



Mapping and Geographic Information

The Office of Mapping and Geographic Information (MAGI or OMAGI) provides centralized Geographic Information System (GIS) services to County departments, the public, and the private sector. A significant portion of the work performed by MAGI staff involves creating, maintaining, managing, analyzing, and distributing spatial data. MAGI staff also creates and maintains maps as well as develops web applications for use by the Board of Supervisors (Board), County staff, the public, and the private sector. MAGI staff also manages the GIS software and infrastructure in collaboration with the Department of Information Technology (DIT) that supports the GIS. The land records data created and maintained by the Land Records Program serves as the underpinning of many other County programs. MAGI staff also collaborates with GIS staff in other departments. GIS's qualitative benefits include improved collaboration, better decision-making, and more efficient business processes. Through the use of GIS, County staff maps land development activity; assists with planning studies; maps and maintains conservation easements data; maintains street centerline data; maps and provides analytical support for County initiatives; assigns addresses, street names, and parcel identification numbers (PINs); and performs many other services. GIS data feeds a number of County systems or processes, such as the Computer-Aided Dispatch (CAD), and permits. GIS data is also a significant component of LandMARC, the County's online land management system. County staff has access to the Office's web-mapping system, including intranet-mapping tools for the County's building inspectors, assessors, and public safety agencies. MAGI also serves as the point of contact for the Conservation Easement Stewardship Program.

Department Activities

Public Information

Provides assistance and GIS information to the public, the private sector, and other County agencies.

System Development and Support Services (DSS)

Provides the critical administration, services, and application development that support the functions of the GIS as well as GIS integration with County systems.

Development and Analysis

Maps, analyzes, maintains, and distributes geospatial data; i.e., mappable data layers maintained and uploaded into the GIS or the GeoHub, which is a central website featuring project-specific interactive map applications, informative dashboards, and topical story maps.

Land Records Maintenance

Maintains parcels, addresses, and street information, per Loudoun County Codified Ordinances, and then transfers these and other data to various data systems.



Mapping and Geographic Information (MAGI)

Financial Information

FY 2024 Adopted Information¹

	Expenditures	Revenue	LTF	FTE
Public Information	\$251,504	\$9,400	\$242,104	2.00
System Development and Support Services (DSS)	1,583,414	0	1,583,414	10.00
Development and Analysis	1,045,611	0	1,045,611	7.00
Land Records Maintenance	1,069,984	49,682	1,020,302	7.00
Total	\$3,950,513	\$59,082	\$3,891,431	26.00

¹ Sums may not equal due to rounding.



MAGI: Public Information

Public Information

What We Do: The Public Information activity provides information on a broad spectrum of land information to the public, the private sector, and County agencies. This activity maintains a help desk where it provides the public with copies of maps, preliminary subdivision plats, digital data, and the copying and scanning of site plans. Staff responds to inquiries on properties and their characteristics (e.g., parcel boundaries, soils, floodplains, etc.) and helps the public understand land records-based data. Staff routinely assists the public in researching and understanding the characteristics of land using the GIS and LandMARC. This activity also provides one-on-one training in how to use the Office's online mapping tool, WebLogis, as well as how to access and download data via the County's public-facing GIS web environment, the GeoHub, which includes an open data platform. Staff services the printers and plotters of the Office and provides administrative support, including purchasing, human resources, and payroll for MAGI. This activity also includes staffing the County Store, which sells items such as Loudoun County apparel, glassware, and other corporate items.

In 2020, staff streamlined common requests for information so that the public could continue to access services by email, telephone, or online. As a result, MAGI now receives fewer onsite visitors than prior to the COVID-19 pandemic.

Mandate Information: This activity is not mandated; however, staff fulfills obligations for Freedom of Information Act (FOIA) requests.

Who Does It: This activity is performed by County staff.

Why We Do It: The open distribution of County maps and GIS data helps internal County customers, County residents, and businesses more easily find the land information they need. Data and maps are used extensively by other County departments, prospective businesses looking to locate in Loudoun County, and surveying and engineering firms.

How We Do It Now – Current Service Level: In FY 2020, the service level provided was distributing 2,700 maps and preliminary subdivision plats within 48 hours of the request. In this fiscal year with current resources, this activity will distribute approximately 3,000 maps or preliminary subdivision plats within 48 hours. Current service level includes approximately 125 help desk encounters each year. The number of help desk encounters has increased steadily each year as the use of the GIS by the public has increased and the types of inquiries have become more complex. Spatial data requests are decreasing as more GIS data is available online and in open data on the GeoHub. While this activity may no longer directly provide as many custom data sets, it supports users in answering questions about data and provides training in open data and GIS use. Preliminary subdivision plats, which are used for building and development permits or homeowners' associations requests, were moved to an online Laserfiche tool in 2020 to streamline the request-distribution process.

How We Plan to Do It in the Future – Recommended Service Level: In the future, staff recommends that the Public Information activity continues distributing GIS information to support the needs of staff, residents, and businesses. Additionally, staff plans to utilize a self-service online map tool, which will be developed in collaboration with the Clerk of the Circuit Court, to distribute subdivision plats. While this will not eliminate the need for support from this activity, it should reduce it. It is also anticipated that in-person customers (the number of which dropped significantly during the pandemic as customer service shifted to email, telephone, and the online environment) will be further reduced as Building and Development staff are relocated from the Government Center to another building. This activity will offer customer services via email, chat, telephone, or online meetings to assist remotely with customer questions.

While the above changes may result in a decrease in the individual number of maps, subdivision plats, or digital data sets that the activity distributes, it is anticipated that as the GIS is used in greater numbers by the public, the complexity of requests will increase, resulting in longer amounts of time spent per individual customer. This activity will continue to monitor performance measures to track trends in map and data distribution as well as help desk assistance provided to customers in the event that service levels must be modified in the future.

**MAGI: Public Information**

	FY 2021 Actual	FY 2022 Actual	FY 2023 Actual	FY 2024 Estimated	FY 2025 Projected
Educate customers and County staff on access, use, and understanding of spatial data, interactive map tools, and maps.¹					
Number of help desk encounters ²	150	158	51	125	125
Fulfill 90 percent of requests within 48 hours. Respond to 100 percent of requests within five days.					
Number of digital data orders	172	157	67	100	100
Number of maps or preliminary subdivision plats distributed within 48 hours	2,532	4,071	3,395	3,000	3,000
Number of emails sent	6,235	5,605	3,830	9,750	5,000
Number of telephone calls received from the public	1,926	1,388	1,564	2,000	1,500
Number of public customers served	8,203	6,211	6,700	7,000	7,000

¹ These encounters include helping a customer use an online mapping resource, including WebLogis, GeoHub, and using open data in ArcGIS online.

² The number of help desk encounters was likely undercounted in FY 2023 due to staff turnover



MAGI: System Development and Support Services (DSS)

System Development and Support Services (DSS)

What We Do: The System Development and Support Services (DSS) activity provides critical services and products that support the functions of the GIS. DSS provides GIS systems administration for the GIS database, desktop, and GIS web environments; programs complex integrations that allow GIS data or services to support other County systems; and develops and maintains GIS applications or solutions. This activity also includes user support, troubleshooting, and management of all software and system upgrades. DSS also monitors and manages security on the GIS platform.

Application development provided in this activity automates operations in other departments as well as integrations with County systems; provides interactive mapping applications; and supports data maintenance, distribution, analysis, and management. This includes analysis of existing business practices, programming, testing, training of staff, and the documentation of programs and processes. This activity administers GIS web tools and online environments. Examples include the redistricting platform (which allows residents to develop and submit proposed redistricting plans); the COVID-19 hub (where staff collaborated with the staff in other departments to share Loudoun-specific COVID-19 metrics); and maps and a tree management solution that allows staff to map, track, and assign inspections and maintenance. Staff develops and maintains applications and open data loaded to – and distributed from – the GeoHub (the County’s public-facing web environment). DSS also supports the GeoPortal, which is the County’s internal GIS platform that allows staff to develop, share, or analyze GIS data or tools in a collaborative environment.

Mandate Information: This activity is not mandated.

Who Does It: County staff performs this activity.

Why We Do It: The services provided by this activity are required to support GIS functions countywide, many of which are mandated or provide critical government services. For example, the CAD system, which is used when citizens call 911, requires GIS data and a well-maintained database to minimize response time. Examples of County functions or programs that rely on GIS services include community planning and zoning, economic development mapping, real estate assessment, land records mapping and administration, emergency response, and building permits and inspections. GIS data and solutions integrate with and complement other County systems to facilitate efficient, timely decision-making. Web-based mapping solutions are often easier to build and maintain than desktop applications. They can reach a wider audience because they are accessible online, they are less costly to maintain, and they are more flexible in what they can present. Interactive web-mapping tools bridge the gap between static maps and the GIS. Existing web-mapping sites also provide internal services countywide. This activity also facilitates access to aerial photography, which is collected annually, and LiDAR, a type of imagery that shows detailed surface elevation, which is shared through the GIS.

How We Do It Now – Current Service Level: In FY 2020, the service provided was approximately 540 unique GIS data sets (including feature classes, tables, or views) managed in the spatial database engine (SDE), with 38,000 data engagements¹ from open data completed each year. In subsequent years, this service steadily increased, due to the use of GIS countywide. Staff was able to keep pace with the number of data sets that needed to be managed and data engagements completed through open data. In this fiscal year with current resources, this activity will manage approximately 2,750 data sets (675 unique data sets) and 55,000 data engagements, while facilitating access to the GIS by assigning and supporting approximately 1,150 user accounts (with 725 unique named users). The activity currently supports about 150 internally-shared or publicly-shared GIS applications. Additional workload resulted from the 2018 implementation of a GeoPortal (the County’s secure, internal GIS website), as more staff is able to access and view maps and create content.

How We Plan to Do It in the Future – Recommended Service Level: In the future, staff expects that this activity will continue to see modest growth in the number of unique GIS data sets and GIS applications managed, as the population and number of businesses grow, and as reliance on data analytics increases. DSS will leverage GIS technology to facilitate this growth. Even as the County’s population growth stabilizes, it is anticipated that the demand for these services will continue as

¹ A data engagement is when the GeoHub is used to search for and view an interactive map or dashboard.



MAGI: System Development and Support Services (DSS)

Board initiatives continue to make use of the GIS. DSS will continue supporting more than 100 map applications and developing complex interactive map applications, such as dashboards, in support of County initiatives.

	FY 2021 Actual	FY 2022 Actual	FY 2023 Actual	FY 2024 Estimated	FY 2025 Projected
Ensure that GIS data is current and available for public and staff use 99 percent of the time.					
Average number of internet visitors per month (Loudoun servers/hosted data)	1,071	2,493	2,732	2,500	2,750
Average number of intranet visitors per day	253	275	282	300	300
Number of data sets managed in the SDE	2,605	2,655	2,657	2,750	2,750
Number of unique data sets (feature classes, tables, or views)	542	663	669	675	675
Number of data engagements from open data completed (searches, views, and downloads)	42,568	37,030	64,093	55,000	60,000
Maintain GIS functionality to a level that supports all users of the Loudoun County GIS by ensuring that the system is current and available 99 percent of the time.					
Number of applications supported	125	137	110	125	125
Number of internal user accounts supported	845	1,144	1,477	1,250	1,250
Number of unique users supported	662	750	1,052	1,000	1,000



MAGI: Development and Analysis

Development and Analysis

What We Do: The Development and Analysis activity develops data or geographic information for other departments (such as conservation easements for the County Attorney); often maintains those data sets; and produces maps, models, queries, and analyses that help other departments maintain or improve their services and respond to direction from the Board. These data, maps, and models are used extensively throughout the County by government agencies, businesses, and residents. This activity develops interactive map applications, dashboards, and open data loaded to the GeoHub. This activity also collaborates with staff in other divisions and departments to find GIS solutions in support of County projects. This activity serves as the point of contact for the Conservation Easement Stewardship Program, including answering questions and conducting stewardship via site visits. This activity requires that staff understands functional aspects of supported County programs, such as floodplain management, and the data being used or created to support it.

Furthermore, this activity manages the contracts for annual base map maintenance and aerial photography. The base map is the foundation for all other mapping on the GIS. The base map is developed through contractual services. First, a flyover captures aerial imagery of the County. Then, features that can be identified from photography (such as roads, driveways, and buildings) are captured as GIS data. Topographic contour lines are also captured. This data is then used in a variety of systems and tools, such as CAD, the assessor's system, and web-mapping tools. This activity also facilitates access to LiDAR data, which is used for environmental or historic research, through interactive mapping and analysis.

The Development and Analysis activity, in collaboration with other MAGI divisions, offers learning opportunities to County staff interested in using the GIS, including one-on-one training, knowledge share sessions, and access to Esri (software vendor) classes. Maps and interactive applications developed by this activity are also increasingly used in support of Board-initiated projects (e.g., the FY 2022 redistricting project and the Zoning Ordinance Rewrite) or in communications with Board-directed committees.

Mandate Information: This activity is not mandated.

Who Does It: County staff provides this activity, utilizing contract services for the base map.

Why We Do It: Aerial photography and a current base map are necessary to support all other programs and processes on the GIS. Geographic analysis and mapping (both static and interactive) supports County projects or Board initiatives. These programs and processes assist other departments in providing a service, improving a service delivery program, or providing information to assist the Board in policy decisions.

How We Do It Now – Current Service Level: In FY 2020, the service level provided with current resources was to review and update approximately 170 square miles of base map (33 percent of the County). In subsequent years, this service has held steady, resulting in the entire County now being remapped every three years. In this fiscal year with current resources, this activity will again review and update approximately 170 square miles of base map data while updating 33 percent of the County base map. Additionally, the activity develops approximately 35 map applications and 250 maps each year. Current service level indicates facilitating approximately 80 conservation easement inquiries each year to assist permitting staff in determining if a requested activity is allowed on a property that is encumbered by a permanent conservation easement.

How We Plan to Do It in the Future – Recommended Service Level: In the future, staff recommends that this activity continues to review and update approximately one-third of the County base map each year. This activity will continue to see demand for map requests, although that number is anticipated to decrease as users turn to self-service downloadable GIS data from the GeoHub, or as an increased number of interactive map applications are developed in support of County- and Board-initiated projects. This activity will continue to see an increase in inquiries to assist with Board-held conservation easements. Some of these requests may migrate to other departments so that this activity may focus on easement data stewardship and the mapping and analysis for GIS data in support of the Board-initiated Purchase of Development Rights (PDR) Program, which was under development at the time of this Program Review. It is recommended that this activity continues to facilitate staff training on the County's GIS and GIS software for at least 100 staff per fiscal year.



MAGI: Development and Analysis

	FY 2021 Actual	FY 2022 Actual	FY 2023 Actual	FY 2024 Estimated	FY 2025 Projected
Train County staff on the County’s GIS and GIS software.					
Number of County staff trained to use or access the GIS	6	115	64	125	125
Update 174 square miles (approximately 33 percent) of geographic area in the County (or greater) each fiscal year.					
Number of square miles of base map data updated and reviewed	204	174	174	174	174
Percentage of County base map updated	33%	33%	33%	33%	33%
Develop new data sets as needed and develop new maintenance processes that support County business practices.					
Number of data sets developed	37	53	18	25	25
Number of data sets edited	43	48	43	60	60
Develop maps, spatial models, and software tools that facilitate service delivery and policy decisions.					
Number of applications developed	49	72	36	50	50
Number of maps developed	304	224	245	225	225
Provide 90 percent of Conservation Easement Stewardship Program assistance to County staff in verifying allowed land use on properties with Board-held easements within 48 hours.					
Number of Board-held conservation easement inquiries facilitated	76	79	79	80	85



MAGI: Land Records Maintenance

Land Records Maintenance

What We Do: The Land Records Maintenance activity assigns, creates, and maintains parcels, addresses, street names, street centerline information, and vehicle routing networks; and then compiles and transfers these and other data to the CAD system, the Computer-Assisted Mass Appraisal (CAMA) system, the LMIS, the County's web-mapping services, the United States Postal Service (USPS), and other County systems. Maintenance of the data occurs in near-real time during the work week to ensure that there are no delays in the issuance of permits and other County services. The workflow requires close coordination with the Department of Building and Development, the Office of the Clerk of the Circuit Court, the Office of the Commissioner of the Revenue, Fire and Rescue, and the private sector. Staff uses digital plats provided voluntarily by private-sector surveying and engineering firms to update the County's data as plats are recorded. Data developed and maintained by staff in this activity is distributed via the GeoHub. This activity is an internal services referral agency for addresses and street names for land development. This activity also provides street name and address updates to external mapping companies such as Google Maps and TomTom.

Mandate Information: Chapter 1020 of Loudoun County Codified Ordinances (Naming of Streets) and Chapter 1026 (Addressing of Premises) pertain to the orderly naming of streets and assignment of addresses within the County. Both ordinances are administered by OMAGI and require accurate land records data.

Who Does It: County staff provides this activity.

Why We Do It: Almost every service provided by County Government is spatial and is tied to a parcel or an address. PINs and complete addresses are both unique identifiers and the means by which property is identified in the County. Premise addresses, street centerline data, and street routing networks are critical to the provision of emergency services. If the County did not provide these services, numerous other County services (including assessments, public safety dispatching (CAD), and building permits and inspections) would have to significantly alter their business practices.

How We Do It Now – Current Service Level: In FY 2020, this activity assigned and transferred 2,499 addresses. Current service level for this program reflects assigning and transferring more than 3,000 addresses to the LMIS, responding to approximately 3,000 requests for address assistance from members of the public or the engineering community, and adding 40 miles of new road centerline to the GIS database. Current service level includes transferring approximately 40 miles of street centerline to Virginia's centerline database annually. This activity also provides updated address and street information to outside mapping companies or organizations such as Google Maps, TomTom GPS, Waze, and USPS. Street name referral activity (the review of land development project plans to ensure that streets and addresses are named and addressed as per Loudoun County Codified Ordinances) has continued to grow in recent years, with 794 plans reviewed in FY 2020 and approximately 950 expected for FY 2024. To help meet increased demand within this activity, a GIS specialist was transferred into Land Records Maintenance from Development and Analysis.

How We Plan to Do It in the Future – Recommended Service Level: In the future, staff recommends that this activity continue to review and assign addresses, maintain parcels, and update and maintain street information. It is anticipated that there will be continued demand for the Land Records Maintenance activity even as development slows, as approved land development projects are completed, existing developments are redeveloped, and there is a need for County systems to continue to require integrations with GIS land records data. The GIS will be enhanced in the coming years to facilitate delivery of emergency services, for example with enhanced street routing networks and 3D structure modeling for addressing. This activity will continue tracking addresses assigned and transferred, the number of new miles of public roads added to the GIS, the number of record plats mapped, and the number of street name referral reviews to determine if the County needs to adjust its service levels.

**MAGI: Land Records Maintenance**

	FY 2021 Actual	FY 2022 Actual	FY 2023 Actual	FY 2024 Estimated	FY 2025 Projected
Maintain parcel, address, and street data on an hourly basis to a level that supports E911, LMIS, CAMA system, and the Automatic Vehicle Location (AVL) system 99 percent of the time during County working hours.					
Number of addresses assigned and transferred to the LMIS	2,979	3,440	2,893	3,000	3,000
Number of addressing customer calls	3,389	3,557	2,768	2,750	2,750
Number of plats mapped, scanned, and transferred to the LMIS	253	265	243	250	250
Number of record plat and site plans addressed	45	82	39	40	40
Number of street name referrals	797	901	1,087	950	800
Adopt the Virginia data model for street centerline and maintain Loudoun's portion of the state's centerline to improve data accessibility and functionality.					
Number of miles of street centerline transferred	37	29	17	40	30