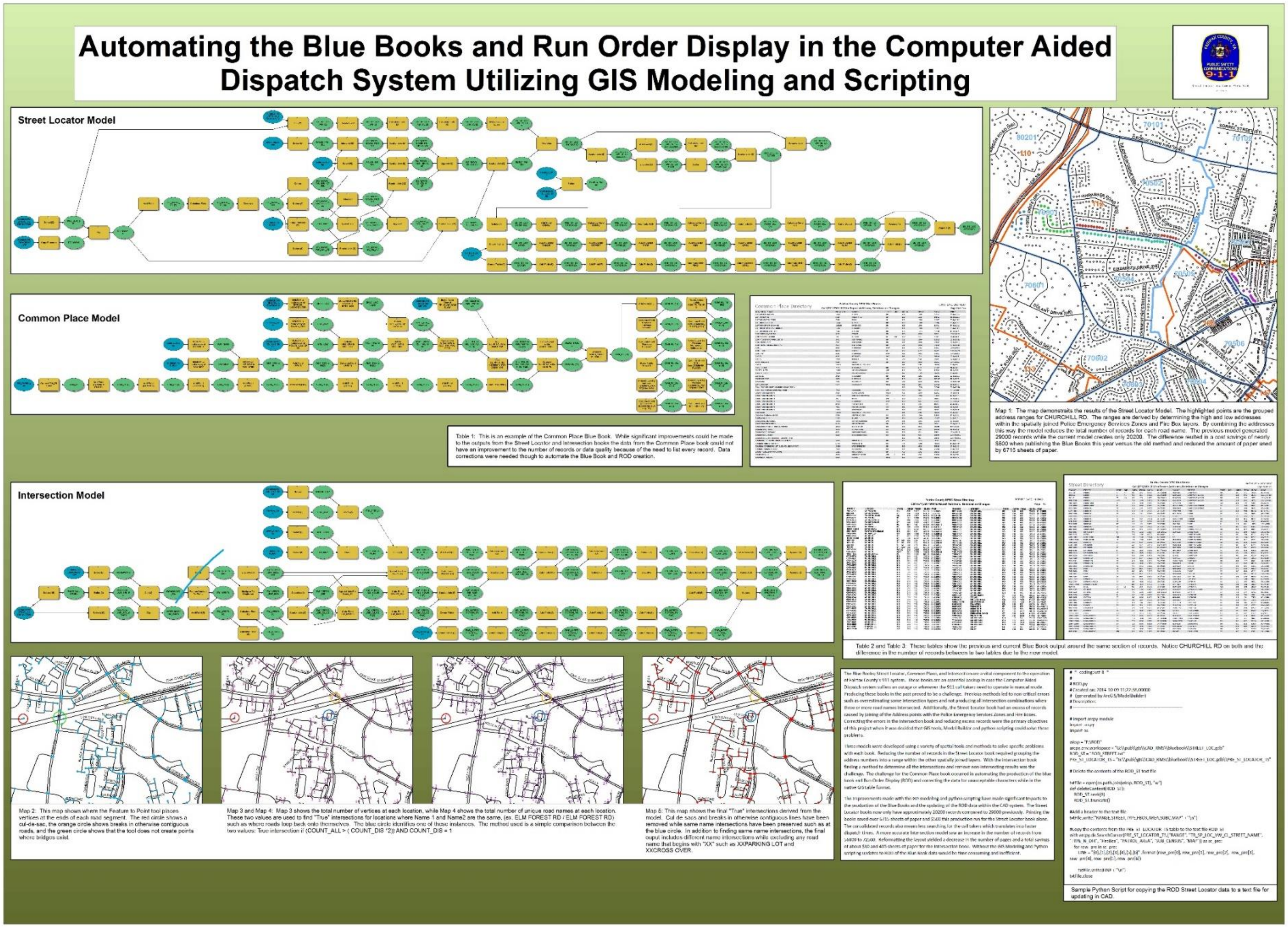
Results

- From this model it was determined that **2,016 out of 29,302** possible stream segments in Fairfax County met the requirements for safe , legal, and convenient volunteer access set forth by this project.
- From these 2,016 sites, **34** occurred within one mile of areas with the highest estimated likelihood of trash. These sites would be best suited for large volunteer groups or groups willing to commit a large amount of time. Sites further away than 1 mile are recommended for smaller groups.
- The map and model generated from this project can now be consulted by the Watershed Planning and Assessment Branch staff when community service organizations request cleanup sites.

Future Work

- Percent impervious surface and population density within a given stream's drainage area will likely correspond to higher amounts of trash in the reach. To make the trash estimation more robust, I would like to include these variables in future analysis.

ANALYTIC CATEGORY



Second Place

Automating the Blue Books and Run Order Display in the Computer Aided Dispatch System Utilizing GIS Models and Python Scripting

Christopher McCarthy

Public Safety Communi-cations

ANALYTIC CATEGORY

First Place

Development of a GIS Toolkit to support Hydrologic and Water Quality Modeling (HWQM) and drainage area characterization of ecological sampling sites

Joseph P. Riley-Ryan, John Burke

Stormwater Management Division of the Department of Public Works and Environmental Services

Development of a GIS Toolkit to Support Hydrologic and Water Quality Modeling (HWQM) and Drainage Area Characterization of Ecological Sampling Sites

Stormwater Planning Division

Joseph Riley-Ryan and John Burke

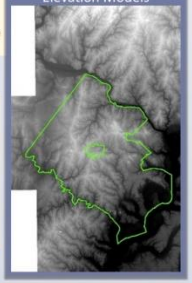
Background

- The overall goal of this effort was to develop a GIS toolkit for facilitating and streamlining workflows related to drainage area delineation and land use analysis performed by the Stormwater Planning Division (SWPD).
- The data derived from these analyses are used in hydrologic and water quality modeling (HWQM), as well as drainage area characterization of ecological sampling sites to support watershed management efforts in the County. The toolkit developed as part of this project leverages the best available GIS data to support these functions, and provides a consistent methodology for performing these analyses.
- Prior to the development of this toolkit, drainage area characterization and HWQM was completed in a somewhat ad hoc manner with wide variety of input data and varying levels of GIS-based analyses.

Methods and Results

- A high resolution DEM was created utilizing the best available countywide terrain data, supplemented with the publicly available data outside the county (Figure 1.)

Figure 1: Merged Digital Elevation Models



- To improve the delineation capability for Green Infrastructure type projects, the stormwater infrastructure (pipes and other conveyance systems) was 'burned' into the DEM, which allowed for explicit accounting of changes in microdrainage areas due to stormwater conveyance systems.
- The conditioned DEM was used to generate the FD and FA grids for drainage area delineation, and it was found that this significantly improved the drainage area delineations to GI facilities (Figure 2).

Figure 2: Results of Incorporating Stormwater Pipes into Micro Drainage Areas

- A model-builder tool was created to allow users to delineate drainage areas to any point of interest in the County using the new FD and FA grids (Figure 3).

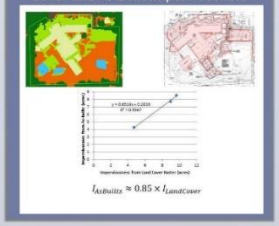
Figure 3: Watershed Delineation Model Builder Tool

- Land use for the toolkit includes the most current planimetric data for imperviousness estimates derived from 2009 aerial imagery as well as a more recent raster land cover layer derived from 2011 satellite imagery. Utilizing model-builder tools for imperviousness estimates as well as land-cover summaries (Figure 4), both datasets were analyzed to develop a methodology for estimating imperviousness and characterizing land-use.

Figure 4: Planimetric and Land Cover Model Builder Tool

- The results showed that the land cover layer provided good estimates of both imperviousness and other land uses of interest. However, a correction factor was necessary to improve the imperviousness obtained from the land cover layer (Figure 5).

Figure 5: Relationship Between Land Cover and As-Built Imperviousness



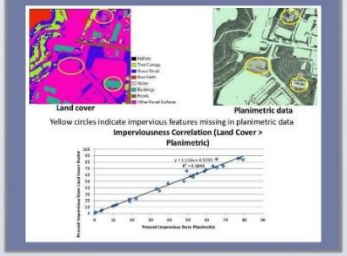
- The model-builder tools were used to randomly sample 60 sites countywide spanning a range of area-imperviousness values (Figure 6).

Figure 6: Countywide Sites Used for Land Cover/Planimetric Imperviousness Evaluation

- **Area ranged from 10 acres to 2 square miles**
- **Imperviousness ranged from 0.2% to 86%**
  - Red = high (> 25% impervious)
  - Yellow = medium (10-25% impervious)
  - Green = low (<10% impervious)
- **60 total sites for entire range of area-imperviousness values**

- A correlation analysis of the results indicated the planimetric and land-cover data yielded consistent results in cases where the land-cover derived imperviousness was higher than planimetric data derived values (Figure 7).

Figure 7: Land-cover (LC) and Planimetric (P) Imperviousness, LC > P



- When planimetric imperviousness values were higher (generally where impervious features were obscured by tree canopy), the land cover imperviousness had to be increased and the forested (tree canopy) area correspondingly reduced (Figure 8).

Figure 8: Planimetric Impervious (PI) and Land Cover Impervious Relationship (PI>LCI)

Red circles indicate impervious features obscured by the tree canopy in land cover data

Utilization

- Examples of how the GIS toolkit was used for HWQM at a proposed retrofit site are shown in Figures 9 and 10.

Figure 9: Hydrologic Analysis for Mantua Elementary School Retrofit Site

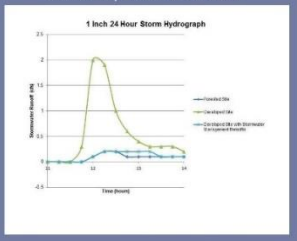
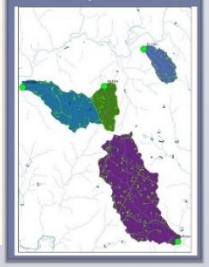


Figure 10: Water Quality Load Reduction Results for Proposed Retrofits at Mantua Elementary School

- Base Load:
  Total Phosphorous = 13.19 lb/yr = 1.17 lb/ac/yr
- Bioswale removal rate:
  Total Phosphorous = 0.94 lb/yr
- Reforestation removal rate:
  Total Phosphorous = 0.51 lb/yr
- New Load:
  Total Phosphorous = 11.74 lb/yr Total Reduction= 1.45 lb/ac/yr (~11%)

- Examples of how the tools were utilized to project and analyze the drainage areas of 320 stormwater ecological sampling sites can be seen in Figure 11.
- Using a randomly selected subset, drainage areas of the ecological sample sites fell within an average of 4% of previous estimations.
- **Overall, the GIS tookit has resulted in a more than 50% reduction in the level of effort required to generate input data sets for HWQM and drainage area characterization of ecological sampling sites.**

Figure 11: A Subset of Ecological Sample Site Drainage Delineations with Impervious Surface Projections



AGENCY CATEGORY
Best Use of GIS for Public Outreach

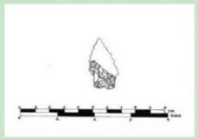
A Cultural History Tour of Old Colchester Park and Preserve
Fairfax County Park Authority

A CULTURAL HISTORY TOUR OF OLD COLCHESTER PARK AND PRESERVE

Colchester Archaeological Research Team, Cultural Resource Management and Protection Branch, Fairfax County Park Authority

http://bit.ly/1w2AA6J

1: OLD COLCHESTER PARK AND PRESERVE



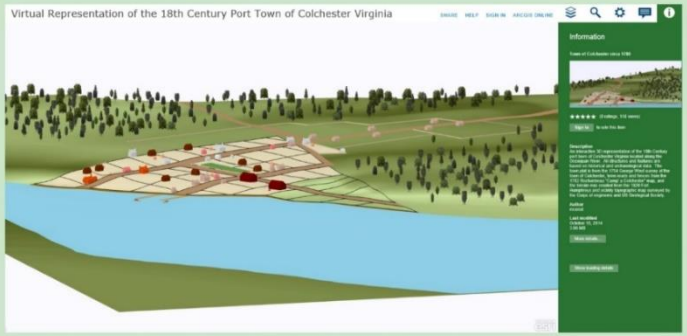
2: EARLY ARCHAIC

3: LATE ARCHAIC—EARLY WOODLAND

4: LATE WOODLAND

5: CEMETERY

Interactive story map highlighting the cultural history of Old Colchester Park and Preserve using images, texts, and links to provide a virtual experience for visitors to explore the diverse history and stories through the material evidence left behind.



An interactive 3D web scene using ArcGIS Online's CityEngine web viewer where visitors can tour the reconstructed town of Colchester circa 1780. The web viewer is linked with tour point 6: Town of Colchester.

6: TOWN OF COLCHESTER

7: TOWN DEVELOPMENT

8: MORRIS POUND (LOT 18)

9: MORRIS POUND (LOT 26)

10: JOHN MCINTOSH, TAILOR (LOT 20)

11: ROCHAMBEAU MAP

12: HANNAH P. CLARK HOUSE

CART Blog, Twitter post, FCPA blog

AGENCY CATEGORY
Best Use of GIS on the Web

Demographic Interactive Mapper

Neighborhood and Community Services

Demographic Interactive Mapper

http://www.fairfaxcounty.gov/demogrph/maps/datamap_cdp.htm

Paul Maliszewski, Neighborhood and Community Services, Fairfax County Government

Description

The Demographic Interactive Mapper was created to make current Fairfax County demographic data readily accessible for public and internal users. The web application was designed to be easy for users to explore and download demographic data across Fairfax County at different levels of geography. The web application has been used by public citizens, students, internal Fairfax County agencies, and surrounding jurisdictions and governmental agencies among others. Since publication in June, 2014 the Demographic Interactive Mapper has had about 5,000 web visits.

The Demographic Interactive Mapper summarizes the most current demographic data created by county demographers by Community, ZIP code, and Census Block Group levels across Fairfax County. These data include total population estimates, 5-year population forecasts, commercial gross floor area, and number of housing units by type, age, and market value. Users can zoom in and out, pan, search by location, select multiple features to summarize data by geography, and export the whole database or selected data. The Demographic Mapper can be found at http://www.fairfaxcounty.gov/demogrph/maps/datamap_cdp.htm. The data this application provides are being used by different Fairfax County departments and agencies including Transportation, Planning and Zoning, Schools, Human Services, Fire & Rescue among others to help plan for programs and services to fulfill Fairfax County needs.

The Demographic Interactive Mapper was constructed to link to data compiled and summarized from seven tables from an Oracle database that is updated on an annual basis through the Integrated Parcel Lifecycle Process (IPLS). The map data is directly extracted from the tables using a query from ArcMap. As the IPLS process is run on an annual basis, the data that the interactive mapper produces will be updated automatically.

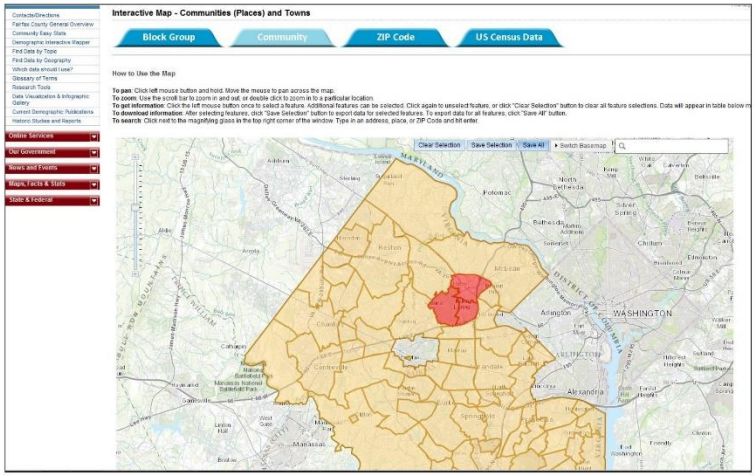


Fig. 1. Map of communities across Fairfax County with selected communities highlighted in red.

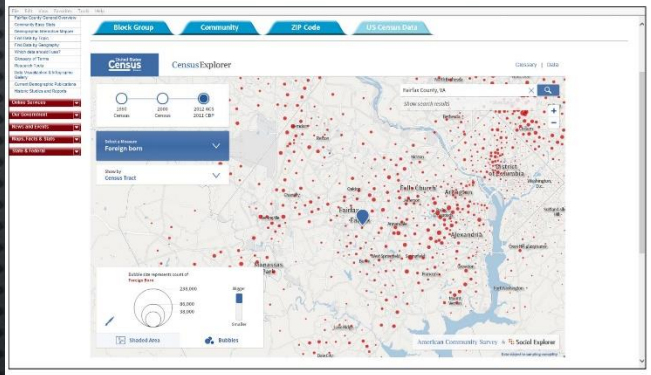


Fig. 2. Map of bubbles showing number of foreign born people across Fairfax County.

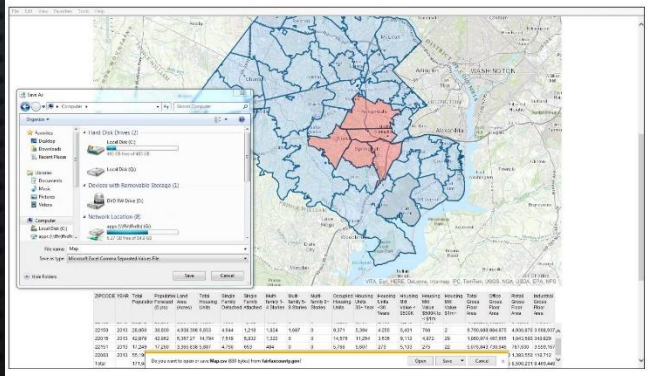


Fig. 3. Map of ZIP codes across Fairfax County with highlighted ZIP codes shown in red. The table below shows the corresponding data associated with the selected features. A window pops open asking the user to save the selected data.

Census Explorer

The Demographic Interactive Mapper also includes U.S. Census Data through the "Census Explorer" that links to a U.S. Census Bureau API through an iFrame window. The Census Explorer includes specific demographic variables at the county level or by census tract. Variables include median household income, 65 and over population, foreign born, high school graduate or more, bachelor's degree or more, master's degree or more, in labor force, professional, scientific and technical industry workers, owner occupied, and household income over $150,000. The Census Explorer also includes County Business Patterns including total wage employees, tech wage employees, average yearly employee wage, average yearly tech employee wage, total establishments, and tech establishments.

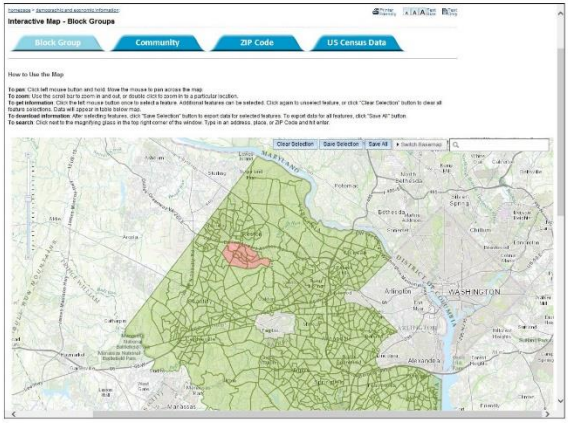


Fig. 4. Map of block groups across Fairfax County with selected block groups highlighted in red.

Source: Fairfax County Department of Neighborhood and Community Services. United States Census Bureau, 2012 American Community Survey.

AGENCY CATEGORY

Most Significant Data Contributor

Existing Land Use

Neighborhood and Community Services

Existing Land Use in Fairfax County

Fatima Khaja, Neighborhood and Community Services, Fairfax County, Virginia

Existing Land Use Layer in Integrated Parcel Lifecycle System

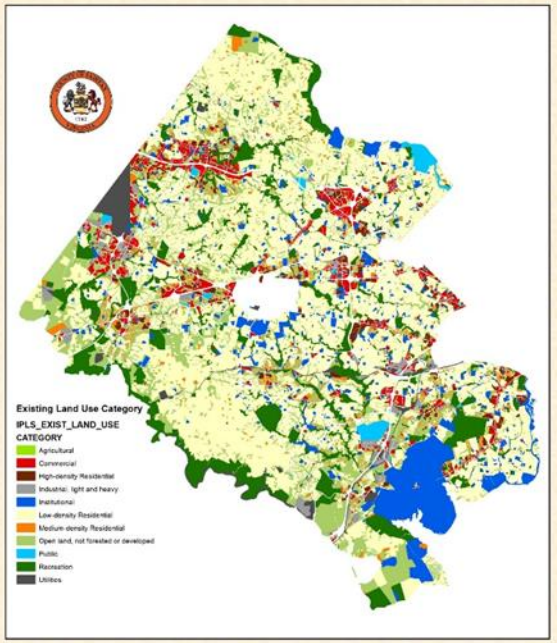
Existing land use and existing land use maps are used by planners and policymakers in determining where future growth should occur and where facilities and infrastructure may be needed. The primary purposes for automating the creation of the existing land use layer were to make it easier to keep this information up-to-date and to reduce the time it takes to produce an existing land use map. The automated Existing Land Use Layer Tool was built as a module in the Integrated Parcel Lifecycle System (IPLS).

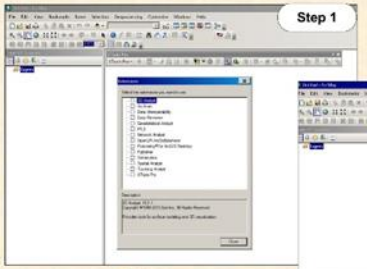
In the past the existing land use layer had to be created manually by using tabular data from Department of Tax Administration (DTA). Each parcel in the DTA database has a designated land use. These data were joined with Fairfax County's GIS spatial data. There are several hundred types of existing land uses and over 400,000 parcels in the DTA database. Because of the large number of specific land use codes, they needed to be categorized into general land use categories and then color coded based on the general use to make them useable for displaying visually in a map. In addition, land associated with condominium projects was not captured unless the analyst created a polygon for the complex.

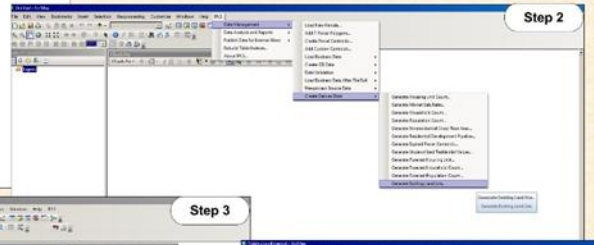
With the automation of this process through IPLS, the existing land use layer can be created in a matter of minutes whereas the manual process took weeks to complete. The existing land use layer can now be easily updated as new data from DTA are loaded into IPLS. The layer can now be hosted in the GIS DataLoader for all county staff to use.

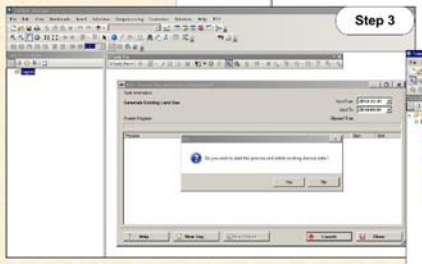
The existing land use layer contains ten general categories:

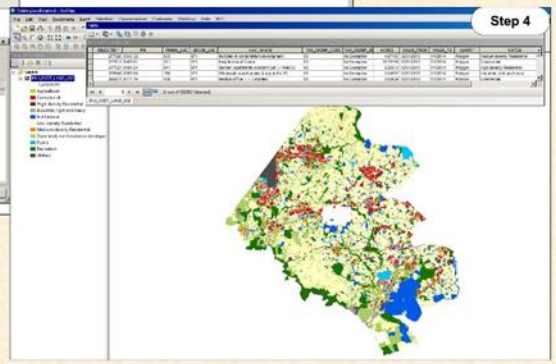
- Agricultural
- Commercial
- Low-density residential
- Medium-density residential
- High-density residential
- Industrial, light and heavy
- Open land, not forested or developed
- Public
- Recreation
- Surface water
- Utilities











The IPLS application is menu driven and the layer is created by using spatial joins and color coded by general category. It also recognizes areas with multiple land uses and creates polygons for condominiums. The resulting layer contains over300,000 records and the following fields:

- Objectid
- Pin: Parcel Identification Number
- Prima_LUC: Primary Land Use
- Secon_luc: Secondary Land Use
- LUC_DESCR: Land Use Description
- TAX_EXEMP_CODE: Tax Exempt Code
- TAX_EXEMP_DESCR: Tax Exempt Description
- Acres: Acres of Land
- Categ: Categories of General Land Use

Fairfax County
NCS
Neighborhood and Community Services

Economic and Demographic Research
Department of Neighborhood and Community Services
October 2014

AGENCY CATEGORY
Best GIS Integration or Application Development

Fairfax County Fire & Rescue Department
ArcGIS Online Website
Fire and Rescue Department

The Fairfax County Fire & Rescue Department's ArcGIS Online Website

The Fairfax County Fire & Rescue Department's GIS team is often tasked with fulfilling ad hoc mapping and spatial data requests from our personnel. One common problem that we face is the time sensitive nature of fire and rescue. Our stations are staffed 24/7, and the GIS team is not always available to address issues when they arise. Firefighters need to be able to quickly access maps and information, such as the locations of fire hydrants near an incident. To accomplish these types of needs at an appropriate scale, the GIS team could make thousands of paper maps to cover the entire county -- however, because our data are constantly changing, it becomes a difficult and feeble effort for us to produce and communicate changes quickly enough for those in the field.

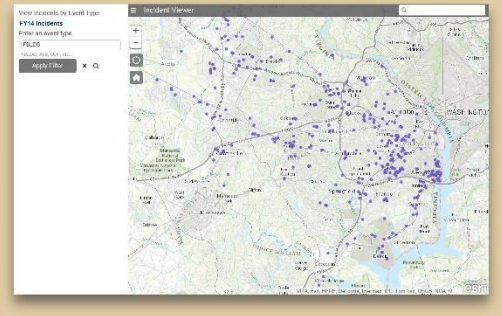
Another problem that we face is the large number of requests that we receive. With 38 fire and rescue stations serving a county of over 1.1 million people, the number of requests that we receive can be significant. Typically, these requests are for similar information but for different areas of the county. Fulfilling these needs is often a manual and time-consuming process, and can lead to additional questions and requirements. For example, creating and providing a pdf map of one fire box boundary may lead to further requests for maps of the neighboring boundaries, and so on.

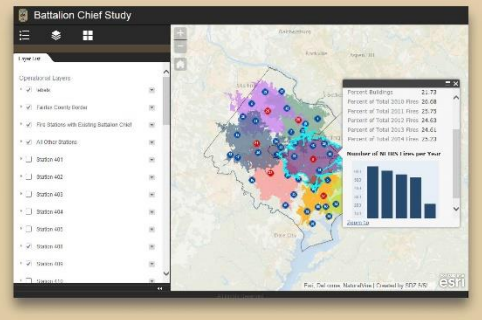
To solve these problems and more, we created an ArcGIS Online website for our personnel to access commonly requested GIS data.

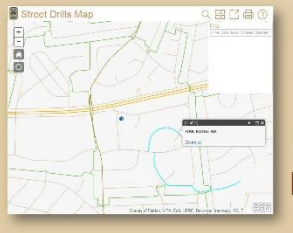
All of our staff have access to web mapping applications on the Fire & Rescue Department ArcGIS Online website. They do not need previous GIS experience to find and view the information that they require, and they no longer have to wait for the GIS team to respond to their common mapping and spatial data requests. This new workflow is beneficial for the GIS team, too, as we now have more time available to focus on our core GIS projects and data efforts.

The Fire & Rescue Department's ArcGIS Online Website is a "one-stop shop" for all of our personnel to quickly access the geographic data and information that they need. At this page, our personnel can access a suite of mapping applications that allow them to:

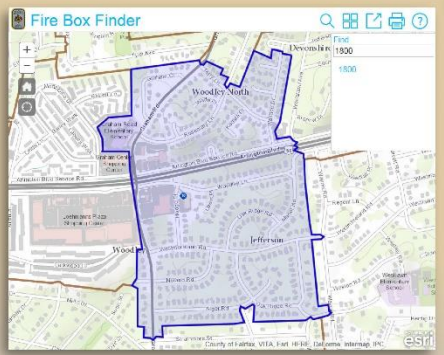
View and filter incidents





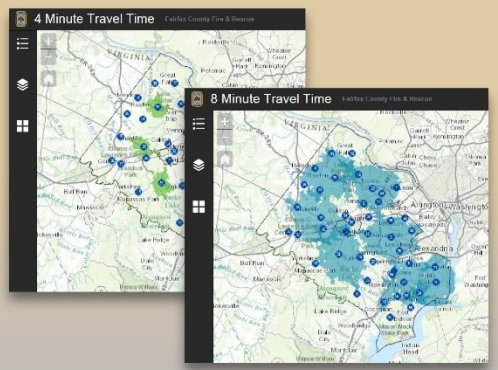


Perform training drills to test street knowledge

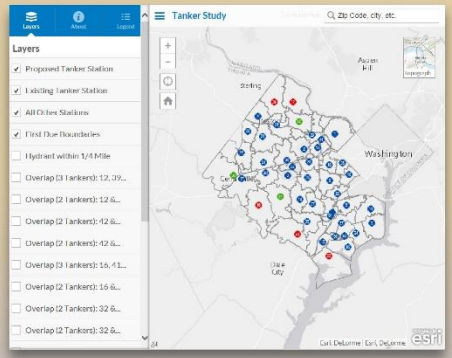


Access ever-changing data (for FRD and other agencies)

View estimated travel time data



Access station planning and analysis tools (for Senior Staff)



Collect and verify hydrant data using ArcGIS Collector

Find station information

AGENCY CATEGORY
Most Significant Progress

Creating a Survey Quality Cadastre
Land Survey Branch of the Department of Public Works and Environmental Services

CREATING SURVEY QUALITY CADASTRAL LAYER

Professional Boundary Determination & Licensed Land Surveyor Analysis

The existing Parcel Layer is remarkably great, considering the historic methods of compilation. Land Survey Branch leadership envisioned improving users' experience of the cadastre through tighter accuracies. The parcel data is used by virtually every GIS user, engineer, surveyor, planner, realtor, District Supervisor, tax administration staff, and even residents use the parcel layer whether or not they realize this. Finally, all the pieces are in place for our plan to share survey quality cadastral solutions with GIS to perform epochs of continual tightening of the existing parcel layer.

In 2003, Land Survey Branch (LSB) began conducting engineering design, construction, and as-built surveys for Capital Improvements Program (CIP) Projects exclusively on the state plane grid, VCS83 North Zone. Over the last 10 years, we added a position focusing on GIS, built skills, and created processes for tracking, converting, and sharing a survey quality cadastre with GIS. Today, we place all of our CIP surveys spatially within the world. Recently, ESRI introduced programs allowing GIS to better process survey data.

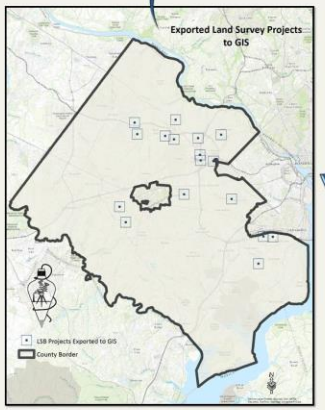
LSB created a GIS Layer as the key for our spatial filing system of some 800 survey projects across the County all of which have professional boundary analysis solutions. We are converting those projects from AutoCAD survey data to ESRI through a process devised through collaboration of GIS and LSB. Thus, we are using agency information created during the surveys largely for CIP projects to build this layer. This is a win-win for Fairfax!

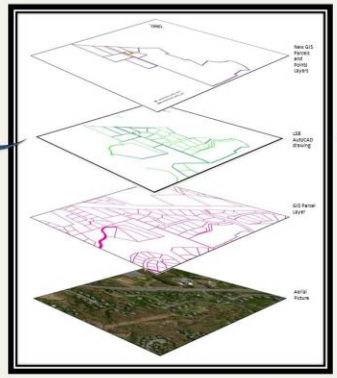
Field surveyed property and right-of-way markers supports professional analysis of the fit of record deeds to the real world. For each project, we analyze deeds for the legal reconstruction of intent under best practices and survey case law, and compute a property mosaic in AutoCAD considering the field evidence. We assign "quality weighting factor" to all field and record evidence at the analysis stage and port that over to ESRI as metadata during the spatial database engine (SDE) edits. Computed deed lines and found evidence "points" go into our Survey Parcel Layer to build a fabric. Surveyed parcels on state plane grid will replace graphic depictions of the parcels. Tightening the existing Parcel Layer to the survey data will create a more accurate cadastre for every GIS user and every published map containing property data.

GIS Sharing Process

Signed, Sealed, and Delivered to clients for Engineering design base

County of Fairfax, Virginia
Department of Public Works and Environmental Services
Capital Facilities, Utilities Design and Construction Division
-Land Survey Branch-



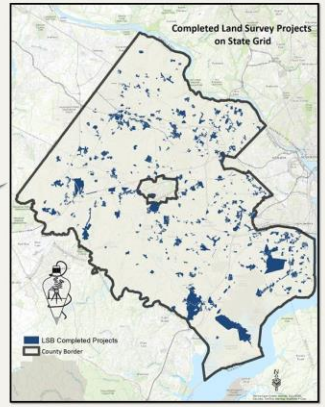


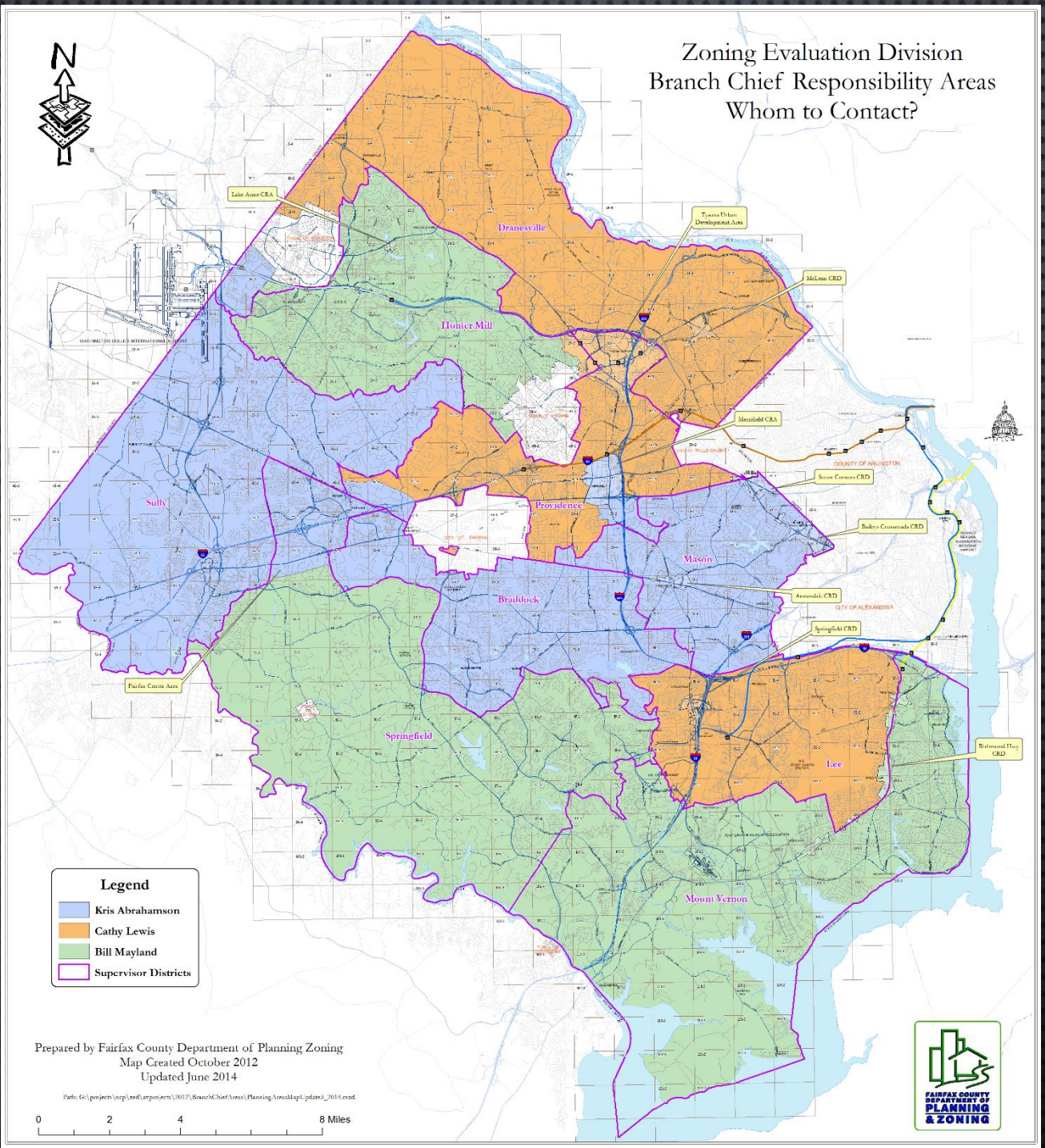
Loading the parcel boundary lines

- Load the CAD drawing file into arc map
- Set a definition query so that only the parcel boundary lines are visible
- Create a version
- Start editing
- Select all boundary lines
- copy the selected lines into the parcel lines layer
- Using COGO toolbar populate line attributes
- Save the edits

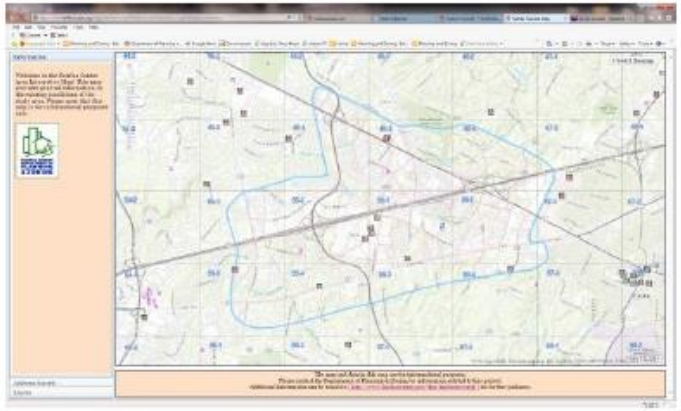
Loading the survey corner points:

- Load the CAD drawing file into arc map
- Set a definition query so that only the parcel corners are visible
- Create a version
- Start editing
- Select all parcel corners points
- copy the selected points into the parcel points layer
- Populate appropriate attributes with Survey quality data
- Save the edits
- Exit Arc Map, open Arc Catalog and use the Add Coordinates tool to update the X, Y, and Z fields.




Zoning Evaluation Division
Branch Chief Responsibility Areas
Whom to Contact?
N
Lake Anne CRA
Tysons Urban Development Area
McLean CRD
Dranesville
Hunter Mill
Merrifield CRA
DOUNTY OF ARLINGTON
Seven Corners CRD
Sully
Providence
Baileys Crossroads CRD
Mason
Annandale CRD
CITY OF ALEXANDRIA
Braddock
Springfield CRD
Fairfax Center Area
Springfield
Lee
Richmond Hwy CRD
Mount Vernon
Legend
Kris Abrahamson
Cathy Lewis
Bill Mayland
Supervisor Districts
Prepared by Fairfax County Department of Planning Zoning
Map Created October 2012
Updated June 2014
Path: G:\projects\orp\zed\mrprojects\2012\BranchChiefAreas\PlanningAreasMapUpdate3_2014.mxd
0
2
4
8 Miles
FAIRFAX COUNTY DEPARTMENT OF PLANNING & ZONING

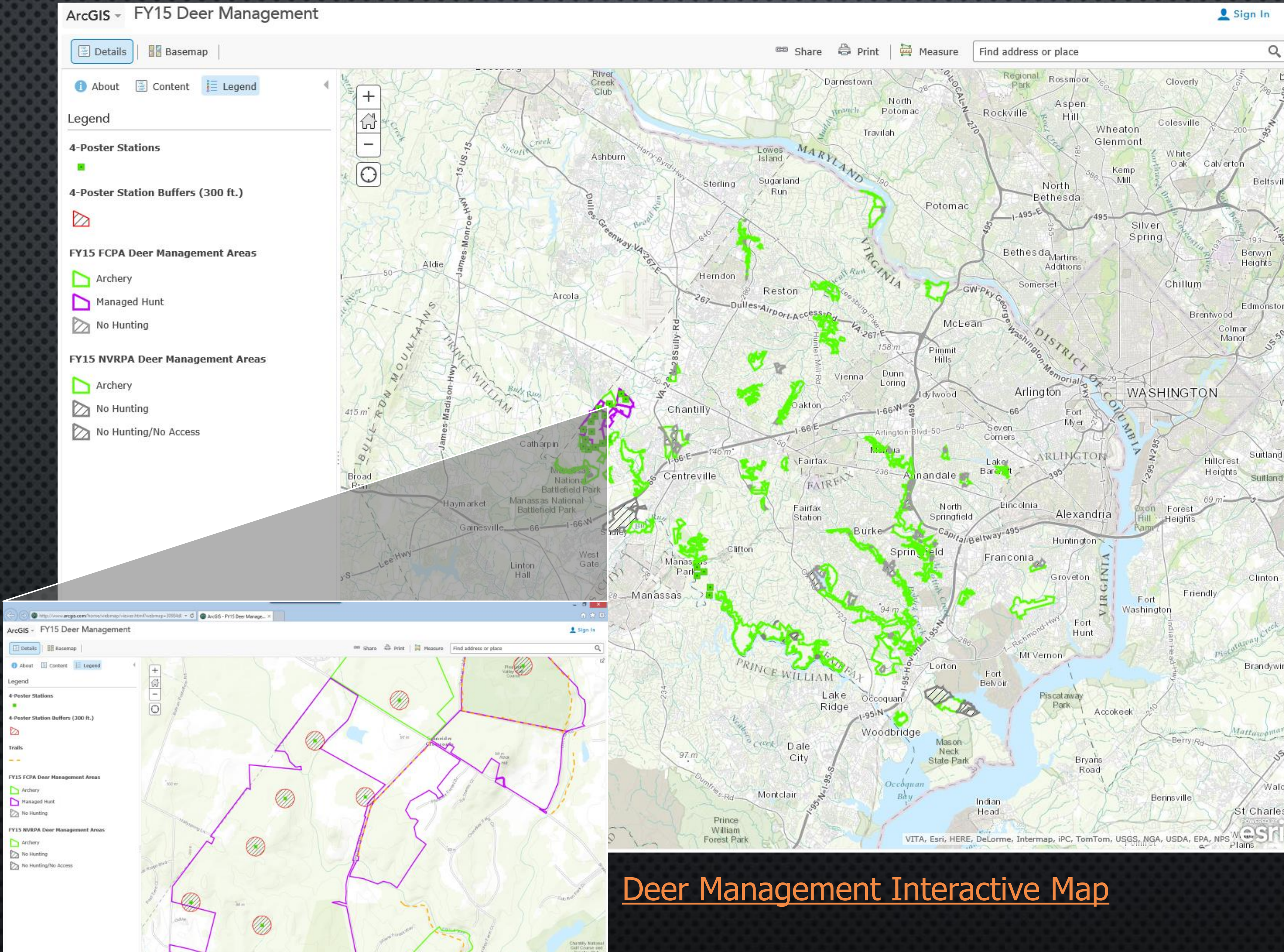
Major Study Area Sub-site (Fairfax Center Area Study)



Link to Interactive Map of Study Area

Static Location map linking to Street Map

Fairfax Forward Website



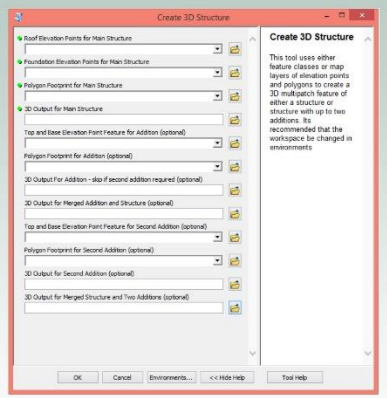
[Deer Management Interactive Map]

Building the 3D "Virtual Representation of the 18th Century Port Town of Colchester" Virginia Web Scene

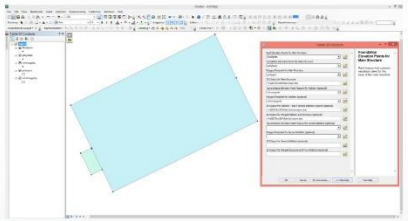
Marion Constante, Cultural Resource Management and Protection Branch, Fairfax County Park Authority

```
## Script to create a 3D Model for a building with or without additions(s).
Feature Class inputs must include referenced polygons and point files with Elevation
values used to create TIN models and Extruded Features (Multipatch).
If including addition(s) the tool will run a merge process
to create a single multipatch object. Can work on any size or shape of building.
The main structure needs separate elevation points for both the roof and foundation, the additions
require seperate fields in the attribute table (elevtop, elevbase).
Created By Marion Constante April 11, 2014"""

# Import arcpy module
import arcpy, sys, string
from arcpy import env
from sys import exit

env.overwriteOutput="True"

# Check out any necessary licenses
arcpy.CheckOutExtension("3D")

coord_sys = arcpy.SpatialReference(2283)

def CreateFeature():
    #Set parameters
    Roof_Points = arcpy.GetParameterAsText(0)
    Base_Points = arcpy.GetParameterAsText(1)
    Bldg_Poly = arcpy.GetParameterAsText(2)

    # Parameters using elevation points for Create TIN tool
    BldgTIN_base = "BldgBase"
    BldgTIN_roof = "BldgRoof"
    Params_Roof = Roof_Points + " " elev Mass_Points <None>"
    Params_Base = Base_Points + " " elev Mass_Points <None>"

    # Create TIN models
    arcpy.CreateTin_3d(BldgTIN_roof, coord_sys, Params_Roof, "DELAUNAY")
    arcpy.CreateTin_3d(BldgTIN_base, coord_sys, Params_Base, "DELAUNAY")

    # Variables for extrude and extrude function to create a 3D multipatch object
    Bldg3D = arcpy.GetParameterAsText(3)
    arcpy.ExtrudeBetween_3d(BldgTIN_roof, BldgTIN_base, Bldg_Poly, Bldg3D)
    arcpy.Delete_management("BldgBase")
    arcpy.Delete_management("BldgRoof")

    # Optional main addition (chimney, addition to structure)
    add_poly = arcpy.GetParameterAsText(5)
    if add_poly:
        addition()
    else:
        arcpy.AddMessage("Done, 3D structure created")
        exit(0)

    return

def addition():
    add_Points = arcpy.GetParameterAsText(4)
    TIN_top = "additionTop"
    TIN_base = "additionBase"
    params_top = add_Points + " elevtop Mass_Points <None>"
    params_base = add_Points + " elevbase Mass_Points <None>"
    arcpy.CreateTin_3d(TIN_top, coord_sys, params_top, "DELAUNAY")
    arcpy.CreateTin_3d(TIN_base, coord_sys, params_base, "DELAUNAY")

    add_poly = arcpy.GetParameterAsText(5)
    addition3D = arcpy.GetParameterAsText(6)
    arcpy.ExtrudeBetween_3d(TIN_top, TIN_base, add_poly, addition3D)
    arcpy.Delete_management("additionTop")
    arcpy.Delete_management("additionBase")

    # Optional second addition (chimney or additional structure)
    add_poly2 = arcpy.GetParameterAsText(9)
    if add_poly2:
        addition2()
    else:
        # Merge both multipatch objects together to form one 3D structure
        Bldg3D = arcpy.GetParameterAsText(3)
        BldgWithAdd_shp = arcpy.GetParameterAsText(7)
        arcpy.Merge_management([Bldg3D,addition3D], BldgWithAdd_shp)

    return

def addition2():
    add2_Points = arcpy.GetParameterAsText(8)
    TIN_top2 = "additionTop2"
    TIN_base2 = "additionBase2"
    params_top2 = add2_Points + " elevtop Mass_Points <None>"
    params_base2 = add2_Points + " elevbase Mass_Points <None>"
    arcpy.CreateTin_3d(TIN_top2, Coordinate_System, params_top2, "DELAUNAY")
    arcpy.CreateTin_3d(TIN_base2, Coordinate_System, params_base2, "DELAUNAY")

    # Variables for extrude to create a 3D multipatch object
    add_poly2 = arcpy.GetParameterAsText(9)
    addition3D_2 = arcpy.GetParameterAsText(10)

    arcpy.ExtrudeBetween_3d(TIN_top2, TIN_base2, add_poly2, addition3D_2)
    arcpy.Delete_management("additionTop2")
    arcpy.Delete_management("additionBase2")

    # Merge all multipatch objects together to form one 3D structure with 2 additions
    Bldg3D = arcpy.GetParameterAsText(3)
    addition3D = arcpy.GetParameterAsText(6)
    BldgWithAdd_shp2 = arcpy.GetParameterAsText(11)
    arcpy.Merge_management([Bldg3D,addition3D,addition3D_2], BldgWithAdd_shp2)

    return


CreateFeature()
```

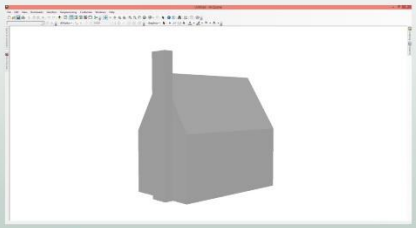
The Python script that is used for the custom ESRI ArcMap tool that requires the user to input point features, which contain elevations to be used to create Triangulated irregular Network (TIN) models for the roof and base of the structure. A polygon is required to extrude between the two TINs by using the tool "Interpolate Polygon to Multipatch" that outputs a 3D multipatch shapefile viewable in ArcScene and the CityEngine web viewer. The user also has the option to create two additions (for Virtual Colchester these were chimneys) using TINs for the base and top and a polygon for the dimensions. The additions are then combined with the main structure to create a single 3D object.



The script tool as seen in ArcMap using the specific parameters to create 3D structures.

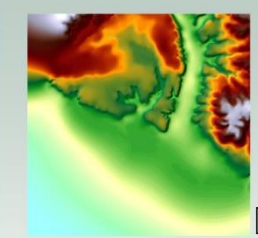


An example of how the "create 3D Structure" works in ArcMap and the elements used to create a 3D model (elevation points and polygons). Below is the output in ArcScene.

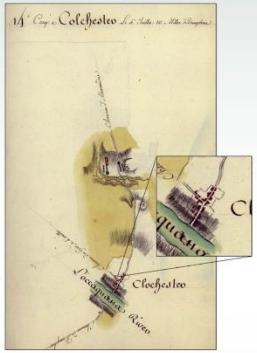


The model of the tobacco funnel in Virtual Colchester, an example of the variety of structures that can be created.

The 3D terrain was created by digitizing the contours of Old Colchester Park and Preserve and surrounding area from the US Geological Society's 1920 Fort Humphreys and vicinity topographic map. The contours were given elevations and created into a Digital Elevation Model (DEM) using the "Topo to Raster" 3D analyst tool in ArcMap.



1920 DEM

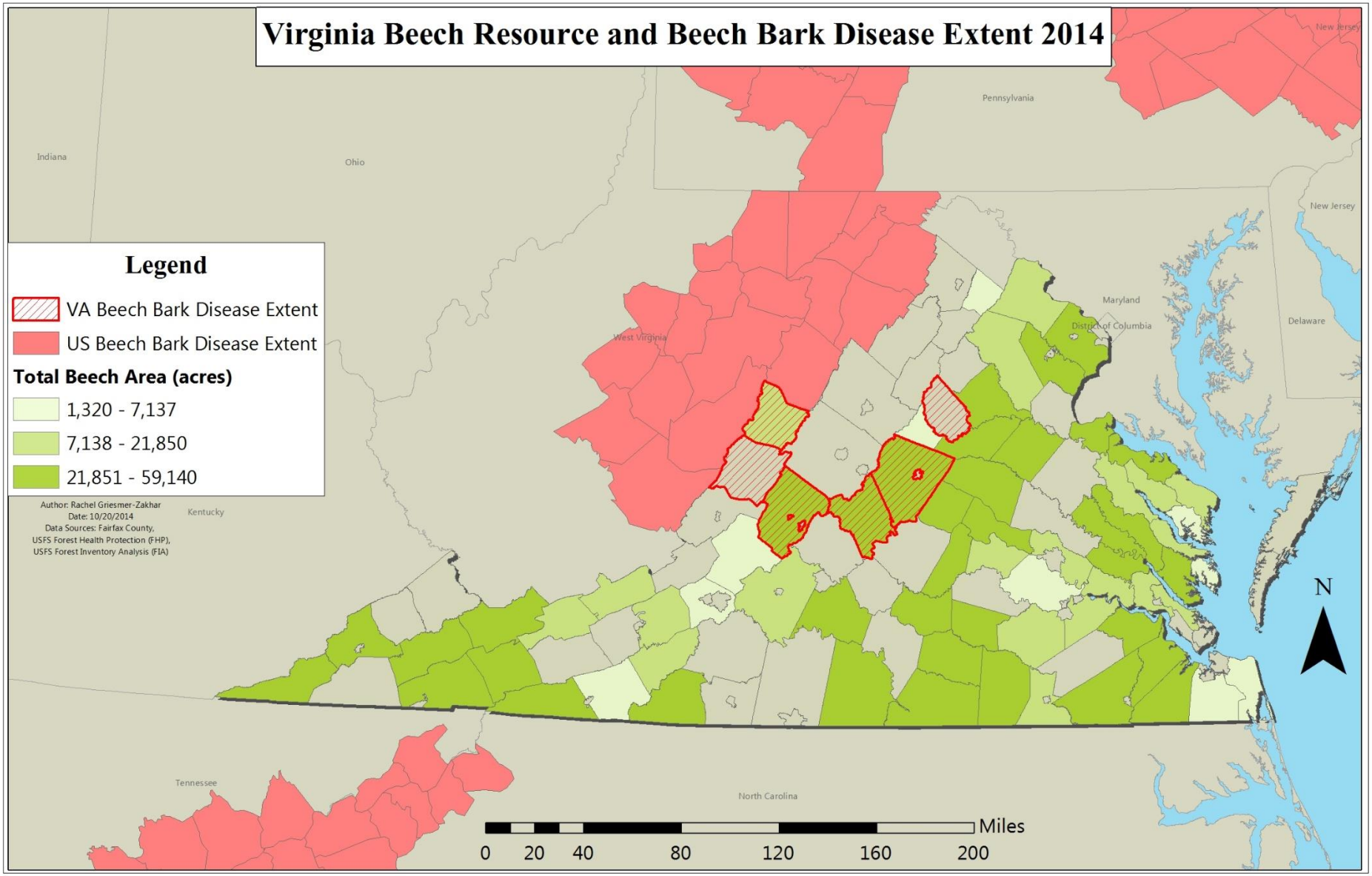


The town roads, fences, and outlying buildings were digitized from the geo-referenced 1782 Rochambeau "Camp' a Colchester" map.

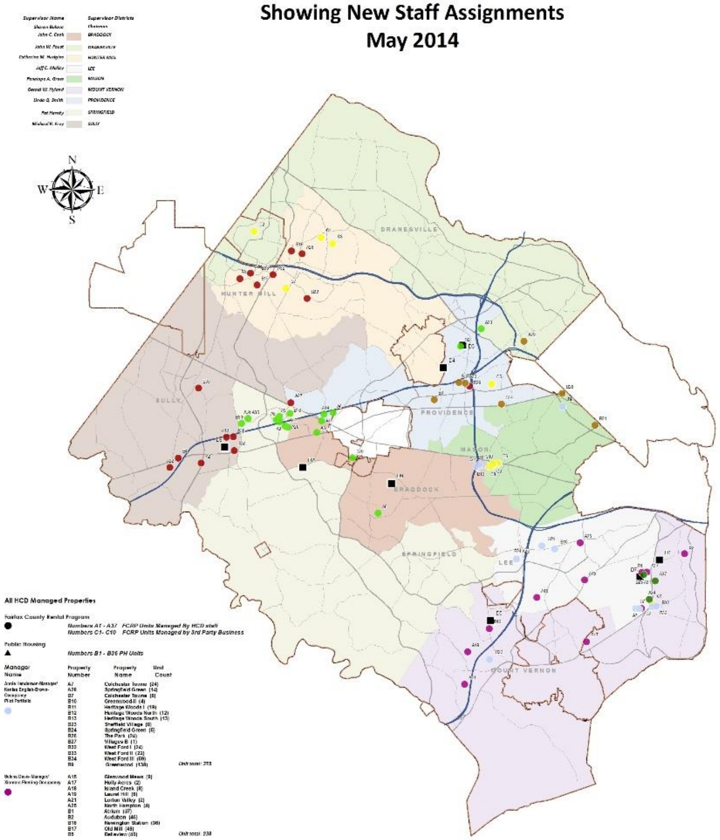
Once all the elements were established in ArcScene (1754 town plat, roads, 3D buildings, trees, occupied dirt lots, extruded polylines for the fences and vineyard, Occoquan River, and shaded relief draped over the 1920 DEM) the scene was exported to a 3D web scene using the "Export to 3D Web Scene" tool in the ArcGIS CityEngine toolbox. The above image is the final scene using the ArcGIS online CityEngine web viewer. The web scene can be viewed here: http://bit.ly/1wbCaiY

(Browser requirements: Mozilla Firefox 16 and higher, Google Chrome 20 and higher, Internet Explorer 11 (limited support), Safari 5 or higher with WebGL enabled)

Virtual Colchester


Virginia Beech Resource and Beech Bark Disease Extent 2014
Legend
VA Beech Bark Disease Extent
US Beech Bark Disease Extent
Total Beech Area (acres)
1,320 - 7,137
7,138 - 21,850
21,851 - 59,140
Author: Rachel Griesmer-Zakhar
Date: 10/20/2014
Data Sources: Fairfax County,
USFS Forest Health Protection (FHP),
USFS Forest Inventory Analysis (FIA)
Indiana
Ohio
Pennsylvania
New Jersey
West Virginia
Maryland
District of Columbia
Delaware
Kentucky
Tennessee
North Carolina
N
Miles
0 20 40 80 120 160 200

Property Portfolios
Showing New Staff Assignments
May 2014



All HCD Managed Properties

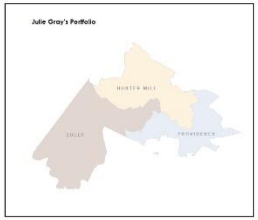
Fairfax County Rental Program

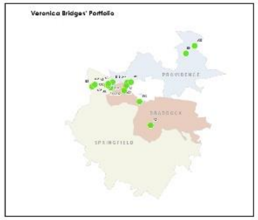
● *Numbers A1 - A37 FCRP Units Managed By HCD staff*
Numbers C1- C10 FCRP Units Managed by 3rd Party Business

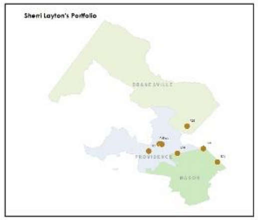
Public Housing

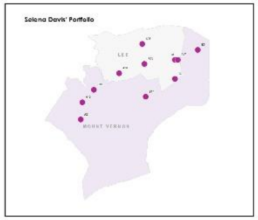
▲ *Numbers B1 - B36 PH Units*

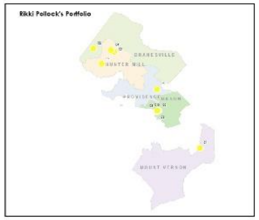
Manager Name	Property Number	Property Name	Unit Count
Annie Henderson-Manager/ Kenlee English-Brown-Occupancy Pilot Portfolio	A7	Colchester Towne (24)	
	A28	Springfield Green (14)	
	B7	Colchester Towne (8)	
	B10	Greenwood-II (4)	
	B11	Heritage Woods I (18)	
	B12	Heritage Woods North (12)	
	B13	Heritage Woods South (13)	
	B23	Sheffield Village (8)	
	B24	Springfield Green (6)	
	B26	The Park (24)	
	B27	Villages B (1)	
	B32	West Ford I (24)	
	B33	West Ford II (22)	
	B34	West Ford III (59)	
	B9	Greenwood (138)	*Unit total: 275*
Selena Davis-Manager/ Xiomara Fleming-Occupancy	A15	Glenwood Mews (9)	
	A17	Holly Acres (2)	
	A18	Island Creek (8)	
	A19	Laurel Hill (8)	
	A21	Lorton Valley (2)	
	A25	North Hampton (4)	
	B1	Atrium (37)	
	B2	Audubon (46)	
	B16	Newington Station (36)	
	B17	Old Mill (48)	
	B5	Belleview (40)	*Unit total: 238*
Sherri Layton-Manager/ Agnes Black-Colden-Occupancy	A16	Halstead at the Metro I & II (4)	
	A29	Stockwell Manor (3)	
	A33	Westbriar (1)	
	B3	Barkley Square (3)	
	B14	Kingsley Park (107)	
	B21	Rosedale (95)	
	B28	Villages (38)	*Unit total: 260*
Veronica Bridges-Manager/ Gwendolyn Davis-Occupancy	A4	Charleston Square (1)	
	A5	Chatham Town (10)	
	A6	Coan Pond (19)	
	A8	East Market I (2)	
	A9	East Market II (1)	
	A10	East Market II M (1)	
	A11	Fair Oaks Landing (1)	
	A12	Fair Oaks Landing N (2)	
	A14	Fairfax Ridge (1)	
	A34	Westcott Ridge (10)	
	A20	Legato Corner (13)	
	A35	Willow Oaks (2)	
	A36	Willow Oaks M (5)	
	A3	Cedar Lakes (3)	
	A23	McLean Hills (26)	
	B6	Briarcliff (20)	
	B31	Waters Edge (9)	
	B20	Robinson Square (46)	
	B18	Ragan Oaks (51)	*Unit total: 222*
Julie Gray-Manager/ Joni Young-Occupancy	A1	Bryson at Woodland Park (4)	
	A2	Castellani (24)	
	A13	Faircrest (8)	
	A22	Madison Ridge (10)	
	A26	Parc Reston (23)	
	A27	Penderbrook (48)	
	A30	Stonegate at Faircrest (1)	
	A32	West Glade (24)	
	B4	Barros Circle (44)	
	B8	Copper Mill (4)	
	B15	Monroe Chase (3)	
	B18	Ragan Oaks (51)	
	B22	Shadowood (16)	
	B29	Virginia Station (6)	
	B30	Walney Oaks (6)	
	B36	Woodland Glen (5)	
	B19	Reston Town Center (30)	*Unit total: 280*
Christina White	A24	Murraygate Village (200)	
	A31	Tavenner Lane (12)	
	A37	Woodley Hills Estates (115)	
	B35	Tavenner Lane (12)	*Unit total: 339*
Rikki Pollack	C1	Gum Springs Glen (60)	
	C2	Herndon Harbor House (120)	
	C3	Cedar Ridge (195)	
	C4	Crescent Apartments (180)	
	C5	Hopkins Glen (91)	
	C6	Little River Square (45)	
	C7	Stonegate Village (240)	
	C8	Wedgewood West (424)	
	C9	Wedgewood East (123)	
	C10	Wedgewood Manor (125)	*Unit total: 1665*
Michael Beals	D1	Beacon Hill Group Home (8 beds)	
	D2	Braddock Crossing Group Home (8 beds)	
	D3	Minerva Fisher Hall Group Home (12 beds)	
	D4	Patrick Street Group Home (8 beds)	
	D5	Rolling Road Group Home (5 beds)	
	D6	Mondloch Place (20 units)	
	D7	Mondloch I (4 beds)	
	D8	Leland Road Group Home (8 beds)	
	D9	Dequincey Group Home (5 beds)	
			Group Home total: 9

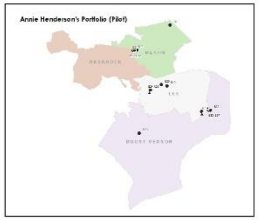


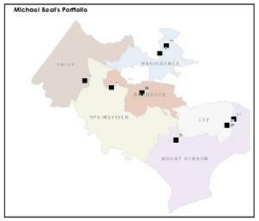


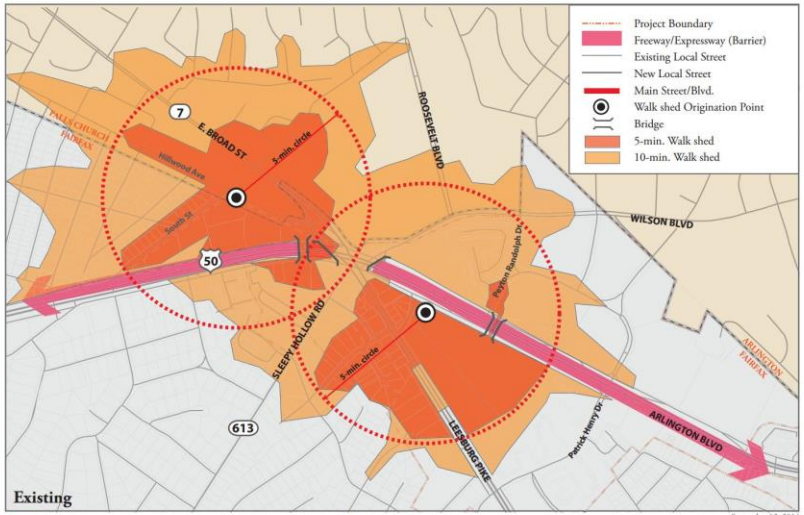






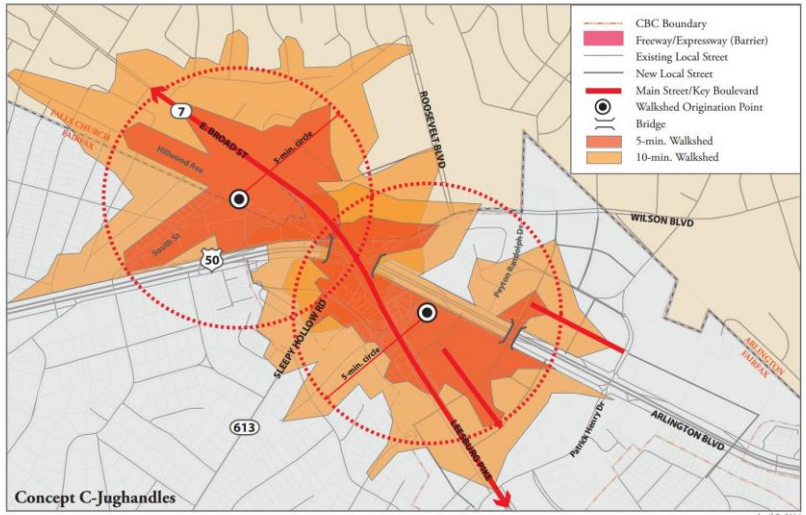






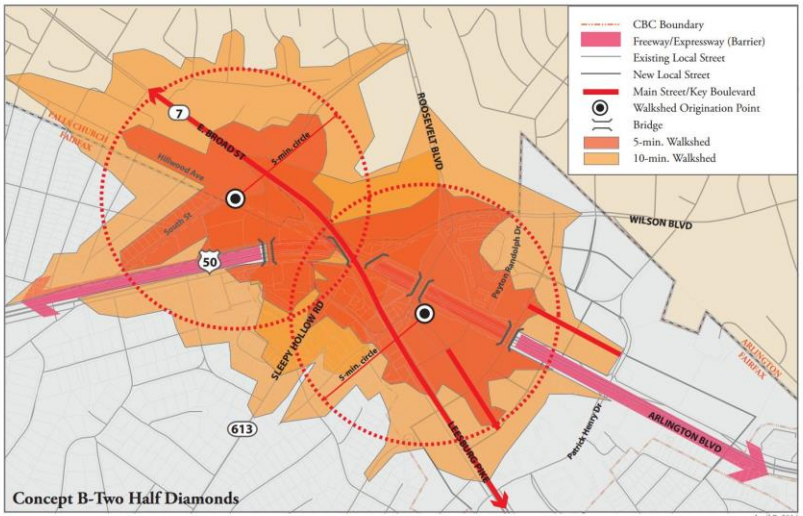
SEVEN CORNERS TRANSPORTATION STUDY
Fairfax County, Virginia

WALKSHED



SEVEN CORNERS TRANSPORTATION STUDY
Fairfax County, Virginia

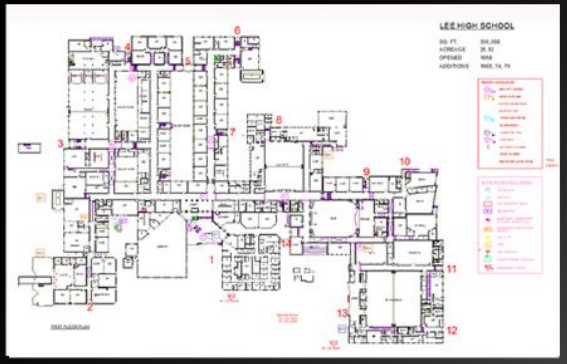
WALKSHED



SEVEN CORNERS TRANSPORTATION STUDY
Fairfax County, Virginia

WALKSHED

Constructing Interior 3D Models of Fairfax County's School Buildings From CAD .DWG Files.



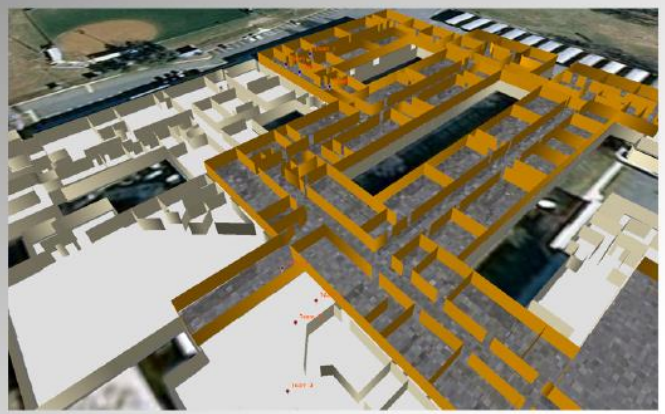
1. CAD drawings where obtained from Liz Hatcher. Functional Application Specialist II, Fairfax County Public Schhols. CAD .DWG files were added to an ArcMap project. The tool Georeferencing was used to supply spatial data to the later, since .DWG files don't include any spatial data. Without this data the .DWG llayer won't display correctly with other spatial data.

2. Areal photos of the schools were from the County's shared SDE. These spatialy known photos were used along side the Geo-referencing tool to help idenitfy known control point. Corners from the school in the areal photos were matched up with the corresponding corner of the .DWG layer. Once more then three control points were mapped the georeferncing tool could adjuct the .DWG file and assign the correct spatail data to the layer.

3. Once all the control points have been assigned the georeferencing tool will adjust the .DWG layer to the correct spatial location that you determined. This spatially enhanced layer was saved and stored within a shared folder and posted to the GIS-Server for other to consume within their online projects.

4. With the .DWG file located accurately on top of the targeted school, a lines layer was generated to repersent the walls within the school. Depending on what, when, how and who will be consuming the attribute can differ to the projects needs. This layer was also stored within a shared drive and posted to the GIS-Server for others to consume within their online projects.

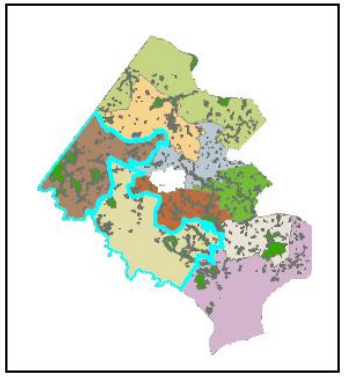
5. Within ArcGlobe the school's line layer were added and the Elevation of the walls where entered onto the properties of the line layer based off the information within the CAD files. These 3D models can be rapidly deployed within the Incident command center to size up an event and determine the best placement of resources around and/or within the structure. The Police are looking to utilities these models within training first to determine their usefulness within a live event.



6. With anticipation of the new Officer's radios with GPS capabilities, the police department's looking to utilize this information out in the field. Employing the Tracking Analysis tool within ArcGIS, the radio GPS information stored within the SQL database can be leveraged and displayed within the 3D models by analysis within an incident command center. Data can be relayed decision makers to aid them in visually identifying resources within the incident, potential threats, location of buildings utilities, as well as the location and status of personal.


COUNTY OF FAIRFAX
COMMONWEALTH OF VIRGINIA
2014 Parks with Trails
PUBLIC PARKS
FCPA Parks
Northern VA Regional Park Authority
Golf Course
City of Fairfax
Town of Herndon
Town of Vienna
Commonwealth of Virginia
United States of America
COUNTY OF ARLINGTON
CITY OF ALEXANDRIA
Miles
0 0.5 1 2 3
Current as of: 10/22/2014

Athletic Fields Data



Legend

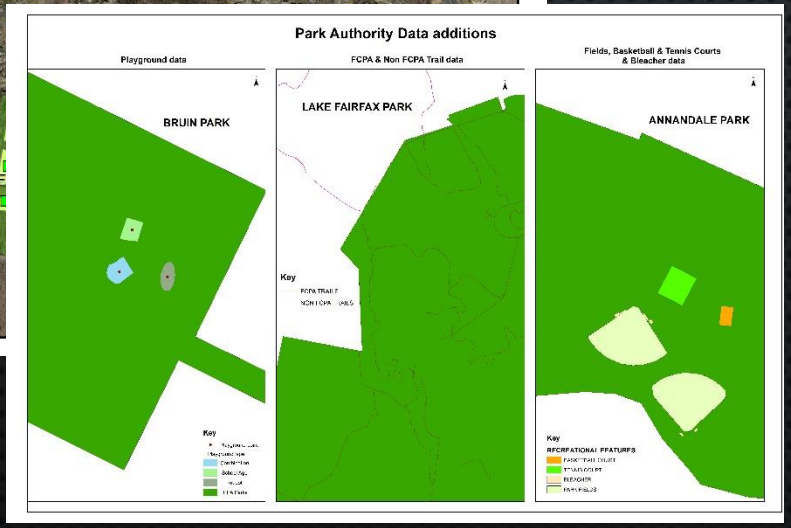
PARKS ATHLETIC FIELDS
- DIAMOND GRASS 90
- DIAMOND SKINNED 90
- DIAMOND SYNTHETIC
- RECTANGLE SYNTHETIC
- DIAMOND GRASS 60/65/70/75/80
- DIAMOND SKINNED 60/65/70/75/80
- RECTANGLE GRASS
- TEE BALL GRASS
- TEE BALL SKINNED

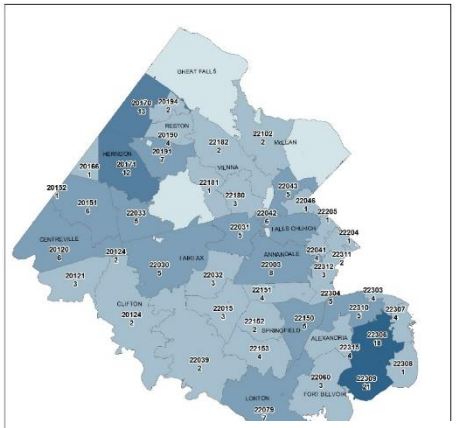
School Fields
- Adult Baseball
- Adult Softball
- Diamond-Synthetic
- Rectangle
- Rectangle-Synthetic
- Youth Baseball
- Youth Softball

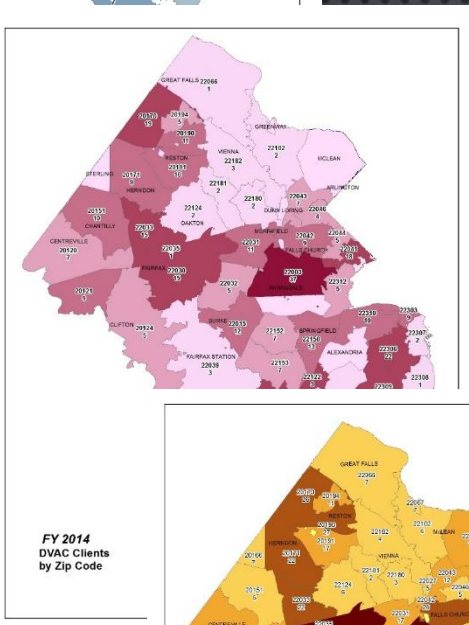
Park Fields
- Park Fields

School Fields
- School Fields

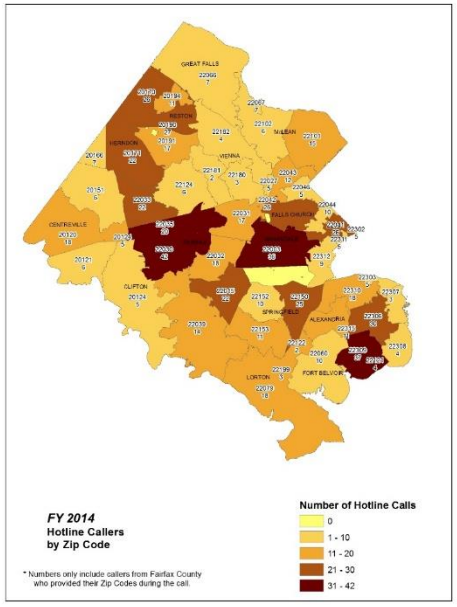
PRKMGR.PARKS_FCPA
- PRKMGR.PARKS_FCPA

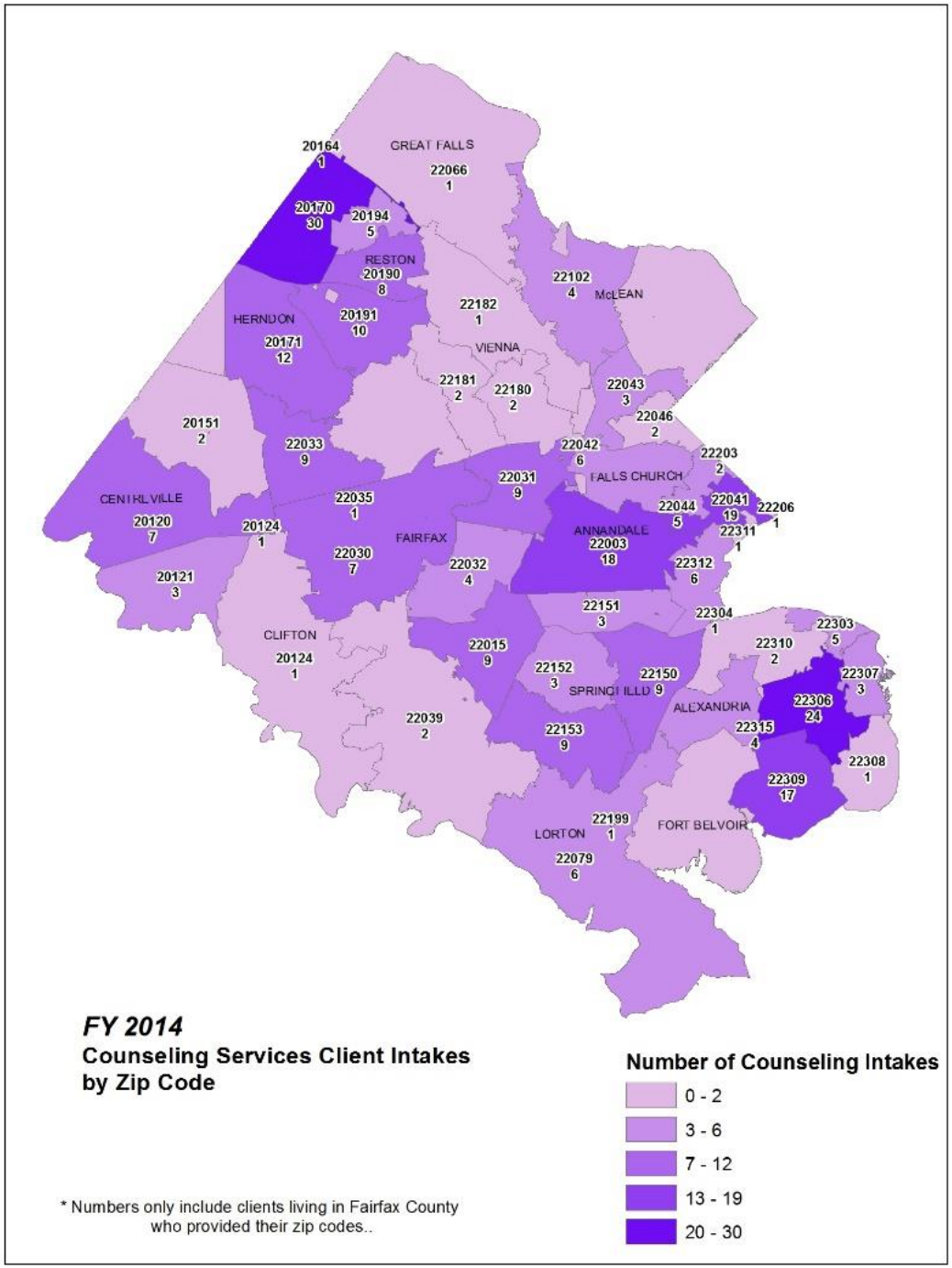






FY 2014
DVAC Clients
by Zip Code





Giving The Power and Tools of GIS To The Users In The Field.

ESRI's ArcMap mapping suite is a group if useful software to collect and build data that users are requesting to utilize out in the field. Before any layers should be collected or built, it's important to understand the needs of the users. What type of data is needed? How's the data going to be collected? What devices are available to the user? And what types of attributes does the user need to have access to?

A GIS Server or an ArcOnline account is needed within the County to publish your data for online distribution. Published layers can be made public or privately within a group, depending on the security that you project needs. FlexViewer or ArcOnline can be used to create and manage these published layers. Additional widgets or tools can be added to your map to give the users more options and/or increase their productivity.

Free GIS online apps. (ArcCollector, ESRI Online, etc...) are available for download on most mobile devices. These apps. allow the user to view and edit layers within the field. Most mobile devices used in the field have GPS capabilities and can be used to collect and display your position within the application. With the mobile devices connected to a network any changes made to the layers within the app. are live and can be viewed by all other connected devices. Operations Dashboard is a standalone application on a computer that allows supervisors and/or commanders the ability to have a broad overview of the project, but not the ability to edit. Preloaded widgets performs basic analysis to provide a quick snapshot of the overall scope of the operation, allowing supervisor or commanders the ability to make real time decisions.

Spatiotemporal Geovisualization of Repeated Sinkhole Complaints 1984-2014 for the Determination of Storm Pipe Rehabilitation Priority

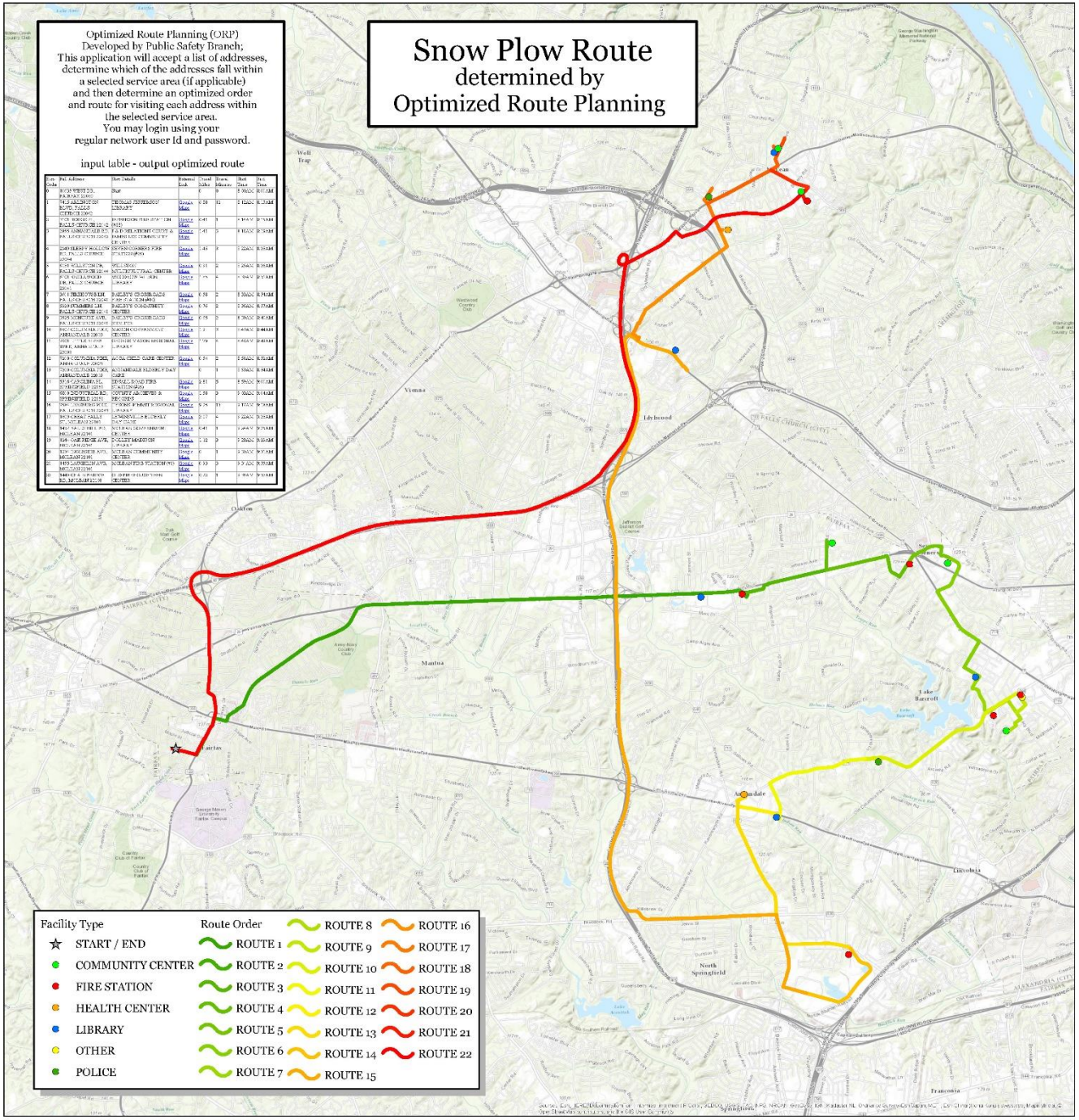
Sinkhole Frequency:
Number of Complaints of Sinkholes

- 1
- 2
- 3
- 4 - 5
- 6 - 14
- STATE
- COUNTY
- TOWN
- CITY

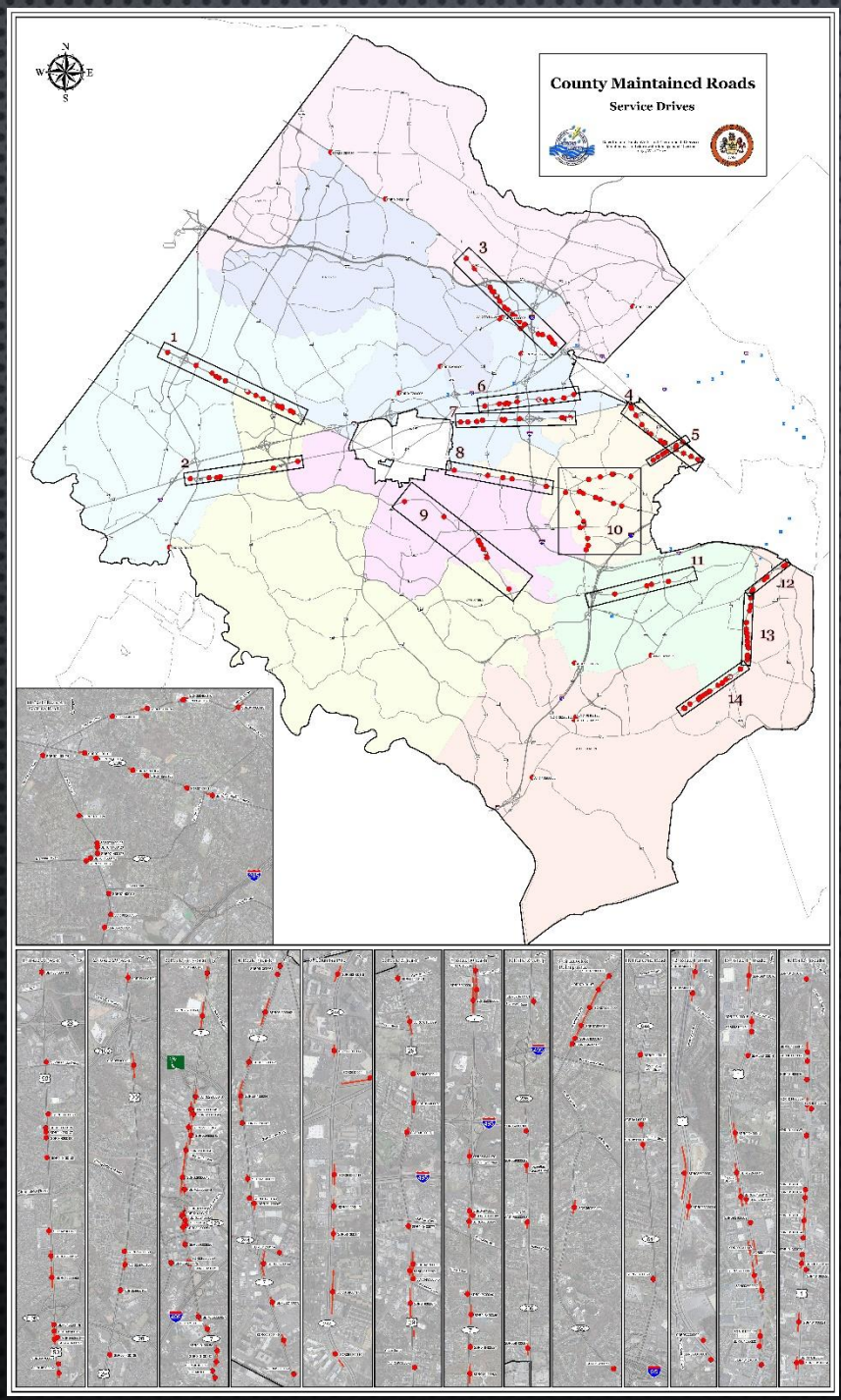
Supervisor Districts, Ft. of Pipe per Sq Mi

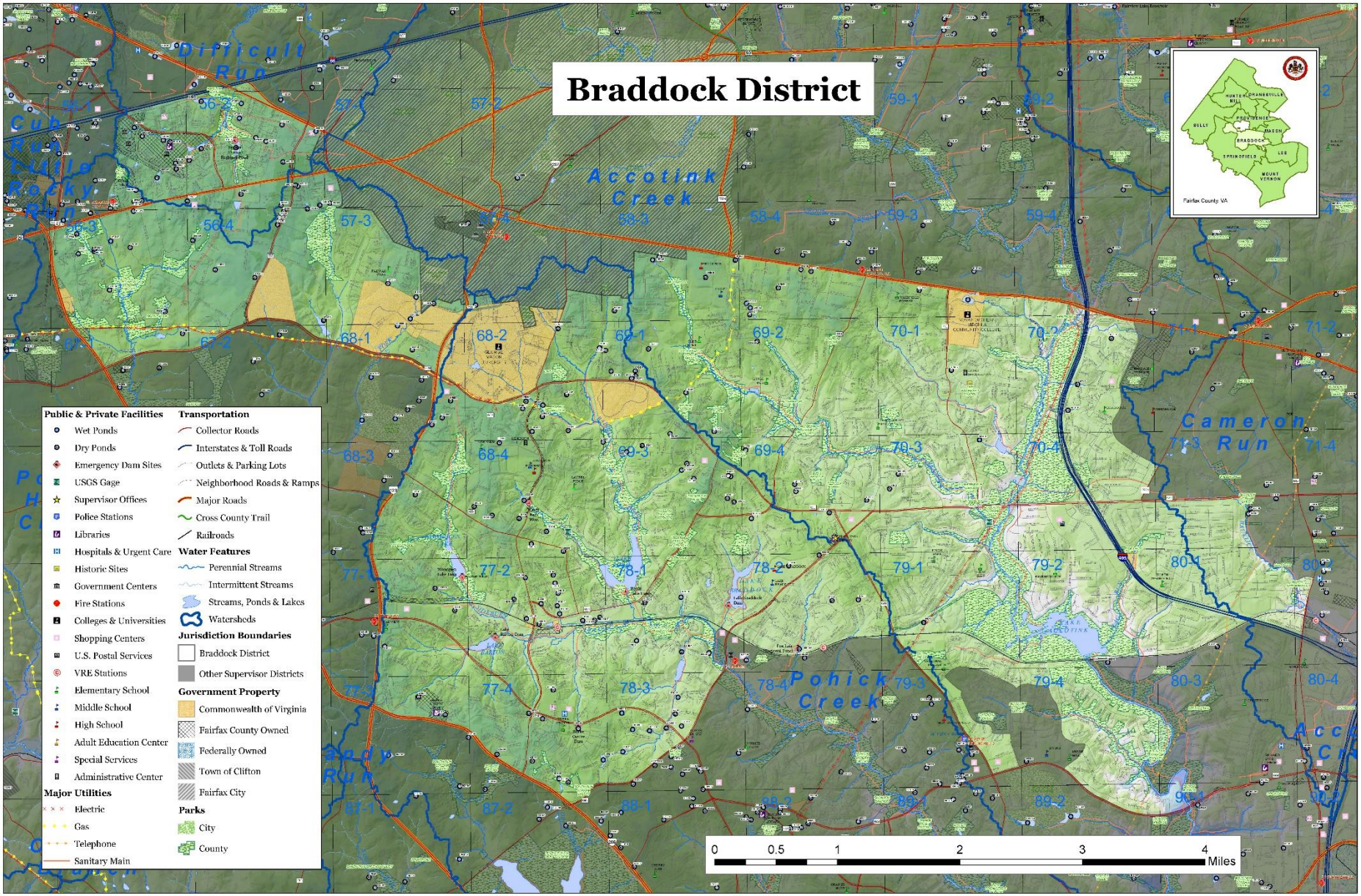
- BRADDOCK, 37109.3
- DRANESVILLE
- HUNTER MILL
- LEE
- MASON
- MOUNT VERNON
- PROVIDENCE
- SPRINGFIELD
- SULLY

COUNTY OF FAIRFAX 1742 VIRGINIA


Optimized Route Planning (ORP)
Developed by Public Safety Branch;
This application will accept a list of addresses, determine which of the addresses fall within a selected service area (if applicable) and then determine an optimized order and route for visiting each address within the selected service area.
You may login using your regular network user Id and password.
input table - output optimized route
Snow Plow Route
determined by
Optimized Route Planning
Facility Type
START / END
COMMUNITY CENTER
FIRE STATION
HEALTH CENTER
LIBRARY
OTHER
POLICE
Route Order
ROUTE 1
ROUTE 2
ROUTE 3
ROUTE 4
ROUTE 5
ROUTE 6
ROUTE 7
ROUTE 8
ROUTE 9
ROUTE 10
ROUTE 11
ROUTE 12
ROUTE 13
ROUTE 14
ROUTE 15
ROUTE 16
ROUTE 17
ROUTE 18
ROUTE 19
ROUTE 20
ROUTE 21
ROUTE 22
Vienna
Idylwood
Clarton
Mantua
Fairfax
Annandale
Lake Barcroft
North Springfield
Lincolnia
Franconia

ANNANDALE REVITALIZATION DISTRICT


County Maintained Roads
Service Drives
N
W
E
S
1
2
3
4
5
6
7
8
9
10
11
12
13
14


Braddock District
Difficult Run
Accotink Creek
Cameron Run
Pohick Creek
Public & Private Facilities
Wet Ponds
Dry Ponds
Emergency Dam Sites
USGS Gage
Supervisor Offices
Police Stations
Libraries
Hospitals & Urgent Care
Historic Sites
Government Centers
Fire Stations
Colleges & Universities
Shopping Centers
U.S. Postal Services
VRE Stations
Elementary School
Middle School
High School
Adult Education Center
Special Services
Administrative Center
Major Utilities
Electric
Gas
Telephone
Sanitary Main
Transportation
Collector Roads
Interstates & Toll Roads
Outlets & Parking Lots
Neighborhood Roads & Ramps
Major Roads
Cross County Trail
Railroads
Water Features
Perennial Streams
Intermittent Streams
Streams, Ponds & Lakes
Watersheds
Jurisdiction Boundaries
Braddock District
Other Supervisor Districts
Government Property
Commonwealth of Virginia
Fairfax County Owned
Federally Owned
Town of Clifton
Fairfax City
Parks
City
County
0 0.5 1 2 3 4 Miles
HUNTER MILL
PROVIDENCE
SULLY
MASON
BRADDOCK
SPRINGFIELD
LEE
MOUNT VERNON
Fairfax County VA

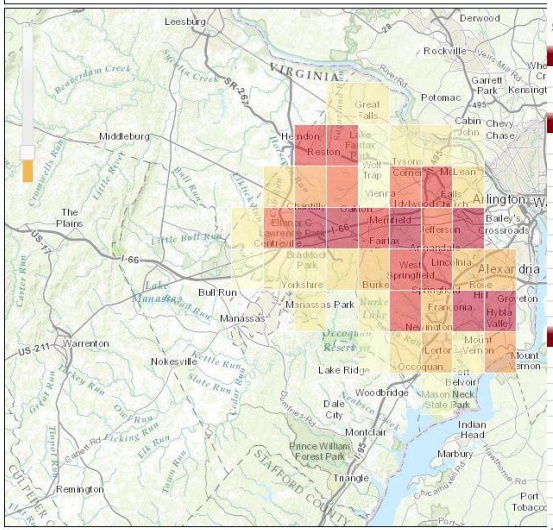
MS4 Reporting: Maps

Table View
Annual Report
Sites Chart
Disposed Material Chart
Sweeping Map

From Event Date: | Search Text:
To Date:

Showing: 44 regions with 325 locations

Reset Zoom | Radius: 250 yards | Clear Map | Help



Search Filters

Reporting Year
- 2013 [379 of 379]
- 2012 [360 of 360]
- 2011 [1 of 1]
- 2010 [1 of 1]
- 2009 [1 of 1]
- 2008 [1 of 1]

Watershed
- Accotink Creek [104 of 104]
- Cameron Run [94 of 94]
- Difficult Run [73 of 73]
- Cub Run [71 of 71]
- Pohick Creek [61 of 61]
- Sugarland Run [34 of 34]
- Dogue Creek [32 of 32]
- Little Hunting Creek [29 of 29]
- Popes Head Creek [28 of 28]
- Pimmit Run [21 of 21]

Show More ...

Location
- All Locations [4 of 4]
- Burke School [3 of 3]
- Colin L Powell Elementary [3 of 3]
- McConnell PSTOC [3 of 3]
- Poplar Tree Elementary [3 of 3]
- Quander Road School [3 of 3]
- Silverbrook Elementary ... [3 of 3]
- Abbott Lane [2 of 2]
- ACCA Child Care Center [2 of 2]
- Animal Shelter- Tempor ... [2 of 2]

Show More ...

MS4 Reporting: Roadways Sweeping Search Results

Printer Friendly | Text Size | Text Only

Table View
Annual Report
Sites Chart
Disposed Material Chart
Sweeping Map

From Date: | Search Text: | Search
To Date:

Search Results (740) Add New (+)

<< < 1 2 3 4 ... > >>

Sweep Date	Location	Disposed Material (Tons)	Sweep Area (Square Yds)	Reporting Year	
08/16/2013	A Scott Crossfield Elementary	5.53	9,203	2013	
08/17/2013	A Scott Crossfield Elementary	2.89	6,144	2013	
09/30/2013	Abbott Lane	0.29	0	2013	
05/12/2013	ACCA Child Care Center	1.10	2,500	2013	
07/17/2013	Alan Lei Center	1.76	4,469	2013	
06/20/2003	Alban Garage	6.42	19,200	2013	
09/30/2013	Alley Lee Manor Subdivision	0.29	0	2013	
10/03/2013	Alley thru 37 (Woodhaven)	0.36	0	2013	
10/04/2013	Alley thru Block 28	0.36	0	2013	
04/14/2013	Animal Shelter- Temporary parking lot	4.51	21,100	2013	

<< < 1 2 3 4 ... > >>

Search Filters

Reporting Year
- 2013 [379 of 379]
- 2012 [360 of 360]

Watershed
- Accotink Creek [104 of 104]
- Cameron Run [94 of 94]
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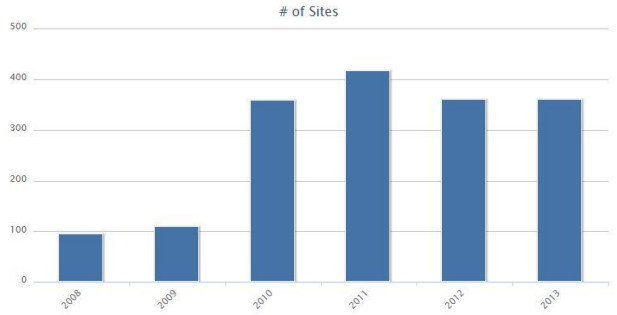
- ACCA Child Care Center [2 of 2]
- Animal Shelter- Tempor ... [2 of 2]
- A Scott Crossfield Ele ... [2 of 2]

Show More ...

Sites Chart
Disposed Material Chart
Sweeping Map

To Date:

Year-over-Year Comparison



Search Filters

Watershed
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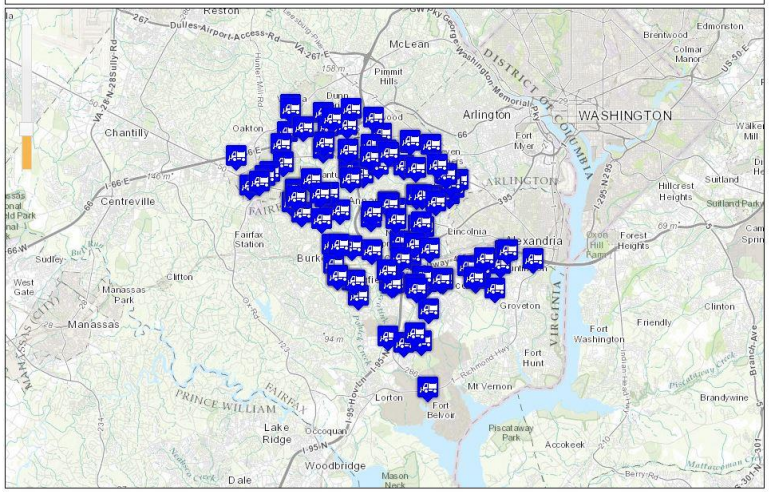
- Abbott Lane [2 of 2]
- ACCA Child Care Center [2 of 2]
- Animal Shelter- Tempor ... [2 of 2]

Show More ...

Chart
Sweeping Map

Showing: 198 surrounding locations

Reset Zoom | Radius: 250 yards | Clear Map | Help



Search Filters

Shortcuts
- Clear Search Conditions

Reporting Year
- 2013 [91 of 379]
- 2012 [107 of 360]
- 2011 [0 of 1]
- 2010 [0 of 1]
- 2009 [0 of 1]
- 2008 [0 of 1]

Watershed
- Accotink Creek [104 of 104]
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- Sugarland Run [0 of 34]
- Dogue Creek [0 of 32]
- Little Hunting Creek [0 of 29]
- Popes Head Creek [0 of 28]
- Pimmit Run [0 of 21]

Show More ...

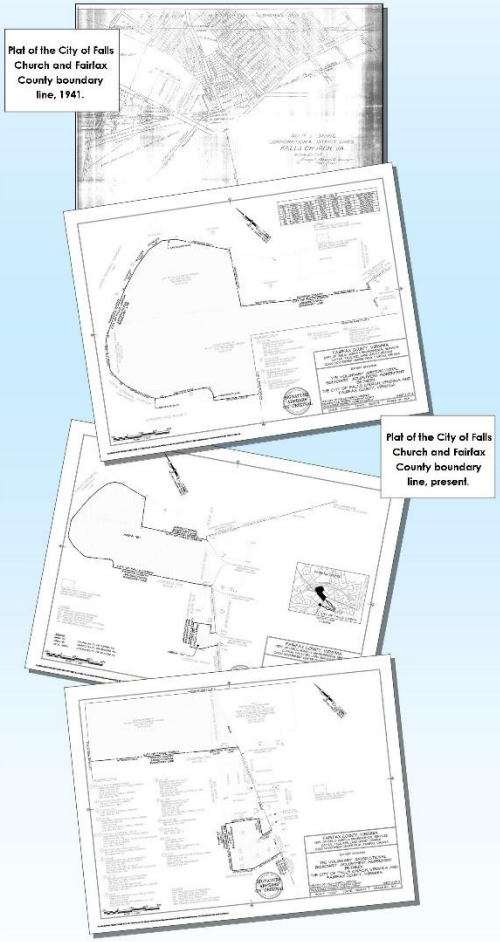
Location
- All Locations [0 of 4]
- Burke School [0 of 3]
- Colin L Powell Elementary [0 of 3]
- McConnell PSTOC [0 of 3]
- Poplar Tree Elementary [0 of 3]
- Quander Road School [0 of 3]
- Silverbrook Elementary ... [0 of 3]
- Abbott Lane [0 of 2]
- ACCA Child Care Center [2 of 2]
- Animal Shelter- Tempor ... [0 of 2]

Show More ...

BOUNDARY

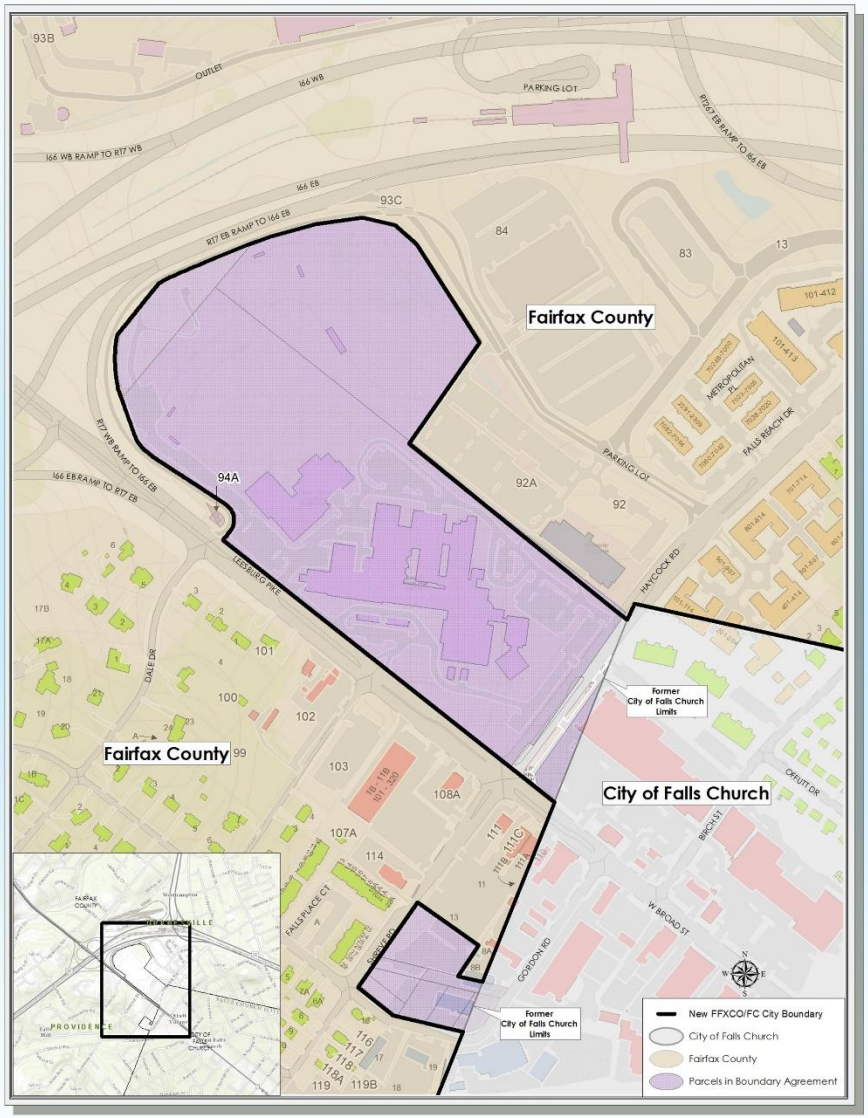
LINE ADJUSTMENT AGREEMENT

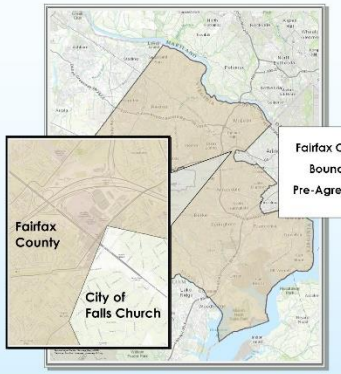
by and between the City of Falls Church
and Fairfax County



Plat of the City of Falls Church and Fairfax County boundary line, 1941.

Plat of the City of Falls Church and Fairfax County boundary line, present.



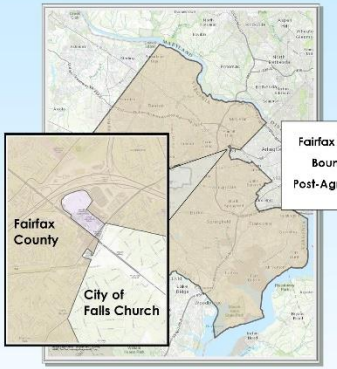


Fairfax County Boundary Pre-Agreement

Fairfax County acquired assets of the water system of Falls Church effective January 3, 2014.One condition of the sales agreement was a "Boundary Line Adjustment Agreement" changing the jurisdictional boundary between City and County. Land Survey Branch, DPWES, performed a survey of approximately forty parcels and the surrounding jurisdictional boundary line involved in the voluntary adjustment of The City of Falls Church and Fairfax County jurisdictional boundary.

Joseph Berry, County Surveyor, in 1941, last surveyed this area of the jurisdictional boundary for the record; County boundaries do not change often or without major effort by many. The team who performed the current survey is Benjamin Neal, Vickie McEntire Anglin, Sue Sheviak, Yilia Vega-Claudio, David Baaz, Joseph Simpson, Paul Dickson, and Gregory B. Harper all of Land Survey Branch, DPWES. The teams authoring the agreement for Fairfax were Cynthia Tianti and Cynthia Bailey, both of the Office of the County Attorney representing Fairfax, and John Foster, Patrick Taves, and David Stoner representing Falls Church.

Land Survey Branch prepared a plat of survey to support the Boundary Line Adjustment Agreement. The contract for the sale was recorded on January 3, 2014 in the land records of the circuit court. At that instant, the jurisdictional boundary adjustment became official and jurisdiction of thirteen properties changed. Land Survey Branch prepared the AutoCAD survey drawings for inclusion in the data layers Parcels, Supervisor Districts, Political Boundaries, and County Border among many others.



Fairfax County Boundary Post-Agreement

LAND SURVEY BRANCH

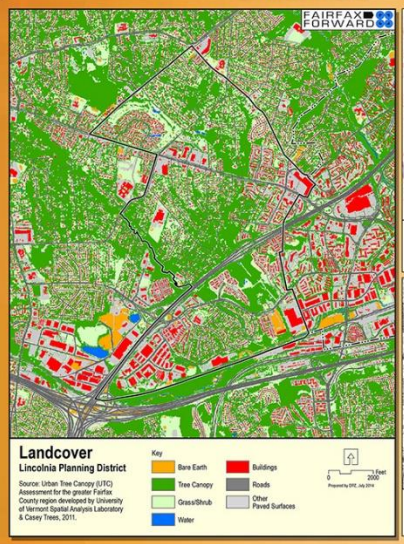
MAP PREPARED USING FAIRFAX COUNTY GIS LAYERS AND LAND SURVEY BRANCH AUTOCAD DRAWINGS

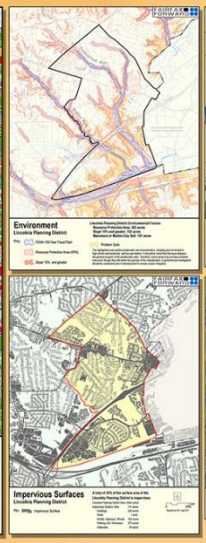
Lincolnia Planning District
Existing Conditions Report Mapping

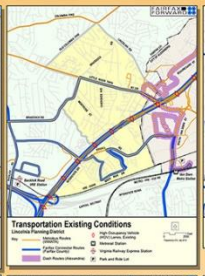
A Series of 23 Specialty Maps for Web and Print Publication

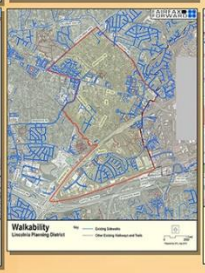
FAIRFAX COUNTY DEPARTMENT OF PLANNING & ZONING

Environment

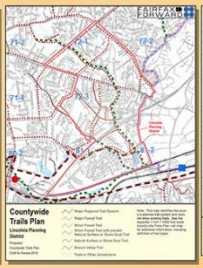




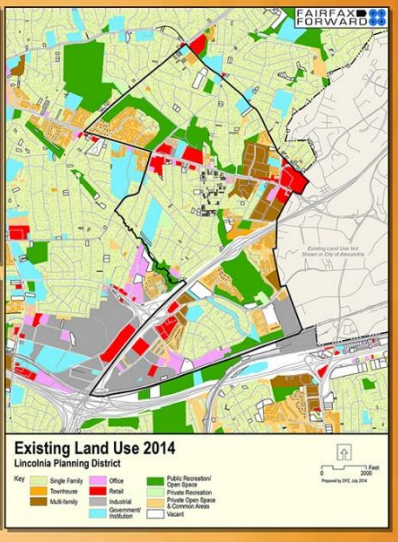


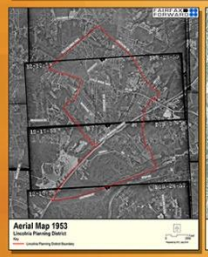


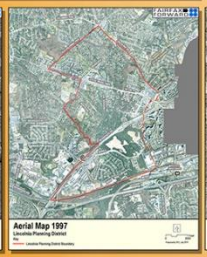
Transportation

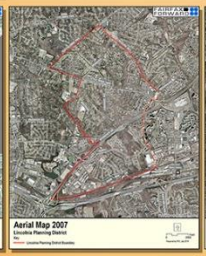


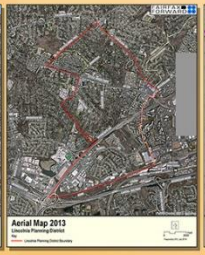
Land Use



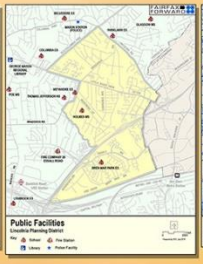


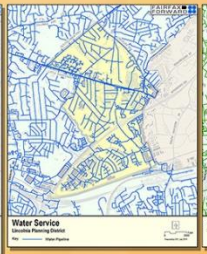


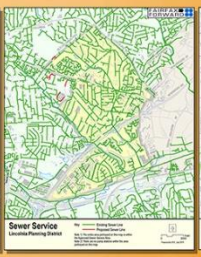




Aerials





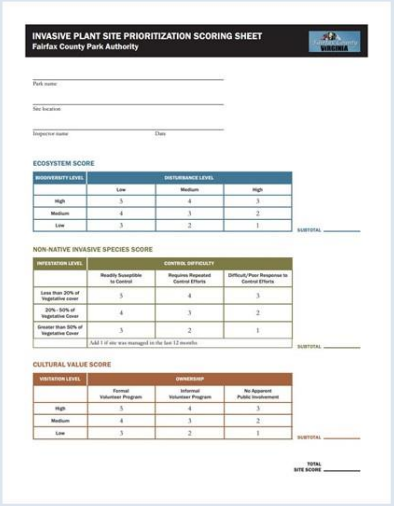


Public Facilities

Submitted by the Fairfax County Department of Planning & Zoning for GIS Day, November 2014

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


INVASIVE PLANT SITE PRIORITIZATION SCORING SHEET
Fairfax County Park Authority

Park name:

Site location:

Inspector name: Date:

ECOSYSTEM SCORE

BIODIVERSITY LEVEL	DISTURBANCE LEVEL		
	Low	Medium	High
High	5	4	3
Medium	4	3	2
Low	3	2	1

SUBTOTAL

NON-NATIVE INVASIVE SPECIES SCORE

INFESTATION LEVEL	CONTROL DIFFICULTY		
	Readily Susceptible to Control	Requires Repeated Control Efforts	Difficult/Poor Response to Control Efforts
Less than 20% of Vegetative cover	5	4	3
20% - 50% of Vegetative Cover	4	3	2
Greater than 50% of Vegetative Cover	3	2	1

Add 1 if site was managed in the last 12 months

SUBTOTAL

CULTURAL VALUE SCORE

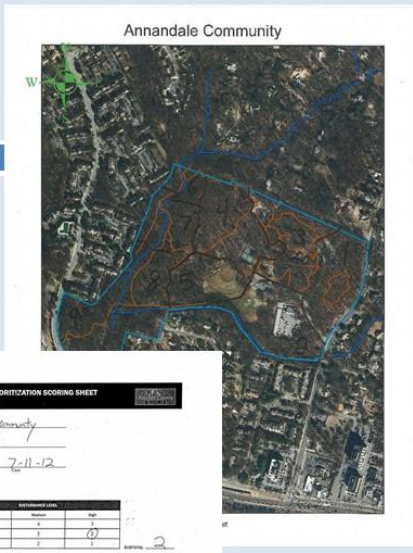
VISITATION LEVEL	OWNERSHIP		
	Formal Volunteer Program	Informal Volunteer Program	No Apparent Public Involvement
High	5	4	3
Medium	4	3	2
Low	3	2	1

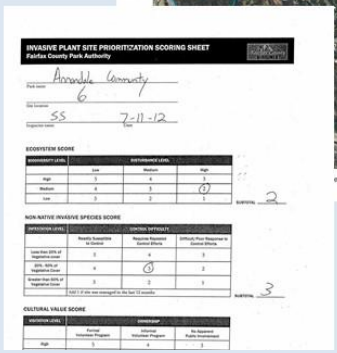
SUBTOTAL

TOTAL SITE SCORE

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




INVASIVE PLANT SITE PRIORITIZATION SCORING SHEET
Fairfax County Park Authority

Annandale Community

6

SS

7-11-12

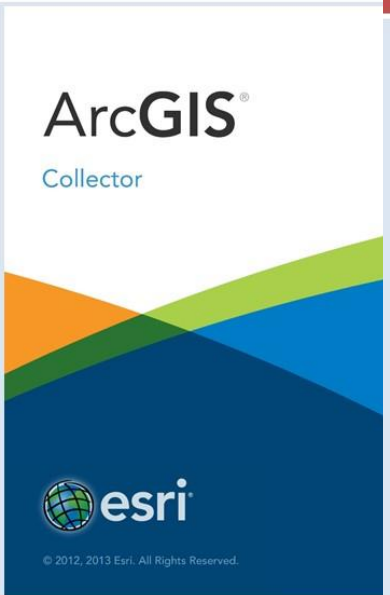
ECOSYSTEM SCORE

NON-NATIVE INVASIVE SPECIES SCORE

CULTURAL VALUE SCORE

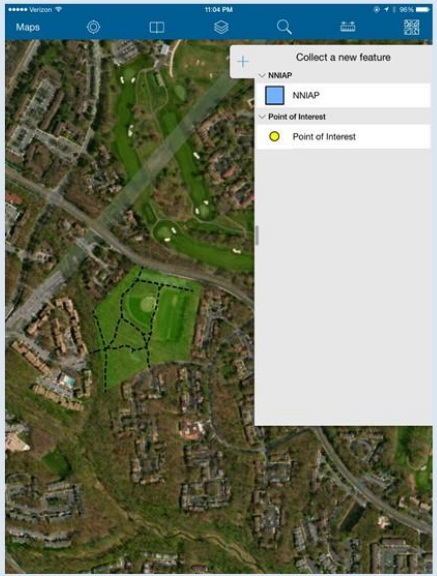
New Methodology: Collector

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



Advantages of Collector

- 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



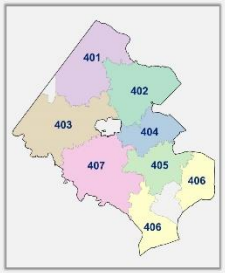
Maximizing Battalion Chief Coverage in Fairfax County using Location-Allocation

Introduction

Background

Fairfax County, VA is situated just to the west of Washington, D.C. It has an area of 407 square miles and is home to over 1.1 million people, making it one of the most densely populated counties in the United States. The Fairfax County Fire & Rescue Department, tasked with providing fire and EMS services to the county, has 38 fire and rescue stations dispersed across Fairfax County.

These 38 stations are grouped into seven geographic areas, called battalions. A battalion represents a collection of station response areas that are overseen by one Battalion Chief. The Battalion Chief is housed at one station in each battalion. Ideally, the seven Battalion Chiefs are housed at the seven stations that provide the most coverage (as determined by drive time) to all areas of Fairfax County.



Above: Fairfax County, VA.
Right: Fairfax County Fire & Rescue Department existing battalion boundaries.

Objective

In an effort to maximize coverage of Battalion Chiefs across Fairfax County, the GIS team at the Fairfax County Fire & Rescue Department was tasked with identifying the seven fire and rescue stations in the county that would serve as the most ideal locations to house a Battalion Chief. To achieve this, we employed the use of Esri's Network Analyst tools to identify seven of the 38 existing fire and rescue stations that would maximize the coverage of Battalion Chiefs.

The assessment was completed using a location-allocation algorithm, which maximizes coverage of facilities such that as much demand as possible is reached. The location-allocation algorithm was run twice using two different demand variables: total area and total number of buildings.

Methodology

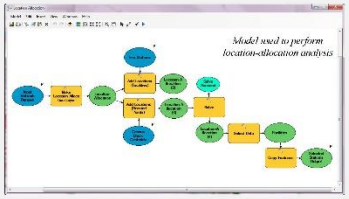
Location-Allocation Analysis

This assessment was performed in ArcGIS Desktop 10.2.1 using the location-allocation algorithm available as part of the ArcGIS Network Analyst extension. The purpose of the location-allocation algorithm is to identify facilities that maximize coverage to a set of demand points within a specified cutoff time or distance.

Left: Illustrative example of a solved location-allocation analysis. Pink lines denote all allocated demand points that a chosen facility (yellow) can reach within a set cutoff time or distance. Facilities in gray were not selected as part of the solution. Image credit: Esri

Two location-allocation analyses were completed as part of this assessment; one to maximize area coverage and a second to maximize coverage to buildings. For each location-allocation analysis, the facilities were defined as all fire stations in Fairfax County (including Ft. Belvoir and Dulles Airport) and the demand points were the 2010 census block centroids in Fairfax County. Both analyses used a ten minute response time cutoff.

For the first location-allocation analysis, only the locations of census block centroids were used as the demand point inputs. This was completed in order to select seven fire stations that maximize coverage based on total area only. The second analysis also used census block centroids as the demand points, but the centroids were weighted by the total number of buildings in each census block for 2009. The purpose of this analysis was to refine the Battalion Chief coverage based on where the most demand is likely to occur.



Model used to perform location-allocation analysis

10 Minute Service Areas

For this assessment, Battalion Chief coverage was defined as the area that a Battalion Chief can travel to in ten minutes from any given station. To identify these areas, ten minute service area polygons were created for each station using the Network Analyst service area solver and an in-house network dataset.

Once the service area polygons were generated, maps were produced to illustrate the ten minute service area coverage of the seven potential Battalion Chief stations according to the results of each location-allocation analysis. To allow for easier data viewing and comparison for non-GIS staff, these data were also distributed via a web map hosted on ArcGIS Online.

Once the maps and data were disseminated to appropriate staff, the coverage maps were compared to the existing Battalion Chief locations to determine the differences in coverage, as well as to select the best placement for Battalion Chiefs in the future.

Model used to generate service area polygons

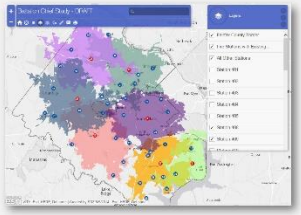
Right: Ten minute service area polygon example.

Results

Maps of results are presented at the bottom of this poster. In terms of area coverage, the results show that the existing Battalion Chief stations cover 73.4% of the area of Fairfax County. The location-allocation analysis that maximized area resulted in an increase in area coverage to 76.5%. The location-allocation analysis to maximize building coverage also resulted in an increase in area coverage, to 75.8%.

In terms of building coverage, the results show that the existing Battalion Chief stations cover 86.7% of the buildings in Fairfax County. The location-allocation analysis that maximized building coverage resulted in an increase in building coverage to 90.1%. The location-allocation analysis to maximize area coverage also resulted in an increase in building coverage, to 88.5%.

Right: ArcGIS Online web mapping application of ten minute service area polygons and location-allocation analysis results.

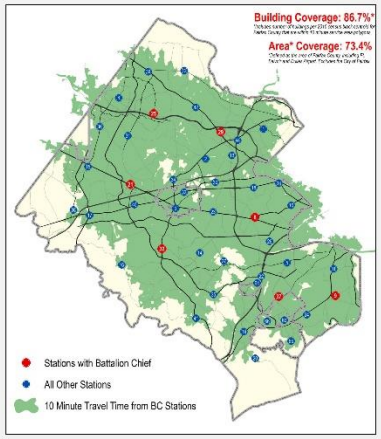


The seven stations selected to maximize area or building coverage are presented in the table below. Three existing Battalion Chief stations (25, 29, and 32) were chosen as stations that would maximize area, while four existing Battalion Chief stations (8, 9, 29, and 32) were chosen as stations that would maximize building coverage.

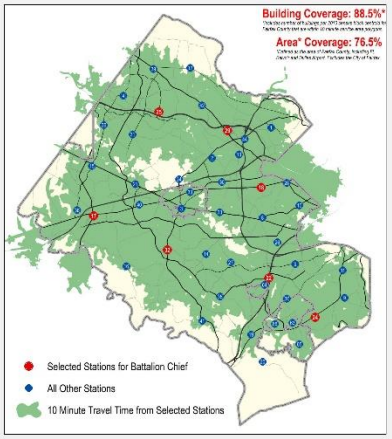
Existing Battalion Chief Stations	Proposed Battalion Chief Stations based on Maximizing Area Coverage	Proposed Battalion Chief Station based on Maximizing Building Coverage
08	17	08
09	18	09
21	22	17
25	24	22
29	25	29
32	29	31
37	32	32

Results (continued)

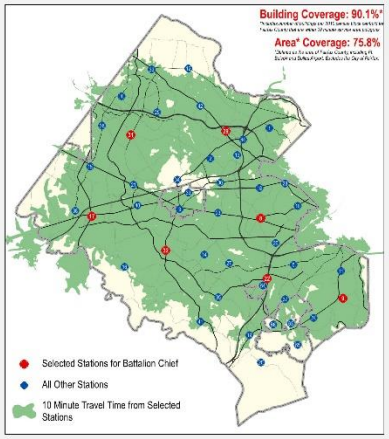
Ten minute travel time from stations with an existing Battalion Chief

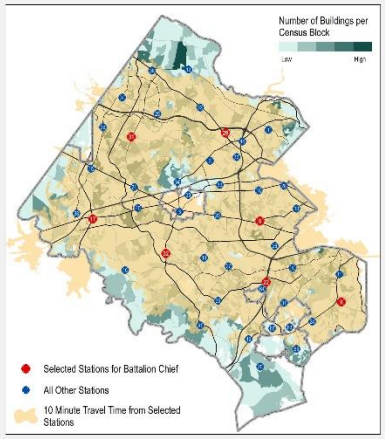


Ten minute travel time from stations selected to maximize Battalion Chief coverage based on total area – not weighted



Ten minute travel time from stations selected to maximize Battalion Chief coverage – weighted by total number of buildings per census block





Conclusions

This assessment suggests that both area and building coverage in Fairfax County can be increased by modifying select locations of existing Battalion Chiefs.

To maximize ten minute coverage to the greatest demand (building locations), it is recommended that the Battalion Chiefs at stations 21, 25, and 37 be moved to stations 17, 22, and 31.

However, it is important to note that this analysis does not take into important factors unrelated to geography, such as a station's capacity to house a Battalion Chief.

Acknowledgements

Thank you to Eric Fisher, Keg Good, and Maura Ardike for your data compilation, ideas, and other feedback on this project.

Further Information

For questions and comments, contact shelby.zelonis@fairfaxcounty.gov

Operations Data Program
Fairfax County Fire and Rescue Department
Carbon Monoxide Incidents

Introduction

The Fire and Rescue Department sought to expand the successful Safety in Our Community Program with a new initiative, Wellness in our Community (WIOC). The main focus of WIOC is to distribute the File of Life and educate residents on the benefits of completing the form; however, an additional component of the WIOC program is specifically directed at the education and prevention of Carbon Monoxide (CO) hazards as a means to avoid illness and death. In order to be most efficient with the outreach program a geospatial analysis was needed to target the appropriate places and populations with CO prevention and education.

Methodology

First, data was extracted from the I/CAD database (main tables stored in FRD data warehouse) to identify all the dispatched carbon monoxide incidents (event types ACOD and ECOD) occurring between January 1, 2010 and May 31, 2014. Then another query was run to extract all reported carbon monoxide incidents (incident type code 424), carbon monoxide detector activation from malfunction (incident type code 736) and carbon monoxide detector activations with no carbon monoxide detected (incident type code 746) from the FireRMS database. ArcGIS was then used to analyze any spatial patterns that may exist. An optimized hotspot analysis was used, aggregating incident counts within fishnet polygons using the Fairfax County fire boxes (released 12/2013) as bounding polygons. The hot spot analysis was repeated for each incident type and the results were compared.

Results

The FRD responds to approximately two carbon monoxide incidents a day, with increasing frequency in the winter months (November through February). Over 90 percent of the CO incidents occurred within residential properties during the evening hours (between 6 and 8 pm).

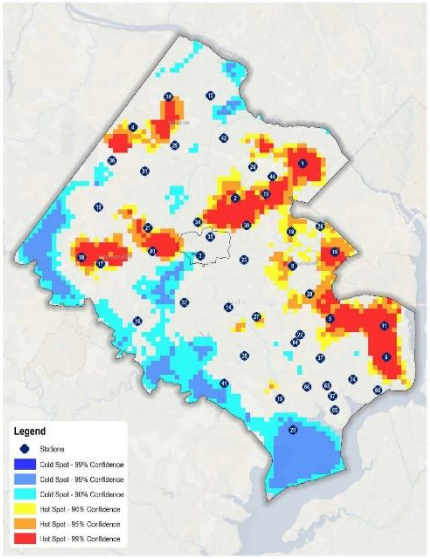
Dispatched CO Events	
Year	Incidents
2010	755
2011	733
2012	824
2013	671
2014	407
Total	**3,390**

The initial hot spot analysis identified an area of approximately 44.8 square miles as statistically significant hot spots of CO events (99% confidence).

Approximately 2 of every 10 dispatched CO events were confirmed as an actual CO event, and approximately 5 of every 10 dispatched CO events were reported as false calls, such as detector activations due to a malfunction or detector activation with no CO detected.

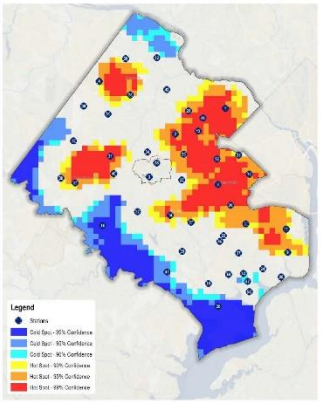
Results

Dispatched CO Incidents (ACOD and ECOD)

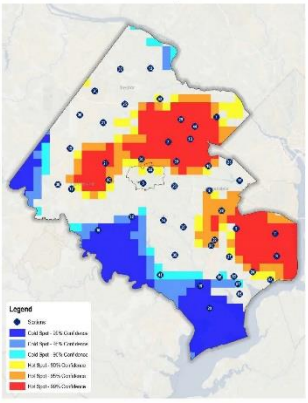


Year	Outcome as Reported in Incident Report: CO Incident	CO detector activation due to malfunction	CO detector activation, No CO detected	Total
2010	176	204	131	511
2011	179	198	94	471
2012	189	256	111	556
2013	138	204	99	441
2014	75	127	61	263
Total	757	989	496	2,242

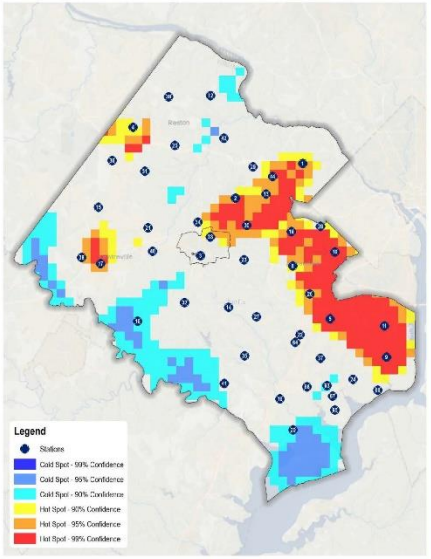
CO Detector Activation/Alarm due to Detector Malfunction



CO Detector Activation with No CO detected by FRD



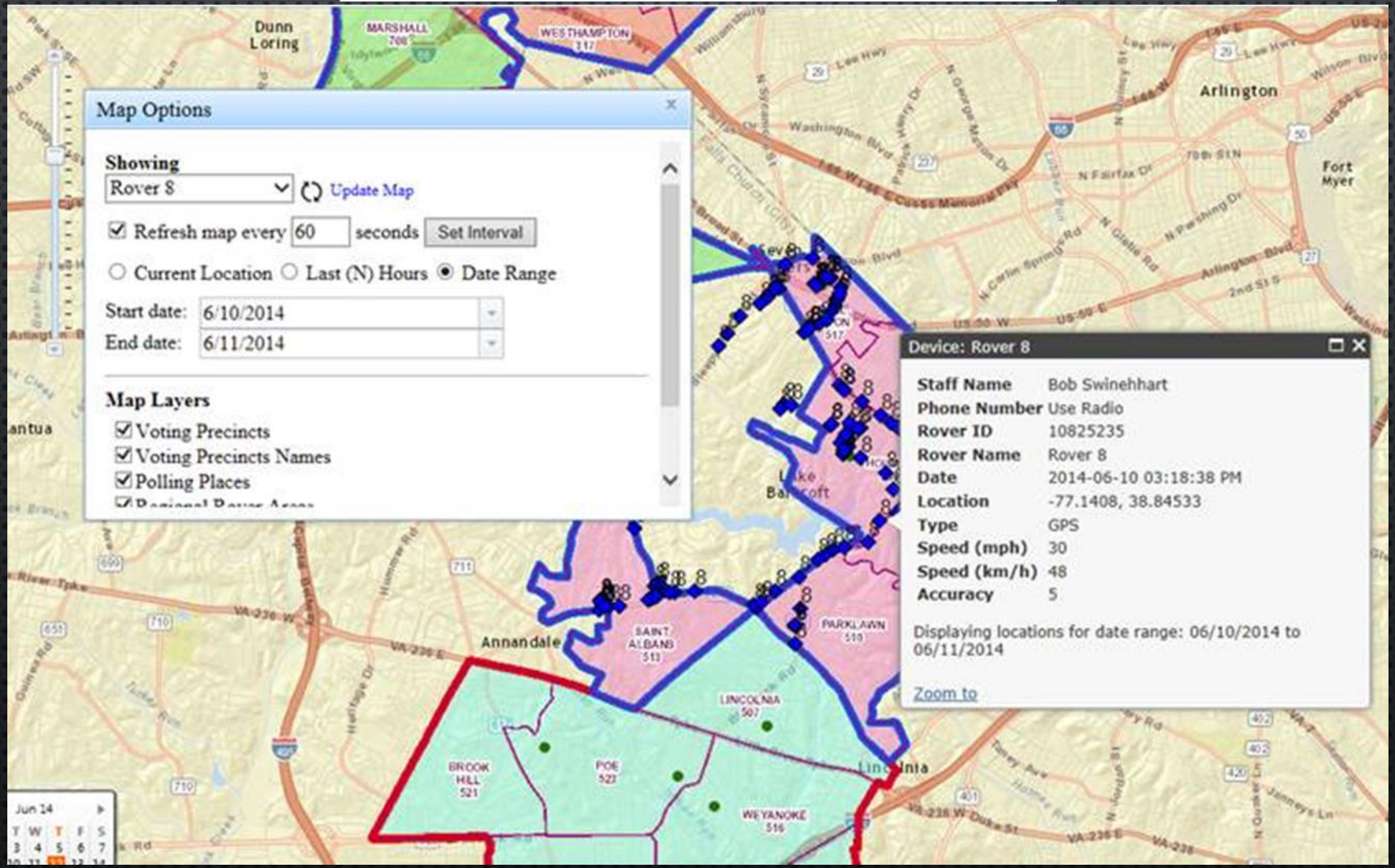
Confirmed CO Incident



Conclusions

Dispatched CO events as well as confirmed CO emergencies were noted within the areas surrounding stations 1, 2, 5, 9, 10, 11, 13, and 17. The hot spot areas are consistent with known higher call volumes and higher population density. The blue areas, shown as cold spots, are areas with traditionally less call volume and less population density. As a result of this analysis, the Fire Chief, the FRD's Fiscal Services, Life Safety section and Operations Bureau were able to devise strategies for the CO portion of the WIOC initiative.

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



The Fairfax County Fire & Rescue Department: Significant Progress in 2014

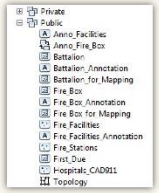
The Fire & Rescue Department has made great strides in our use of GIS over the past year. We've extended our GIS capabilities in a number of ways: we've increased our GIS staff, revamped our data creation and maintenance processes, and introduced our entire department to web mapping applications that we have created using ArcGIS Online. Here's a snapshot of the progress we've made this year:

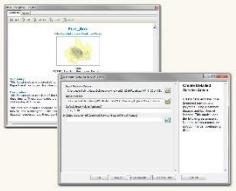
Increased GIS Staff

Due to increasing demands for GIS support over the years, the department saw a need for an additional full-time GIS staff member. In March, we hired a third full-time GIS Analyst to our team!

Data Improvements

This year we have made significant progress towards cleaning up our in-house data and making it more readily accessible to all GIS users. As part of this process, we have made all of our master datasets accessible via SDE.

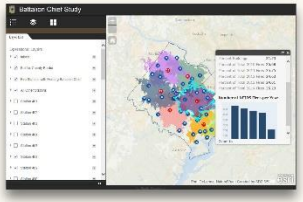


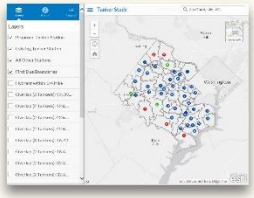


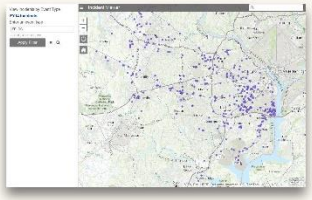
Creation of our ArcGIS Online Website

Our primary accomplishment this year has been our move to ArcGIS Online. Our GIS team receives a large number of mapping and spatial analysis requests from our personnel, and often this is further complicated by the time-sensitive nature of fire and rescue. To address these issues and more, our GIS team created an ArcGIS Online website. This website serves as a "one-stop shop" for our personnel to quickly access the geographic data and information that they need. At this site, our staff can:

Access station planning and analysis tools (Senior Staff)





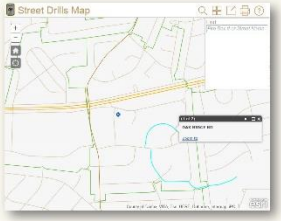


View and filter incidents

Find station information

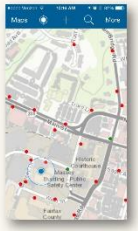
View estimated travel time data

Access ever-changing data (for FRD and other agencies)

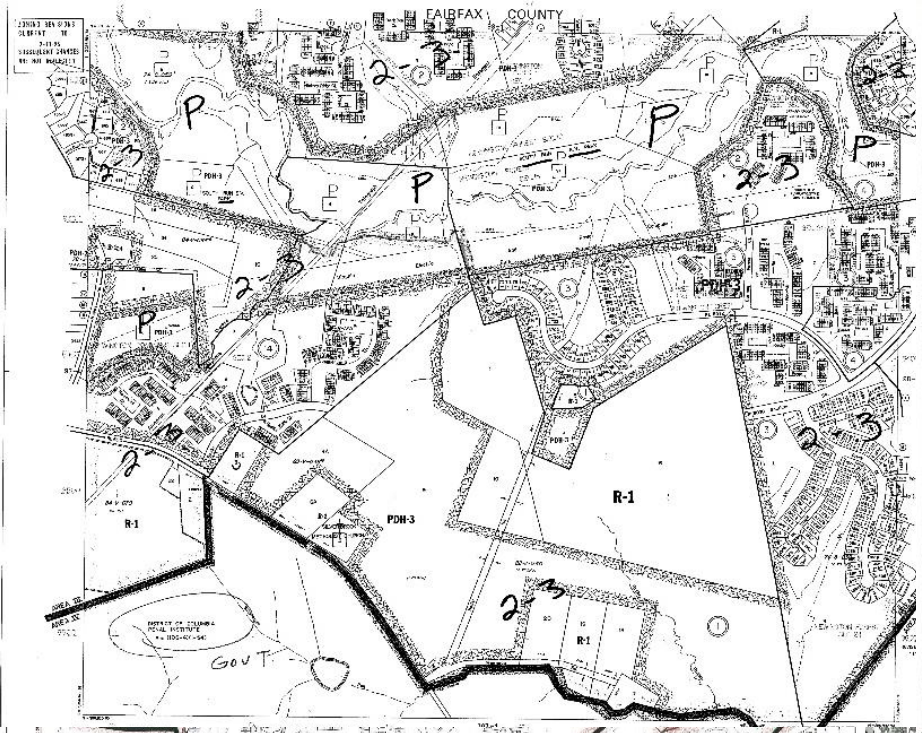


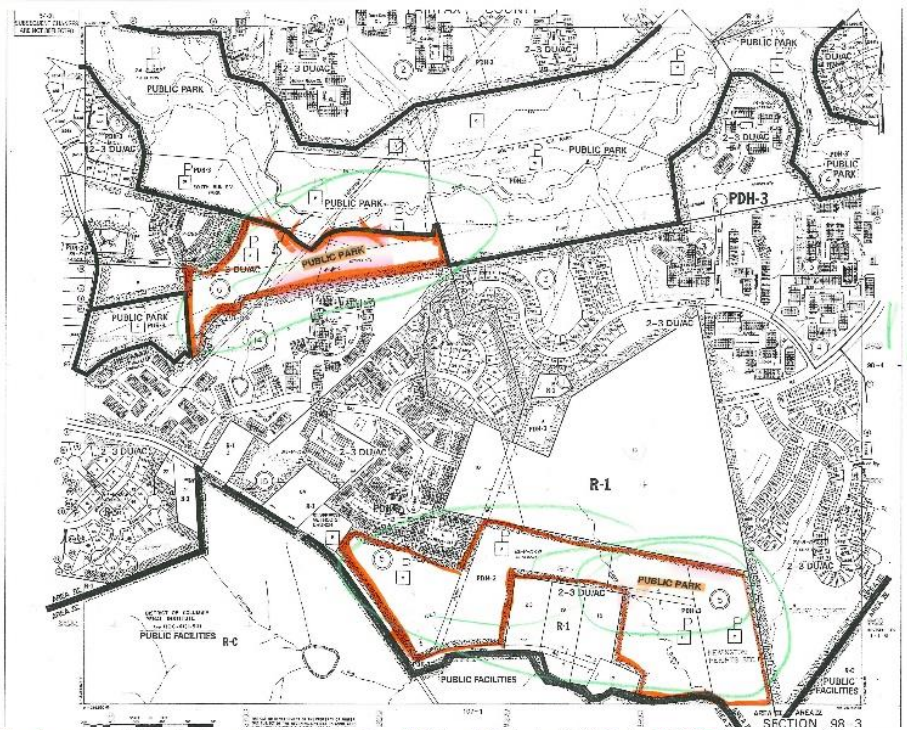
Perform training drills to test street knowledge

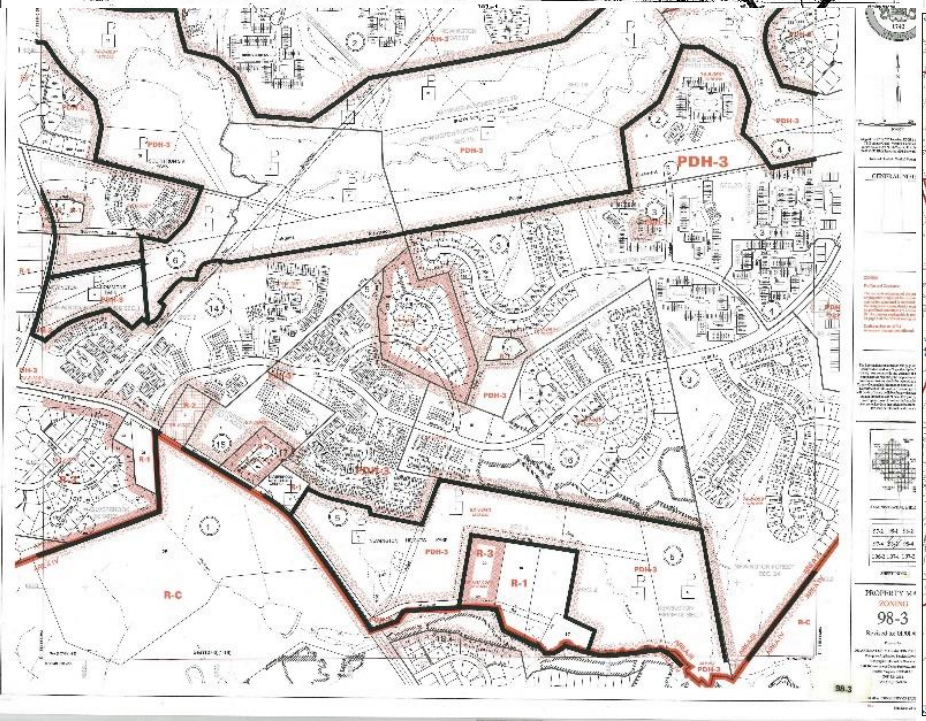
Collect and verify hydrant data using ArcGIS Collector

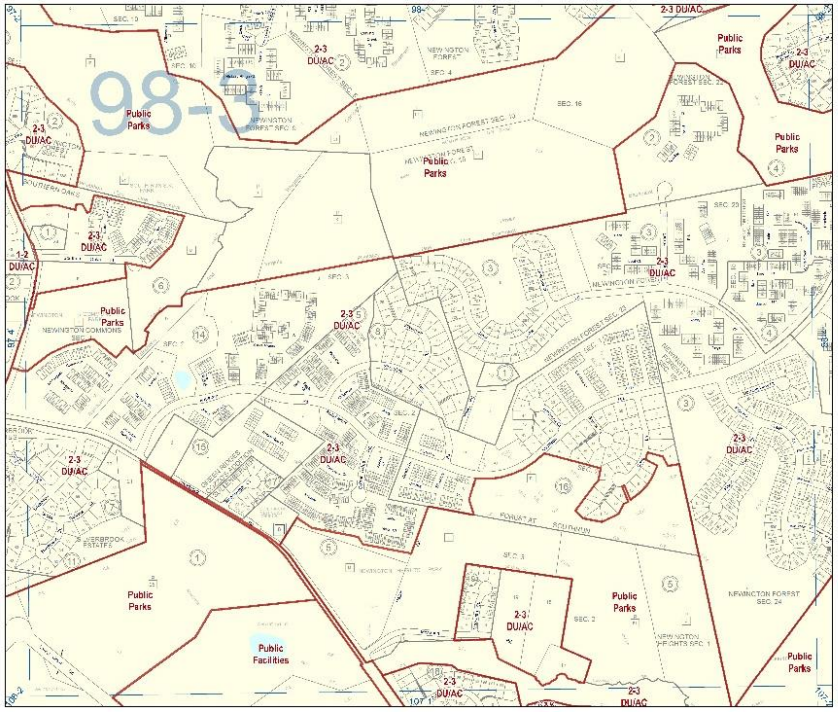


This year, we've not only improved our day-to-day GIS tasks, but we've made GIS accessible to every staff member in our department. Our efforts have been extremely well-received by Fire Chief Bowers and the rest of our Senior Staff, who are excited about GIS and the prospect of what we can accomplish in the future. This year has been an excellent milestone for us, but we will continue to make great strides in the use of GIS for our department in the future as well.









TAX MAP:

98-3

COMPREHENSIVE LAND USE PLAN

BASELINE RECOMMENDATIONS

1-2 DU/AC Baseline Recommendation

Note

E3 Fairfax Center Area Land Unit

Fairfax Center Area: Consult the Land Use Summary Chart for assigning baseline, intermediate and overlay area recommendations that are not within Fairfax Center Area Comprehensive Plan.

97-3	98-4	99-1	99-4	99-4
97-4	97-2	98-1	98-2	99-1
97-3	97-4	98-3	98-4	99-3
	97-2	97-1	97-2	
	107-4	107-3	107-4	

500 FEET

Prepared by:
DEPARTMENT OF PLANNING AND ZONING
GIS Mapping Unit