

# Geospatial Datasets

Core Enterprise Geospatial Data Infrastructure

St. Louis County, Minnesota

**Current Version Updated 02-17-2009**





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Division of Planning, Research, and GIS*

*Prepared For: County Geospatial and GIS Users*

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St. Louis County  
Planning & Development Department

Minnesota  
United States

**Introduction:** Geospatial data is perhaps the most important component to a successful enterprise Geographic Information System (GIS). All analysis, research, mapping, and data integration starts with a high-quality set of geospatial data.

St. Louis County has been investing in GIS and geospatial data since 1984. While the county is rich in data, it lacks a coordinated infrastructure for managing that geospatial data in a most efficient and cost effective manner. Geospatial data can be difficult and costly to acquire and maintain, so it is imperative that the county establish a strong coordinated enterprise geospatial data infrastructure system.

This document is intended to serve as a guide to organizing geospatial data types across St. Louis County. It covers eleven categories of data that will be referred to as "Core Enterprise Geospatial Data Infrastructure." It follows national and state organizational standards while recognizing St. Louis County's unique differences. As St. Louis County builds and maintains the enterprise GIS system, the core enterprise geospatial data categories will be followed as closely as possible to ensure that county geospatial data management continues to improve, which will bring about efficiencies and cost-savings, as well as decision support capabilities that have previously been difficult to realize.



# Core Enterprise Geospatial Data Infrastructure

## CATEGORIES

(SDE Naming)

### Imagery

NSDI, MSDI, GN  
Imagery typically refers to aerial photography, which is used for many purposes at St. Louis County. It is effective as a "background" layer to other geospatial data, and can be used by GIS specialists to delineate real-world features.

IMAGE



### Cadastral (Parcels)

NSDI, MSDI, GN  
The Cadastral (Parcel) layer at St. Louis County is the fundamental tool for analyzing land ownership information. The county is in the process of developing parcel data. This data will provide the foundation for many applications across the county pertaining to land ownership.

CDSTRL



### Transportation

NSDI, MSDI, GN  
Transportation features typically include roads (centerlines), trails, airports, shipping ports, and other representations of features that depict the transportation systems in the county. The road centerline layer is critical since it provides the necessary information for emergency dispatch and public works maintenance.

TRANS



### Addressing & Places

GN  
The county is planning for the development of an official Address Point layer for use in GIS systems across departments. The address dataset will be used for emergency dispatch and other law enforcement purposes, as well as a further piece of information for land use planning with the parcel data layer.

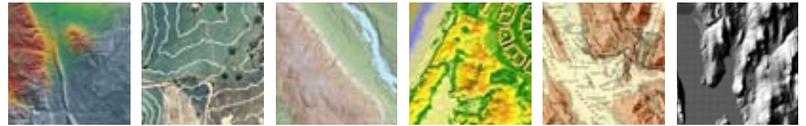
ADDRPLCS



### Elevation

NSDI, MSDI, GN  
Elevation data, typically in the form of contour maps and Digital Elevation Models, is used extensively for modeling the surface of the earth. This type of information is useful for departments such as Land, Planning, Public Works, and others as they determine appropriate land uses, forestry and construction processes.

ELEV



### Structures

GN  
Structural data, often known as planimetrics, will be developed in the future to highlight the locations and dimensions of buildings and important structures throughout the county. Along with parcel and address data, this information will be particularly useful for law enforcement, planning, and assessment purposes.

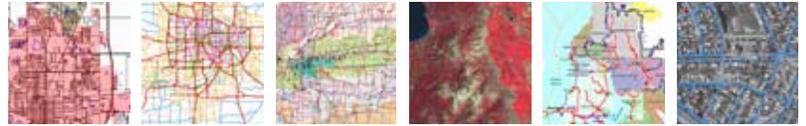
STRUCT



### Utilities

GN  
Utility data will be utilized for site planning, economic development, land use planning, emergency / homeland security, and many other operations at St. Louis County. Having an understanding of the locations of utility features (electric, gas, sewer, water) is key to development and emergency response.

UTIL



### Administrative Boundaries

NSDI, MSDI, GN  
Many administrative boundaries exist within St. Louis County. Examples include municipalities, state and federal management areas, county zoning districts, and many more. Geospatial analysis depends on these boundaries to render accurate results.

ADMIN



### Geodetic Control & PLSS

NSDI, MSDI, GN  
Geodetic control refers to precise surveys covering very large areas such as the High Accuracy Reference Network (HARN) developed in Minnesota in 1996. The Public Land Survey System is the basis for all land titles and property descriptions in Minnesota. With GPS surveying, PLS corners can be referenced to geodetic control.

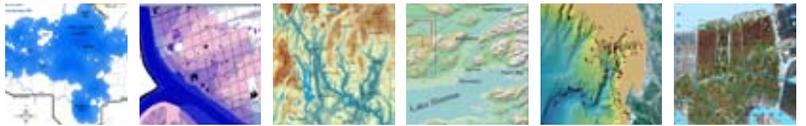
GEOD



### Environmental

NSDI (Hydrography), MSDI (Hydrography), GN (Hydrography & Environmental)  
The physical world within and around St. Louis County will be represented with numerous environmental layers. Lakes, rivers, streams, wetlands, soils, land cover, geomorphology, mining areas and many other physical earth features will be available for use in mapping and analysis. Hydrography: NSDI, MSDI. Soils: MSDI

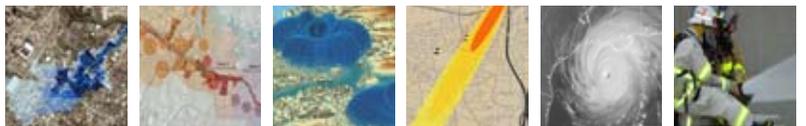
ENVIRO



### Emergency Operations

GN  
In addition to the layers listed above, the Sheriff's, 911 Communications, and others will utilize additional geospatial data in emergency response situations such as response districts, hazard areas, critical infrastructure, and other emergency geospatial data to conduct emergency operations.

E911



### Recreation

Features and locations used primarily for recreational purposes. May include such features as trails, parks, accesses, or recreational complexes. This type of data may logically exist in other categories, but grouping these features helps users to find and utilize the data appropriately..

REC



NSDI: National Spatial Data Infrastructure -----

(Seven main framework themes: Imagery, Cadastral, Transportation, Elevation, Administrative Units, Geodetic Control, and Hydrography)

MSDI: Minnesota Spatial Data Infrastructure -----

(Eight main framework themes: Imagery, Cadastral, Transportation, Elevation, Administrative Units, Geodetic Control, Hydrography, and Soils)

GN: GIS for the Nation -----

(Fourteen main framework themes: Imagery, Cadastral, Transportation, Elevation, Administrative Units, Geodetic Control, Hydrography, Environmental, Land Use/Land Cover, Addresses, Utilities, Structures/Critical Infrastructure, Emergency Operations, and Base Map)

# Core Enterprise Geospatial Data Infrastructure

## SUB-CATEGORIES EXAMPLES

### Imagery

Leaf-Off Aerial  
Color Infrared Aerial  
Natural Color Aerial  
Oblique Aerial

Satellite Images  
Ground-Level Photos  
Miscellaneous Photos  
LIDAR-based Imagery

Scanned Documents



### Cadastral (Parcels)

Parcels  
Subdivisions/Plats  
Blocks  
Lots

Right-of-Way  
Lease Sites  
Discrepancy Points  
Pre-Placement



### Transportation

Roads  
Forest Roads  
Trails  
Railroads

Waterways  
Airports  
Seaports



### Addressing

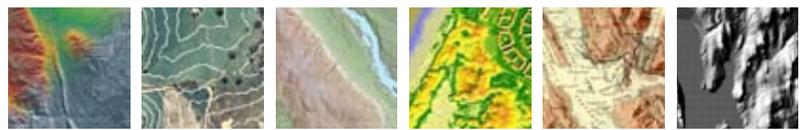
Address Points  
Geocoding Services  
Driveway Locations  
Places



### Elevation

Digital Elevation Models  
Digital Raster Graphics  
Digital Terrain Models  
Point-specific Elevations

LIDAR-based points



### Structures

Building Footprints  
County Facilities  
Driveways  
Parking

Sidewalks



### Utilities

Electric Lines  
Gas Pipelines  
Sewer Lines  
Water Lines

Utility Poles  
Radio Towers  
Fire Hydrants  
Manholes

Steam  
Telecommunications



### Administrative Boundaries

Jurisdictional  
Judicial  
Political  
School District

Zoning  
Voting  
Zip Code  
Service Areas

Tax Forfeit  
Econ Dev  
DNR / Census



### Geodetic Control & PLSS

HARN  
PLS Corners  
PLS Lines  
Sections

Quarter Lines  
Quarter-Quarter Lines  
Site-specific survey data



### Environmental

Lakes (Hydr)  
Rivers & Streams (Hydr)  
Wetlands (Hydr)  
Watersheds (Hydr)

Soils  
Land Cover  
Geomorphology  
Flood Plains

Climate & Weather  
Vegetation  
Physiography  
Mining



### Emergency Operations

Police Districts/Stations  
Fire Districts/Stations  
First Responders District  
Ambulance Districts

Incidents & Hazards  
Evacuation Routes  
Shelters & Em. Facilities  
Critical Infrastructure

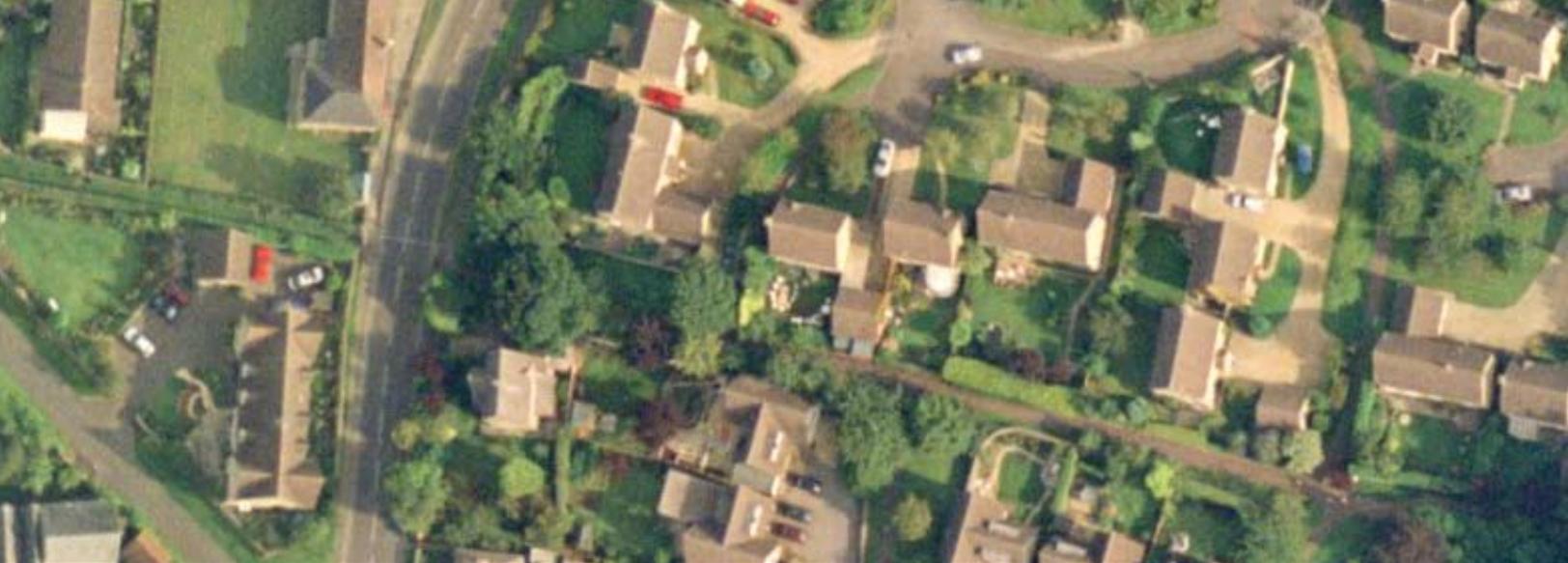
Road Closures, Ports  
Containment Areas  
Disaster Recovery  
Hazard Mitigation



### Recreation

n





# Imagery

## About

Imagery, in the broadest sense, refers to pictures of features that are typically captured via remote sensing methods. Typically, in a GIS setting, these types of images include aerial photography and satellite imagery; but the types of images available to the county for use in a GIS are many and varied. Aerial photography, in particular, is extremely valuable in GIS applications because it provides a real-world backdrop to all other features being mapped or analyzed.

## Types (Examples)

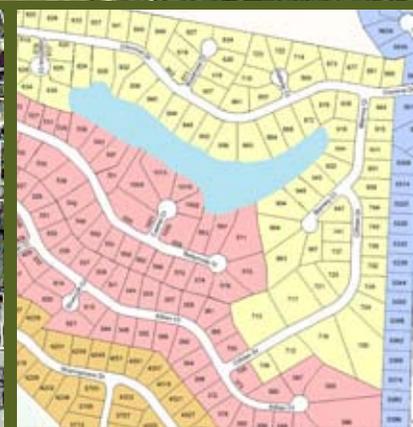
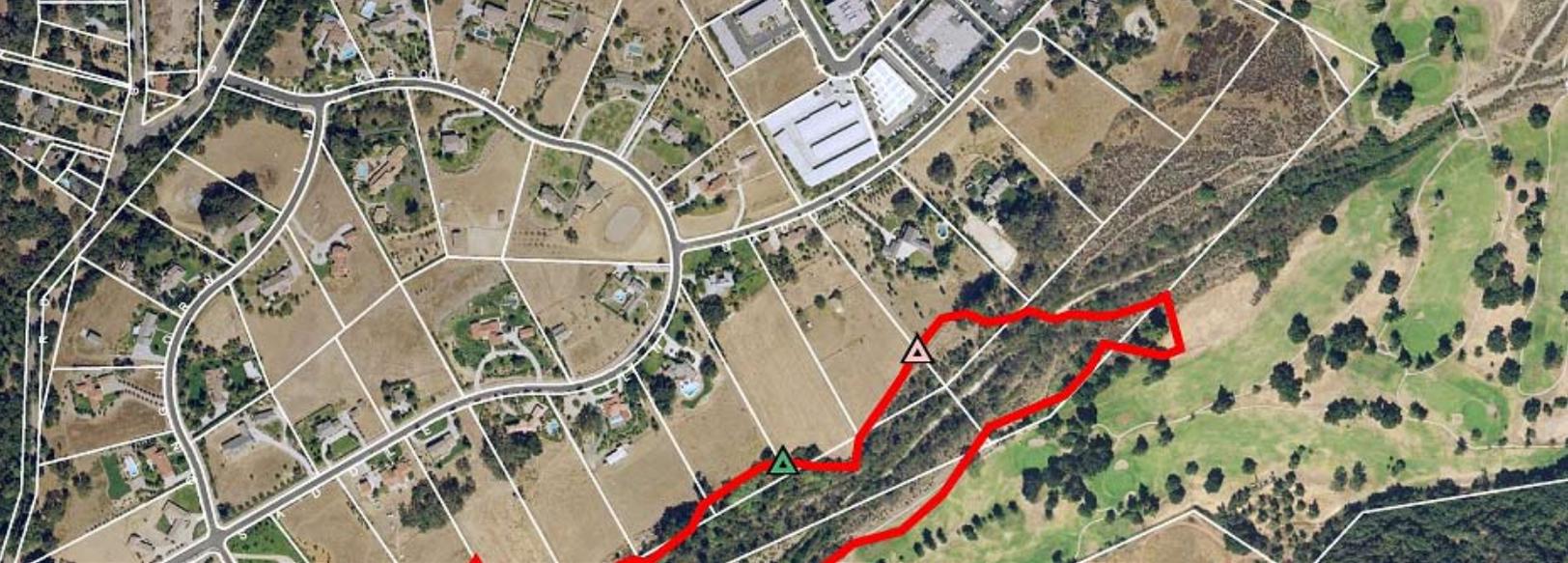
- Orthophotography
- Oblique Aerial Photography
- Infrared
- Satellite Imaging
- Radiometer
- Imaging Radar
- Thermal Imaging
- Radar Scanning
- Light Detection and Ranging

## Purpose & Use

St. Louis County utilizes imagery, particularly aerial photography, for providing a snapshot of the features that exist on or near ground level in the real world. The county's many types of aerial photography can be used for different types of analysis:

- Identifying buildings and infrastructure
- Monitoring forest growth and tree health
- Identifying agricultural resources
- Determining land use and land cover
- Law enforcement and emergency operations





# Cadastral (Parcels)

## About

A cadastral (parcel) layer is a digitally stored spatial representation of a legal description, linked to many attributes about the property such as land ownership, parcel size, configuration, land use, improvement values and other related information. One way of thinking about parcel data is to consider it as a digital version of a plat book; but in reality, the data contained within parcel data is much more detailed and designed for analysis. From a county perspective, the presence of a cadastral (parcel) layer allows for the building of an integrated system of land management information. In St. Louis County, the cadastral (parcel) not only includes parcels, but also many elements that formulate or impact parcels such as lots, blocks, subdivisions, right-of-way, roads, rivers, PLSS, etc..

## Types (Examples)

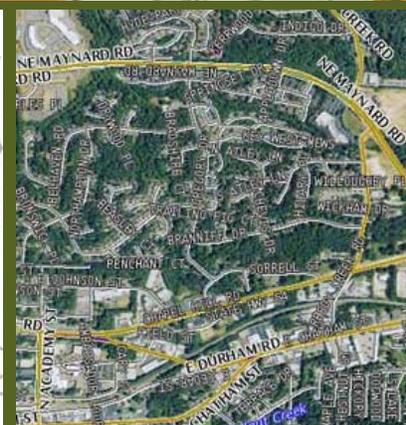
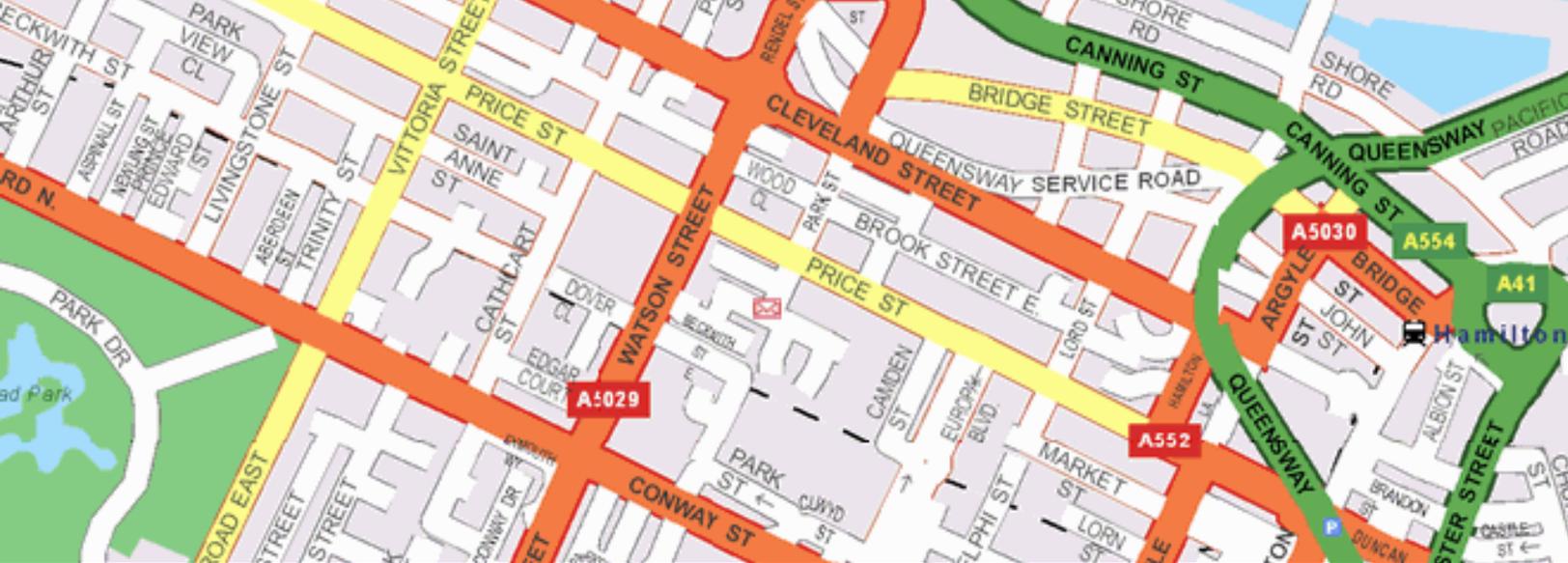
- Parcels
- Subdivisions
- Blocks
- Lots
- Right-of-Ways
- Lease Sites
- Discrepancies
- Annotation

## Purpose & Use

St. Louis County utilizes the parcel and PLS data to describe and visually identify land ownership. The parcel is the fundamental base from which taxes and assessments are calculated, and it is the basis by which all land-related decisions are based.

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St. Louis County  
Minnesota, United States





# Transportation

## About

The transportation data includes various forms of transportation. One of the most important is roads. Road centerline data, as the name suggests, identifies in a linear fashion the road network as mapped down the center of the road surface. Road centerline data is typically collected by Global Positioning receivers mounted on vehicles that travel down the road's center; however, other means of collecting centerline data are sometimes used, including interpretations from aerial photography. Important information about roads is included in the layer's associated attribute file. These attributes can include data about the surface type, length, road names and numbers, maintenance history, addressing ranges, functional class, and many other informational pieces. The county is home to numerous recreational trails, as well as airports and waterways, an international seaport, and railway transport.

## Types (Examples)

- Road Centerline
- Trails
- Waterways
- Airports
- Seaports
- Railroads

## Purpose & Use

St. Louis County utilizes transportation data for a number of purposes. One of the most common uses is for public visualization of the road network, as seen in the official St. Louis County highway map. However, from an analytical standpoint, the road data is capable of providing decision support related to maintenance and improvements in public works, emergency/911 dispatch, routing and navigation, forestry access, land use planning and design, locating utilities, rural addressing, and many other possible uses. Similarly, St. Louis County utilizes information produced in-house and by other agencies to depict wooded trails, as well as other transportation features: waterways, seaports, railroads and airport data.

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Minnesota, United States





# Addressing & Places

## About

Addressing refers to the collection of physical address features and common names of places. These are typically stored as points which reference building locations or driveway entrances. The physical address is important since data is often referenced to addresses, which will help to reference the real world features, access points and other land record data.

## Types (Examples)

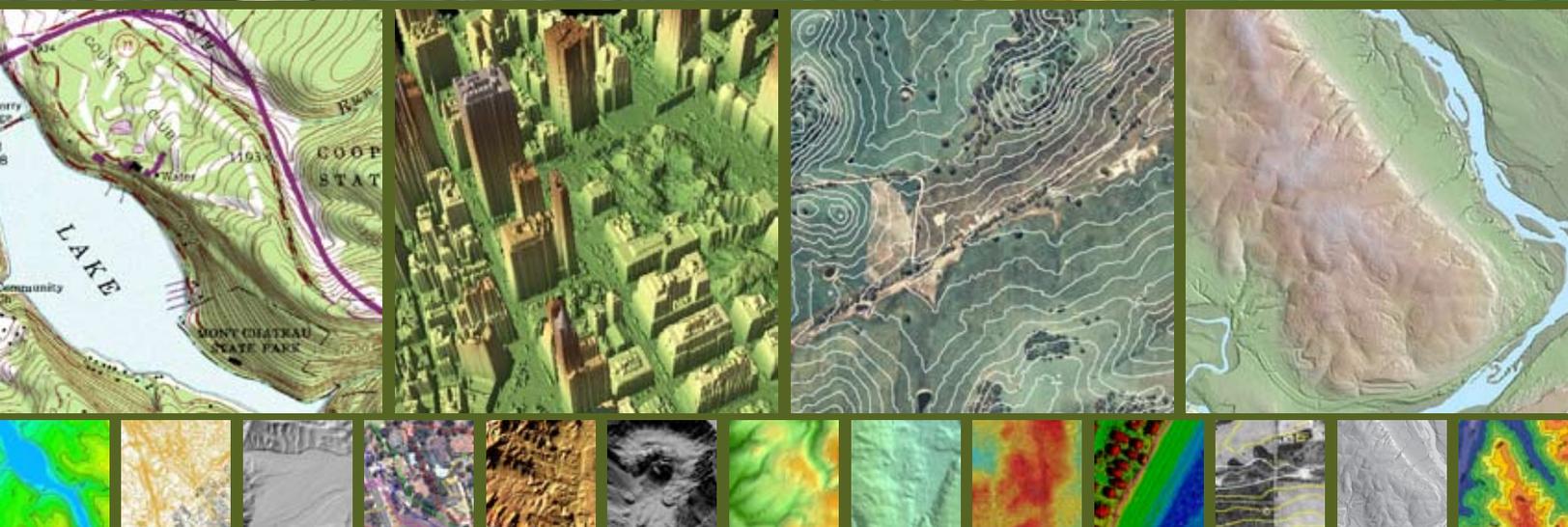
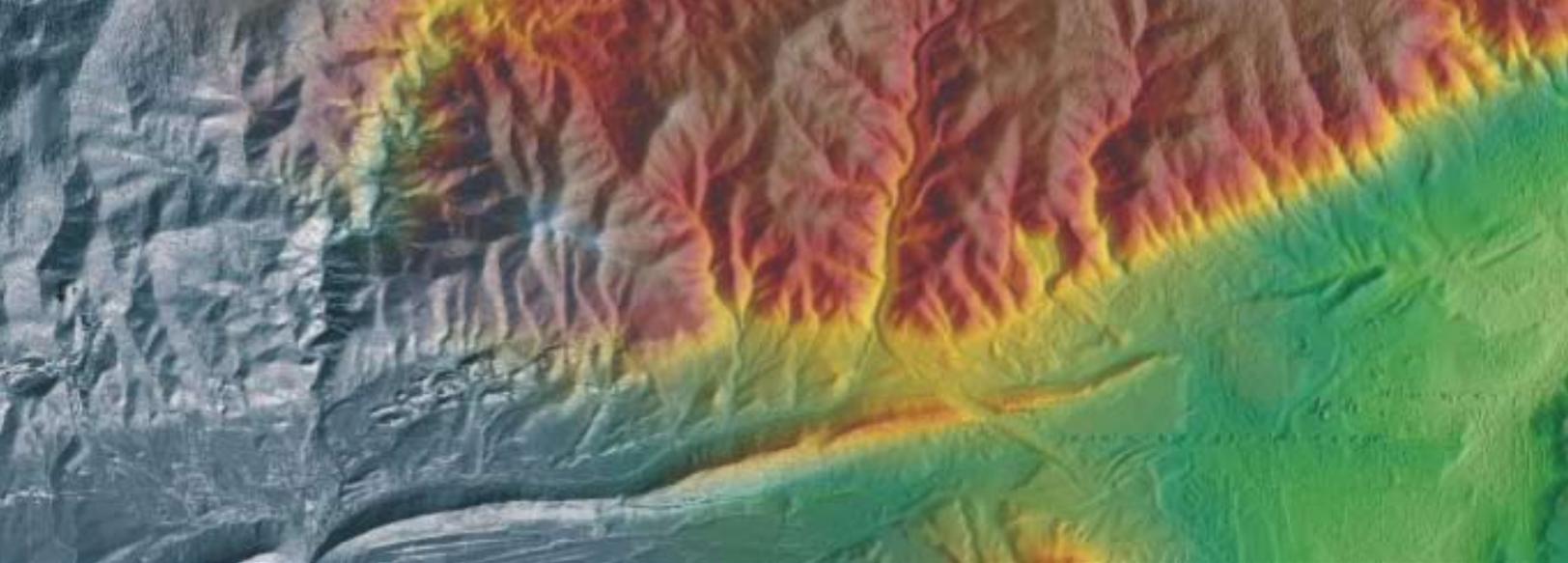
- Address Points
- Places

## Purpose & Use

St. Louis County will utilize address and place data for emergency response and all planning related activities on the parcel level. Addressing is important for emergency response and other law enforcement because it provides the actual physical location of buildings and access points (driveways, etc.) which is sometimes not the case with parcel data. Address information will also be very useful for many county departments in helping to identify multiple land or property ownership issues such as apartment buildings or other multi-unit dwellings. It will be important for property notification for various projects, programs, and statute requirements.

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# Elevation

## About

Land elevations and topography is critical to making informed land use decisions. The topography, or “lay of the land”, is an indicator of land use suitability and development potential. It also plays an important role in characterizing the effects of drainage, stormwater runoff, vegetation removal, and other environmental and man-made factors.

Elevation data takes many forms, although typically in a GIS environment, it is formatted as a raster Digital Elevation Model (DEM), Digital Terrain Model (DTM) or contour map Digital Raster Graphic (DRG.) Each of these elevation data models has different characteristics that dictates analysis potential. Another form of elevation data can include point-specific elevation readings collected by surveyors or technicians in the field.

## Types (Examples)

- Digital Raster Graphic (DRG)
- Digital Elevation Model (DEM)
- Digital Terrain Model (DTM)
- Point-Specific Elevations

Collection methods include stereoscopic aerial photo interpretation, Light Detection and Ranging (LIDAR), or field surveys and observations.

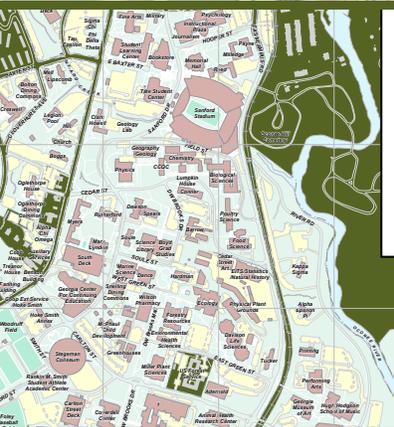
## Purpose & Use

St. Louis County uses elevation data throughout the various departments for a number of applications:

- Development and building suitability analysis
- Vegetation/forestry analysis
- Public Works road construction & maintenance
- Emergency/911 search and rescue
- Surface water drainage pattern modeling
- Wetland interpretation
- Stormwater runoff analysis
- Slope analysis
- Viewshed modeling

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# Structures

## About

Structural data, or planimetrics, is geospatial data that depicts the locations, orientation, shape, sizes and other useful information about buildings, critical infrastructure, and other non-utility manmade features. Understanding the locations and layouts of buildings helps county departments to more accurately assess property values, and make land use or resource decisions based on human construction activity on the land. Other operations, such as emergency dispatch, are greatly aided by the availability of structures (planimetrics).

## Types (Examples)

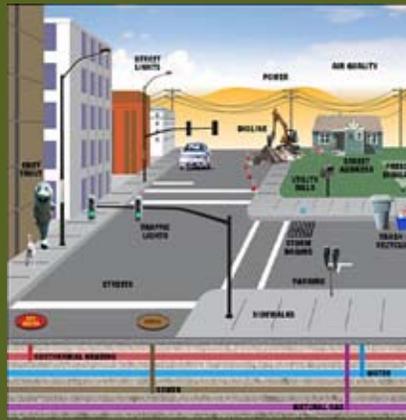
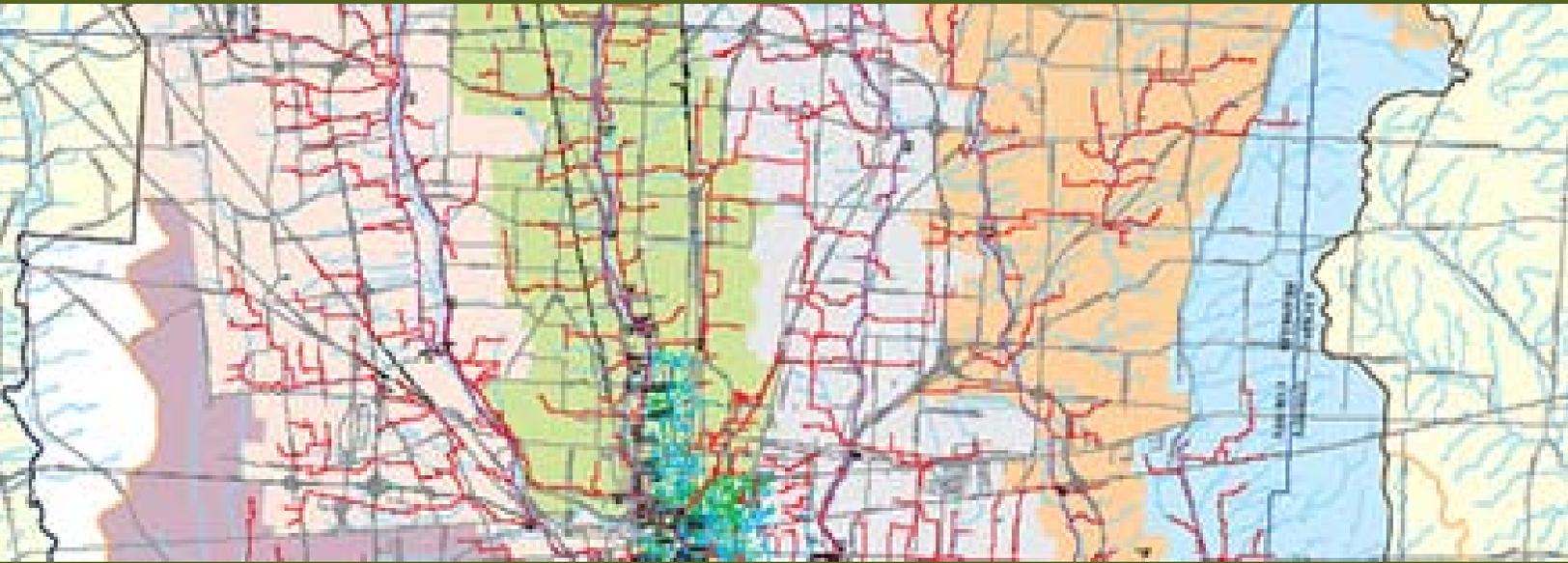
- Building Footprints
- Driveways
- Parking
- Sidewalks
- Septic Areas
- Wells

Building footprints, and other planimetric data are typically collected by interpreting shapes from aerial photography, or by field collection of building and other footprint dimensions. Occasionally, field observations are also used to make these determinations.

## Purpose & Use

Identifying the locations and sizes of buildings or other man-made structures is increasingly important for determining land values and making informed decisions pertaining to land use. The information contained in a planimetric layers attributes can include a number of characteristics about each structure. This data is useful not only for the planner or assessor, but also many other county departments that could utilize such data for land use or resource management, emergency/911 dispatch and operations, and more. Structures (Planimetrics) can be a source for identifying critical infrastructure for maintenance or emergency purposes.





# Utilities

## About

Utilities data refers to information about linear features such as electric transmission lines, gas pipelines, water lines, sewer lines; and point features such as utility poles, towers, fire hydrants, and the like. This type of information is used for modeling land use and development scenarios, 911/emergency operations and response, public works construction and maintenance, and potentially many other applications in county government. Utilities are, in a sense, a form of planimetric data, but their importance to county operations warrants a separate category within the core geospatial data categories.

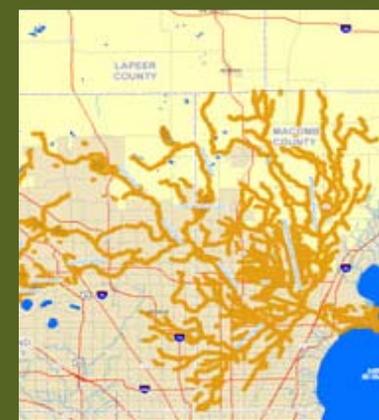
## Types (Examples)

- Electric Transmission Lines
- Gas Pipelines
- Sewer Lines
- Water Lines
- Utility Poles
- Radio Towers
- Fire Hydrants
- Manholes

## Purpose & Use

Utility data is important to county operations, particularly for planning purposes: land use decision support, future zoning, building potential and suitability, economic development initiatives, and more. Departments such as Public Works need to know utility information to properly maintain and construct roads, bridges, and other infrastructure. The Sheriff's Department and 911 may need to respond to incidents involving utilities, so having this information available in a geospatial format is critical to responding effectively and safely.





# Administrative Boundaries

## About

Boundaries refer to any line or partition that is used for separating features or limiting movement from one area to another. Sometimes boundaries are represented by real physical objects; but in many cases, boundaries are intangible, perceived lines based on legal or other descriptions. In the case of perceived boundaries, common examples include administrative or jurisdictional lines such as municipalities, counties, park districts, and other governmental units. Additionally, regulatory features such as zoning districts can be found along with the Administrative Boundary layers.

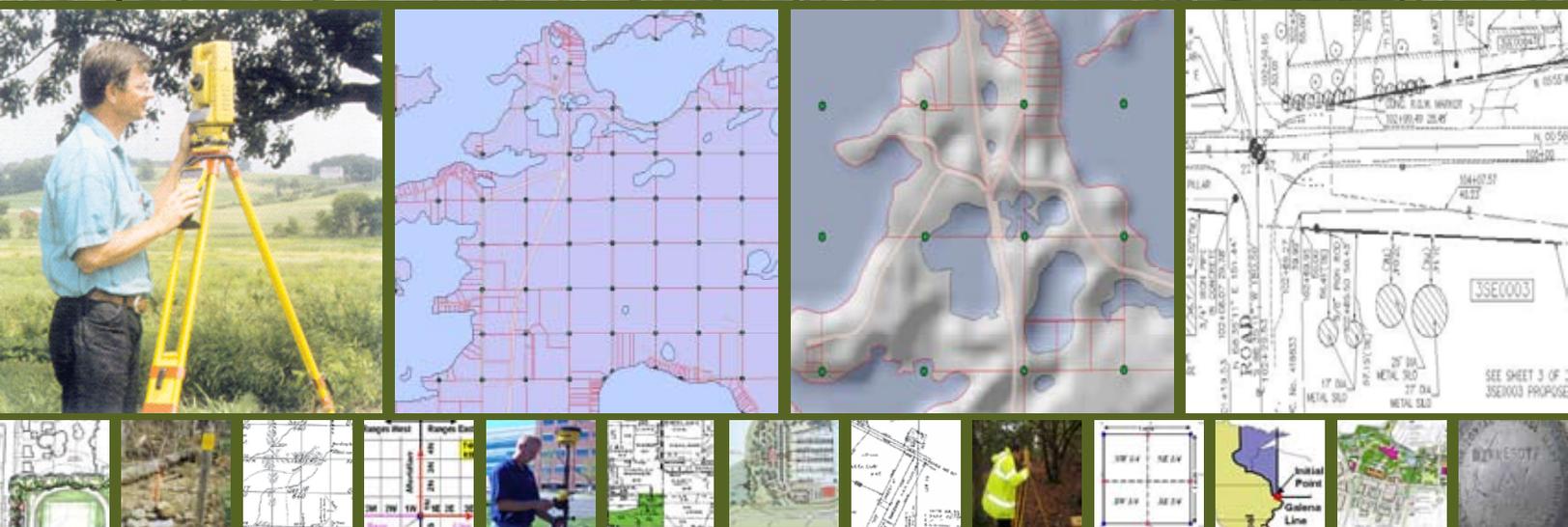
## Types (Examples)

- Administrative
- Political
- Jurisdictional
- Statistical
- Zip Code
- School

## Purpose & Use

St. Louis County needs to utilize boundary information for numerous reasons. Land use is affected by jurisdictional or physical boundaries, as are almost all other county decisions where various physical factors, governing bodies, or agencies operate within or around the county. Even statistical boundaries, such as census areas, need to be factored in many county decision making processes.





# Geodetic Control & PLSS

## About

Geodetic Control consists of a network of widely spaced precise survey markers established throughout St. Louis County. This network is part of the state wide High Accuracy Reference Network (HARN) which in turn is connected to the North American network (NAD83) and the whole world (WGS84). It is this network that allows the GIS to be developed in "Real World" coordinates so that it is geographically consistent with the rest of the world.

The building blocks for the parcel layer are contained within the Public Land Survey System (PLSS). The PLSS is the system by which surveyors have partitioned the land so it can be subdivided and described consistently. St. Louis County possesses digital files that clearly define this rectangular survey system through Township and Range lines (36 sq. mi), Section Lines (square miles or 640 acres), Quarter and Quarter-Quarter sections (160 acre and 40 acre polygons, respectively). The PLSS forms the basis for all land titles and property descriptions in Minnesota.

## Types (Examples)

- HARN
- PLS Corners
- PLS Lines
- Sections
- Quarter Lines
- Quarter-Quarter Lines

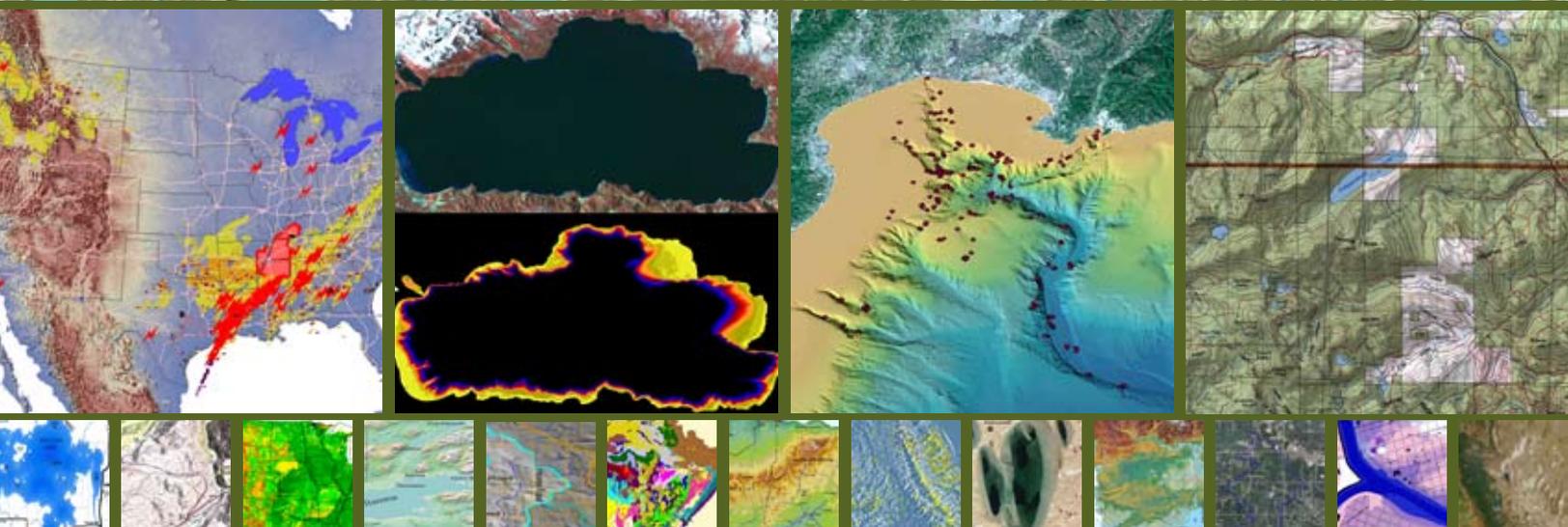
## Purpose & Use

St. Louis County possesses a series of digital data, largely produced by other organizations, that reflects the Public Land Survey. In addition to these files, the surveyors at St. Louis County are regularly updating and enhancing survey control information, such as the High Accuracy Reference Network (HARN) developed in 1996.

Modern technologies, such as satellite based surveying (GPS, etc.), allow for elements of the Public Land Survey System to be connected to the Minnesota HARN; which in turn can be used to develop and analyze land ownership information.

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Minnesota, United States





# Environmental

## About

All natural features in St. Louis County and surrounding areas will be found in the Environmental category. Important basemap features, such as lakes and rivers, soils, land cover, wetlands, and geomorphology among others. Having access to this type of information allows the county to analyze all other information types against the realities of what exists in the natural world. Natural or Environmental features play a key role in determining development patterns, recreational opportunities, and many other aspects of the way the county's citizens live and the way the county does business.

## Types (Examples)

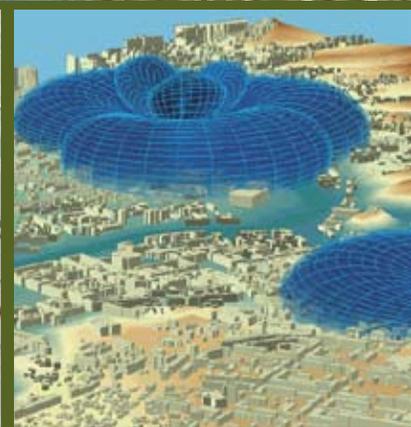
- Water (Lakes and Rivers)
- Soils
- Land Cover
- Geomorphology
- Flood Plains
- Climate Data

## Purpose & Use

Environmental data can serve a number of purposes. The most common use is as a series of basemap features that help map users understand the locations of features such as lakes, rivers, forested areas, and other important features on the surface of the earth. The county will also utilize environmental data in analysis functions that attempt to evaluate the presence of water, shorelines, slope and aspect, soil quality, and other factors.

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# Emergency Operations

## About

Data related to Emergency Operations which may include incidents, hazards, shelters, evacuation routes, and other sensitive or confidential information typically reserved for law enforcement or Homeland Security.

## Types (Examples)

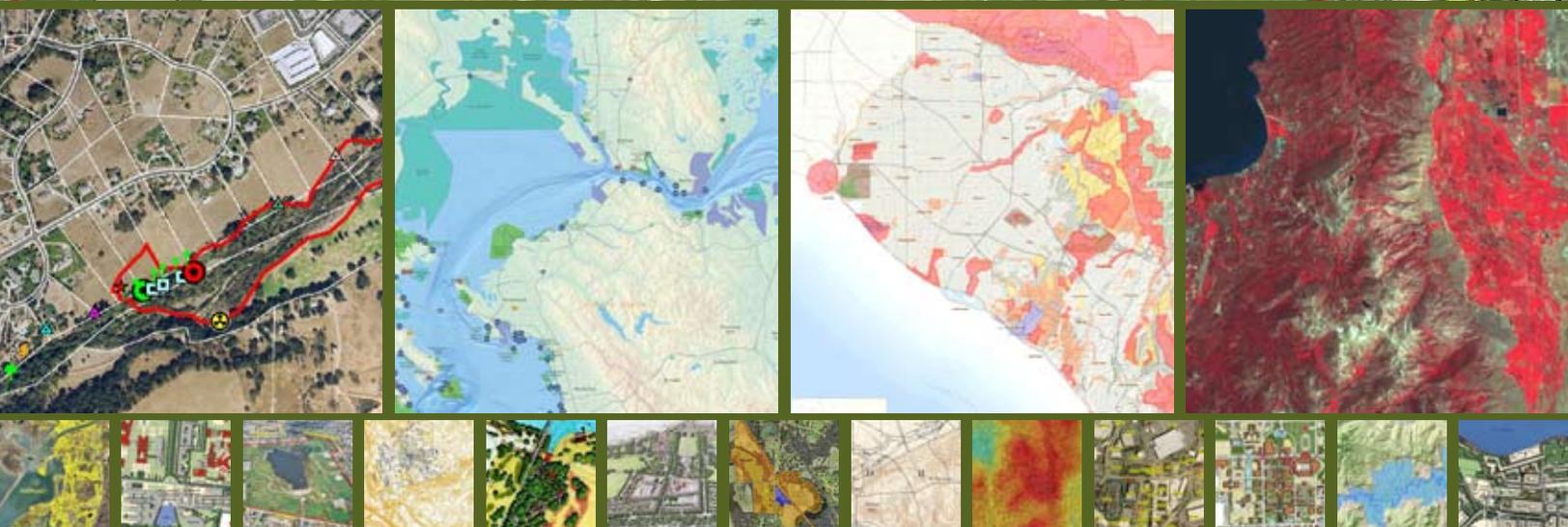
- Police Districts
- Ambulance Districts
- Fire Districts
- First Responder Districts
- Incidents
- Hazards
- Shelters
- Evacuation Routes
- Road Closures
- Containment Areas
- Disaster Recovery
- Mitigation

## Purpose & Use

Emergency response and law enforcement depend on quality data to map out and analyze situations they are presented with. GIS will play a greater role in future emergency operations. In addition to regularly used GIS data such as road centerlines, aerial photography, and infrastructure. Emergency Operations will depend on data created for specific incidents or other varied datasets created for hazard response and mitigation.

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# Department Geospatial Data

## About

Many county departments develop, utilize, and share geospatial data, but it may not necessarily be appropriate for inclusion under a core geospatial directory, but may be core needs of the department. However, these datasets may occasionally require accessibility outside departments, so it is a goal of the Enterprise GIS effort to include as much department geospatial data as possible.

## Types (Examples)

- Land: Forest Management Areas
- Land: Timber Harvest Areas
- Land: Tree Cover Type
- Land: Lease Cabins
- Planning: Feed Lots
- Planning: Developments
- Planning: FAA Towers
- Public Works: Gravel Points
- Public Works: Survey Control

## Purpose & Use

St. Louis County's GIS users will see a need in the future to integrate many different geospatial data layers, sometimes including those that aren't part of the geospatial core. It will be important for users to have an understanding of the data being utilized. Data that is often requested inter-departmentally, or from outside sources may be placed in a unique directory, categorized by department, for these often-utilized department geospatial datasets.







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