

KING COUNTY GIS CENTER

Biennial Report

2015–2016

MISSION

The King County GIS (KCGIS) Center designs, develops, and delivers effective and responsive geographic information systems solutions to empower the King County workforce, the public, and our regional partners to promote and support equity and social justice, economic development, and environmental sustainability for King County and its communities.

WHAT WE DO

The King County GIS Center provides services for the capture, management, analysis, and display of geographically referenced information. The technology we offer enables users to view, manipulate, interpret, and visualize data to reveal spatial relationships, patterns, and trends, in order to promote smart data-driven decision making. Our products come in the form of maps, charts, reports, data, and responsive interactive applications for mobile and desktop platforms. KCGIS Center tools and services are embedded in many of the County's business systems where location-based analysis and display are requirements.

The KCGIS Center is now part of the Regional Services section of the King County Department of Information Technology (KCIT). This organizational relationship enables us to strengthen and expand our long-established and highly-regarded provision of GIS services and support to King County and beyond. The resources available to the KCGIS Center through KCIT provide a broad and firm foundation as we develop increasingly advanced and innovative solutions to an increasingly diverse and demanding community of clients.



King County GIS Center
201 South Jackson Street
Seattle, WA 98104
www.kingcounty.gov/gis



King County

Our staff of experienced, highly-skilled GIS professionals is available to King County agencies and external customers for GIS consulting and project management, as well as for all types of GIS products, services, and support. These products, services, and support are essential for achieving the business and management goals and objectives of King County government, local and regional agencies, residents, and private firms throughout the Puget Sound region. The KCGIS Center creates solutions to meet client requirements through three lines of business.

Enterprise Operations provides the centralized technical, administrative, and management coordination for the County's GIS programs to support GIS professionals and end users across all King County agencies.

Matrix Staff Services supports King County client agencies with a team of experienced GIS professionals, each of whom is assigned to work directly with agency personnel and develops in-depth knowledge and skills to support the unique business needs of specific work programs.

Client Services offers a full range of GIS consulting, project, technical, and training services to King County agencies and external customers. These include:

GIS Consulting Services

Custom-tailored analysis and evaluation services designed to focus on client objectives and empower the successful pursuit of their goals. Service maturity evaluations, needs assessments, and other relevant tools and strategies are developed which align with and support the strategic direction and aspirations of the client organization.

Spatial Data Services

Creation of spatial data, ongoing data maintenance and enhancement, and made-to-order customization of existing data to meet specific client needs.

Cartography Services

Design and production of custom map products, publication-quality cartography, and brochures and pamphlets integrating GIS with graphic design.

Spatial Analytic Services

Analysis of spatial and tabular data to identify and characterize patterns and trends of significance to clients, and generation of maps, reports, and graphic products for presentation of the analytical findings.

Spatial Solution Services

Creation of custom solutions to streamline desktop GIS operations and workflows, and development of web-based mapping tools and services for the delivery of spatial information to digital devices of all kinds.

GIS Training Services

Provision of training courses and workshops for GIS professionals and end users with offerings ranging from fundamentals to advanced technical topics, as well as custom GIS curricula developed for specific business needs, taught at our in-house training facility or at on-site locations convenient for clients.

2015–2016 ACCOMPLISHMENTS AND A LOOK AHEAD

ENTERPRISE OPERATIONS

KCGIS Governance Committee Restructuring

During the 2015-2016 biennium the KCGIS governance committees were refreshed with new charters and memberships. The GIS Oversight Committee, which had experienced significant turnover, had several vacancies, and was no longer performing a meaningful role, was replaced with a GIS Steering Committee (GSC), comprising GIS business representatives from King County agencies. The GIS Technical Committee was renamed the GIS Technical Advisory Committee (GTAC) and its membership was reoriented to include only GIS technical experts. A charter was developed for each of the new committees to clarify roles and responsibilities, and to ensure that the work of each committee complements and supports the work of the other. The GIS Steering Committee focuses on business applications of GIS and takes the lead in determining the priority work initiatives and service-level requirements of the KCGIS Center. The GIS Technical Advisory Committee focuses on the technical implementation of GIS and on designing, developing, and deploying solutions which fulfill the priorities and business requirements defined by the GSC. The two committees were constituted and fully operational by April of 2016, following a nine-month definition and transition process.

GIS Priority Initiatives

Under the guidance and direction of the KCGIS governance committees several priority initiatives were completed or advanced during 2015 and 2016. The iMap web-mapping application was successfully replaced and modernized with a highly responsive interface design which readily adapts to desktops, laptops, tablets, and mobile phones. The KCGIS Center continued to work closely with the Department of Assessments to implement targeted improvements to the County's cadastral data, an ongoing multi-year effort which has significantly enhanced the positional accuracy of the cadastral layer. A project to catalog and describe all of the unincorporated areas within the County's urban growth boundary was completed. A complex, demanding project to develop countywide GIS data layers for zoning (Figure 1)

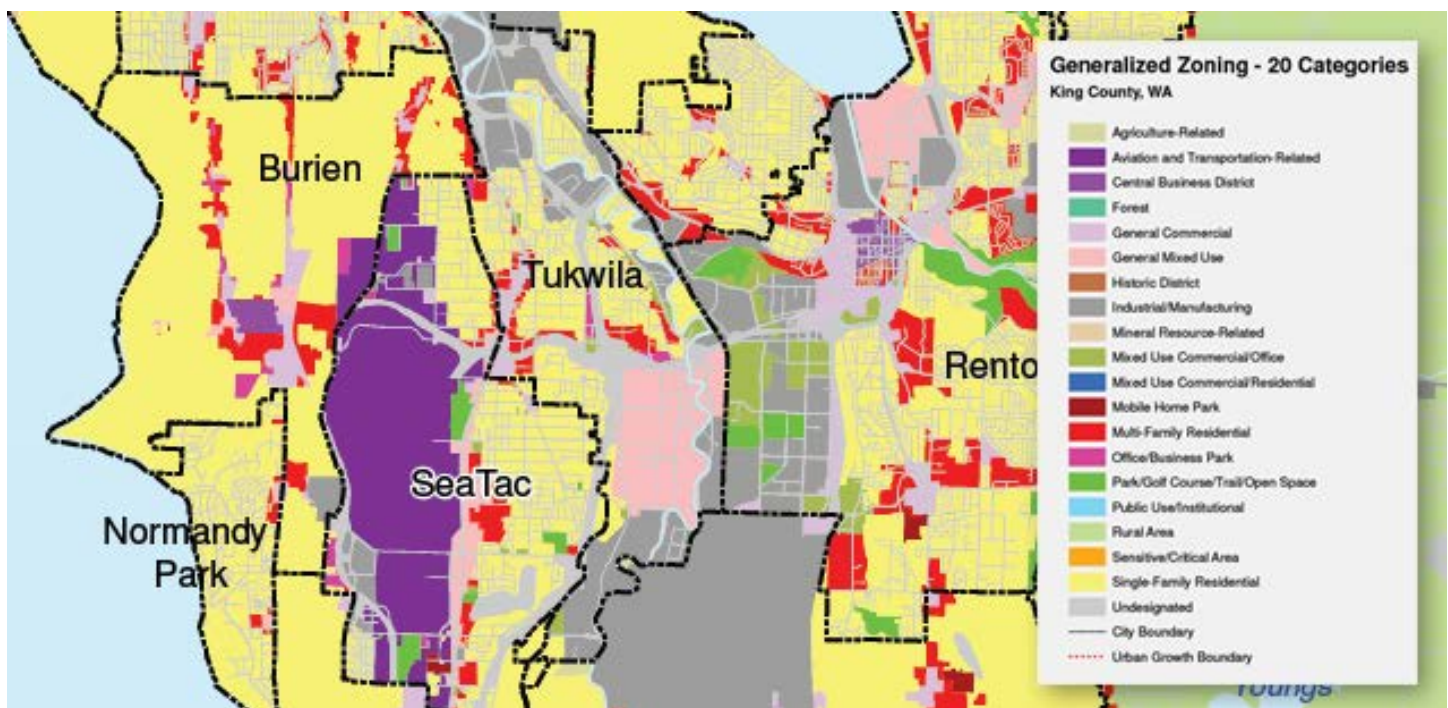


Figure 1. A portion of the new countywide, multi-jurisdictional zoning layer.

and comprehensive plan land use designations was approaching a successful completion at the end of the biennium, and an ongoing data maintenance plan for those layers was ready to be initiated.

The governance committees have developed a reprioritized set of GIS priority initiatives to be worked on during the 2017-2018 biennium. There continues to be a significant focus on improving the quality of key data layers, with separate initiatives for the cadastral layer, the street network (known as TNET), address points, and streams and wetlands. Other important initiatives will focus on technical processes, such as optimizing the enterprise data maintenance environment, determining the path forward for our vector data warehouse platform, and instituting a data maintenance prioritization and tracking system for the Spatial Data Warehouse.

Spatial Data Warehouse and Enterprise Data Coordination

The KCGIS enterprise Spatial Data Warehouse (SDW) now hosts over 1,400 layers and tables, which are managed and maintained by the KCGIS Center and 17 contributing County agencies. Growth in the number of datasets during 2015 and 2016 significantly enhanced the County's ability to meet the business needs of a wide range of County departments and agencies. Implementation of standards for SDW transactions – dataset addition, dataset modification, and dataset removal – is contributing in significant ways to optimizing operations and processes which use enterprise data. Best practices for metadata management were also enhanced through updated metadata quality assessment protocols.

Issues with metadata documentation are now promptly identified and affected data stewards are provided with guidance to enable them to resolve these issues and improve the quality of their metadata.

Channels of communication between the KCGIS Center and data-steward agencies continue to improve through the use of site meetings and ongoing Data Handling Team meetings. The latter forum provides regular opportunities for stewards to present their data to a group of knowledgeable peers, to clarify and explain detailed characteristics of individual datasets, and to elicit feedback for the steward regarding possible enhancements to their data and metadata.

A major focus for the KCGIS Center during the 2017-2018 biennium is a suite of exciting new data and data coordination initiatives. These include expanding initial ventures into cloud-based GIS, rolling out our GIS Open Data platform, testing and implementing new imagery storage and data delivery formats, and building out data quality protocols and procedures in concert with development and implementation of data maintenance plans. These initiatives are supported by Amazon Web Services (AWS) and Azure for data and application hosting, and by SharePoint for collaboration workspace development and intranet website hosting.

One of the most significant of these initiatives is the planned replacement of the KCGIS Center's current FTP-based GIS Data Portal with an Open Data Portal hosted by Esri. This platform will provide access to greater functionality for our customers, while reducing the internal overhead required for operating a GIS data download site. Our initial Open Data Platform deployment will use on-premise virtual server resources, with plans to host it in AWS or Azure once

operational procedures are in place for those cloud-based services.

The KCGIS Center is also taking advantage of cloud resources in testing a new data store type and a new format for imagery data. Published results, and our own in-house testing to date, indicate that the combination of AWS S3 data store with imagery transformed to the Meta Raster Format will likely improve the delivery of imagery services to both desktop and mobile clients.

Finally, a renewed emphasis on data quality will be a primary focus of our enterprise data operations during 2017 and 2018. Development and use of clearly documented data maintenance plans and close coordination with the KCGIS governance committees to prioritize and track maintenance of vital business datasets should result in significantly improved, consistent management of our enterprise data. Fully implementing SharePoint to track and document data quality issues, and to make relevant documentation available via internal web pages, is expected to be highly effective in support of these efforts.

Internet Mapping Services

The KCGIS Center's flagship web-based mapping application, iMap, was completely updated and modernized during the 2015-2016 biennium, with a new interface and a highly responsive design. The iMap interface now responds to different screen sizes and formats for viewing on desktops, laptops, tablets, and mobile phones (Figure 2). It was also developed using modular programming techniques, which facilitate simple, quick implementation of new features and functionality in a plug-in fashion. This approach will enable iMap to be incrementally and continuously improved in the future without requiring major rewrites.

Parcel Viewer, a simplified complement to iMap, is slated for updating and modernization during the 2017-2018 biennium. This application will be improved and made more robust using the latest techniques in responsive design and modular programming.

Self-service web-based mapping applications are being adopted by growing numbers of GIS users through the KCGIS Center's subscription to ArcGIS Online. Dozens of these applications had been created and put into service by the beginning of 2017, and steadily increasing use of this platform is anticipated throughout the next two years (Figure 3).

Mobile data collection projects are also expected to increase in number. The KCGIS Matrix Services staff supporting the DNRP Water and Land Resources Division (WLRD) have pioneered new techniques and implementation patterns using a full range of GIS technologies, including ArcGIS Server for map services and feature services, ArcGIS Online for web-map configurations, and the Collector application for iPads and iPhones as the front end.

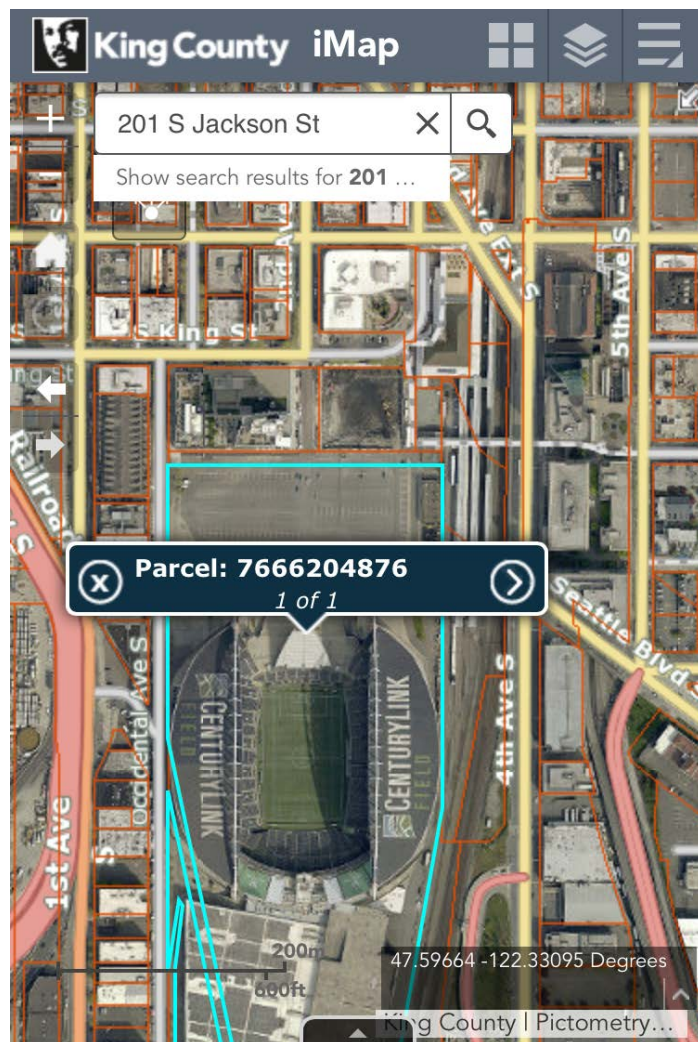


Figure 2. The iMap screen as it appears on a mobile phone.

As noted above, the KCGIS Center will be implementing the Esri Open Data Portal during the 2017-2018 biennium (Figure 4). This will provide users with a state-of-the-art interface for discovering, exploring, and downloading King County's GIS data. This development is expected to greatly improve data accessibility, as well as the value and benefits derived from making these data available at no cost to the public.

Regional Spatial Data Coordination

During 2015 and 2016 King County participated in two major regional GIS data acquisition efforts. More than 90 cities and other government entities joined with King County in the City Consortium Project to acquire high-resolution natural color and color infrared orthoimagery for a four-county area, including all, or large portions of, King, Kitsap, Pierce, and Snohomish counties. Imagery covering each participant's area of interest was delivered, along with additional supporting data and documentation. Through an ongoing contract sponsored by Kitsap County and the Puget Sound Lidar Consortium, King County also coordinated with 40 partners to acquire and distribute new lidar datasets, which

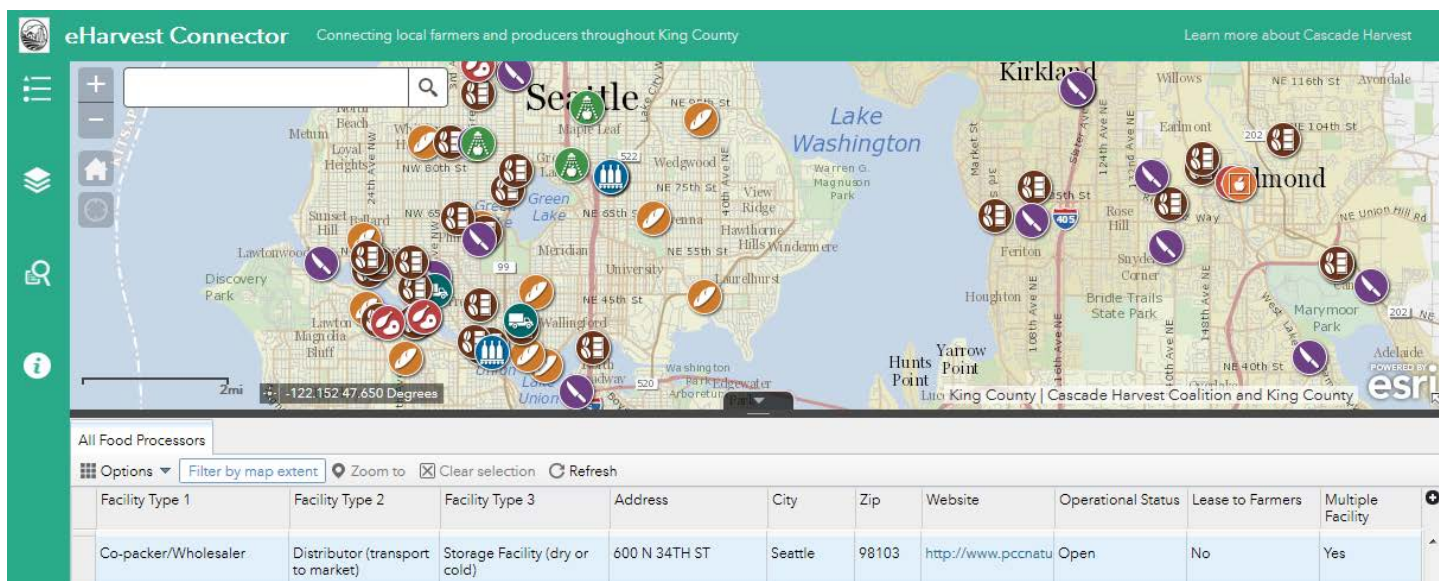


Figure 3. eHarvest Connector is an example of how data from a standard spreadsheet which contains location information (in this case street addresses) can be displayed in a configurable (i.e., no-programming-required) interactive web-mapping application on the ArcGIS Online platform. Numerous data analysis options, such as the filtered search tool in this example, can be added to ArcGIS Online applications via configurable widgets.

are used to create detailed topographic models of the earth's surface. The new regional orthoimagery and lidar datasets satisfy a key base data requirement for King County and the other participants. Concurrent acquisition of both of these datasets during the same general timeframe demonstrates both the operational and fiscal benefits and the efficiencies achievable through such large-scale regional partnerships. These will in turn provide powerful incentives for similar future multi-participant data acquisition projects.

Regional coordination also continues in the long-established program of acquiring and exchanging GIS data with other jurisdictions and agencies throughout King County and the Central Puget Sound region. Data layers covering a broad range of themes are acquired at regular intervals from over 70 cities and other local agencies, counties, tribes, and state, regional, and federal agencies. These data, along with their accompanying documentation, are managed in the Spatial Data Warehouse to ensure that King County staff always have current, comprehensive spatial data available for their programs and projects. During 2017 and 2018, this program is slated to undergo significant revamping, to ensure that it continues to effectively serve the needs of the entire King County GIS community. A new KCGIS Steer-

ing Committee priority initiative will focus on optimizing this program for all users of GIS data acquired from external sources.

Collaborative Regional GIS Study

For the 2017-2018 biennium the KCGIS Center has established as a key initiative the development of a plan for a collaborative, integrated, sustainable regional GIS, to meet the needs of public agencies throughout King County and the Puget Sound region. It is anticipated that much of the effort and cost of operating GIS could be shared on a regional basis, and that such a collaborative approach could successfully leverage and extend the capabilities and benefits which have already been realized by the numerous existing GIS programs in the region. A funding package has been included in the 2017-2018 budget to support a multifaceted effort, in cooperation with other regional stakeholder agencies, to explore options for creating a regional GIS. The proposed scope of work for this effort includes an assessment of the current state and effectiveness of the GIS programs of King County and of the other participating jurisdictions and agencies, using the GIS Assessment Service of the URISA GIS Management Institute. This assessment would identify potential future GIS capability and maturity improvements

Figure 4. The new Open Data portal was well into development at the end of the 2015-2016 biennium.



which could be achieved once a regional collaborative GIS is implemented and operational. In addition, potential future financial benefits would be measured by performing a high-level GIS Return On Investment (ROI) assessment of King County and all participating jurisdictions and agencies, similar to the groundbreaking 2012 King County GIS ROI study conducted by the University of Washington Evans School of Public Administration.

MATRIXED GIS STAFF SERVICES

During the 2015-2016 biennium, the KCGIS Center provided Matrixed GIS Staff Services to eight County business units. These included all four divisions of the Department of Natural Resources and Parks, two divisions of the Department of Transportation (the King County International Airport and the Road Services Division), the Department of Permitting and Environmental Review, and the Regional Planning group within the Office of Performance, Strategy and Budget. All of these groups will continue to be supported by Matrixed GIS Staff during the 2017-2018 biennium.

Department of Natural Resources and Parks—Parks and Recreation Division

During the 2015-2016 biennium the popular ParkFinder web application was rewritten for multiple platforms to provide much faster access to mapping and information for King County parks. A new TrailFinder web application was also developed and deployed, specifically to provide mapping and information for regional and backcountry trails (Figure 5). TrailFinder features Metro Transit bus routes and bus stops to help promote the use of public transport to reach trailheads and other trail access points. Matrixed GIS Staff completed extensive trail data updates and cartographic revisions during both 2015 and 2016 for the popular Backcountry Trails map series. Multiple revisions were completed for the Parks Open Space Plan map, and a series of maps was designed and produced for inclusion in the Regional Trails Needs Report. Finally, numerous maps were created for grant applications and presentations to the Washington State Recreation and Conservation Office as part of RCO's program to provide funding for outdoor recreation programs and projects.

Work planned for 2017 and 2018 includes continuing enhancements to ParkFinder and TrailFinder, to add functionality and to optimize their use on mobile devices. A key enhancement will be development of ArcGIS Online overlays to incorporate Park Alerts and Trail Alerts to notify the public of closures, revisions, and special events. Matrixed GIS Staff plan to further expand use of ArcGIS Online to enable more flexible and responsive access for the public to mapping and information about King County parks, trails, facilities, and events. Expanded GIS data design and development will be a key element of the Parks Asset Management Project,

along with the coordination and sharing of spatial data with Parks staff who will be developing the project's Lucity-based asset management database. GIS data analysis and mapping are also expected to play a growing role in the community engagement process, which is an essential part of planning and managing the County's parks, trails, and facilities.

Department of Natural Resources and Parks—Solid Waste Division (SWD)

During 2015 and 2016 the Illegal Dumping application and associated Jurisdiction Verifier application were rewritten in a newer language, with added functionality designed to improve responses to customer requests and better serve their needs. Extensive GIS support was provided to the South County Recycling and Transfer Station siting project for site selection and evaluation processes, and for ensuring satisfactory consideration of equity and social justice factors for county residents within the new facility's proposed service area. This work included demographic and environmental analysis and mapping, traffic studies, drive-time analysis, and address research and data compilation to support the community engagement process. Property value analysis and mapping were also completed to help determine potential economic effects of proximity to transfer stations and other Solid Waste facilities. Increased levels of GIS support were provided to SWD outreach and education programs to improve and extend services and to increase revenue. New and updated address research and data compilation for mailing lists were completed for properties adjacent to Solid Waste facilities to support improvements in ongoing operations, address concerns of nearby residents, and ensure compliance with all legal notification requirements.

Plans for the 2017-2018 biennium include continuing enhancements to existing applications and increasing use of ArcGIS Online to enable more flexible and effective responses to customer requests and access for the public to mapping and information about Solid Waste facilities, programs, and events. New and expanded GIS demographic analysis and mapping is also planned to support greater progress toward meeting equity and social justice objectives in SWD operations throughout King County. This work is expected to focus increasingly on support for outreach and education programs to provide and improve services to currently unserved and underserved communities. New phases of criteria-based research are also anticipated to support site selection and evaluation processes for proposed Solid Waste facilities throughout King County.

Department of Natural Resources and Parks—Wastewater Treatment Division (WTD)

Several key projects were completed for the Wastewater Treatment Division during the 2015-2016 biennium, including geocoding approximately 100,000 addresses as part of

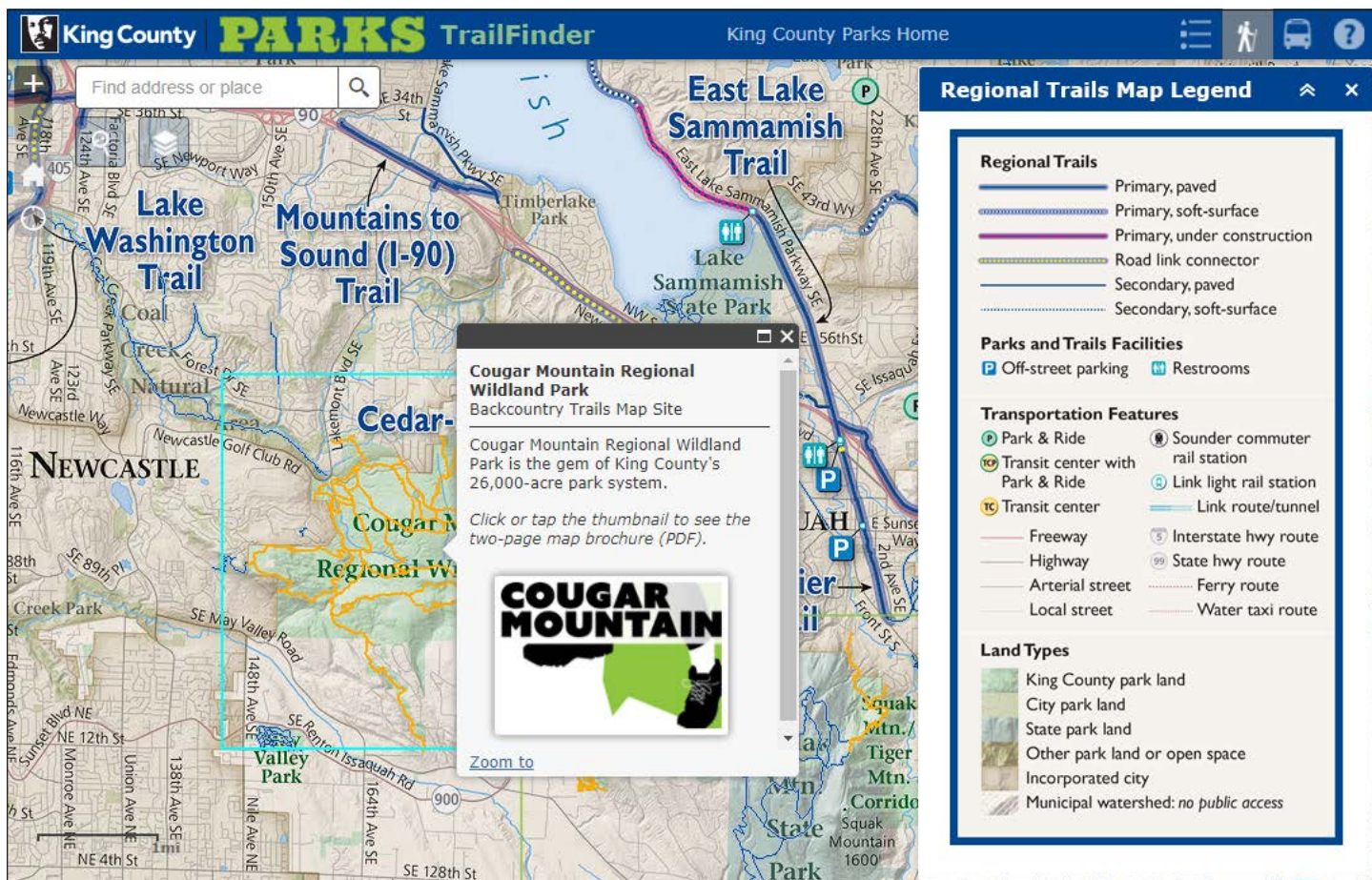


Figure 5. TrailFinder provides one-stop access to information about both the Regional Trails System in King County and the collection of 18 Backcountry Trails (BCT) sites that are managed by King County Parks. The former is represented in the screenshot above by the artwork from the print version of the Regional Trails map, which is displayed as a layer in TrailFinder that users can turn on and off, and by its legend. The latter is represented by the pop-up box that provides information about, and a link to the Backcountry Trails series map brochure for, Cougar Mountain Regional Wildland Park.

an Industrial Waste (IW) survey effort. Several new web-mapping sites were developed and implemented to support a number of WTD programs, including a data portal for IW inspectors to more efficiently access formerly decentralized information through a single data source. Matrixed GIS Staff supported the implementation of several major capital projects, including siting the Georgetown Wet Weather Treatment Plant, the Lake Hill Trunk Upgrade, and the North Creek Interceptor Upgrade. GIS services also assisted ongoing planning efforts for a regional needs assessment and for the Chelan and Hanford/Lander Combined Sewer Overflow (CSO) projects. Cartographic and analytical support was provided to a federally-mandated cooperative effort between WTD and Seattle Public Utilities to optimize joint operational approaches. GIS data development and maintenance during 2015 and 2016 concentrated on updating the Facility Information Retrieval System (FIRS) GIS database, which is used for asset management purposes. To support this effort, GIS data were synchronized and linked to the WTD Computerized Maintenance and Management System (CMMS) for cross-platform use of GIS and work order data.

Several important data development and upgrade projects are planned for 2017 and 2018. Among these are the completion of the CSO database, which will contain an inventory of all overflows recorded in the last twenty years. Development of comprehensive local sewer network data is also expected to be finished, as will identification of all local and direct connections to the WTD conveyance network. Work will also continue on QA/QC of the FIRS GIS database and on its integration with CMMS. The “One-lines” conveyance atlas will be fully updated and additional new web-mapping services will be developed to increase and improve communications and service to partner agencies and to the public. Finally, GIS support for numerous capital projects and planning efforts will be a significant component of WTD’s Matrixed GIS Staff work program during 2017 and 2018.

Department of Natural Resources and Parks—Water and Land Resources Division (WLRD)

Accomplishments for 2015 and 2016 included significant advances in GIS data design and reporting, standards and documentation, and procedures and accountability, as well as comprehensive updates to essential datasets. A key improvement was the development of a GIS-based online

tool for processing data and calculating environmental risks in areas prone to landslides and steep slope hazards. Transparent models were also developed and put to use by the Snoqualmie Valley Agricultural Production District (APD) Riparian Restoration and Agricultural Partnership Building Project to identify riparian restoration opportunities which minimize impacts to agricultural lands. Applications were developed for the Noxious Weeds program which are improving field data collection efficiency and the generation of notifications for the King County Road Services Division and for the King County Parks and Recreation Division, as well as for other sections of WLRD. Additional accomplishments during 2015 and 2016 include expansion and updating of the stormwater asset inventory by more than 400 miles of right-of-way and over 2,000 stormwater facilities. Finally, Matrixed GIS Staff supported the creation of an Equity and Social Justice (ESJ) iMap application, which will be a valuable resource in the future for illustrating the many ways in which the division's policies, programs and services are moving WLRD toward achieving its ESJ goals.

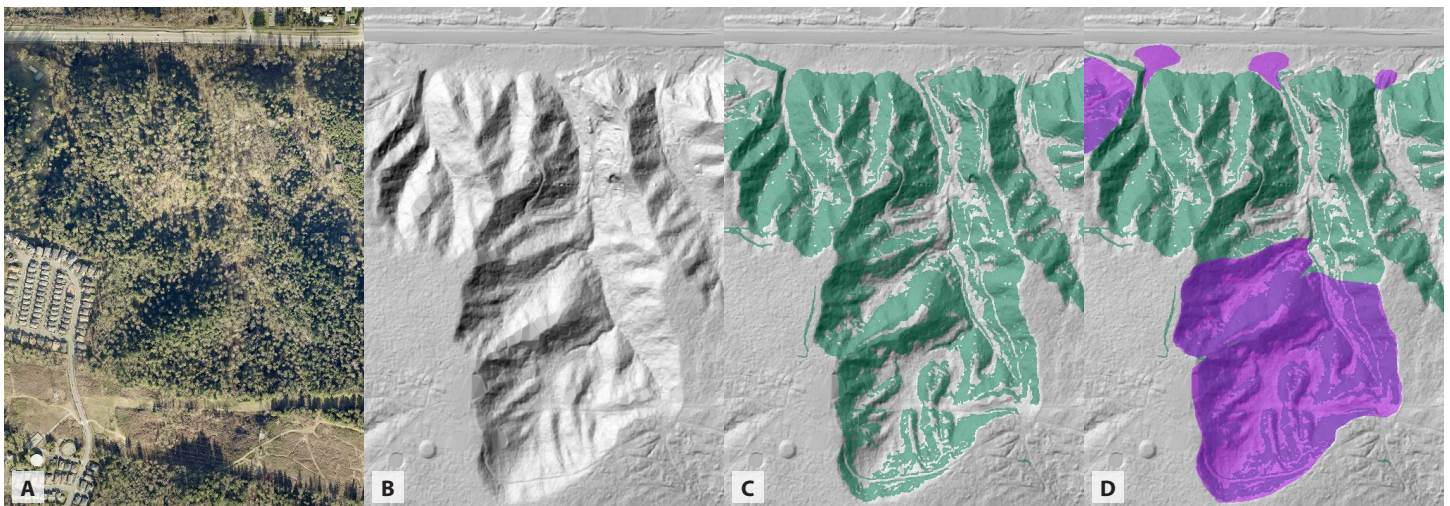
For 2017 and 2018 WLRD's GIS Matrixed Staff plan increased support for significantly improved field data collection for a wide range of division programs. Work is expected to progress as well with increased GIS data integration, standardization, and collaboration across programs, including the Bug Program, Rural and Regional Services, Flood Patrol, and Noxious Weed Control. Significant improvements are also planned to the quality of the GIS hydrography layers (streams, lakes, and stormwater conveyance system), to coincide with the adoption of a data schema which complies more fully with national standards for hydrographic data. In addition, increased Matrixed GIS Staff support is anticipated for the new WLRD Fish Resource Monitoring Program.

Department of Permitting and Environmental Review (DPER)

During 2015 and 2016 Matrixed GIS Staff support to the Department of Permitting and Environmental Review empowered several key advances in efficiency and modernization. The Environmentally Sensitive Areas map service was created, with input from DPER staff, and has been a significant element in ensuring greater value and benefits from the updated iMap web-based mapping application. Several existing map services were migrated during the biennium from dedicated DPER virtual servers to KCGIS Center enterprise servers, enhancing operating cost efficiencies and enabling improved support. Training and analytical assistance were provided to make possible the publication of both the first-ever Potential Steep Slope Hazard data layer and a much-improved Potential Landslide Hazard data layer (Figure 6). Matrixed GIS Staff were recognized during the 2015-2016 biennium for their efforts in support of the successful implementation of King County's new online building permit process. This team also began developing familiarity and expertise with marijuana facility land use issues, as well as increased proficiency in working with the complex patterns and intricate character of King County's zoning and land use data.

Looking ahead, a revised Vashon Town Plan, a major analysis and mapping project, is expected to reach completion in 2017. Two new major projects are slated to start during 2017 and are expected to continue into 2018. The first of these, a web-based system to track recently recorded plat lots until they are officially created and published by the Assessor's office, will address the ongoing need for GIS objects to be available immediately after recording, to enable GIS-based queries of property attributes. The second new major project is the migration of the Accela GIS module to a new JavaScript-based application before the currently optional

Figure 6. Revealing through GIS what the naked eye cannot see: A) 2015 aerial photo, B) ground-surface shaded relief, C) potential steep slope hazard areas, D) potential landslide hazard areas.



user interface becomes mandatory. Completion of this work will ensure the long-term viability of the linkage between KCGIS and the vendor-hosted permitting system which the Accela GIS module provides.

Department of Transportation—King County International Airport

Through a series of changes in technology and key staff at King County International Airport/Boeing Field during the 2015-2016 biennium, Matrixed GIS Staff provided substantial application and database development, update, and support for the Airport's Property Management System. This system is designed to enable Airport personnel to access a suite of applications related to property management from one online site. Each of these applications now accesses the information which it requires from a single integrated database, whereas previously data were maintained separately for each application. The Property Management System also accesses hard-copy maps and reports, so that users can access the most current information available in multiple forms. This suite of applications includes tools which enable users to view, edit, add, and search leases, facilities, insurance, and inspection information through maps and traditional database query interfaces. The majority of the work completed during 2015 and 2016 was for lease, hangar, and tie-down management, insurance tracking for leases and hangars/tie-downs, and building facilities reporting. Database design, conversion of department tabular and spatial data, and a web interface were all successfully completed and delivered to Airport management and staff.

For the 2017-2018 biennium Matrixed GIS Staff will be working closely with Airport staff and managers to develop and implement a spatial database application for managing the Airport's safety and security data. The Safety and Security Data Management System will serve as the central repository for all Airport safety and security data. The first phase of development will focus on creating a module for managing perimeter security data. Later phases of development will expand the system to include modules for managing a suite of applications from one online site. This will operate in a manner similar to the Airport's Property Management System, with each application in the suite accessing the information which it requires from a single integrated database. This suite of applications will include tools to enable users to view, edit, add, and query data, as well as print reports and hard copy maps.

Department of Transportation—Road Services Division (RSD)

During the 2015-2016 biennium Matrixed GIS Staff provided essential technical assistance and coordination for the Road Services Division upgrade of their Cityworks asset management system by designing and configuring the map

and data services to be consumed by the system. An Automated Vehicle Location (AVL) function was added to the My Commute web-mapping application to enable the public to view and confirm which King County roads have been cleared by sanding and plow trucks during snow and ice storms. The linear features displayed on the map are activated by real-time signals from the trucks, such as when plows are raised or lowered, and are time stamped so that they can be removed from the map display after a specified period of time. The My Commute application was also enhanced with a new interface and map symbology, a highly responsive design for use on mobile devices, and a more robust backend to improve performance and support peak load demands during storm events. Finally, the Road Asset Viewer web-mapping application was significantly improved, with the implementation of a new print function and an upgraded interface which incorporates greater control for users.

The RSD Matrixed GIS Staff Services work plan for 2017 and 2018 includes building a new mobile GIS data collection application for the division's pavement rating system. This project will further advance the goal of supporting RSD field crews with flexible, effective GIS tools. The Road Asset Editor and Road Asset Viewer, two essential applications developed and maintained by Matrixed GIS Staff, will undergo complete modernization upgrades during the 2017-2018 biennium. The KCGIS Center will coordinate closely with RSD managers and staff to ensure that this work is completed successfully.

Regional Planning

Matrixed GIS Staff support was established for Regional Planning at the beginning of 2015. The primary work focus for the initial two years of this program was the 2016 King County Comprehensive Plan (KCCP) update. The 2016 edition of the KCCP was a major update and required an extensive volume and variety of GIS support. One major element of this work involved a proposal to change the urban growth boundary amendment process to enable "notch" areas to be reclassified to urban designations. A detailed analysis of the possible effects of this proposed change was completed and delivered to King County elected officials and their staff to provide essential background and context for their consideration of the proposed change. Potential annexation areas (PAAs) were reviewed comprehensively, and then organized and classified to highlight the differences between urban PAAs and city in rural area PAAs. All of the maps in the KCCP were thoroughly redesigned under the overall direction of Regional Planning.

Looking ahead to 2017 and 2018, we expect two major data development efforts begun during 2016 to be completed. The first of these is an expansion of the municipal jurisdiction layer from three counties to six, to include all

counties adjacent to King County. The other is the development of a database of urban growth area designations, with which all changes made from 1984 to the present date can be tracked. A series of additional data development projects is planned for the remainder of the 2017-2018 biennium. The current tribal lands data layer will be expanded to cover the same six counties as the municipal jurisdiction layer and will be renamed to accurately reflect that only federally designated reservation lands are included. Change tracking databases will also be created for both zoning designations and planned land use designations, using the model of the urban growth area designation database.

CLIENT SERVICES

The KCGIS Center's Client Services group develops and delivers a complete range of GIS products and services to clients of all types and sizes. County agencies, suburban cities, fire, utility, and school districts, tribes, community groups, private firms, and individual citizens all benefit from the extensive knowledge, skills, and experience of the Client Services staff. During 2015 and 2016, KCGIS Center Client Services completed more than 250 projects of all types for more than 70 different customers.

A key project in 2016 was the evaluation for Public Health - Seattle & King County of over 80,000 parcels throughout the county for the presence or absence of on-site septic systems. Records for septic systems compiled in recent years have been of generally good quality, but in decades past record-keeping for these systems was incomplete and inconsistent. To ensure sufficient information to support effective policy making, Public Health needed to verify the total number of septic systems in the county on a parcel-by-parcel basis. This project combined analysis of septic system records, information from sewer districts, and other source information to greatly improve and complete the records of septic systems in King County.

A groundbreaking project was completed during the 2015-2016 biennium for King County's Office of Cable Communications (OCC), which is responsible for overseeing all of the County's cable franchisees. The terms of each franchise agreement stipulate that the franchisee must provide OCC with data and maps which document the location of their network infrastructure. Until recently, however, these data had never been imported into a usable GIS-based form, and were therefore of limited value and utility. KCGIS Center Client Services staff worked closely with OCC staff to convert the franchisee data and then utilize them to create effective maps and documents which can be shared with County officials, utility regulators, and the public. Client Services also assisted OCC in clarifying data requirements for future franchise agreements, to rationalize and facilitate future data sharing.

For the King Conservation District and Cascade Harvest, the KCGIS Center created the "eHarvest Connector" web-mapping application in 2015. This application uses ArcGIS Online technology to connect sustainable agriculture practitioners with various vendors and support services across the county. Small-scale farmers can use the eHarvest Connector to locate commercial kitchens, cold storage, meat and poultry processors, and other businesses that support agriculture in their area of King County.

Another innovative project completed during 2015 was a "hot spot" crime analysis in the unincorporated Skyway area near Renton. This was developed for the King County Prosecuting Attorney's Office (PAO), to support their need to clearly determine the nature, frequency, and distribution of various crime types in the area, thereby enabling more effective prioritization of their criminal prosecution efforts. Through the application of advanced GIS visualization tools, the KCGIS Center assisted PAO in viewing and evaluating their data and accomplishing their prioritization goals.

For DNRP's Water and Land Resources Division (WLRD), we created a detailed 3-D fly-over animation, using recent high-resolution aerial imagery, to depict the Willowmoor Floodplain Restoration project along the Sammamish River near Marymoor Park (Figure 7). Several habitat restoration projects have been completed or are planned in the area. This animation greatly aids WLRD staff in illustrating the context and scope of these efforts, and in communicating clearly and effectively with project stakeholders.

The KCGIS Center's long-standing collaboration with the City of Covington continued in 2016, as we assisted City staff with the production of their Comprehensive Plan update. A large volume of data analysis and mapping was developed and delivered to facilitate production of this update. The final result was that Covington produced a compelling, effective Comprehensive Plan with our support.

Throughout 2015 and 2016, Client Services worked closely with DNRP's Parks and Recreation Division to design and build a data viewer for the Eastside Rail Corridor (ERC), and to assemble a large, diverse compilation of spatial data to be used with it. The ERC data viewer enables detailed analysis of the corridor and all adjacent properties and property interests (such as utility easements) along its entire length. Planners can use the data viewer to study the corridor, or specified portions of it, in as much detail as necessary, panning and zooming their view to achieve an appropriate level of detail and turning relevant map layers on and off as needed. Use of the ERC data viewer is enabling greatly improved products to be generated quickly and efficiently for public use and to support community involvement in planning for future recreational trail development along the corridor.

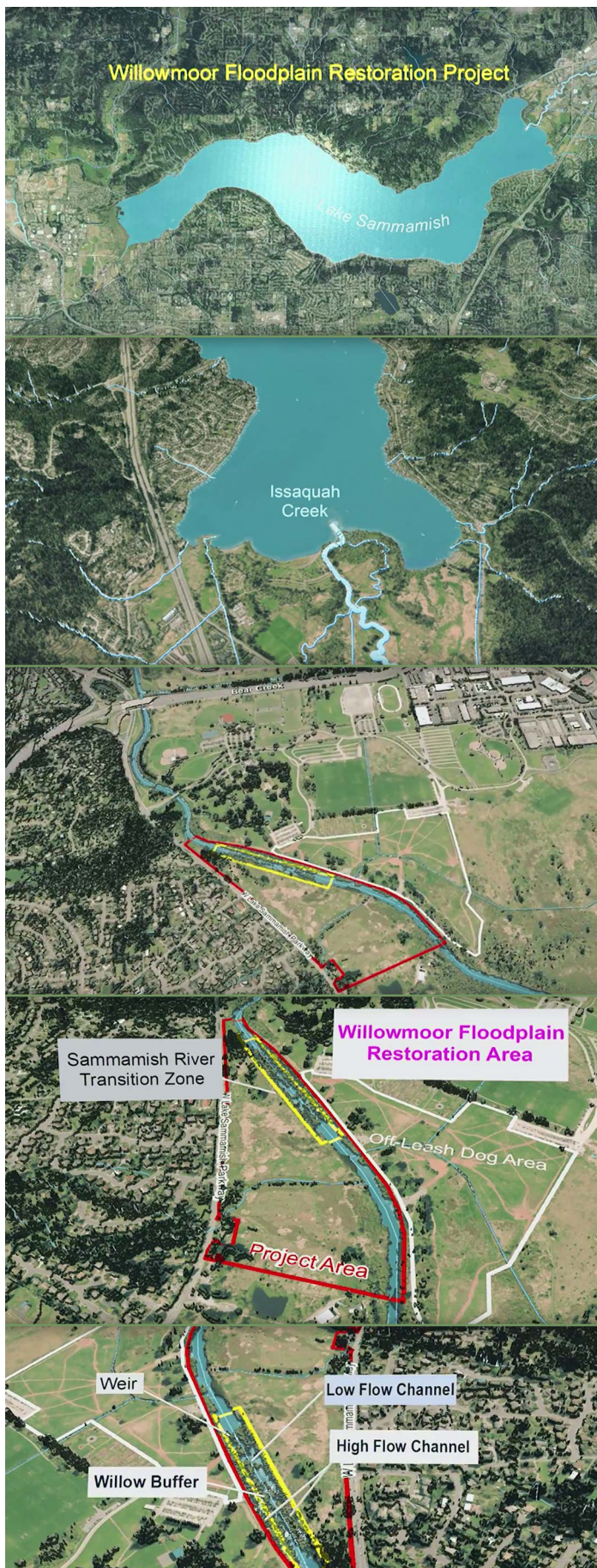


Figure 7. A series of video frames from the 3-D fly-over animation of the Willowmoor Floodplain Restoration project. High-resolution aerial photo imagery is draped over a lidar-derived digital elevation model.

For longtime client Regional Animal Services of King County (RASKC), KCGIS Client Services created a master address file during 2015 and 2016 which cross-references all member-city information with Animal Control District boundaries. This enables RASKC dispatchers to confirm whether an incident is within their service area, as well as which district it is in. It also greatly improves operational efficiency by providing RASKC planners with the data they need to knowledgeably allocate individual service areas into patrol districts.

During the 2015-2016 biennium KCGIS Client Services supported the City of Bothell in upgrading their GIS technology to current versions and in migrating their core data layers into the latest geodatabase models. We also assisted City staff with developing scripted workflows for their regular data update processes, and advised them on best practices for maintaining and growing their enterprise GIS environment.

Finally, we provided support and assistance to the Preparedness Section of Public Health - Seattle & King County in creating an interactive website for their staff which enables them to visualize all of the numerous medical facilities across King County, along with other public health facilities, utility infrastructure, and environmental conditions and hazards. This site was built using ArcGIS Online, which empowers Public Health staff with the capabilities to focus on specific areas of the county and to query any of a wide range of datasets, to ensure that they have the information they need to improve program planning and provide highly effective service delivery to the public.

Looking forward to the 2017-2018 biennium, KCGIS Client Services anticipates significant continuing growth in development and deployment of ArcGIS Online applications. The ease and flexibility of developing these applications is enabling our clients to grow their capabilities significantly through the use of interactive websites with dynamic, real-time data. Major initiatives are also under way in Client Services to implement mandated government policies, including conversion of eighty years' worth of legal documents into a comprehensive franchise boundary data layer, and further refinements to the newly-developed on-site septic system data resource. We also anticipate growing business and revenues from new consulting services agreements with external jurisdictions and agencies to conduct GIS needs assessments and to implement comprehensive GIS infrastructures. Through KCIT's Regional Services Business Development Plan, KCGIS Client Services are setting aggressive targets for growth in existing and expanded service areas, including custom data delivery, training, GIS-based applications, on-call support, and professional-quality cartography.

King County GIS Center by the Numbers

KCGIS Center Client Services in 2015-2016

- 269 projects
- \$1,228,131 revenue (\$4,565 per project)

KCGIS Center Training Program in 2015-2016:

- 45 classes
- 353 students (7.8 per class)
- \$295,305 revenue (\$6,562 per class)

KCGIS Center staffing

- 28 FTEs in 2015-2016 (27 FTEs planned for 2017-2018)
- 14.2 years average tenure with King County (at end of 2016)

King County GIS Web Mapping Services in 2015-2016

- 698,704 internal sessions (46% increase over previous biennium)
- 8,396,931 external sessions (50% increase over previous biennium)
- 5,989 unique internal users (50% increase over previous biennium)

King County ArcGIS for Desktop usage in 2015-2016

772 unique internal users (all time high and 7% of total county employment). This number grows every year, setting a record again in 2015-2016, and represents a large, diverse group of users who dynamically employ GIS every day to support a wide range of programs, projects, and services to the entire King County community.

King County ArcGIS Online usage in 2015-2016

213 unique internal users, comprising a growing community of County staff who are developing new and innovative solutions with ArcGIS Online to support and improve a wide range of services for internal customers and the general public.

KCGIS Center Spatial Data Warehouse (vector data)

- Spatial layers
 - Points: 126
 - Lines: 363
 - Polygons: 565
 - *Total: 1,054*
- Business tables (relate to Spatial layers)
 - *Total: 453*

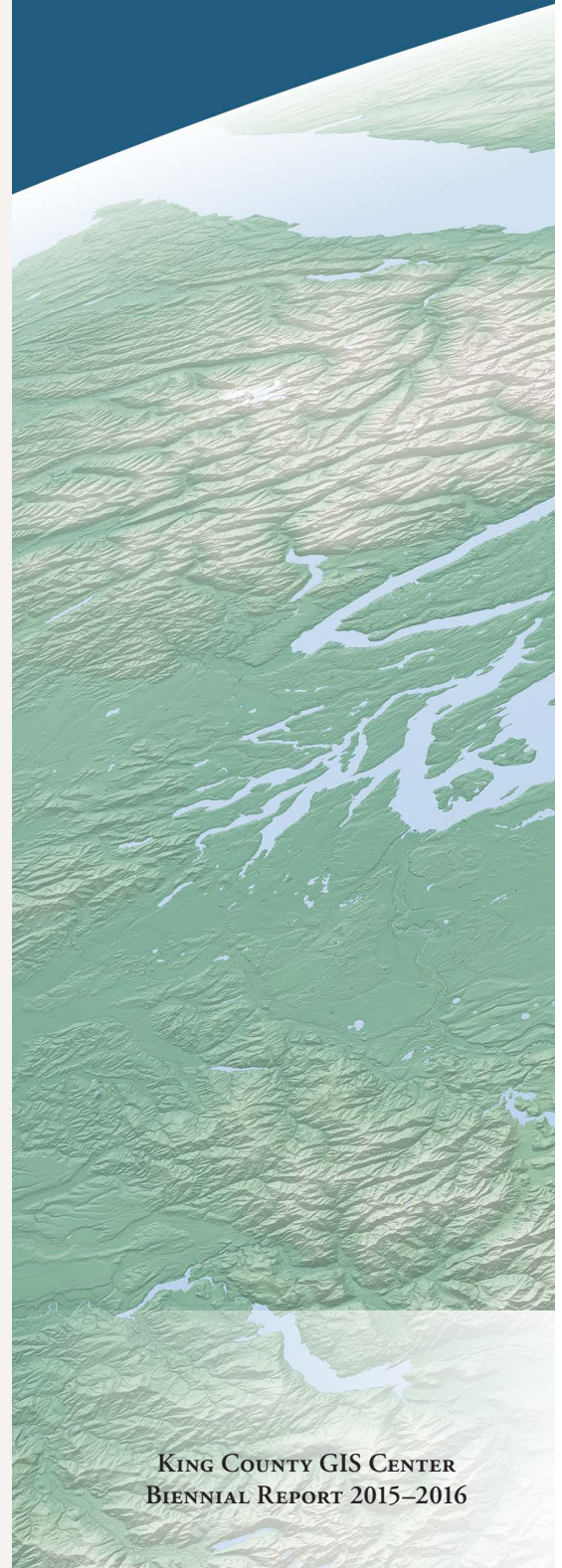
Raster data

- Over 175 imagery and lidar elevation datasets, collectively covering the majority of King County
 - *Total: nearly 4 TB*
- Nearly 150 other imagery and lidar datasets, from cities and other limited-extent projects
 - *Total: more than 272 GB*
- Pictometry imagery usage (2017 to date)
 - King County business groups or linked applications: 15
 - Total number of King County users: 112



King County GIS CENTER

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