

ArcGIS for Land Records

An Esri® White Paper
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ArcGIS for Land Records

Executive Summary

The ArcGIS® for Land Records solution is a complete geospatial platform for land records management. It is a modern, commercial off-the-shelf (COTS) software solution that provides open, standards-based tools for implementing a sustainable, cost-effective solution to common local government land records challenges. Using ArcGIS, assessors and their staff gain access to many valuable tools and resources that improve land records management across the board.

Land records information has always been a vital part of local government operations, though historically undervalued and underused. To address this, Esri developed the ArcGIS for Land Records solution, which uses common implementation patterns to form a complete geographic information system (GIS). For land records, these patterns include efficient data management, spatial analytical tools for value analysis, data access in the field, dashboards for executive decision support, and communication of information to taxpayers.

Managing land records in a purpose-built software solution yields many downstream benefits. For example, using solution-based COTS software reduces IT spending and training costs while delivering industry-standard workflows, apps, and information products. As assessors work toward complete and efficient management, they struggle to meet ever-increasing expectations of officials and the general public for quality, transparency, and access to information, as well as tight budgetary constraints and reduced staffing.

ArcGIS for Land Records meets those expectations by delivering the following advantages:

- Reduced costs
- Expanded capabilities
- Increased efficiencies
- Reduced appeals
- Help in finding new revenue
- Improved data quality
- Enhanced citizen experience with government
- Improved government operations

Background

Assessors have been using computers since the technology became commercially available. Calculating real property values involves complex mathematics, and computing resources from their advent provided assessors with welcome efficiencies and new capabilities. At the beginning, these systems employed highly customized applications and workflows because very few, if any, integrated software solutions yet existed.

Subsequently, assessor duties expanded from calculating value to maintaining parcel data, providing maps and data to the public, and managing addresses. Over time, separate systems were developed for managing and executing these functions, which sometimes were loosely integrated. But often there was no integration, which led to duplicated efforts, complex workflows, and systems that became difficult and costly to support.

Even today, assessors spend considerable time just maintaining technology and not working on the core mission of the office: property assessment, managing appeals, and publishing the tax roll. At the same time, demands for access to data have increased from both government and the public—driven by several converging issues:

- Data is digital and easily accessed.
- Computing capabilities are available to everyone.
- Technology has enabled data to become easier to use for many applications.

Fortunately—or unfortunately—the assessor historically has had the most current and authoritative data in local government. In many jurisdictions, the assessor's office has become the manager of the GIS and the publisher of maps and data for use internally in local government and by the public.

Public expectations have changed and will continue to change. Access to data means much more than viewing or photocopying a paper map. Data needs to be current, easy to use, and consumable in other applications. These changing expectations also include new requirements for analysis: How much will land value change next year? How much has it changed this year compared to last, or over the last three years? Where are the foreclosures? How are they affecting real estate value in the neighborhood? What are the changing demographics? With growing analytical capabilities, particularly spatial ones, new questions will continue to be asked.

Today's online data aggregators can compile data and loosely calculate nonauthoritative values. These fill the void when easily accessible and usable authoritative data from the assessor's office is unavailable or difficult to access. The public may use data from these inaccurate online resources as the basis for tax appeals. However, appeals cost local government time and valuable assessor's office resources. Easily accessible and consumable assessment data reduces appeals.

Departments throughout local governments increasingly rely on assessors' authoritative data. This is changing the role of the assessor's office, creating new challenges and opportunities. Assessors are becoming data managers for essential data in local government. This responsibility calls for new efficiencies to provide accurate, concise, and usable data. Governments are looking for sustainable solutions that grow and evolve with changing needs. No longer can we build data systems from scratch. Standards-based, supported, purpose-built systems are required for the assessor.

ArcGIS for Land Records is a complete geospatial platform for land records management in a COTS solution, offering a reliable, efficient path to better land records management. With a COTS solution, assessors are able to speed deployment, lessen reliance on internal and third-party application development, deploy new releases of core technology as it becomes available, and obtain standardized technical support and training.

By using ArcGIS for Land Records standards and data models, each jurisdiction no longer needs to invest scarce time and money in costly customization. Out-of-the-box, comprehensive capabilities and rich geographic data enable the effective management of all types of geospatial data such as imagery, basemaps, and parcels. The ArcGIS solution includes analysis capabilities for understanding valuation patterns and trends that help assessors predict future valuation and assist in reducing appeals. This complete solution contains an executive dashboard to provide real-time information on valuation, sales, appeals, and status of work inside an organization. ArcGIS for Land Records has smartphone and tablet applications that can be used by the public to locate a property's official assessment or access other public information.

Efficient Data Management Tools

ArcGIS provides a comprehensive set of data management tools for all types of geospatial data, including imagery, basemaps, and parcels. Parcel data is critical in local government and is used by many organizations outside the land records office, including those that support disaster response, public safety, engineering, and public works, as well as planners, real estate professionals, and developers. As local governments strive to support other organizations, they are charged to provide authoritative data that includes timely, accurate parcel information.

Landowners are important users of parcel information as well. With information available publicly 24 hours a day, citizens are scrutinizing online property data. There are new expectations. The data on local government GIS sites is generally accepted as authoritative when compared to other aggregated online mapping and valuation data. For department credibility, it has become crucial to maintain property characteristics and positional accuracy that overlay correctly on high-quality basemaps. Esri provides a land records solution as a core part of the ArcGIS platform to help users

- Produce web maps from a variety of ArcGIS data sources.
- Implement efficient data management workflows.
- Incorporate best practices from the land records industry.

The ArcGIS Parcel Editing Solution, included in ArcGIS, helps users improve the integrity of parcel data, increase its usefulness throughout the organization, and increase parcel editing efficiencies.

The ArcGIS Parcel Editing Solution has three key parts:

- Purpose-built workflows and supporting tools
- A parcel-specific data model to maintain data integrity and history
- A parcel editing template that streamlines daily parcel editing tasks

ArcGIS for Land Records supports the management and use of all types of georeferenced imagery such as current satellite imagery and low-cost oblique orthophotography. Imagery integrated into GIS is valuable for many functions including updating basemaps and reviewing site-specific conditions to identify unmapped improvements.

Modern Public Data Access

It wasn't too many years ago that public data access in the assessor's office called for having a D-size map book available for the public and access to individual property records. Today, with computer technology and the public's rapidly evolving expectations,

public data access means something entirely different. It means not just easy access to parcel and property information on all properties but also access via a variety of devices (desktop computers, tablets, smartphones, etc.) as well as ways to access this information with other technology.

The basic technology for modern public data access is an easy-to-use web portal that contains not just property information but also other data of interest to both the general public and property professionals, such as zoning and school information, for making informed decisions. Most governments also have high-resolution orthophotography and map layers that help keep other data layers in context. Providing this data to the public is now standard and expected.

In addition, assessors provide data internally to staff and other government departments. Often, there is more data shared internally than published publicly, so both sharing and security technologies are important. This changing role of the assessor—as data manager and provider—has brought on new responsibilities and, with them, the associated challenges. Delivering 24/7 access to local government data for public safety, public works, real estate, and government operations requires new, efficient technology that doesn't consume the assessor's time.

Modern public data access is more than a website with property information. It is *the* platform for improving communication and providing data so that the user can easily choose how to view a map and associated data. It includes access to the data by open standards—Web Map Services (WMS) and Web Feature Services (WFS)—that enable other applications to use the data. It also includes access via any device, such as a smartphone or tablet, that allows the user not only to choose what to view but also to search, discover, and query data. These capabilities not only provide an expected service to the public but also reduce office personnel time spent fulfilling requests and handling appeals.

ArcGIS for Land Records provides the assessor's office with extremely easy-to-configure COTS solutions for modern public data access. This includes a web-based parcel viewer application that is deployable in minutes, leveraging ArcGISSM Online—Esri's cloud mapping environment. Additionally, the web portal technology is accessible on mobile devices using a web browser or a variety of COTS apps such as ArcGIS for Android and ArcGIS for iOS. This interoperability of ArcGIS technology across operating systems gives assessors flexibility with deployment options while still using COTS technology. These data access options are particularly valuable to real estate professionals.

ArcGIS Integration with Tax and Assessment Systems

Integrating ArcGIS with tax and assessment functions adds value to office business systems. ArcGIS provides advanced spatial analysis capabilities for identifying valuation trends, overlaying demographics with other data, analyzing neighborhoods, and performing better QA/QC. Visualization capabilities in ArcGIS give assessors the ability to see on a map any assessment anomalies that would otherwise go undetected and result in increased appeals. ArcGIS enables local assessment staff and officials to work as efficiently as possible and ensures that work results in a defensible value at the most reasonable effort and cost by government.

Assessment operations usually require managing several technologies, many workflows, and personnel in both the office and the field. These technologies and workflows have

evolved from disparate systems over time and often lack useful integration, if they are integrated at all. The result may not only be duplicated efforts but also a need for disproportionate amounts of IT support, making it very difficult to see into office operations. What is needed is a common integration platform that gives the assessor the ability to understand the status of work in both the office and the field—its quality and adherence to schedules.

Understanding factors that impact value and defending an assessment are challenging tasks, particularly when trying to build public confidence to minimize appeals. Bank transactions, foreclosures, and sheriff sales contribute to the challenge. This is compounded when the public uses nonauthoritative data aggregators like Zillow to question and appeal values.

ArcGIS for Land Records provides several valuable capabilities to help administer the assessor's office such as managed workflows, a platform for disparate technology integration, and an executive dashboard for desktop access to data for better decision making.

Executive Dashboards

The Executive Dashboard, included in the solution, contains visualization capabilities for mapping changes in valuation, determining valuation based on specific parameters (e.g., cost per sq. ft.), and easily identifying outliers. You get a clear view of year-on-year changes in value, and you can overlay any other datasets to understand influences. This can be done at the county, school district, and neighborhood levels as well as the individual parcel level.

Executive dashboards provide real-time and historical information including valuation trends, comparable sales (comps), appeals status, and status of work inside the organization such as parcel editing backlog and field inspection scheduling. Assessors who have implemented a dashboard consult it each morning and throughout the day to make decisions on allocating resources and reporting status.

The Value Analysis Dashboard, part of ArcGIS for Land Records, provides up-to-date information on the impact of property sales, foreclosures, and assessment appeals on real estate values and tax revenue. Additional dashboards can be easily configured using the apps provided with the platform for a quick overview of the status of work, location of areas of concern, and general organizational data.

New Data for Assessment—Maps Help Defend Appeals

In addition to providing tools to manage data in the office, ArcGIS for Land Records integrates data from hundreds of external sources and delivers analysis capabilities to the assessor's desk. Data such as household and disposable income, traffic counts, and house counts and type is available for analysis with distances from commercial locations and drive times. For example, this yields more accurate insight into the purchasing power of a store market supporting your commercial assessment. These are the tools that commercial businesses use to locate and analyze the performance of their stores by location. They can be used by assessors to help calculate and defend assessor rent calculations.

These new web-based analytical tools and data in Esri® Community Analyst, part of the ArcGIS platform, help you get the most from your technology investment. Part of the COTS solution, Community Analyst provides over 40 standard reports and the ability to

compare property area characteristics, both within and outside your jurisdiction. Because it is web based, you have access to the most up-to-date data and analysis.

Spatial Analysis— Trends and Patterns in Your Community

Assessors across the country integrate GIS with tax, assessment, and other operational systems. Integrating these systems delivers GIS analytical capabilities to data maintained in other systems. Leveraging this data in GIS gives the assessor visualization tools for making sure that all properties are on the tax roll. Using the analytical capabilities of GIS, assessors can see year-on-year trends, sales ratio comparisons, cost-per-square-foot comparisons, and lot size calculations. Additionally, anomalies and outliers are easily identified with advanced mapping capabilities.

How much tax revenue will be produced next year? How can we reduce the number of appeals? How do we identify trends in valuation and detect assessment anomalies? These are questions often asked of assessors. Spatial analysis with ArcGIS provides the ability to visualize trends and patterns in assessment data. Advanced capabilities, such as overlaying demographic data with assessment data, can reveal trends in valuation. Understanding these trends helps assessors provide accurate, defensible assessments. Public officials are constantly challenged to provide quality data. By using spatial analysis and visualization to identify anomalies and outliers, officials can help improve the accuracy and quality of that data. The ability to visualize trends helps officials and assessors understand the year-on-year changes and answer the toughest questions.

ArcGIS Online provides the assessor with access to rich online geographic and demographic data. This data can be simply overlaid while reviewing assessments, neighborhoods, and comparable sales, or it can be incorporated into detailed analytics and spatial analysis. Additionally, this information can be shared easily throughout local government or with the public.

A Platform for Apps

ArcGIS for Land Records provides a platform for building and deploying apps for iOS, Android, and Windows devices. Included with the solution are the following ready-to-use apps for assessors:

- Executive Dashboard
- Value Analysis Dashboard
- Parcel Viewer (mobile and web based)
- Public Notification (for creating mailing labels from maps)
- Map Book Generator (for creating map books automatically)
- Deed Drafter (efficient parcel data entry tools)
- Addressing (enterprise management and citizen feedback app)
- Community Addressing (public input for address quality)
- Damage Assessment (field data collection and office management)

The platform gives the assessor these apps out of the box, and as the platform develops new capabilities, Esri will update the apps so you won't have to. Esri also will continue to develop new apps. ArcGIS Marketplace is a site where Esri users can get apps and data from a variety of Esri partners. This gives the assessor access to new core technology capabilities and an opportunity to use the solution set of apps without maintaining

ArcGIS Online— Cloud Capabilities

separate application technology. The goal is to save time and money and keep technology current.

ArcGIS Online is an integral part of the platform. ArcGIS Online provides access to vast amounts of geographic data including essential basemaps, satellite imagery, and orthophotography. It also provides the robust data sharing and publishing technology that's key to successful local government GIS, relieving the strain on servers, data storage, and the IT department while delivering new capabilities.

Users inside and outside the assessor's office, including the local business community and the general public, will be able to use the online maps and services to access current, authoritative tax and assessment information and other local government data. Users will be able to apply this data inside applications without having to maintain their own GIS infrastructure. Here are the main ArcGIS Online features:

- Costs associated with making data widely available are reduced.
- Users can deploy maps and data collection apps on iOS and Android devices.
- Map data is hosted and maintained by Esri at one or more data centers in the United States to ensure high availability, performance, and security.
- Each organization retains all ownership of its data.
- Access to map data is available through online maps and applications.
- ArcGIS Online is included with desktop software and enterprise license agreements.

ArcGIS Online delivers cost-effective, fast access to data from the field, in the office, via the web, or on mobile devices. This data can be shared across departments and with the public. ArcGIS Online combines cloud computing and data storage with a wide selection of basemaps and mapping services, enhancing system value to government and the public.

Key Benefits of ArcGIS Online for Assessors

ArcGIS Online is a secure online mapping platform that gives you the ability to publish your parcel and other data online, engage and inform taxpayers with ready-to-use apps for smartphones and tablets, and use data in Microsoft Excel to make maps and help analyze property values.

Combine your data with thousands of other discoverable layers and imagery and explore maps on hundreds of topics published by Esri and authoritative GIS sources. Manage and organize your maps, apps, and data through an easy-to-use catalog using folders and groups.

Central to the solution platform, ArcGIS Online provides the computing infrastructure, data, and analysis capabilities for using GIS throughout your office.

ArcGIS Online delivers COTS capabilities so you can

- Easily publish parcel maps on the web.
- Share data within your organization.
- Access parcel and assessment data on smartphones and tablets.
- Leverage data in spreadsheets for spatial and value analysis.
- Increase the quality of your work.

Data Access in the Field—Efficient Field Management Tools

Field verification of assessment data is an ongoing requirement. Many jurisdictions require that assessor staff physically visit each property at regular intervals. By efficiently routing field staff and providing field-workers with accurate, up-to-date information in real time, assessors can ease the effort of mandated field inspections. Many organizations have realized efficiency gains of up to 40 percent by implementing ArcGIS to help logistically organize this work.

It can be difficult to access data in the field and efficiently update data in the office. ArcGIS provides the capabilities to send data, including digital photos and forms, directly from the field to the office and from the office to the field, using a variety of mobile devices. Office workers can have immediate access to data collected in the field. This eliminates the need for paper maps in the field and improves the accuracy of data as well as the speed at which data is incorporated into the GIS. By employing standard data models and applications, users can take advantage of new mobile GIS advances without developing costly custom applications.

Public Communication

Public access to land records information is an essential element in the goal of government transparency. ArcGIS supports web standards and is the most common technology used in government portals. ArcGIS is used by the general public for applications designed to help locate polling places, reserve a campsite, report traffic conditions, locate a property for lease or sale, record crime statistics, identify planned development, and show the location and community impact of emergency events.

ArcGIS makes online interaction more powerful and presents data in a format that makes viewing and understanding easier. Governments are increasingly using the ArcGIS platform to build mapping applications that engage the public, deliver transparency, and enhance policy making. ArcGIS integrates geospatial services in the cloud with real-time data, citizen-generated content, mobile applications, and social networks to promote the open government practices that leaders and the public expect. Sometimes referred to as Gov 2.0, this online interaction engages the public and helps improve data and services. For example, a citizen can easily overlay new, accurate imagery with parcels, then locate any discrepancies in the parcel data and communicate that back to the office.

Another example of Gov 2.0 citizen engagement is the Community Addressing application, which allows the general public to contribute missing site address locations and provide citizen contact information for current addresses. This interactive web application includes a simple tool to review existing addresses and submit new address and contact information for review.

Communicating with Maps

Maps help assessors quickly communicate large amounts of complex information to public officials and citizens. Maps showing specific analysis, such as valuation trends, publicly owned property, and tax-exempt property, can provide public access to

information and reduce counter traffic in the assessor's office. ArcGIS for Land Records enables assessors to generate and publish maps in many ways. Standard maps, such as tax maps, can be created using the Map Book Generator included in the solution. Additionally, ad hoc and self-service mapping is supported online or at custom kiosks.

Esri Maps for Office provides new mapping capabilities for all of local government. With ArcGIS Online, Microsoft Office users can leverage the content and capabilities of ArcGIS Online while using the familiar Excel and PowerPoint. Esri Maps for SharePoint maps your organization's data in SharePoint lists or your data warehouse.

Achieving Enterprise GIS

New software licensing models are available for local government. Enterprise license agreements (ELA) from Esri provide an efficient and effective way to manage enterprise software deployment. Essentially, for an annual fixed fee, the ELA ensures that an organization can have nearly unlimited access to the ArcGIS platform, including all desktop, server, online, and mobile technologies. Bundled with an ELA is access to many types of geospatial data useful to local government, including basemaps, demographics, and imagery. The ability to use as much software as needed delivers considerable flexibility. For example, additional assessment value analysis may be required at the end of the tax year, which may call for more GIS analysis capabilities than are needed the rest of the year. In another scenario, a new web viewer with advanced capabilities may become available midyear and be obtained under the agreement. The ELA simplifies budgeting and planning. Hundreds of communities across the country have implemented the ArcGIS platform using the ELA licensing model.

There are different paths that organizations can take to implement the ArcGIS for Land Records solution. You can start by examining your organization's business needs—and thus determine the applications that will provide the greatest value—by reviewing the content on the ArcGIS Resources site, previewing the applications, reading the blogs, and watching the videos. When you are ready to begin implementing the ArcGIS for Land Records solution, have a plan for working through this organizational shift. There are additional resources available to help with this process: blogs and tools for loading data into the parcel editing solution; assistance from Esri Professional Services, which has various packages to assist in the process; and Esri partners that have experience and expertise in this area.

Implementation— Let's Get It Done

When is our organization ready for enterprise GIS? What resources will we need one time or for the short or long term? How much training does my staff need to begin and to sustain a productive environment? What resources are available? All these questions should be asked, and the resultant implementation plan can be different for every organization.

For organizations with limited technical staff, migrating to the ArcGIS for Land Records solution will be a onetime effort. Many organizations choose to use an Esri partner with which they have worked in the past. Some organizations choose to contract with Esri Professional Services to help them analyze their data, develop a plan, and deploy the solution. Often, this is the fastest, lowest-risk option, and there are service packages specifically designed for such implementations.

Ongoing support is available through Esri Technical Support, Esri resource centers, and training. ArcGIS for Land Records is a supported product that has all the benefits of the entire ArcGIS platform and Esri customer care.

Delivering Ongoing Benefits

Many communities have a minimum return on investment (ROI) that must be reached to authorize and fund the implementation of technology such as GIS. Return on investment can be accurately calculated with GIS (see [The Business Benefits of GIS](#)), but GIS doesn't stop with the initial implementation; it has countless uses, and new applications are developed daily. Organizations can implement new GIS applications to deliver ongoing ROI and additional benefits.

New applications that leverage standard data models and are available to all ArcGIS users are posted—often to the ArcGIS Resources site and ArcGIS Marketplace. These new applications empower an organization and its GIS to deliver ongoing benefits, with demonstrated ROI of enterprise GIS via the ArcGIS platform.

Esri is committed to the ongoing success of our users through technical support; training; our user community; and the Esri Enterprise Advantage Program (EEAP), where users are assigned a technical adviser and have a suite of customized services to meet specific needs.

Summary

Assessors can meet today's challenges—from doing more with less, defending commercial appraisals, modernizing systems, and delivering expected customer service—with ArcGIS for Land Records, a COTS solution built on maintained, sustainable technology. It provides

- Tools and workflows that increase efficiency.
- Analysis capabilities for more effective decisions.
- A growing collection of applications that are easy to implement and use to meet your business requirements.
- Online resources delivered as ready-to-use content and services.
- A platform for collaboration and sharing geographic information.

ArcGIS for Land Records is a complete geospatial platform for land records management that delivers increased productivity through purpose-built applications and workflows that sustainably support the daily needs of the assessor, both today and tomorrow.

By the Numbers—ArcGIS for Land Records

40%—Counter traffic reduced with modern public access implemented

\$386 Million—Valuation increased, 50% due to GIS and computer-assisted mass appraisal (CAMA) integration—Jeff Williams, Washington County, Arkansas Assessor, Special Achievement in GIS (SAG) Award Winner

\$4 Million—Increased tax revenue—Jeff Williams, Assessor, Washington County, Arkansas

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42%—Increased productivity of reassessment process with GIS—Jarra Underwood, Auditor, Wayne County, Ohio

67%—Reduced time to enter new data—Dallas Central Appraisal District, SAG Award Winner

50%—Reduced routine parcel maintenance time—Frank Conkling, Panda Consulting, Palm Beach Gardens, Florida (Esri partner)



Esri inspires and enables people to positively impact their future through a deeper, geographic understanding of the changing world around them.

Governments, industry leaders, academics, and nongovernmental organizations trust us to connect them with the analytic knowledge they need to make the critical decisions that shape the planet. For more than 40 years, Esri has cultivated collaborative relationships with partners who share our commitment to solving earth's most pressing challenges with geographic expertise and rational resolve. Today, we believe that geography is at the heart of a more resilient and sustainable future. Creating responsible products and solutions drives our passion for improving quality of life everywhere.



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