

Fairfax County Police Online GIS Mapping Portal Enterprise

Portal Enterprise Setup

Fairfax County Police Department has taking on the task to build a GIS Portal Enterprise environment to allow the sharing of sensitive police geospatial data between internal agencies and patrol officers, using webmaps, web applications and dashboards. Members of the Fairfax County Police Department can access Portal online from their workstation, MCT (Mobile CAD Terminal) or any mobile device that's connected to the County's network, via Airwatch[®].





Insight Data Analytic Application



Survey 123 / Field Data Collection





Image from ESRI®



Fairfax County Police Internal Web Applications

Fairfax County Police Public ArcGIS Online Organization

Fairfax County Police is developing an ArcGIS online (AGO) organization so the public can have access to police data. With the use of collaborate a secure data flow will link the Police's Portal to the public site.

AGO Police Public Site



https://fcpdgis.maps.arcgis.com

ArcGIS open data hub provide Fairfax County Police Department a central location for sharing out Portal content with the public and other organizations. Data hub allows the public online access to search, view and download police shared content.

Police Public Open Data Hub



https://policedata-fcpdgis.hub.arcgis.com



The report and accompanying story map, Aligning Efforts for Success: Economic Inclusion, from the Health and Human Services (HHS) Office of Strategy Management, Data Analytics unit, was published in May 2019. The report highlights the difficulties many county residents face on the road to increasing their economic status and was developed in response to a review of current HHS cross-agency strategies to provide analysis and recommendations about key factors which impact the success of those strategies. This work, and similar reports in the future, will be used to inform the development and evolution of strategies for HHS as well as countywide strategic planning efforts as they unfold, including One Fairfax. This will allow the county to align investments and continuously improve outcomes.

In an effort to increase the exposure of this work and reach different audiences, an online component, a story map, was used as a companion to the hard copy report. The ESRI cascade story map design was chosen so the story map would flow as one continuous story, like the hard copy report, emphasizing the connectedness of the narrative. However, bookmarks were included at the top of the screen to help users navigate quickly between sections if needed. The text from the hard copy report was streamlined to include a more focused narrative within the story map. At certain times, the text was changed to mirror the color of the corresponding graphic in order to emphasize and connect certain information. A link to the accompanying hard copy report was also included at the end of the story map for additional information.









success of HHS strategies is the implementation of the One Fairfax policy, an overarching approach to ensure an inclusive community for all individuals. As such, it is important that equity be considered when implementing all HHS strategies to strengthen opportunities for everyone regardless of race, color, sex, nationality, sexual orientation, income, or where they live.



The visuals within the story map include a combination of Fairfax County logos and pictures, stock photos from unsplash.com and istockphoto.com, graphics designed in Piktochart, and maps built in ArcGIS Online (AGO). Two interactive maps built in AGO were used, including the Percent Households Receiving Food Stamps/SNAP Benefits and Percent Households with Income Below Poverty Level. The data in both maps were aggregated by ZIP Code. Map features included allowing users the ability to zoom in and out of the map, as well as the ability to click on each ZIP Code in the map to open a pop-up with more information. A legend was also included for both maps as a reference.



The interactive nature of the story map allowed for increased functionality and ease of use. For example, websites and other Data Analytics products were linked throughout the text for additional information. Furthermore, all data was sourced both throughout the document as the data was cited, as well as in a source list at the end of a story map. This allowed the user to immediately click on a link which opens a new tab, navigating them directly to the source.



Aligning Efforts for Success: Economic Inclusion



County of Fairfax, Virginia Hydrological Map

Based on Stream Order and Stormwater Infrastructure





The Analysis and Refinement of MSAG Data In Public Safety Communications

Raleigh Maier – Fairfax County DPSC GIS Analyst

Introduction

In the past few decades, advancements in communication technology have created opportunities for current 9-1-1 systems to support these emerging, modern services. This movement, known as Next Generation 9-1-1 (NG9-1-1), aims to resolve communication infrastructure limitations by providing Public Safety Answering Points (PSAPs), government jurisdictions, and other agencies with a variety of products and practices so that they are able to process all types of emergency calls in a variety of formats. The National Emergency Number Association (NENA) is responsible for defining and supporting NG9-1-1 by working together with PSAPS and with the 9-1-1 industry to promote development and modernization of emergency services across the country.

The Fairfax County Department of Public Safety Communications (DPSC) continues to follow the standards and practices established by NENA in order to ensure that all modern forms of emergency communication are able to be received. An example of Fairfax following NENA's standards is by ensuring that the master street address guide (MSAG) and automatic location information (ALI) is up to date and accurate. An MSAG is a database of street names and house number ranges within their associated communities and their associated emergency service numbers (ESN) that assist with call routing. The ALI is 9-1-1 call location data consisting of business names, apartments or suite numbers, street addresses, and other relevant information associated with a specific phone number. The ALI information appears on the computer screen of a 9-1-1 call taker whenever they answer the emergency line. Without accurate or well-maintained MSAG/ALI data, PSAPs will face increasing difficulty when attempting to locate 9-1-1 callers or



Results and Readjustment of Comparison Process

Matching records will indicate that your GIS data is a 1:1 match with your provided MSAG data, whereas mismatching data, including mismatching address ranges and street names, indicate that your data has errors. These errors should be a cause for concern as they outline issues within either the provider's MSAG records or with the centerline data used for emergency service call routing. It is imperative that Fairfax County attains and surpasses the NENA standard in order to continue moving forward as a paragon with Next-Gen 911 functions.

Results from the MSAG comparison process showed that, while over 95% records did match, the final match ratio fell short of NENA's standards.

Initially, non-matching MSAG records were identified and adjusted based on flagged error messages specific to each record. Corrections were also submitted to Intrado in order to refine their provided data for future analysis operations. However, during this comparison process, the sheer amount of records that were needed to be readjusted in Intrado's database to better match DPSC's GIS data was concerning. It was determined that, while the records could genuinely be inaccurate and could warrant adjustments by Intrado, the way by which MapSAG compares MSAG data to GIS data was not processing data as intended. A review of MapSAG's .INI file which controls the parameters of how data is read was crucial in order to determine whether the issue was MapSAG or the data itself.

taitor 569 I Values (MapSAG configuration parameters)



dispatch emergency services.

In order to determine if the GIS centerline data is accurate and synchronized with Intrado's MSAG records, DPSC GIS utilizes a software called MapSAG within an ESRI ArcMap environment to analyze and compare both data sets. This is done to ensure that the GIS data and MSAG/ALI are standardized and free of any errors. NENA standards require that the MSAG-centerline match rate for complying jurisdictions should be at least 97 percent.

While GIS data of any size will contain errors, Fairfax County continues to pursue a >99% match rate when it comes to MSAG/ALI and GIS data. This means it is critical for DPSC and other agencies to take important steps in the pursuit of data synchronization. The process of how centerline data and the steps to resolve any errors will be presented in this submission so that one may understand the critical role of data management as the 9-1-1 industry continues to evolve.

As public safety services continues to move forward with the Next-Generation 911 implementation, it is imperative that Fairfax County, DPSC, and other emergency service agencies continue to maintain accurate data county-wide, as well as with other jurisdictions.

Comparison Process

The initial step in synchronizing MSAG data involves building an ArcMap environment that contains the street centerline and address point data. MSAG data is provided to DPSC in a tabular format by Intrado's web service and is converted into an ArcGIS-recognizable format once uploaded to the ArcMap environment. MapSAG will generate the MSAG from the street centerline data by comparing data to the MSAG extract from Intrado. The comparison process involves a 1:1 comparison of attributional values such as ESN codes, street ranges, range parity values, and directional values in order to determine

Build the MSAG GIS table

During the comparison process, MapSAG will standardize and export the attributes of your GIS centerline data to a table in the GIS database called MSAG_GIS.

Compare the MSAG Tables

MapSAG will then compare the newly generated MSAG_GIS table layer to the MSAG records provided by Intrado. Checks will be based off of attributional data and are essentially a 1:1 check process as MapSAG looks to find any outstanding records. Partial checks can be performed if the user were to require specific data checks. For example, The user could choose to exempt driveways from the comparison process by setting MapSAG parameters to ignore driveway records. These are known as exception rules.

Image 2. Full extent view of the street centerline data used for comparison in ArcMap. The arrows are apart of the street centerline and are symbolized to show which direction streets are drawn.



Image 4. A closer look at the ArcMap testing environment. The displayed features include centerline and address location data.

Source	State	Community	ESN	Exchange	Dir	Street Name	Suf Type	Suf Dir	O/E/B	Low	High	Comments
MSAG_COMPARE	KS	NEW YORK	4839	NYEE	E	BRAMLE ST			В	100	937	Adjust Street Name in MSAG
MSAG_GIS	KS	NEW YORK	4839	NYEE	Ε	BRAMLEY ST			В	100	199	
MSAG_GIS	KS	NEW YORK	4839	NYEE	Е	BRAMLEY ST			в	400	599	
ISAG_COMPARE	KS	NEW YORK	4839	NYEE		HOWARD ST			B	400	699	SA BRAD
ISAG_GIS	KS	NEW YORK	4839	NYEE		HOWARD ST			В	400	599	
ASAG_GIS	KS	PARIS	4835	HNS	Ε	LINCOLN ST			В	300	599	
ISAG_COMPARE	KS	PARIS	4835	HNS	E	LINCON ST			B	300	599	BAR DECKARDER OF CALLER

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ODDCHARACTER	0		DEFAULT VALIDATION OPTIONS
EVENCHARACTER	E		DIST_LAYER
BOTHCHARACTER	B		DRIVEWAY
MSAGCHANGEREPOR	C:\Temp\MSAGChanges.txt		🛅 EDITOR ID
BUILDMSAGFROMCO	True		EMS_LAYER
BUILDMSAGFROMENTI.	False		EN LAYER
BUILDMSAGFROMESN.	True		EXCHANGE_LAYER
BUILDMSAGEROMEXC	False		FIRE_LAYER
BUILDEROMACTUALS	False		GEOFILE
GRANDFATHEREDADD	False		INTERSECTION_BUILDER
HIGHTEXT	HiphText		LAW_LAYER
0 OWTEXT	lowTaxt		MAPFLEX DATA EXCHANGE
			MFUsourceData
POSTAL SUFEIXALIASES			MFUtargetData
			NENA GUID
			ONLINE MSAG
MISAGLAST MODIFIEDBT			PAGEANDGRID_LAYER
			PLACE LAYER
			Polygon_LAYER_1
ODDEVEN	2		Polygon_LAYER_2
DIRECTION	3		Polygon_LATER_3
STREET	4		REPORT
SUFFIXTYPE	5		REVISION_HISTORY_FIELDS
SUFFIXDIRECTION	6		STREET CLASS
COMMUNITY	7		- TRUCTURE
COUNTYID			STRUCTURE_STATUS
STATE 2			TRACT LAYER
COMPANYID			UNIQUE_ID
2 ENTITY			URBANPOLY_LAYER
REXCHANGE		-	×
les are text files that contain MapSAG	configuration information. Its used to customize MapSAG tools, functions and macros for ArcGIS. This application edits and formats your MapSAG INI file. INI template is included for reference.		
stars the second second second large the 191	file. Please backup a master corv. before edition		Save Cancel

Image 8. MapSAG INI Editor. Specific values in field dictate how MapSAG reads the data

Implementing Adjustments in the Comparison Process

After obtaining a match rate that was below the NENA standard rate, it was necessary to look back at the match process in order to resolve any issues that could be affecting record synchronization.

The MapSAG configuration information within the .INI file was reviewed and it was determined that parameters which affect tools such as the MSAG checks were not properly formatted with our GIS data. The particularly challenging aspect of this revision process was understanding in what order does MapSAG interpret the imported data. By reassigning the single-digit values of the check parameters to align with the format of the imported GIS data, the following check process resulted in a significant increase in the match rate.

By interpreting the errors presented by the non-match records table, limitations of the MSAG checks were made apparent. After adjusting MapSAG parameters to correctly interpret the format of the imported GIS data, the resulting match-rate was increased to >99%. surpassing all previous match-rates NFNA standards.



Image 9. Two examples of the MSAG results window once the match process has concluded

Review MSAG Matches/Non-Matches

Once the comparison process finishes, two distinct tables are generated. A nonmatch table will feature all of the MSAG records that could not be matched to an existing record during the comparison processes. Non-matched records could result from several kinds of data errors which necessitates a review to determine if the issue stems from inaccurate range parity, address ranges, or other issues.

The second table that will be generated is the match table. It contains all the records of centerline data that were found to be associated with existing MSAG records. The MSAG match rate is based on the total amount of records that are able to be matched between the centerline data and the provided MSAG records.

Build MSAG_GIS and MSAG_Compare:



Compare Resulting unmatched Records:



Image 1. MSAG Data Comparison. Process

Image 5. Unmatched MSAG records detailed in ArcMap.

OID	Street Name / Address Range	Error Description
90	N JEFFERSON ST (500-598)	Left Parity Error
106	ALLEY (0-0)	Address Range All Zeroes
119	S LOGAN ST (0-199)	Right Parity Error
119	S LOGAN ST (0-199)	Left/Right Parity Error
122	CONGER ST (0-199)	Right Parity Error
122	CONGER ST (0-199)	Left/Right Parity Error
139	W HWY 36 (318-361)	In Multiple ESN and Community Polygons
144	ATHLETIC ST (0.199)	Right Parity Error



Image 6. MSAG address records with a description of what MapSAG deems as errors.

Image 7. Example of a validation report following a comparison between data in ArcMap. MapSAG can produce a variety of graphs and statistical analysis reports.

Future Plans and Practices

As the 9-1-1 industry continues to evolve and develop with modern technology, it is imperative that Fairfax County DPSC adheres with next-generation 9-1-1 standards and practices. In the case of MSAG/ALI data validation, it is critical for Fairfax to maintain the most accurate records of addresses as possible. Comparing GIS data to provided MSAG records presented a unique opportunity to modify the quality check process of MSAG/ALI data within a geospatial environment.

Analyzing and comparing MSAG/ALI records provides is critical when determining if errors in these data sets exist, as MapSAG software highlights gaps in data or inaccurate values. Fairfax County is heavily populated and requires most precise address data when providing emergency services to the large population.

DPSC GIS will continue to pursue opportunities that will ensure that MSAG/ALI data is precise and enables accurate call routing. Changes in street ranges, parities, or street names can impact emergency which facilitates the need for PSAPS to follow robust quality check procedures. Fairfax DPSC has worked to establish MSAG/ALI analyzation processes that meet NG 9-1-1 standards and will continue to enhance data checks so future data can be seamlessly incorporated into emergency service systems.

COMMUNITY RISK REDUCTION SMOKE ALARMS INITIATIVE

PURPOSE

- Track progress toward the goal of installing 6,221 smoke alarms by February 2020
- Display of Emergency Data Gathering Repository (EDGR) data in an interactive application available to all Fire and Rescue Department (FRD) personnel



FIRE AND RESCUE DEPARTMENT GOAL: 6,221 SMOKE ALARM INSTALLATIONS BY FEBRUARY 2020

BENEFIT TO THE AGENCY

- Live tracking of all EDGR prevention data to allow the Community Risk Reduction (CRR) Program Manager to identify at-risk communities for additional prevention initiatives and education
- Introduce agency personnel to interactive, GIS-based business intelligence reporting; encouraging data-driven decision-making
- On-demand reporting capability for fiscal personnel tasked with monitoring and submitting progress reports to FEMA (grantor)



STATION COMMANDER "Where are there multi-unit buildings

in my first due with no installations?" "Did we go back and install smoke alarms at our last house fire?"

ANSWER: Zoom and click on the map



your First Due that have Multi-family Residential buildings that may be in need of smoke there are no orange points present

> Prepared by Jessica LeBlanc–Operations Data Analyst Fairfax County Fire and Rescue Department September 24, 2019

Converting Development Plan Data to 3D Scenes



This project is one that has been on the wish list for several years. Now we finally have the technology and infrastructure to create a modern web scene depicting approved and planned buildings.



ArcGIS Pro is utilized to build the dataset, set the workflow and publish the data to ArcGIS Online.



This is a modern web scene that allows the user to navigate through the 3D space, click on the developments to find more information, perform simple analysis, turn on and off layers including the colorized LIDAR.

The Department of Planning & Development is in the process of meeting with stakeholders to gather input for the data model. This process will help to develop a data model to support staff and give the organization a good method to incorporate 3D analysis in the development review process.

Next Steps:

- Finalize the Data Model
- Populate the attributes for the schema
- Analyze the need for architectural detail in the 3D models
- Explore types of Site Analysis to be performed
- Decide what layers would be beneficial in the Web Scene
- Analyze Widgets to be utilized in the Web Scene





Automated Modeling to Identify Potential Vernal Pools Using Object-Based Image Analysis Fairfax County Park Authority

What is a Vernal Pool?

Vernal pools are temporary to semi-permanent pools occurring in shallow depressions that typically fill during the spring or fall and dry during summer or in drought years. Vernal pools provide important breeding habitat for amphibians, such as wood frogs and salamanders, as well as numerous invertebrate taxa adapted to temporary waters. Vernal pools may also support rare plant communities comprised of wetland and aquatic species. Although they may have intermittent inlets and outlets, vernal pools otherwise lack surface-water connections to permanent bodies of water and are usually free of predatory fish. Vernal pools occur in natural or excavated depressions in a diversity of landscape settings, including uplands, floodplains, coastal plains, as part of headwater streams and seepage systems, or embedded in larger wetland complexes.



Vernal Pool and Salamander at Old Colchester Park & Preserve

Problem & Solution

Previously, the Park Authority lacked comprehensive location information of existing vernal pools on Park Authority property, making it challenging to protect these critical habitats. Rather than walk every acre of park property, the Park Authority utilized LIDAR and multi-spectral data to create a predictive model of potential vernal pool locations in partnership with the University of Vermont's Spatial Analysis Laboratory. Potential vernal pools were modeled using object-based image analysis and highresolution remote-sensing imagery (see input datasets table). An objectbased image analysis rule set for identifying and mapping potential pools was developed in eCognition, state-of-the-art object-based image analysis software. Potential sites were assigned a classification value based on the rule set which was informed by expert opinion based on both regional and local vernal pool characteristics (see modeling sequence table). The strongest factor considered was evidence that ephemeral water occurred within depressions in the landscape during spring conditions, indicative of potential vernal pools.

Input Dataset Digital Elevation Model (DEM) Normalized Digital Surface Model (nDSM)

LiDAR Intensity

Flow Accumulation

Orthoimagery

National Agricultural Imagery Program (NAIP) Land Cover (tree canop buildings, roads, other impervious surfaces, et

County Boundary

Roads

Hydrology - Open <u>Wate</u>r

Hydrology - Edges

Existing Fairfax County Vernal Pools Database (Training data)

Seguence	Modeling Step	Criterion	Comments
1	Masking of Areas Unlikely to Support Vernal Pools	Large Water Polygons	Thematic hydrology (Hydrology - Open Water) polygons >500m ² removed
		Developed Areas	Roads, buildings, and other impervious surfaces incorporated from thematic land cover
		Large Tree-less Areas	Large areas (>5,000m ²) with low vegetation (<2m) removed
2	Depression Modeling	Identify Low-slope Areas (Seeds)	DEM-derived slope <3%
		Growing Routine - Part 1	Grow until mean slope difference between candidate pool and adjacent terrain <3m
		Growing Routine - Part 2	Grow until mean slope difference <5m
3	Outlier Analysis	Flow Potential	Low flow accumulation (<4m ²) or low flow accumulation per depression area (<15)
		Size - Large	Large (>7,250m ²) and high LiDAR Intensity (>90)
		Size - Small	Small (<110m ²) and close to water (<20m); or small (<300m ²) and high LiDAR Intensity (>80)
		Depth	Very low depth (<0.035m)
		Adjacent to Non- Habitat	Relative border >0 and no evidence of water (Mean leaf-off NIR >120)
		Adjacent to Large Water Polygons	Relative border >0.1
4	Final Classification	Highest Classification Value	Geometric weighted mean of percent pool area with low leaf-off NIR values; percent pool area of low LiDAR intensity values; and pool size
		Moderate Classification Value	Geometric weighted mean of percent pool area of low LiDAR intensity and pool size
		Low Classification Value	Minimum value of leaf-off NIR; distance to other pools; and pool depth
		Obscured by Conifers	Geometric weighted mean of the difference between normalized difference vegetation indexes for leaf-off imagery vs. leaf-on imagery; leaf-off NIR, vegetation height (nDSM); distance to other pools; and pool depth
		Hummocky	Alternative depression modeling using a DEM-derived slope layer that is 8 times the standard resolution of 1m; captures larger depressions
		Anthropogenic	Alternative depression modeling that identifies steep-slope areas (DEM-derived slope <30%)

	Туре	Source	Processing	
	LiDAR derivative, 1.5-ft ground sample distance (GSD)	Original LiDAR data (LAS format) (2012, 2014)	Filtered ground returns and exported to surface	C
	LiDAR derivative, 1.5-ft GSD	Original LiDAR data (LAS format) (2012, 2014)	Filtered last returns, creating digital surface model (DSM); subtracted DEM from DSM to normalize height values relative to ground	iı (: C P
	LiDAR derivative, 1.5-ft GSD	Original LiDAR data (LAS format) (2012, 2014)	Filtered last returns and exported intensity values	() ()
	LiDAR derivative, 1.5-ft GSD	Original LiDAR data (LAS format) (2012, 2014)	Flow directions modeled from DEM and in turn used to model flow accumulation	C
	Multispectral imagery (4- bands: Red, Green, Blue, Near Infrared), leaf off, 0.5-ft GSD	Fairfax County, Virginia (2013)	Mosaic tiles; degrade imagery to 1-ft resolution for easier use	v c p
	Multispectral imagery (4- band), leaf on, 3.281-m GSD	USDA Farm Service Agency (2014)	Mosaic tiles	ii d
/, :.)	Thematic GIS layer (raster)	University of Vermont Spatial Analysis Laboratory (2015)	None	n
	Thematic GIS layer (polygons)	Fairfax County, Virginia	None	AN LAN
	Thematic GIS layer (polygons)	Fairfax County, Virginia (2011)	None	
	Thematic GIS layer (polygons)	Fairfax County, Virginia	None	
	Thematic GIS layer (lines)	Fairfax County, Virginia	None	
	Thematic GIS layer (points)	Fairfax County, Virginia (2018)	None	

Input Datasets for Vernal Pool Modeli

Compiled into a comprehensive spatial layer that permitted efficient review of individual features (see map), the final model identified 8,301 potential pools (see results table). As designed, the *Potential Vernal Pools - Highest Classification Value* category captured the fewest candidate pools among the primary classes (435), followed by progressively more pools in the moderate (2,186) and low categories (2,984). The *Potential Vernal Pools - Obscured by Conifers* class captured more than 1,600 candidate pools, with the Fairfax County-specific categories (hummocky terrain and anthropogenic features) contributing more than a thousand more. A proportion of these candidate pools were undoubtedly false positives, particularly in the low and obscured by conifers categories, reflecting the modeling's emphasis on avoiding omissions (over prediction). Shadowing in leaf-off orthoimagery and inconsistencies in LiDAR intensity values were the likely origins of confusion for marginal landscape depressions. However, many of the false positives are easily discounted during manual review of the final modeling output.



Comparison of Existing Vernal Pools (left) to Modeled Output (right) - Huntley Meadows Park

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Summary of Potential Vernal Pools Mapped by Automated Feature Extraction

The automated techniques used identified *potential* vernal pools; true functionality as amphibian-breeding habitat can only be determined in the field. This modeling effort provides a comprehensive overview of the landscape depressions that may fill the vital ecological role of isolated wetland. This dataset will allow agency ecologists to locate potential pools much more quickly and verify if the potential pool is in fact active amphibian breeding habitat. Verified vernal pool locations will then be used to inform future natural resource management and planning efforts.

Modeling Results

odeled Vernal Pool Class	Number of Modeled Potential Pools
Pools - Highest Classification Value	435
Pools - Moderate Classification Value	2,186
Pools - Low Classification Value	2,984
Pools - Obscured by Conifers	1,646
Pools - Hummocky	332
Pools - Anthropogenic	718
	8,301

Next Steps

Fuel Sites Application

Problem: Until this year, the only fuel sites map utilized for the Department of Vehicle Services (DVS) was an 8 ½ x 11 static county wide map showing fuel site locations. Because of the small size, the map had very little detail and had to be used in conjunction with a tabular list of fuel site locations. Employees and contractors often lost time looking for the fuel site closest to them. Additionally, once on-site, they had problems finding the physical pump location. The static map had also not been updated since 2011 and did not have the correct fuel sites shown.





Solution: DVS staff worked with GIS to accurately map all current fuel site locations for their staff and other County employees. This layer is now available as an enterprise GIS layer. ArcGIS Online was used to create an interactive application. Since Fairfax County is a contributor to the world topographic basemap, all the building and transportation features appear at a detailed level. Aerial imagery is also available to view within the application.

Finding Nearby Sites: Users can use the "NearMe" widget to find fuel sites within a specified distance of any address or feature. By typing an address or selecting a point on the map, users can get a list of all fuel sites within a specified radius.

Driving Directions: Once users find a desired site through the application, they can get driving directions directly to the site.





Accurate Locations



<u>Search</u>: This app utilizes the Search widget which gives users the ability to search for fuel sites by address, site name, or site number.

Show search results for 44

Department of Vehicle Services Fuel Sites





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E.	Fairfax County Geocoder	P 4
	12000 GOVERNMENT	-one
	CENTER PKWY, FAIRFAX, VA	ity Mall a Cente
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1/Latarates	DR, FAIRFAX, VA	Tumpi Shopp
	12000 GOVERNORS CREST	Cente
0000	CT, ALEXANDRIA, VA	
Estat	12000 GOVERNORS CT,	
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Lenc	12000 GOVERNORS HILL DR,	10
Minte	ALEXANDRIA, VA	23
ly Par	12000 GOVERNORS POND	







FAIRFAX COUNTY GOVERNMENT **DEPARTMENT OF NEIGHBORHOOD & COMMUNITY SERVICES**



School Regions







A Fairfax County, VA, publication Fairfax County is committed to nondiscrimination on the basis of disability in all county programs, services and activities. Reasonable accommodations will be provided upon request. For information, call 703-324-4600, TTY 711. www.fairfaxcounty.gov/neighborhood-community-services

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This map is intended for reference purposes only. Fairfax County does not provide any guarantee of the accuracy or completeness regarding the map information. Map Produced: 1/23/2019



Streamlining Site Construction Complaints with GIS

BACKGROUND

There are approximately 1,600 active construction sites currently in Fairfax County. Many of these sites are residential infill development occurring in neighborhoods adjacent to other residents' properties. Land Development Services (LDS) site inspectors are responsible not only to perform their regular inspection duties, but also to respond to residents' complaints related to site construction. Site Construction Complaints include the following types of issues:

- Malfunctioning erosion and sedimentation controls
- Drainage problems
- Tracked mud on the roadway
- Construction activity within a tree-save area
- Any activities that may harm the environment or cause safety risks or damage another property

Prior to the new GIS Applications described here, staff managed site construction complaints using a spreadsheet in SharePoint. There were multiple issues with this workflow, including:

- No spatial context to the complaints to analyze trends
- Difficult to locate complaints due to ambiguous location descriptions
- Tabular public report not user friendly
- Difficult to research complaint history

The new GIS Site Construction Complaints System was launched on April 2, 2019 in order to streamline the process of reporting and managing site construction complaints. Prior to the release of the new system all Site Inspection Staff participated in a training session. The new system is comprised of five GIS applications.

- 1. Submission App
- 2. Management App
- 3. Inspection App
- 4. Reporting App
- 5. Monitoring App/Dashboard



1. SUBMISSION APP

The Site Construction Complaints Submission app was created in *ArcGIS Online using a GeoForm*. This public app gives residents the ability to file a complaint and identify on the map the exact location of the complaint using the Site Construction Complaints Submission App. This will ensure that LDS staff can efficiently locate and respond to the issue. Complainants can also upload photos and videos using the app, to further illustrate the nature of their complaint.

The biggest challenge was making sure the personally identifiable information submitted by the public remained secure. This was not as easy as expected due to the requirement of the service to be public in order to enable public editing. This was handled by turning off mapping capabilities in the service while still allowing for create capabilities. This gives the user the ability to create a new complaint, but the service will not be able to draw in any application.







2. MANAGEMENT APP

This system was the first in the County to utilize the GeoEvent server. The GeoEvent server was used to create an email notification service. The service is configured to query the Site Construction Complaints Service every 60 minutes, looking at records where the complaint status is blank. This signifies that the complaint is new and has been recently added to the service. The server then sends out a notification email to LDS staff which contains the details of the new complaint.

The Site Construction Complaints Manager is an *internal Portal for* ArcGIS web application. Once LDS staff have received the notification email, they can then use the app to manage and track site construction complaints by performing the following tasks:

- content
- active construction sites
- email generator

3. INSPECTION APP

The Site Construction Complaints Manager is an internal Portal for ArcGIS web application, designed for use on County iPhones. The inspector opens the new complaint email on their phone, and clicks the link in the email, which will not only open the inspector app, but also zoom directly to the complaint. This functionality was accomplished by passing the unique identifier parameter into the ESRI WAB share widget.

This mobile GIS application is used by Site Development and Inspections (SDID) Inspectors in the field to manage site construction complaints by performing the following tasks:

- Navigate to the complaint
- and "Date Closed"

4.REPORTING APP

This public GIS web application created in ArcGIS Online shows all complaints submitted during the past 30 days. The public can use this app to track the status and resolution for all Site Construction Complaints. The data in this application is updated daily. However, complaints will only be viewable in the Reporting App if they have been reviewed by LDS staff and the "Reviewed for Public" field is equal to 'yes,' to ensure that any inappropriate comment or language is removed before becoming publicly viewable.

This application was put in the spotlight on July 8, 2019 when we experienced a 1,000-year flooding event in McLean. Due to the number of requests from citizens and several reporters, we were updating the app twice a day for several weeks. The photo below was submitted through the app during the



Screen complaints submitted by the public for appropriate

Transfer complaints to appropriate agency if not related to

Assign the complaint to the appropriate inspector though

Update the "Resolution" of the complaint

Close out the complaint by updating the "Status"

Site Cons	struction	Complaints Manager		
▼ Find a	address or place	Ce Q Pender Vilage Shopping 200 L Control Cont	Cair Ry Det 493 ft Penderbrook	book
890		 Gia[®] Site Construction C Image: Cia[®] Image	Pender of Penderbrook Of	Pine Tree Or
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	To	O Nichols, David:	Date Closed.	
\triangleright	Cr]	Ser District: Braddock	
Send	cc		Towne Center Shopping Action sent to:	alley Rd
	Bcc		Center Description: There is severe flo	oding
	Subject	Site Construction Complaints	from construction next door to	my
The follow	ing complai/	nt has been issued to the LDS Site	Battlefield	Lalley p. S
Constructi	ion Complair	nts System.	rlan Resolution:	n.Memor Fairfax Farms
			Reviewed for public?	10 al Hwy 50
Complaint	ID: 48608		PIN:	
District: Br	raddock		2 Jaar	66
Name: Ric	k Flair		Email the Inspector	Randor
Email: Ric.	Hair@fourh	orseman.com	Fair Lakes Promenade	Y A A A
location: /	1-969-9603 4179 Duch St	+	Shopping Center	> 10000000
Complaint	Type: Drain	age related	Zoom to	
Descriptio	n: There is s	evere flooding from constrcution next door	Shopping Cent	
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Please use	e the link bel	ow to navigate to the complaint in the Site		
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38.872 Degre	ies Sa U	A Contraction of the second se	county of Fairfax, County of Loudoun, County of Prince W	illiam, VITA, Esri, HERE, G



Site Construction Complaints Report		≘ \$ # & ()
Find address or place	dennew Dr	About 😞 🗙
	nonotitier B Perdetbook Op	This web application contains Land Development Services (LDS) site construction related complaints submitted in the last 30days. This application is intended for public use to monitor and track Site Construction Complaints. The Site Construction Complaint data in this app is maintained by Site Development and Inspections Division (SDID) and is updated weekly by LDS GIS. The nature of the complaints in this data include the following.
Monuna Fairfax Towne Center	Site Construction Complaints	 Malfunctioning erosion and sedimentation controls
ke of Shopping Center Shopping Center	Complaint ID: 48608	Drainage problems
Ox Hill Bothafiald	Complaint Closed Status:	•Tracked mud on the roadway
Park	Complaint 10/10/2019 Date:	•Construction activity within a tree-save area
Readerlan Penderlan	Incident 4178 Rush St Location:	•Any activities that may harm the environment or cause safety risks or damage another property
S Cedar	Type: FairOaks	For more information please contact:
a start of the sta	own value: Mail	Site Development and Inspection Division (SDID)
and the second sec	Inspector: Date Closed: 10/11/2019	Land Development Services
Ber Branne O	District: Braddock	12055 Government Center Parkway, Suite 535
	Action sent to: Zoom to ····	Fairfax, Virginia 22035
	Fair Oaks Shopping Co	Telephone: 703-324-1780
Fair Lakes Plwy Four Addition Plant	IGENB IGEED 201	
Bi Grove C Hebre B	Parton Hills TV Fairfur Public Safety	
Lincoln Lake Way	Headquarters "A Shopping Center	
600ft	E County of Fairfax, County of Loudoun, County of Prin	

5.MONITORING APP

The Site Construction Complaints **Dashboard** uses charts, gauges, maps and other visual elements to reflect the status of Site Construction Complaints throughout the County in real time. From this dynamic dashboard LDS managers perform on-thefly *spatial analysis* of all complaint activity. This application was created in the portal for ArcGIS and is available to all County employees.

The dashboard was the highlight of LDS's GIS presentation at the September Development Process Committee meeting before the Board of Supervisors. The Board was very pleased to have real time, transparent access to this information to support their constituents.

ARCHITECTURE

The Site Construction Complaints dataset resides in the Enterprise Geodatabase (EGDB). There are three services published off a master version fitting the specific app requirements needed:

- 1. The service for the Dashboard and Manager App is internal and has full editing privileges.
- 2. The service of the Inspector App is internal and only has three editable fields.
- The service for the Reporting App published off the master version is public and has full editing capabilities. However, there are some restrictions on the service due to potentially exposing personally identifiable information.

Publishing these services off the master version allows us to function internally in real time while aintaining the ability to review the complaints before they become public. There is a service published directly off EGDB default that is used the Reporting App. There is a definition query on this service that only allows complaints that have been reviewed to be viewable in the Reporting App. The master version is posted to EGDB at 8am every morning so the public can track their complaints.

BENEFITS

This system of GIS Applications provides significant improvements to the overall process of managing site-related construction complaints and to the level of service we provide to our customers, including:

- Streamlines the entire process from complaint submission to complaint resolution, saving staff time
- Gives the public the ability to provide the exact location of the complaint, resulting in increased efficiency and accuracy
- Improves the process for transferring complaints to the appropriate agency when needed
- Provides the spatial context needed to analyze trends Increases transparency by giving the public the ability to track
- complaints and their resolution in user-friendly web map.
- Dashboard provides real-time data visualization and analytics for management

Land Development Services





NEXT STEPS

- Integrate with the new Camino Permit Guide which will not only be used as a permit guide for residents, but also be a complaint guide ensuring that all complaints get directed to the correct agency.
- Configure the GeoEvent Server to send confirmation emails to complainants on submission and complaint update emails when the status changes.
- Replace the GeoForm with Survey123 for ArcGIS once it allows for version editing. This gives us the ability to use webhooks and additional configuration options not available in the GeoForm.
- Expand the system to include complaints from Northern Virginia Soils and Water Conservation District and additional Land Development Services complaints.

Stream Physical Assessment 2.0 Leveraging Survey123 with ArcGIS Collector





There are over 1,600 miles of streams and associated channels in Fairfax County and more than 1.1 million people. To support our large population, we have lots of infrastructure such as roads, houses, malls, libraries, and schools. As we develop our land, many of our streams have eroded or over-widened when too much stormwater runoff is sent to our streams quickly instead of soaking into the ground. As streams shift, our stormwater infrastructure(pipes that carry runoff from houses, shopping centers, and roads to our streams) may be damaged and need repair.

Ashud ID: withor: Benk [1	Reach # Date: Investigators: Time Prov Status (sindu one): No flow Low Yow Normal High/Claw High/Tarbié (>10% of stream bank 70 – X0% of the 50 – 72% of the <52% of the		53) Head ruta	No head sate in 0.5 – 2% head sate. 2 – 3% h reach or grade control has arrested The head sate. Some lower for ruliple occurrences. Control of the head sate.	euts. Multiple head cuts >3 for multiple 5 feet, or one head cut > 5 feet,		Head o	uts These will be points dropped on a	map	
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Initial inspections were performed on paper. Results of the inspections would then be transferred to a computer for analysis.





In order to assess the current condition of our streams and our stormwater infrastructure, staff from the Department of Public Works and Environmental Services will perform a visual stream physical assessment annually between November 15 and May 15. Only a portion of the county will be assessed per year.







Results from the assessment will be used to: • develop an annual countywide stream physical condition assessment score,

- identify adjacent infrastructure needing maintenance,
- help identify candidate streams for restoration opportunities,
- help identify small watersheds where stormwater infrastructure improvements/retrofits or other management actions could improve stream health, and
- identify areas needing additional monitoring

Fairfax County Fire and Rescue

Situational Awareness Dashboard

The Situational Awareness Dashboard combines and filters data streams from the County's Public Safety Computer Aided Dispatch system through the CAD2GIS Geospatial Data Exchange Service, Survey123 forms for windshield survey damage assessment, Technical Rescue Operations, and the Community Emergency Response Team's Community Assessment form. The various data streams are organized to display resource, incident, and damage statuses on a minute to minute basis. In addition, the dashboard also embeds commonly used web sites and social media feeds. The data feeds are mapped and filtered to assist with situational awareness immediately following an incident. In addition to the surveys and feeds dynamic ability This one-stop shop for situational awareness gives decision makers better information, on a day-to-day basis and in the moments following a large scale incident or disaster.





1742 FAIRFAX COUNTY, VA

Incident Map information is entered by Fire and Rescue Department Incident Management Planning Section personnel on an incident/hazard specific basis. Typical information found on this map includes, but isn't limited to: Incident Facilities, Division and Branch Boundaries, and any other GIS data that can be used to support the planning and decision making process. The Resource Status tab can be used by Operations and Communications in order to get up to the minute information about current resource commitments and shortages. Information on this tab is filtered in order to separate Fire and Rescue units into specialties. Situational Awareness in regards to resource statuses has long been a challenge, and this tab is utilizing the CAD2GIS data feed to provide a situational awareness tool for Emergency Response and EOC personnel.

Information in this tab may be up to one minute old.



The Incident Monitor tab provides a snapshot of all active Fire and Rescue incidents in Fairfax County. This view of the data allows decision makers to view surges in certain call types to increase situational awareness.

Information in this tab may be up to one minute old.



Following an incident, Fire and Rescue personnel can utilize Survey123 to collect data that is then displayed in this viewer. In addition, the Community Emergency Response Team (CERT) has a separate survey that they can complete as part of the CERT Community Assessment Program. Structural Damage Report data located in this tab was created in order to comply with FEMA's Damage Assessment Process.



Technical Rescue teams utilize Survey123 in order to document structural statuses during a disaster. Search and Rescue teams can move from location to location submitting structural statuses as

The intent of this display is to convey a high level assessment of the situation to EOC and Fire and Rescue personnel. In 30-60 minutes after a large incident, these surveys are filled out and this display allows the viewer to determine "How big is this incident?" and "How bad is this incident?".

Once the information is received, the Planning Section can use the data to determine parameters for a targeted assessment of particular sites in areas that the surveys have indicated were affected by the incident.

Information in this tab may be up to 1 minute old. Current Data is for demonstration purposes only.

well as photographs and comments about the affected location.

The process was created for Fairfax County in accordance with the International Search and Rescue Advisory Group's guidelines.

Prepared by: Ian Gregoire: Emergency Management Specialist Fairfax County Fire and Rescue Department October 18, 2019 Live data in the Situational Dashboard is considered For Official Use Only (FOUO) and is password protected in ArcGISOnline. To access live data contact Ian.Gregoire@Fairfaxcounty.gov

A LOOK TO THE PAST

Historical population change and its drivers in Fairfax County, VA

Economic, Demographic and Statistical Research, Department of Management and Budget

A Story Map for Public Outreach

The Economic, Demographic and Statistical Research (EDSR) unit conducts quantitative research to support the goals and initiatives of Fairfax County. GIS application and tools are used to produce spatial-explicit products and communicate them to the agencies, other governments, and public via Fairfax County's <u>demographic website</u>, <u>Open Geospatial Data</u>, and GIS databases. Below are a few examples:

• <u>Demographic Reports</u>, annual publication, which contains maps, tables, and graphs of small-area economic and demographic estimates and forecasts, generated by the Integrated Parcel Lifecycle System (IPLS), a GIS-based analytical application created by EDSR.

• <u>Demographic Mapper</u>, updated annually, a Web Map App that navigates users to find the current information on population, housing units, market value and commercial and industrial gross floor area by various geographies.

• Generalized Existing Land Use, updated annually, creates a shapefile and published map from administrative land use data.



In 2019, we conducted a special study to understand the underlying assumptions of the historical population change and discuss its economic drivers in Fairfax County. This study compiled the richest demographic dataset of census from 1790 to date, developed a complex statistical program for trend analysis, and tailored the output for Fairfax County's history.

The results of this study are made into a <u>Story Map</u> to highlight how Fairfax County's population growth has intertwined with the changes of land use, economy and technology advancement, and how demographic diversity has shaped Fairfax County to be resilient and thriving.

The narrative is informative and easy to understand, along with matching graphics. Racing chart and video are integrated to bring the visualization dynamic. The highly-used <u>Generalized Existing Land Use</u> is interpreted in the context of population growth. A special interactive <u>spyglass web map app</u> is created to view the existing planned land use (simplified by zoning districts) in any area of interest and compare it with historical map of the 1950's. Linking to U.S. Census Bureau newly developed API and data reporting platform, a graphic that synchronizes with source data is embedded into the story map, which also allows users to directly interact with Census' data presentation.

Like many other ESDR products, this story map will be updated annually to include the most up-to-date information. Moreover, another study developed partially upon this one, titled "*A Look to the Future: population projection of Fairfax County, VA*" will be made to a story map shared with public to provide a complete picture on our population change.



See U again

@GIS Day, 2020

H)

Why Do We Care



Fairfax County's population is diverse, and the economy is vibrant. This overview of the past to the present is developed to showcase the changes to the demographic make-up, economic vibrancy and shed lights on the drivers of resilient and thriving construct of the county. Providing this information to Fairfax County agencies and public, we hope to support the goals and actions of working together to shape a better and equitable future for residents in Fairfax County.

History of Population Growth and Land Use Change



In the State of Virginia, Fairfax County is the 47th-largest in area, yet the most populous jurisdiction, with about 13% of the state's population. Fairfax County has not always been densely inhabited. In fact, prior to 1940, the population grew slowly for a century, and stayed below 2% of Virginia's population. From 1940 to 1990, population increased 20 times,

and then carries a steady growth rate until today, when the county's population has reached to about 1.17 million.

While the growth of federal governments during and after World War II in 1940's spurred a rapid growth in the county,

made it increasing suburban with urban clusters emerging, Fairfax County has deliberately kept a balanced land development plan. Interact with the <u>zoning comparison web app</u> to look up any area of interest, and compare today's land development categories to 1950's.

ethnicity are the major contributors to our population growth and stabilized age composition.

Thriving Economy Over Time

Fairfax County is one of the United States' wealthiest counties. A government-driven economy is not the full story. Job vibrancy and good public schools have been the major contributing factors driving people to live in Fairfax County.



Migration and increase in people of different races and

Resident Employment by Industry in Fairfax County, VA

The types of job in Fairfax County have changed significantly over time due to labor market shift and advancement in technology. Follow the racing chart to track the changes of industries in which Fairfax County residents performed their occupation since 1850.

Race and Ethnicity in Fairfay County (1850-2017)







Demographic Changes

We have a stable working-age e population providing strong labor force. Follow the video to see

how Fairfax County's population gradually moved from an expansive to stationary pyramid over the last century, with baby boomers in 1950's and 60's.



Out of 10 residents, we now have 3 Virginia born, 4 born in other states of the US, and 3 foreign born. Fairfax County is almost majority minority with 49.9% of its population comprises of non-Hispanic Asian and Pacific Islanders, Hispanics, Blacks or African Americans and mixed race.

Additional URLs:

COUNTY OF FAIRPART THE SECOND Prepared by Xuemei Han, EDSR, DMB, Fairfax County, VA, October 18, 2019. Story Map URL: <u>http://bit.ly/33G1Uv4</u> Fairfax County's Demographic website. https://www.fairfaxcounty.gov/demographics/

Open Geospatial Data on demography. https://data-fairfaxcountygis.opendata.arcgis.com/search?tags=FFX-Demography Generalized Existing Land Use.

https://www.fairfaxcounty.gov/demographics/sites/demographics/files/assets/landuse/genexistinglanduse.pdf https://data-fairfaxcountygis.opendata.arcgis.com/datasets/existing-land-use-generalized

Zoning Comparison Web Map App. https://arcg.is/1n8H8z





FAIRFAX COUNTY PARK AUTHORITY ATHLETIC FIELDS BOOKLET



These maps display data from Fairfax County's enterprise geodatabase. They are generated biannually, or as needed, for reference by both project managers and contractors. Contained within each map are polygons that represent Park Authority diamond and rectangle fields generated from the Diamond Fields and Rectangle Fields feature classes. A table accompanies each map listing the field number, field type, field surface, dimensions, lighting, and irrigation of each athletic field. Values with pick lists are shown in the tables below:

	Field Type	Field Surface			
GIS Code	Explanation	GIS Code	Explanation		
Diamond – 50	This is a diamond where the largest	Cool Season	The surface is cool season grass.		
	available base paths are 50 ft.				
Diamond – 60	This is a diamond where the largest	Warm Season	The surface is warm season grass.		
	available base paths are 60 ft.				
Diamond – 65	This is a diamond where the largest	Synthetic	The surface is synthetic material.		
	available base paths are 65 ft.				
Diamond – 70	This is a diamond where the largest	Skinned Cool Season	The infield is skinned and the outfield is cool season grass.		
	available base paths are 70 ft.				
Diamond – 90	This is a diamond where the largest	Skinned Warm	The infield is skinned and the outfield is warm season grass.		
	available base paths are 90 ft.	Season			
Rectangle	This is a rectangle field.	Dual Warm / Cool	The infield is warm season grass and the outfield is cool season		
		Season	grass.		





Date Created: 10/17/2019 11:35 AM by the Fairfax County Park Authority

https://www.fairfaxcounty.gov/parks/

https://www.fairfaxcounty.gov/parks/





Integration of Decision Support System With GIS for Lifecyle Asset Management



Wastewater Management's Collection Division (WCD) implemented Innovyze's InfoAsset Planner decision support system to assist in management of wastewater assets (sewer lines and manholes/structures).

The goal of the asset management program is to optimize sewer line rehabilitation and improvement plans based on available budget and to prioritize pipe failure risk. A Risk Model was developed based on Consequence of Failure (COF) and Likelihood of Failure (LOF) of the sewer lines.

Asset Management is a continuous improvement process that involves several key stakeholders in an organization including management, engineers, GIS/IT analysts, financial planners, and field staff.



Data imported into ArcGIS to support InfoAsset Planner Model

- Closed-circuit television (CCTV) sewer line inspections data imported from Oracle views that were exported from the WinCan database
- Legacy CCTV sewer line inspections data that has been stored within Infor EAM
- Infor EAM data which is used to track work order and scheduled maintenance, similar to CCTV data, Oracle views were created for work orders or service request relevant to the InfoAsset Planner database analyses
- GIS data which will be analyzed (sewer lines and structures) will need to be periodically imported into the InfoAsset Planner project file geodatabase. All other background GIS layers are directly connected through SDE database connection.
- CCTV videos and pictures will be linked by tables that contain the file pathway and file names.



Decision Tree for Large Diameter Pipes



The InfoAsset Planner Operation Center is where the Model inputs are organized. Modifications to the Model can be done within the Operation Center, this window can be docked within ArcMap.

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	▶ 1	1-Negligible	224.97	76.73	3,625	
	2	2-Low	26.7	9.1	539	
	3	3-Medium	35.44	12.09	589	
	4	4-High	6.1	2.08	101	
а,	5	5-Extreme	0	0	0	



Several Decision Trees have been created to assist in sewer line rehabilitation planning. The decision trees run through a series of yes or no conditional statements and the results are placed in "buckets" for rehab action plans.

Base Risk Analysis

Further analysis is forthcoming on creating a defined risk matrix and creating pipe failure probability curves using multiple statistical models.



FAIRFAX COUNTY GOVERNMENT DEPARTMENT OF NEIGHBORHOOD & COMMUNITY SERVICES

Mount Vernon District



Supervisor Districts





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Fairfax Connector 308 Ridership Analysis

The Fairfax Connector 308 was launched in early April 2019 as a mean of creating new connections and completing missing links in service in the Franconia-Springfield and Mount Vernon areas. The route operates weekdays between 5:45am and 10:20pm, and from 7am to 8:20pm on weekends. Major connections include Springfield Town Center, Manchester Lakes Shopping Center, Hilltop Village Center, Mount Vernon Plaza and Gum Springs Center. Route 308 also serves the Kingstown and Sherwood Regional Libraries, the South County Government Center and Mount Vernon Governmental Center. As a new route, the 308 was expected to fill a gap where existing service from the Franconia-Springfield Metrorail station did not reach. This analysis is part of an effort to determine how the route is being used and if there are any identifiable points for improvement.

As part of Fairfax Connector's Intelligent Transportation System (ITS) we receive daily counts of rider activities (boarding/alighting) for all Fairfax Connector routes. These passenger counts are averaged for weekdays, Saturday, and Sunday services, and are plotted on a map (far right). Passenger surveys supplement this information by asking where riders originate, are they transferring to/from another service, and what their final destination is. The ridership responses for the Fairfax Connector 308 are plotted below and a heatmap was created to better visualize areas where respondents were originating (left), leaving the 308 (center), and overall trip (right).

Interestingly, while the majority of riders have a final destination within expected walking distance of 308 service (roughly 1/4 mile), there are a number of riders who use the 308 as a midpoint in their travel to another destination not served by the 308. Of note are the riders terminating at the INOVA Mount Vernon Hospital, but continue on to destinations around the Huntington Metrorail Station. In some extreme cases*, riders can be using Fairfax Connector 308 service to reach destinations in Washington DC (via Metrorail) or in Prince William County (other bus service).

ROUTE	DIRECTION	STOP_ID	STOP	BOARDINGS	ALIGHTINGS	ON_OFF
308	NORTHBOUND	6464	MOUNT VERNON GOVERNMENT DR @ M	42.85	0.31	43.16
308	NORTHBOUND	6416	PARKERS LA @ SHERWOOD HALL LA	4.18	0.33	4.51
308	NORTHBOUND	3320	SHERWOOD HALL LN @ MOUNT WOODLEY PL	6.00	0.25	6.25
308	NORTHBOUND	3298	SHERWOOD HALL LN @ FORDSON RD	0.43	0.08	0.51
308	NORTHBOUND	3299	SHERWOOD HALL LN @ RICHMOND HW	3.69	4.51	8.20
308	NORTHBOUND	6458	RICHMOND HWY @ LADSON LN	31.24	3.22	34.47



Map of the Fairfax Connector 308 route. The Fairfax Connector 308 runs between the Franconia-Springfield Metrorail Station and the INOVA Mt Vernon Hospital. With stops along Beulah St, Telegraph Rd, Jeff Todd Way, and Richmond Hwy, Fairfax Connector 308 serves many points of interest (shown in white).

Subset of Route 308 Weekday APC data. Boardings/Alightings are averaged by stopID to produce an accounting of passenger activity. Total boardings & alightings are summed to a volume of traffic (On_Off) at any particular stop.



Heatmap of ridership survey responses. Riders were asked as series of questions to plot their trip. Questions included where their trip originated, where they departed the Fairfax Connector 308, and what was their ultimate final destination after leaving the bus service. Not all riders of the 308 begin their trip here, some are transferring from another service as indicated by points (red triangles) located away from the 308 route. Responses to leaving the bus service and final destinations are plotted as orange squares and blue stars respectively.

 Origin ★ Final Destination Metrorail Station



business square footage, and median household income to estimate a likelihood of potential ridership in the area.





Heatmap of ridership survey responses. Riders were asked where their trip on the Fairfax Connector 308 was ending (orange square). There are some erroneous responses indicated by responses ending outside the Fairfax Connector 308 routing, however most fell along the route. Not all riders' trips end with the Fairfax Connector 308, some may need to transfer to other transportation services to reach their final destination. As the Fairfax Connector 308 serves both the Franconia-Springfield Metrorail Station and INOVA Mt Vernon Hospital as terminus points, riders are likely transferring to another service at these points.

Map of ridership survey responses. Rider's total trips are shown as two segments*: travel from their origin/home and their destination using the Fairfax Connector 308 (shown in blue), and the rider's final destination after stepping off of the Fairfax Connector 308 bus (shown in green). It is apparent that a measurable number of Fairfax Connector 308 riders' trips do not end with the 308 as indicated by the long green trips to destinations not served by Fairfax Connector 308. Longer trip lines mean the Fairfax Connector 308 is but a small part of a particular total commute.

*Some trips are shown as using 308 service in areas outside (long blue lines directing away from the 308 route), while they are likely due to incorrect/confused survey responses, they do still provide a picture of the respondent's commute as they are still using the 308 as part of their trip.

Automated Passenger Counter (APC) data of average weekday ridership. APCs record when passengers enter (board) or exit (alight) the bus. Bus stops showing high activity is one factor to consider when adding infrastructure upgrades including bus shelters and/or sidewalk & trail connections. Overlaid is a 'Transit Propensity' dataset which is derived from a number of factors including number of households,







1976 RUNNING OUT OF ROOM

2019 RUNNING OUT OF ROOM Annandale Community Park provides wildlife corridors and a respite from traffic and congestion.



In 2019, the Hidden Oaks Nature Center (HONC) celebrates it's 50th Anniversary. In support of the event on October 19TH, the Park Authority created a Story Map in concert with two additional products (a map series and a Story Map Tour app) to illustrate the history of the nature center. The Story Map includes the evolution of the building, surrounding parkland and community, nature center exhibits, and programming throughout the decades.

Entitled "Imagine the Next 50 Years", viewers are encouraged to consider how they can impact HONC over the coming 50 years through learning about the **last 50**. This serves a twofold purpose – both communicating how the Nature Center has served the community at large, as well as promoting the 50th anniversary event.



A companion app to "Imagine the Next 50 Years" was created at the same time – "Habitats and Havens Along the Old Oak Trail". The goal of this application is to create a park experience online for patrons that are unable to use this non-ADA accessible trail, as well as to encourage patrons to visit in person if they are able.

The trail encircles the nature center and is a major attraction for guests. The Story Map Tour application takes users on this journey without even needing to visit the park. With 16 stops, there are illustrative text and images about the surrounding environment of each stop. The user will learn about the social and physical history of the land, as well as about the plants and animals found in the park!

This application is available on our website, discoverable for patrons that are looking for activities to do "on your own" https://www.fairfaxcounty.gov/parks/hidden-oaks/on-your-own



MAP SERIES DISPLAY FOR THE NATURE CENTER

For many years, an exhibit entitled "Running Out of Room" has hung on the wall at HONC. Four posters of aerial imagery demonstrate how rapidly the area surrounding Annandale Community Park (where HONC is located) has urbanized. These were created over a decade ago and needed a refresh. In conjunction with the digital story maps, the maps shown here were produced for display in the exhibit space. This connects the digital products to the nature center and supports consistent messaging.

Celebrating Hidden Oaks Nature Center's 50th Anniversary

"IMAGINE THE NEXT 50 YEARS" STORY MAP

In the mid 1960s, the Fairfax County Park Authority's agency director dreamed of a little cabin in the woods where families, scouts, and schoolchildren could learn about nature and meet native wildlife.

Fast forward in time, and Hidden Oaks Nature Center has become exactly what the director initially envisioned. With a rich 50 years of history, "Imagine the Next 50 Years" effectively captures HONC's journey and evolution. The application communicates change over time through 1) physical expansion through the decades, 2) the exhibit message, 3) the running out of room story, 4) the outdoor playground "Nature" Playce", and 5) native wildlife. Each section concludes with a reflection on how the next 50 years may evolve. The app closes with the reminder that everyone can make a positive impact and asks users to consider how you envision natural places in 50 years.

f 💟 🔕

The application is full of both historical and present-day photos, allowing the user to imagine all that has evolved for HONC. Commercial aerial imagery supports the "Running Out of Room" section, while a photo taken from a helicopter shows the baseball fields after they were constructed. The "Expansion Through the Decades" section contains embedded web maps that users can expand to see how the park has changed from 1976 to 2019. The Story Map is available on our website.



Imagine the Next 50 Years



For more information about other events at Hidden Oaks Nature Center, or to learn more about the Park Authority, please see the additional links below.



Nature Center

Author: Fariss Agatone, Fairfax County Park Authority. Questions? Email Fariss.Agatone@fairfaxcounty.gov Gratitude to the following contributors: Suzanne Holland, Michael McDonnell, Fiona Davies, and Dave Ochs. Imagine the Next 50 Years: https://bit.ly/33Fhya2 | Habitats and Havens: https://bit.ly/2IWALMw



Native Wildlife

Fifty years ago, the nature center featured a broader range of animals than today, including mammals, birds, and marsupials. Families commented that the live animals were a main reason they become regular visitors, and the exhibits evolved to focus on native reptiles and amphibians.



Clara the opossum visits with a staff member on the right.

2019 WEB APPLICATION CATEGORY



🕤 💟 🔞



FAIRFAX COUNTY GOVERNMENT **DEPARTMENT OF NEIGHBORHOOD & COMMUNITY SERVICES**



Future Sites

- Franconia Police Station/ Franconia Museum
- Lorton Community Center
- **P** Mixed Use Retail
- **P** North Hill
- South County Police Station and Animal Shelter



A Fairfax County, VA, publication

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3

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0.75

0



6

Miles

4.5

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Procurement of and Material Management

Request for Proposal 2000002845

Solar Power Purchase Agreement Services

GIS into a

Spokespersons from potential Offerors have stated that this solar project is the largest solar energy undertaking in VA, on the East Coast and possibly nationwide to bring solar power to the forefront with government entities.

Interactive Mapping Applications Phase I Projects <u>http://bit.ly/2ouIH0j</u> Phase II Projects <u>http://bit.ly/2B5fE61</u>



Phase | Projects Government Facility Fairfax County, which is home to over 1.1 million residents, is governed by an elected 10-member Board of Supervisors (Board). Through its Statement of Priorities, the Board has pledged to engage residents and businesses to protect investment in eight critical areas, including "a clean, sustainable environment". On July 10, 2018, the "Fairfax County Operational Energy Strategy" (Energy Strategy), https://www.fairfaxcounty.gov/energy/sites/energy/files/assets/documents/fairfax-county-operational-energy-strategy.pdf was adopted by the Board with the intended purpose of ensuring energy and resource efficiency are explicitly considered, examined, and executed throughout all County government operations and decision-making.

To that end, the Office of Environmental and Energy Coordination (OEEC) was established to lead the county's cross-organizational development and implementation of effective environmental and energy policies, goals, programs and projects. OEEC engages county departments, authorities, businesses, and residents to advance environmental and energy priorities and address community needs. The CECAP will be a community-driven plan that provides pathways for all residents, workers, organizations, and businesses to reduce their energy use and decrease community-wide greenhouse gas emissions.

Fairfax County (FCG) is conducting a joint procurement on behalf of itself, the Fairfax County Park Authority (FCPA), the Fairfax County Public Schools (FCPS), and the Fairfax County Redevelopment and Housing Authority (FCRHA). Collectively these Fairfax Entities have identified approximately 113 facilities as sites for potential Phase I Solar Power Projects throughout the County. An additional 124 projects have been identified as potential Phase II Projects.

- Utilizing ArcGIS Online technology, interactive maps were created for <u>Phase I</u> and <u>Phase II</u> projects.
- Each facility is symbolized by type, and when clicked on reveals relevant details, including: • Name and address of the location
- Potential types of solar structures (rooftop mounting, ground mount, and canopy structure mounting) • Annual electric costs and current provider
- The table at the bottom of the map is a list of all projects that may also be used to navigate to them.



Facility ▲ Name	Street Address	Roof Age (yrs)	Warranty (yrs)	Gross Building (sq ft)	Electric Utility	Average Annual Electric Consumption (kWh)	Annual Peak Electric Demand (kW)	Building Roof Material	Parking Lot Mount/Canopy	Park Mou
Chantilly High School	4201 Stringfellow Rd	Roof replacement is in progress.	20	387550	Dominion	3,918,120	1768	Yes	No	No
Cherry Run Elementary School	9732 Ironmaster Dr	1	19	83532	Dominion	837,840	263	Yes	No	No
Chesterbrook	1753 Kirby Rd	6	14	53699	Dominion	748,800	300	Yes	No	No

Reston Community Center

Tools for Measuring, Drawing and Printing allow the user to customize the map and create pdf files of each facility

Each Offeror was required to understand the conditions at each separate location so they could propose solar configurations for each location (type of mount, amount of kWh that could be produces on site, estimate a cost for required equipment). Without the support of GIS, thousands of manhours would have been spend in organizing site visits to each of the 113 Phase I project sites & 124 Phase II project sites to allow potential Offerors (15 separate companies attended the preproposal conference) initial access to determine shade cover and potential area available to support solar panels.



Red: Band_1

Blue: Band_3

Virginia, Sources: Esri, HERE, Garmin, FAO, NOAA, USGS

County of Fairfax, County of Loudoun, County of Prince William, MNCPPC, VITA, BuildingFootprintUSA, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA | Fairfax (

Using the "Zoom To" option in the pop-up window takes the user to the facility and the background map switches to current aerial imagery

Potential Offerors were able to independently and repeatedly go to any site and review this data, via the interactive mapping application. Locations may be searched by facility name, or street address. When zoomed in close on a facility, current, high-resolution aerial imagery provides a true "look" at the rooftop of each facility. Measuring and drawing tools facilitate greater understanding of the dimensions and layout.

Photo by Unknown Author is licensed under CC BY-M



1. Technical Background

According to 'Architecting the ArcGIS Platform : Best Practices' (ESRI, the latest version published in June 2019), ArcGIS supports multiple approaches to application implementation while helping users minimize cost and efforts (FIG. 1).

ESRI offers app templates and focused solutions for specific problems and business areas, so users can download apps from ArcGIS Online, Enterprise Portal and GitHub (github.com/esri) then modify the source code for these templates to add discrete capabilities. In addition, several ArcGIS COTS apps use modular frameworks that let users create custom widgets and plug them into the apps.

In this project, the existing apps and widgets from ArcGIS Enterprise Portal were used to incorporate extended functionality to support integrated business workflows for Fire Prevention Systems Notification Solution.

2. Business Use Cases & Design >> Initial Design with Existing Solution

FRD's Fire Prevention Office needed an internal web solution to share operational status for Fire Prevention Systems (System Outages for Fire Alarms, Sprinklers, **Central Stations, etc) with associated location information.** The initial business needs were outlined as:

- Data collection with location for Field Inspectors
- Data updates for Supervisors
- Data sharing for Internal Staff
- Mobile-friendly interface on County's iPhones
- Secured authentication using County's User Login

To provide these major functions, it was planned to build three kinds of apps from existing templates, **Crowdsource Reporter, Manager, Operations Dashboard as illustrated below.**

Supervisor

Group

>> Additional Needs for Custom Functionality

Inspectors

In addition to the functionality that the existing apps offer, there were two other capabilities required to enhance the current business workflows.

- On-the-fly spatial query for First Response area where outage is located - Email notification for Station Commanders and Shift Captains

To add this additional capability, it was decided to extend the CrowdsourceReporter app with custom Web API and code modification in widgets. The app template was downloaded from the GitHub site and the modified app was hosted on FRD's internal web server with modified code.

Extending ArcGIS Apps for Integrated Business Workflows -Enterprise Portal Solution for Fire Protection Systems Notification

Prepared by Dahae Hwang, GIS Analyst Fairfax County Fire and Rescue Department

FIG 1. Configure first for the lowest cost and least effort, then extend and customize as needed.

3. Implementation >> Custom Functionality Added to the App

>> Benefit & Future Extensibility

Integrated business workflows from field data collection to notification mana to increase work efficiency by reducing manual work steps Data can be used for trend analysis to improve business operations Custom code and Web API can be easily re-used for similar business solutions (i.e., Emergency Vehicle Preemption (EVP) Outage Management Solution)

EVP Outage I	Manager		o- a o	Hwang, Dahae 🔻
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of Operating	08/14/2019 11:05 am	Test	Test	4318.80
ot Operating	08/14/2019 10:16 am	Test	Rest	6675 UT
ot Operating	08/14/2019 9:16 am	Tester	Text	3206 AI
ot Operating	08/07/2019 2:02 pm	FireTest	Comments	3443 HI
ot Operating	08/07/2019 1:54 pm	Dahae	Comments	12106 F
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ot Operating	08/07/2019 1:23 pm	Dahae	Comments	11660 /
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Fairfax County Fire and Rescue Department Uniform Personnel's Declared Place of Residence

The residence locations are displayed via a heat map which obscures the specific locations while still portraying the density clusters. Of 1,375 personnel, 229 reside within the County and 1,146 reside outside.

> FRD GIS Section Map created October 18, 2019 Data as of May 20, 2019

LIBRARY LOCATOR

FairfaxCounty.gov/library/branches

Commercial Revitalization Districts & Areas Population, Economic, and Household Profiles

The Community Revitalization Section of the Department of Planning and Development (Formerly: The Office of Community Revitalization) facilitates strategic redevelopment and investment opportunities within targeted commercial areas that align with the community's vision and improve the economic vitality, appearance and function of those areas. To encourage redevelopment, CR-DPD has provided basic demographic information for the Commercial Revitalization Districts and Areas to highlight the potential benefits of redeveloping within the Districts. The data previously was provided by an outside contractor and became cost prohibitive.

With a need to replace the reports several solutions were discussed including; downloading individual Census tables from the American Community Survey, using Fairfax County Demographic data and ESRI Business Analyst. Unfortunately, the data reporting required having multiple buffers of 1/4, 1/2, 1 mile, and within the CRD and CRA boundaries. Using just the Fairfax County Demographic data would not work since several districts abutted neighboring jurisdictions: Arlington County, City of Alexandria, and City of Falls Church our data sources needed to include them to accurately replace the existing demographic reports. Downloading Census data for all jurisdictions was time consuming and still required significant data clean up.

ESRI Business Analyst provided the demographic data types of interest, formatted for easy analysis, included Fairfax and all the adjacent jurisdictions and could be performed automatically. Katherine Miga used the ESRI Business Analyst desktop version to compile the data for each buffer region surrounding the districts. While working with the compiled data many of the districts appeared to have significant overestimates for total population within their boundary. ESRI Business Analyst uses a weighted approach to proportion the population over the entire census block area. Unfortunately, the CRD's and CRA's are comprised mostly of commercial land use types that have no population while many of the census blocks extend beyond the CRD and CRA boundaries and include residential areas. The inclusion of the residential areas skews the demographic data, but there is a solution to this problem. Find the actual total number of residential units in each buffer region for each district and adjust the compiled data to more accurately reflect the demographics for each region.

Easier said than done! Fairfax County's GISMGR.PARCEL_GIS_PARDATALL has the LIVUNIT field but the best datasets for the three other jurisdictions; Alexandria: Building, Arlington: Parcels, Falls Church: Buildings did not have a units field. Some research of the available online real estate assessment information yielded the unit counts for the other jurisdictions.

With a housing unit count for each region surrounding each District and Area the ESRI Business Analyst demographic data can be recalculated starting with Total Population.

New Total Pop. = Old Average Household Size * (New Housing Unit Count * (Old Total Households / Old Total Housing Units))

New Total Population is then used to recalculate: Population by Age, Educational Attainment, Race & Ethnicity, and Employment by Occupation.

New Category Total = New Total Population * (Old Category Total / Old Total Population)

Similarly, Housing Units by Value and Households by Income were recalculated using the same ratio approach above with Total Housing Units and Total Households respectively.

Housing Units by Type and Age and Total Commercial Square Footage required a different approach. Unit Type can be found in the Land Use Code Description in the PARDATALL for Fairfax but, Unit Age can only be found in the DWELDATALL and COMDATALL datasets. For the other jurisdictions during the research phase to find the unit counts the Type and Age were also collected. PARDATALL is joined to DWELDATALL and COMDATALL and then select by location is used to find the features within each region (within, 1/4, 1/2, & 1 Mile) surrounding each CRD and CRA for each joined layer. Tables of the selected features were created to be processed in Excel; 72 tables for Fairfax County, 9 tables for Alexandria, 6 tables for Arlington, and 3 tables for Falls Church. A couple of Excel formulas later each table had Housing Type and Age of Units grouped into categories.

Total Commercial Square Footage was calculated using the joined PARDATALL & COMDATALL dataset. The building square footage can be found in the BUSLA field. COMDATALL has multiple feature references for the same building structure. To avoid double counting the building square footage a new field was added which combined the following fields: PIN, IMPRNAME, and BUSLA, then a Frequency count was performed on the field. The frequency table was joined back to the PARDATALL & COMDATALL table and a new field was added and calculated with NEW BUSLA = BUSLA / Frequency. The Commercial Square Footage was only calculated for within the Districts and Areas because there was no similar total square footage found for the other jurisdictions. This process yielded 9 tables for Fairfax County and similar formulas in Excel were used to group the commercial square footage into categories by type.

The last components of the project were the inclusion of Business Gross Receipts and Business/Professional Licensures. Acquired using an address list with the help of Donna Parker in the Department of Tax Administration. These statistics give a general view of economic strength, activity, and types of businesses located in each District.

The finalized tables were uploaded to Microsoft Power BI for display on the new Community Revitalization Website at www.fcrevite.org/district-profiles. General location maps created in ArcMap were included to correspond with the selected Districts and regions.

Notes:

Thank you to Katherine Miga for running the ESRI Business Analyst Reports and Donna Parker for her help compiling the Business Gross Receipts and Business/Professional Licensures.

Website: www.fcrevite.org/district-profiles

Total

Population

A

OBJECTID

12

Populatio

Total opulation = 2

Figure 2: Annandale Commercial Revitalization District. Map showing location and number of residential within census blocks and Annandale CRD. ESRI Business Analyst Total Population was 277 and 87 units. Corrected based on 24 occupied units is Total Population of 77.

Richmond Hwy CRD

& 1/2 Mile Buffer

2010

2000

Figure 1. Map showing Commercial Revitalization Districts and Areas and the impact buffers made to include surrounding jurisdiction data.

A B	C D	E	F	G	Н	I	J	K	L	М	Ν	0
IECTID FID_1	YEARBLT BNAME	BUNITS	da	da				YRBLT				
16855 23362	1940	1	Detached house 1.5	Detached house 0		Ingle Family	303	1700	0 Be	fore 1940	285	
17092 23661	0	1	Detached structure 0	Detached house 1	151	Duplex	2	1701	0	1950	156	
17102 23673	1986	1	Detached house 2	Detached house 1.25	13	Townhouse	601	1702	0	1960	6546	
18415 24097	1961	12	Apartment Attached structure 3	Detached house 1.5	14	Multiplex	150	1703	0	1970	1500	
18418 24102	1961	11	Apartment Attached structure 3	Detached house 1.75	6	Multifamily 1-4 Sotries	5530	1704	0	1980	451	
18419 24103	1961	10	Apartment Attached structure 3	Detached house 2	95	Multifamily 5-8 Stories	202	1705	0	1990	1968	
18422 24107	1961	12	Apartment Attached structure 3	Detached house 2.25	1	Multifamily 9+ Stories	5507	1706	0	2000	1000	
18424 24110	1961	12	Apartment Attached structure 3	Detached structure 0	1	Mobile Home	0	1707	0	2010	4	
18425 24113	1961	12	Apartment Attached structure 3	Detached structure 10	327		12295	1708	0			
18426 24116	1961	11	Apartment Attached structure 3	Detached structure 15	1			1709	0			
18427 24119	1961	11	Apartment Attached structure 3	Detached structure 5	1		¢2.5200	a^{1710}_{2710}	t2.⊏200			
18429 24122	1961	12	Apartment Attached structure 3	Detached structure 7	201		92.Г 299;	17 17	PZ.E299	55)		
18431 24125	1961	11	Apartment Attached structure 3	Detached structure 9	207			1712	0			
18440 24143	1986	1	Detached house 2	Duplex 0	2			1713	0			
18447 24153	1961	12	Apartment Attached structure 3	Townhouse or row house 0	1			1714	0			
18458 24172	1961	11	Apartment Attached structure 3	Townhouse or row house 2	79			1715	0			
	1966	14	Apartment Attached structure 4	Townhouse or row house 3	466			1716	0			
	1966	14	Apartment Attached structure 4	Townhouse or row house 3.25	28			1717	0			
~ ·	1966	14	Apartment Attached structure 4	Apartment Attached structure 2	702			1718	0			
	1966	14	Apartment Attached structure 4	Apartment Attached structure 2.5	10			1719	0			
<i>n</i> c	1966	14	Apartment Attached structure 4	Apartment Attached structure 3	1596			1720	0			
	1966	14	Apartment Attached structure 4	Apartment Attached structure 4	815			1721	0			
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	1966	14	Apartment Attached structure 4	Apartment Detached structure 14	173			1723	0			
	1966	14	Apartment Attached structure 4	Apartment Detached structure 15	818			1724	0			
•	1966	14	Apartment Attached structure 4	Apartment Detached structure 16	2356			1725	0			
Over:	1966	14	Apartment Attached structure 4	Apartment Detached structure 17	313			1726	0			
	1966	14	Apartment Attached structure 4	Apartment Detached structure 2	152			1727	0			
	1966	14	Apartment Attached structure 4	Apartment Detached structure 3	20			1728	0			
	1966	14	Apartment Attached structure 4	Apartment Detached structure 4	526			1729	0			
	1966	14	Apartment Attached structure 4	Apartment Townhouse or row house 2	34			1730	0			
	1966	14	Apartment Attached structure 4	ARHA Attached structure 2	15			1731	0			
	1966	14	Apartment Attached structure 4	ARHA Townhouse or row house 1	8			1732	0			
	1966	14	Apartment Attached structure 4	ARHA Townhouse or row house 2	19			1733	0			

Figure 3. Excel spreadsheet showing the residential units table for City of Alexandria. In the future python will be used to compile the statistics instead of creating 90 individual tales to calculate total residential units and determine age groupings.

Commercial Revitalization Districts and Areas: 2018 Population Profile

Commercial Revitalization Districts and Areas: 2018 Households Profile

Select District: Annandale Baile	y's Crossroads L	ake Anne	Lincolnia	McLean	Merrifield	Richmond Highway	Seven Corners	Springfield	
Select Buffer: CRD Bound	ary	CRD & 1/4	Mile Buffer		CRD & 1/2 Mile But	ffer	CRD & 1 Mil	e Buffer	
Seven Corners CRD & 1/4 Mile Buffer	Total Ho Househo Average Househo	useholds: 4 Ids with Ch Household Ids Poverty	,935 <i>ildren:</i> 1 <i>Size:</i> 2.6 <i>/ Rate:</i> 13	,503 52 3.30%	Housing <u>Total:</u> 5,17	7 0 30.12% -	4.31%	● Ow ● Rei ● Va [,]	vne nte
County CEDAR LAN BEL AIR AND TRAINING COUNTY	Languag English Only 54.12% Median I Housing	es Spoken (<u>y: English & P</u> 36.2 House Valu Units by Ty	at Home Another: <u>2</u> 9% e: \$582,5 ype:	2: <u>Another Only:</u> 9.58% 599	++++++++++++++++++++++++++++++++++++++	Units by 50 50 6 6 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	Value: 595 198	1669)
All data are estimates for 2018 unless	Multifamily 1-4 Sto Multifamily 5-8 Sto	ories	647	1,440	Housing ²к	2,061	Age:		
otherwise noted. Sources: U.S. Census Bureau, Census 2010 Summary File 1 and ESRI forecasts for 2018	Multifamily 9+ Sto	ories	1,	,129	1K	1,096	800		

ARLINGTON BLVD ARE DARCHOFT COUNTY ARE DARCHOFT COUNTY ARE DARCHOFT COUNTY COUN	tal Consumer Spending: \$1.45B r Capita Income: \$44,479 edian Household Income: \$80,178 useholds By Income: <\$25,000 \$146 .000-\$50,000 6514 .000-\$75,000	*Business Gross Receipts: \$1.23B *Total Commercial Sqft: 9.71M *Commercial Sqft. By Type: 4.10M
ARLINGTON BLVD ARLINGTON BLVD VOR VOR VOR VOR VOR VOR VOR VOR VOR VOR	capital income: \$44,475 edian Household Income: \$80,178 useholds By Income: <\$25,000	4.10M 4.34M
Fairfax County City of Alexandria S150,00 Manage Manage All data are estimates for 2018 unless otherwise noted. Transpo Sources: U.S. Census Bureau, Census 2010 Transpo Summary File 1 and ESRI forecasts for 2018 and 2023; Fairfax County Department of Tax Installa	100-\$100,000 5785 100-\$150,000 3911 >\$200,000 3911 >\$200,000 4030 Interview of the second se	1.66M 0.48M 0.13M Retail Office Industrial Hotels Apartments *Top 10 Business/Professional License NAICS Description Professional, Scientific, and Technical Services Other Services and Public Administration Retail Trade Administrative, Support, Waste, and Remediation Services Accommodation and Food Services Real Estate and Rental and Leasing Health Care and Social Assistance Transportation and Warehousing Construction Educational Services

Total Population: 74,723 **Educational Attainment 25 Years & Over:** 2023 Population Estimate: 77,915

High School; No Diploma	9,257
High School Diploma or GED	8,556

Figure 4-7. Sanpshots of the Commercial Revitalization Districts & Areas Profiles statistics displayed in Micrsoft Power BL

PLANNING & DEVELOPMENT

Single Family

Special Acknowledgements:

A variety of people contributed toward the data collection and refinement of the Power BI displays. Without their help this project would not have been possible. Katherine Miga; GIS Office for her help in running the ESRI Business Analyst desktop software.

Donna Parker: Tax Administration for compiling the Gross Receipts and NAICS Business/Professional Licensures.

Community Revitalization Program Managers: Laura Baker, Doug Loescher, JoAnne Fiebe, and Liz Hagg; for constant input and patience while designing the Microsoft Power BI display.

Visit the new Community Revitalization website at www.fcrevite.org

Project Completed by: COMMUNITY REVITALIZATION **Chris McCarthy**

- 10-TYSONS CORNER MARRIOTT
- 11-SAFFORD ALFA ROMEO
- 12-MERCEDES BENZ OF TYSONS CORNER

- 13-INDUS CORPORATION
- 20-NEWGATE SHOPPING CENTER 21-WILLSTON APTS 22-REDWOOD COMMERCIAL 23-THE CORNER AT SEVEN CORNERS 24-SHEEHY FORD 25-CRATE AND BARREL 26-AUDI TYSONS CORNER
- 33-PISTONES ITALIAN INN 34-BUSARA 35-CAPITAL ONE 36-WORTHINGTON EXXON 37-CENTREVILLE CREST 38-6201 LEESBURG PIKE 39-KOONS TYSONS TOYOTA

Shopping Center FAIR OAKS MALL TYSONS SQUARE CENTER HILTON MCLEAN APPLE GROVE WILLSTON CENTER II THE WESTIN TYSONS CORNER TYSONS CORNER MARRIO SAFFORD ALFA ROMEO INDUS CORPORATION HILTON SPRINGFIELD SPRINGFIELD MEDICAL CENTER CENTREVILLE SQUARE WILLSTON CENTER CENTREWOOD PLAZA NEWGATE SHOPPING CENTE WILLSTON APTS REDWOOD COMMERCIAI THE CORNER AT SEVEN CORNERS SHEEHY FORD CRATE AND BARRE AUDI TYSONS CORNEI BENTLEY TYSONS NEW GRAND MART THE SHOPS AT FAIRFAX SQUARE SPRING MALL SQUARE MAGILLS PIZZA AND BUFFE PISTONES ITALIAN INI BUSARA CAPITAL ONE WORTHINGTON EXXON CENTREVILLE CREST 6201 LEESBURG PIKE KOONS TYSONS TOYOTA

Transitioning Stormwater Facility Maintenance from Reactive to Proactive: An Experiment in Risk Assessment and Predictive Analytics Stormwater Maintenance Division

Eric Caldwell

promotion of infiltration. Additionally, in densely populated areas, trees provide highly desirable green space. Figure 6 maps canopy for 1261DP. The County average is about 52%, and this site is well

- life of this facility, avoiding costly construction activities resulting from facility failure. When work is required to remediate this site, it should be done in
- early Fall, when stabilizing vegetation can be best reestablished. A proactive approach would consider community outreach, using
- this information to educate residents. Suggestions such as tree planting, invasive plant control, rain barrels may be exceptionally helpful in this watershed.

Laurel Hill

(formerly Lorton Correctional Complex)

Distribution

The Section 141 of Public Law 105-277, the Lorton **Technical Corrections Act** of 1998, gave the General Services Administration (GSA) the responsibility of disposing of the Lorton Correctional Complex to the extent appropriate.

Transfer was completed on July 16, 2002. That plan dictates allowable uses governing future development of the subject properties including institutional park land and open space, as well as passive and active recreational uses.

The problem is that the parcels used in the fair market value analysis and proffers do not match with the parcels recorded in the subdivision plat. Relating the appraisal and proffers to current land configurations (subdivision parcels) is very difficult to visualize because these parcels do not share common boundaries and naming conventions. The County Attorney's Office (OCA) needs to easily visualize the proffers and see which property is burdened by what. The map shows how the parcels relate to the fair market value assigned to each in the appraisal report.

The purpose of this map is to assist OCA and Planning and Development to easily visualize complicated historic proffers associated with the transfer of the Lorton property from GSA to the Board of Supervisors of Fairfax County (BOS). Land Survey Branch supports OCA with assistance for Lorton/Laurel Hill land use and boundaries.

Parcel- Description/Use Identification A- Environmental Quality Corridors (EQC)

B- Natural Resource Area C/D- Transportation Facility/Elementary School Site E- Middle School Site F- High School Site G- Former Nike Site H- Natural Resource Area I- Golf Course Area J-1 and J-2- Park and EQC Areas K- Redevelopment Area L- Maximum Security/Central Facility M- Laurel Hill House N- Park and EQC Areas O- Former Nike Site P- Fire Station Site Q- Occoquan Facility R- Park and EQC Area S+T- Landfill / Energy/Resource Recovery Facility **U- Youth Correction Center** V- Environmental Quality Corridors (EQC)

Laurel Hill Land Distribution **Laurel Hill Comprehensive Plan** Laurel Hill Historic MOA **Lorton Correctional Complex Subdivision Plat**

2,000 3,000 4,000 5,000 US Feet 1,000

This map presents information from four different sources: Laurel Hill Historic MOA layer, Laurel Hill Land Distribution Layer, Laurel Hill Comprehensive Plan, and the Lorton Correctional Complex Subdivision Plat from 2001

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C+D

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Office of Emergency Management GIS Integration

ArcGIS Online Shelter Dashboard

The Emergency Shelter Status dashboard was created for the Office of Emergency Management to provide a visual representation of county shelter data during an emergency event.

This dashboard was created using the Operations Dashboard application within ArcGIS Online and receives its data from an integration with the Fairfax County WebEOC software application, where shelter data is collected.

Situational Awareness Viewer

The Situational Awareness Viewer is a visual tool to see a high-level overview of an incident and where resources are concentrated. The mapping tool allows for easily viewing information regarding decision making for incident response and recovery tactics.

WebEOC Data

	Not OP	0.5			703	0	300
	Not Open	CLOSED	40	U	(95	0	1017
Annandale)	Not Open	INITIATED	25	0	715	0	150
tor	Emergency	OPEN	0	0	300	0	500
(nic)	Evacuation	CLOSED	0	0	1017	0	5456
Fairran	Eva Open	CLOSED	0	0	150	0	J12
Center	it Not Open	CL OSED	0	0	500	275	
lexandria) - ro	church) Nor C.	CLO SI OSE	D O	0	5796		
school (Falls C	Noron		SED 0	0			
nmunity Cente	er Nor OP	nen CLO.	OSED	65			
on Center (Ale	exanuttion Not O	CL	00				
ion cen	iter Not	Ope					
ecreante cente	er(Mclean)						
creation			Ch	altar	Lind	or Tor	
			JI	כונכו	ΓΠΙΟ		JI

Fairfax County Emergency Shelter Status

The Shelter Finder Tool was created for the Office of Emergency Management and Family Services to use when identifying a county of the shelter locations. shelter during an emergency event.

This tool can be used on the go buy the OEM Duty Officer to identify the closest sheltering locations to support the emergency event. When information is updated in the WebEOC, the information is reflected on the map as well so you can see the status

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cesseRd	Legend		
	Emergency Shelters		
	Closed		N
	Initiated		
ibtree brie	🔶 Open		
N.	🤶 Full		
			h
	Californ		
L.	AND		
-	Layer List		
	- School Facilities	•••	^
	Elementary School		
	Middle School		
	High School		
-	Other School Facilities		711
21	Community Centers	•••	
Bran	▶ RECenters		
A	Libraries Burke		
	▶ Supervisor Districts	**	1

SUPPLEMENTAL MEDIC UNIT DEPLOYMENT

WHAT AREA OF THE COUNTY WOULD BE BEST SERVED BY AN ADDITIONAL MEDIC UNIT?

PROBLEM | QUESTION

- When additional medic units are funded, WHERE should the Fairfax County Fire and Rescue Department (FRD) deploy those units to best serve the needs of the County?
- Given the four existing supplemental medic units at Stations 8, 9, 10 and 11, are those **LOCATIONS** still recommended to have supplemental medic units?

REQUIREMENTS

- Consideration must be given to call volume (demand), call type (resources), time of day and location within a **Proffer Exempt Zone** (PEZ) (https://bit.ly/2lxbrnQ)
- Analysis must include coverage by 6-minute response time (NFPA standard 1710)

SPATIAL METHODOLOGY & ANALYSIS

1) Point, line and polygon data was added to an ArcGIS Pro project:

- . call for service points (FRD data warehouse results set, with geometry)
- . fire station points (Fairfax County EGDB)
- . roadway network dataset (FRD EGDB)

BENEFITS TO THE AGENCY

Identifies current and projected service demands for strategic and responsible human and apparatus resource deployment in compliance with national standards Comprehensive spatiotemporal methodology which can be replicated for future reexaminations

DATA EXTRACTION & ENRICHMENT

- 1) Call for service data for Fiscal Years 2017 and 2018 was extracted from the FRD's data warehouse, limited by unit type (medic and engine) and event type (emergency medical service (EMS), fire or public service).
- 2) Weights were calculated for each call by call type (ALS = 1, BLS = .5, other = 0) and time of day (0700-1859 hrs = 1, 1900-0659 hrs = 0).
- 3) Average dispatches and average time on calls per day were calculated by counting the number of incidents and summing the total time on calls, then dividing by the distinct number of dates in the results set. These aggregates were grouped by unit ID.

Consistently, medic units M422, M405 and M429 ranked top three by dispatches and time on calls. Are those three fire stations also the busiest by incident count and/or weight? Keep reading!

. Proffer Exempt Zone polygons (Fairfax County EGDB)

2) A 1/4 mile, continuous hexbin grid was created across the County with centroids applied to each with the Feature to Point tool.

- 3) Added weight of 1 (inside) or 0 (outside) PEZ to incident weight of each call through **Spatial Selection** and **Table Column Calculation**. Total incident weight ranged from 0 (nighttime, non-ALS/BLS call, outside PEZ) to 3 (daytime ALS call inside PEZ).
- 4) Call for service points were aggregated to the hexbins with the Aggregate Points tool, giving each hexbin weighted values for both incident count and incident weight sum. 5) Location Allocation network analysis for Maximize Coverage was conducted on each of the below Aggregation Strategies, using both incident points and hexbin centroids as demand points, with 6-minute drive times for the following scenarios: . select six stations | select six stations, Stations 8, 9, 10 & 11 required
 - . select eight stations | select eight stations, Stations 8, 9, 10 & 11 required
 - . select eight stations, Stations 8, 9, 10, 11, 25 & 29 required (previous recommendations)

Aggregation Strategy	Incident Type Weights	Graphic Example	Analysis Value
Incident Point Equal Weighting	non-ALS/BLS, night (1) BLS, night, PEZ (1) non-ALS/BLS, day (1) ALS, day, PEZ (1) BLS, day (1)	•••	Each point = 1
Incident Point Incident Weighting	non-ALS/BLS, night (0) BLS, night, PEZ (1.5) non-ALS/BLS, day (1) ALS, day, PEZ (3) BLS, day (1.5)	••	Each point ranges between 0 and 3 in weight
Hexbin Centroid O Incident Count	non-ALS/BLS, night (1) BLS, night, PEZ (1) non-ALS/BLS, day (1) ALS, day, PEZ (1) BLS, day (1)		Centroid Value = 5 There are five incidents of equal weight within the hexbin.
Hexbin Centroid O Sum Incident Weight	non-ALS/BLS, night (0) BLS, night, PEZ (1.5) non-ALS/BLS, day (1) ALS, day, PEZ (3) BLS, day (1.5)		Centroid Value = 7 The sum of the five incidents' weights within the hexbin is 7.

Location Allocation was initially executed using incident and hexbin centroids as Demand Points, weighting each by incident count and incident weight, for each of the 5 listed scenarios (20 runs). After considering those results, Location Allocation was executed again using only hexbin centroids as Demand Points and using 3 weighting strategies in order to normalize the composite incident weight by the total number of incidents being counted.

		FY17				FY18	
Rank-Time	Unit ID	Average	Average Time	Rank-Time	Unit ID	Average	Average Time
on Call		Dispatches/Day	on Calls/Day	on Call	OnterD	Dispatches/Day	on Calls/Day
1	M422	7 to 8	> 7 hours	1	M422	7 to 8	> 7 hours
2	M405	6 to 7		2	M405	7 to 8	
3	M429	6 to 7		3	M429	6 to 7	
4	M430	7 to 8		4	M426	6 to 7	
5	M414	5 to 6		5	M430	7 to 8	
6	M426	6 to 7		6	M417	6 to 7	
7	M421	6 to 7		7	M421	6 to 7	
8	M413	6 to 7		8	M415	6 to 7	
9	M417	6 to 7		9	M401	5 to 6	
10	M401	5 to 6	> 5 hours	10	M414	5 to 6	> 5 hours

By incident count and weight, these three fire stations also appear to do some "heavy lifting," but there appear to be several other fire stations with a consistent and heavy service demand. How can we figure out who's busy now, who's demand may increase with zoning exemptions and who can still make it to their calls for service within six minutes? Keep reading!

RESULTS

In the ratio of weighted incidents analyses, the existing stations with supplemental medics (8, 9, 10 and 11) are not recommended for the additional unit. Station 22, the busiest by demand as well as by incident concentration and weight, is also not recommended for a supplemental medic. However, stations 15 and 39 are consistently recommended for a supplemental medic despite having not risen to attention by demand and incident concentration alone. These recommendations are consistent whether including or excluding PEZs as a weighting factor.

In the straight weight analysis, stations 8, 9, 10 and 11 are consistently recommended as for a supplemental medic. Station 22, the busiest by demand as well as by incident concentration and weight, is also consistently recommended for a supplemental medic.

< -0.50 Std Dev	C = 0.50 Std Dev	Dev	Elecation Allocation Network Analyses				
-0.50 - 0.50 Std. Dev.		Std. Dev.	Maximize Coverage, Six-minute Drive Time, Hexbin Centroid Demand Points				
0.50 - 1.5 Std. Dev.	0.50 - 1.5 St	0.50 - 1.5 Std. Dev.		Weighting Strategy			
> 1.5 Std. Dev.	> 1.5 Std. [ev.	Recommendation Strategy	(stations are listed in order of priority)			
404	425 442	4/1	neconnendation strategy	Hour +	Proffer + Hour +	Proffer + Hour +	
436 431 422 424	436 431 429 401	X7		Call Type / All Events	Call Type / All Events	Call Type	
	402 413		coloct civic tations	39, 15, 32,	15, 39, 31,	13, 9, 4,	
415 421 434 430 4180rg 428	421 434 430 <u>4180rg 428</u>	al and a second	select six stations	8, 34, 19	40, 32, 18	10, 21, 22	
440 410 410	440 423 410 410	- Car	select six stations,	39, 15, 8,	15, 39, 8,	13, 4, 9,	
			w/ 8, 9, 10 & 11	9, 10, 11	9, 10, 11	10, 8, 11	
432 414 416 427 405	432 414 427 405 41	8	select eight stations	39, 32, 15, 17,	15, 39, 31, 40,	9, 4, 13, 10,	
	422			31, 8, 34, 19	32, 18, 9, 19	21, 22, 23,17	
424	420		select eight stations,	39, 15, 32, 19,	15, 39, 31, 40,	13, 4, 21, 9,	
		and the second s	w/ 8, 9, 10, & 11	8, 9, 10, 11	8, 9, 10 ,11	22, 10, 8, 11	
	A20		select eight stations,	15, 32, 25, 8,	15, 25, 40, 32,	25, 21, 30, 29	
		Sec.	w/ 8, 9, 10, 11, 25 & 29	29, 9, 10, 11	8, 9, 10, 11	9, 10, 8, 11	
				ratio of weighted incid	dents to total incidents	straight weight	
					Prepared by I	essica LeBlanc - Operations Data Analys	
			Fairfax County Fire and Rescue Department				
			September 30–2019			, 2019	
					1		

FAIRFAX COUNTY GOVERNMENT **DEPARTMENT OF NEIGHBORHOOD & COMMUNITY SERVICES**

- South County Teen Center

A Fairfax County, VA, publication 04/2019 Fairfax County is committed to nondiscrimination on the basis of disability in all county programs, services and activities. Reasonable accommodations will be provided upon request. For information, call 703-324-4600, TTY 711. www.fairfaxcounty.gov/neighborhood-community-services

This map is intended for reference purposes only. Fairfax County does not provide any guarantee of the accuracy or completeness regarding the map information. Map Produced: 4/9/2019

Syphilis & Health Equity: Directing Outreach Resources to High Disease Burden Areas **Fairfax County Health Department**

What is the Problem?

- Syphilis is a sexually transmitted infection caused by the bacterium *Treponema pallidum*.
- An untreated syphilis infection can result in serious health problems, including permanent damage to the nervous system leading to symptoms of altered behavior, difficulty coordinating muscle movements, paralysis, sensory deficits, and dementia. Pregnant women can transmit syphilis to their unborn child, potentially resulting in stillbirth.
- Syphilis infections are increasing throughout the nation, including Fairfax Health District (i.e., Fairfax County, City of Fairfax, & City of Falls Church).

Health equity for syphilis infection has not been achieved in Fairfax Health District

Health equity is achieved when everyone has an equal chance to be healthy regardless of their background (Centers for Disease Control and Prevention).

- During 2018 in Fairfax Health District...
 - □ Young adults aged 20-24 years had the highest rate of syphilis infection (38.2 per 100,000 persons).
 - □ 92% of syphilis infections were in males.
 - □ Non-Hispanic, black males were infected at rate 4.8 times higher compared to non-Hispanic, white males. A similar comparison showed Hispanic males with a 2.9 times higher infection rate.

Syphilis Case Rates, by Ethnicity-Race and Gender, Fairfax Health District, 2018

0< to 25 25< to 50 50< to 75 75< to 100 100<

Division of Epidemiology & Population Health

Where Should We Focus Resources?

Syphilis Case Rates Among All Residents, by Zip Code, Fairfax Health District, 2014-June 2019

Syphilis Case Rates Among Non-Hispanic, Black Males, by Zip Code, Fairfax Health District, 2014-June 2019

- While syphilis impacts residents throughout the district, not all areas are impacted equally.
- Clustering of high disease burden areas is present by racial-ethnic groups in Fairfax Health District.
- Disparities in sexually transmitted infections are a result of complex societal interactions, but these reasons have their roots in broader patterns resulting in health disparities (e.g., poverty, access to health care, social network).
- Healthcare providers are critical partners in the effort to prevent, identify, and treat syphilis and other sexually transmitted infections.
- Health Department staff starting outreach to healthcare providers in high disease burden areas will allow for more efficient use of department resources.

- These investigations include:
 - □ Client interview / education
 - □ Verifying clients were appropriated treated by healthcare providers to clear infection □ Linking clients to care, if needed
 - Anonymous sexual partner notification
 - No-cost testing of sexual contacts at Health Department clinics
- Health Department clinics offer:
 - □ Sexually transmitted infection and HIV testing at 5 clinics (locations below)
 - Pre- & Post-test counseling
 - Test result notification via text message

Syphilis Case Rates Among Hispanic Males, by Zip Code, Fairfax Health District, 2014-June 2019

Presented at Fairfax County GIS Day November 2019

Our Efforts

The Health Department investigates all syphilis cases in the Fairfax Health District.

The Health Department provides ongoing direct outreach to healthcare providers starting in high disease burden areas using disease specific infographics. Information provided includes local information on disease burden, how the healthcare provider can help stop the disease (Talk. Test. Treat.), and how the Health Department can help the provider.

Location of Fairfax County Health Department Clinics and Healthcare **Providers Targeted for Outreach by the** Health Department - Division of Epidemiology & Population Health

