Using GIS & Pictometry in Environmental Applications

St. Louis County Planning & Community Development
Enterprise GIS
MACPZA 09/24/2015

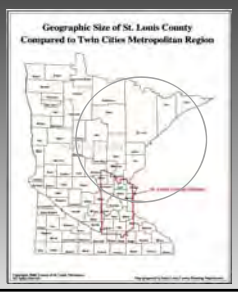
Outline of today's presentation

- An overview of St. Louis County's use of GIS and Pictometry Imagery.
- GIS Infrastructure – Enterprise GIS concept
- Breaking down silos – making GIS work across departments
- Workflows, models, geoprocessing
- Examples of Pictometry imagery in use

St. Louis County, MN

- About 6,800 square miles
  (Larger than DC, Rhode Island, Delaware, and Connecticut)
- Over 1,000 lakes
- 2010 Pop. = 200, 319
- Jurisdictions: 125
  Cities: 25
  Townships: 72
  Unorganized Townships: 28
- Urban & Rural
- Seasonal & Non-Seasonal
- Mining & Mineral Exploration

St. Louis County, MN



GIS: Modernizing Land Records Management

GIS Capabilities at St. Louis County

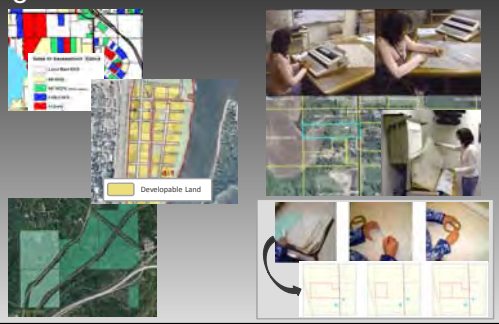
- Significant investments in geospatial technologies and personnel:
- 11 GIS Professionals, 160+ ArcGIS Users including several "advanced editors", 300+ Web Service Users
- Enterprise GIS office in Planning Dept. includes a GIS Manager, GIS Planner, 2 GIS Principals, 2 GIS Specialists.
- Auditor's manages cadastral/parcel mapping – 1 GIS Principal
- Land & Minerals – 2 GIS Specialists
- Public Works – 1 GIS Specialist
- 911/Sheriff – 1 GIS Specialist
- GIS positions being considered for Assessor & Environmental Services
- Career ladder for GIS professionals – Technician, Specialist, Principal
- Pictometry Imagery customer
- ESRI Enterprise License Agreement
- Public-facing GIS content at www.stlouiscountymn.gov/explorer
- www.stlouiscountymn.gov/maps

GIS Under the Hood

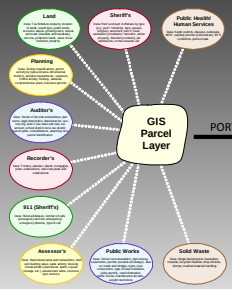
Why GIS

1. **Better Decisions: More Informed and Quicker**
   A tool to query, analyze, locate, spot conditions, portray trends, identify patterns, and model scenarios
2. **Improved Productivity and Efficiency**
   Streamlined many common tasks. One department can benefit from another. Data collected once/used many times
3. **Improved Data Management**
   Information is better managed and formatted to be user-friendly.
4. **Improved Access to Information**
   More comprehensive information and quicker to residents, businesses, and other gov't agencies.
5. **Improved Management and Facilitation of Collaborative Projects**
   Expanded opportunities for improved planning, analysis, and decision support for economic development or other multi-agency efforts.
6. **Additional Benefits**
   - Reduced data costs
   - Improved data quality and standards
   - Minimized data conflicts
   - Improved participant operations
   - Leveraged technology investments
   - Reduced project costs

Using GIS in Land Records



GIS: Modernizing Land Records Management

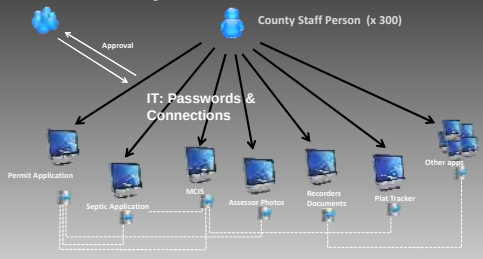


- **Traditionally, data was in "silos" meant only for each department to access individually.**
- **Working with multiple databases presented many challenges.**
- **Parcel data allows for a common linkage between departments' data.**

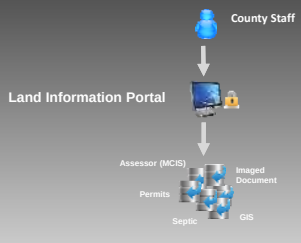
BIG Concept #1
Data Organization/Standardization

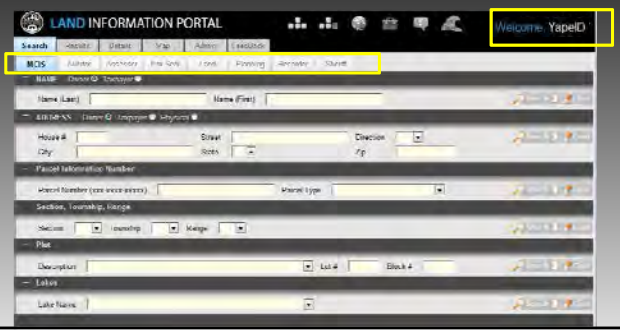
BIG Concept #2
Access & Security

Pre-Portal



BIG Concept #2
Access & Security





DETAILS Tab
Department-specific results (limited access)
Property Reports & Linked Documents

BIG Concept #3
Enterprise Tools

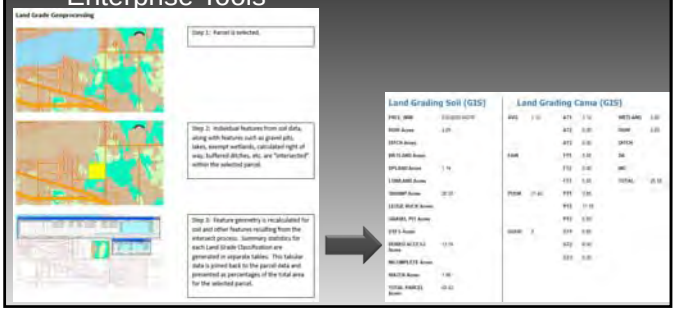
Example: public notification process

Hours & Days
X
1000s times per year

Minutes
X
1000s times per year

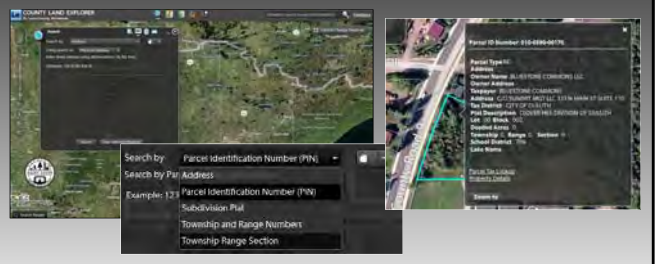
BIG Concept #3
Enterprise Tools

Example: Assessor's Land Grading (multi-layer geoprocessing



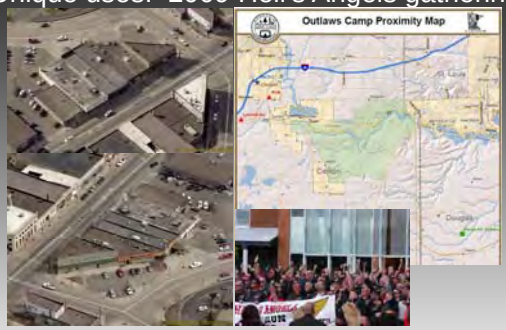
BIG Concept # 4: Public access to data and tools

County Land Explorer: www.stlouiscountymn.gov/explorer
Maps and Apps: www.stlouiscountymn.gov/maps



Pictometry Imagery: More than pretty pictures

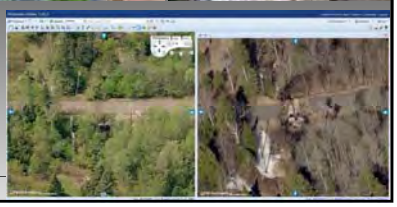
Unique uses: 2009 Hell's Angels gathering



2012 Flood

Pictometry Online: Access to historical oblique imagery, great for damage assessment

Pictometry offers an Emergency Assistance Program (EAP) with their contracts – free or reduced cost flights if your disaster qualifies.

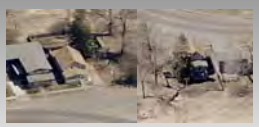


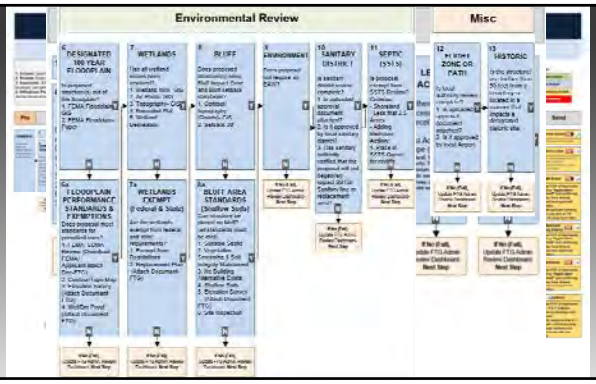
Transition Slide

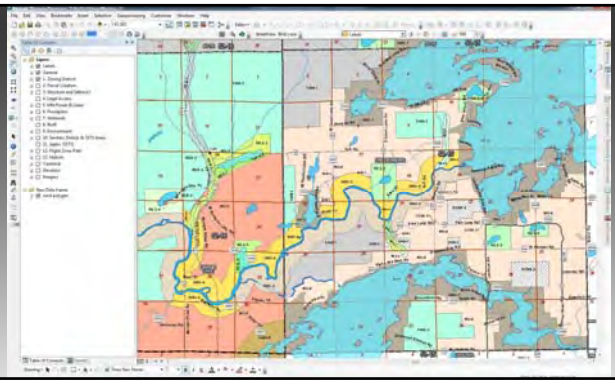
- Permit Review Workflow & .mxd project

- Zoning Ordinance & Geoprocessing Models

- Pictometry & Vacation Rentals







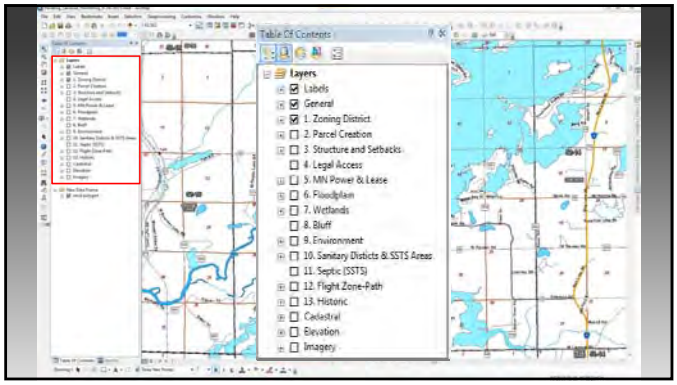
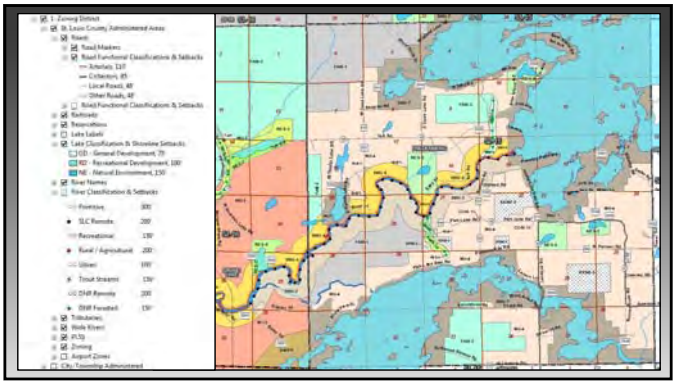
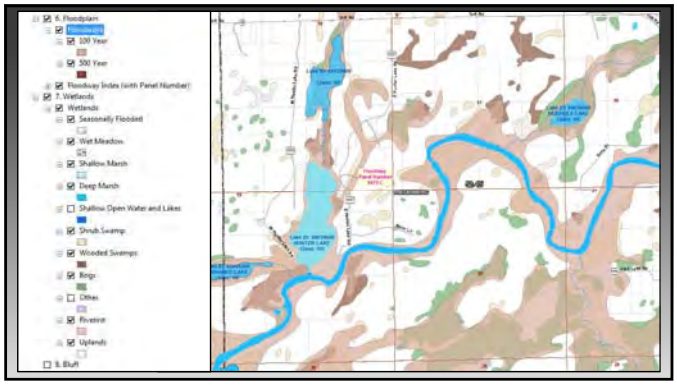
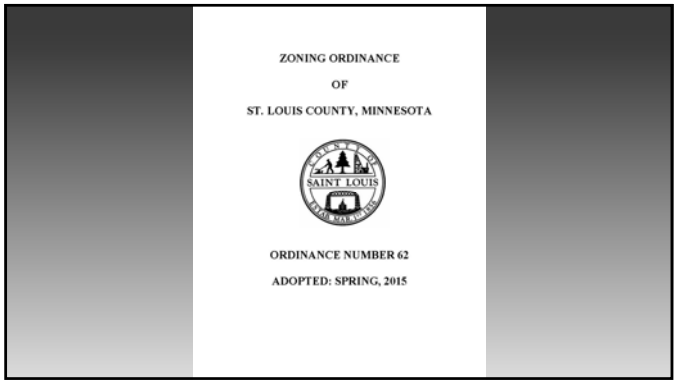


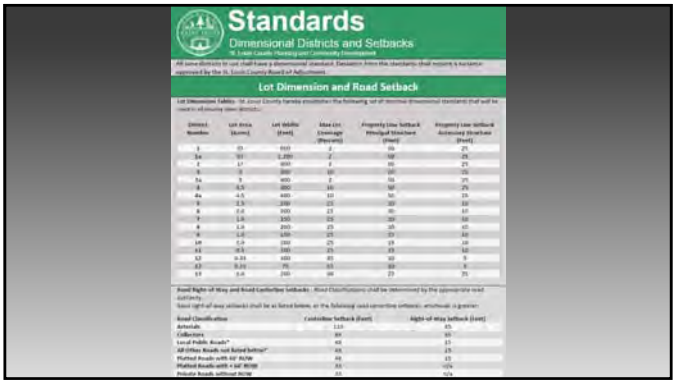
Table Of Contents
Layers
Labels
General
1. Zoning District
2. Parcel Creation
3. Structure and Setbacks
4. Legal Access
5. MN Power & Lease
6. Floodplain
7. Wetlands
8. Bluff
9. Environment
10. Sanitary Districts & SSTS Areas
11. Septic (SSTS)
12. Flight Zone-Path
13. Historic
Cadastral
Elevation
Imagery

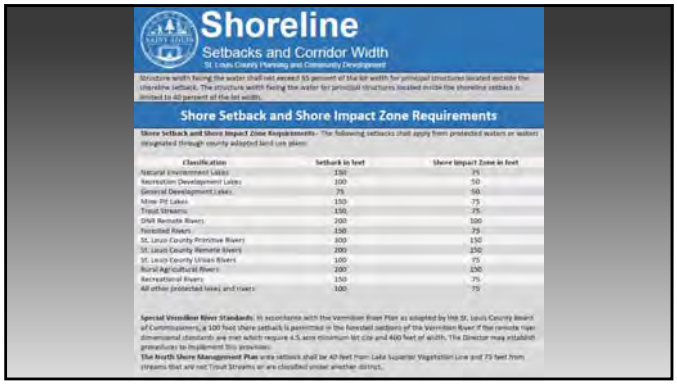



6. Floodplain
100 Year
500 Year
7. Wetlands
Wetlands
Seasonally Flooded
Wet Meadow
Shallow Marsh
Deep Marsh
Shallow Open Water and Lakes
Shrub Swamp
Wooded Swamps
Bogs
Other
Riverine
Uplands
8. Bluff

Elevation
LIDAR Contours 2 foot
Contours 10 foot
LIDAR Buildings
LIDAR Hydrography Breaklines
LIDAR Hillshade 1 Meter
LIDAR Hillshade 3 Meter
LIDAR DEM 1 Meter
LIDAR DEM 3 Meter
Imagery
Air Photo 2013 Pictometry
Air Photo 2010
Air Photo 2009
Air Photo 2009 - Color Infrared
Air Photo 2009 30CM NORTH
Air Photo 2009 30CM SOUTH
Air Photo 2008
Air Photo 2006
Air Photo 2005
Air Photo 2004
Air Photo 2003
Air Photo 1991
Air Photo 1939
Protected Waters Inventory
USGS TOPO 24K


ZONING ORDINANCE
OF
ST. LOUIS COUNTY, MINNESOTA
SAINT LOUIS
ORDINANCE NUMBER 62
ADOPTED: SPRING, 2015


Standards
Dimensional Districts and Setbacks
Lot Dimension and Road Setback



Shoreline

Setbacks and Corridor Width

St. Louis County Planning and Community Development

Structure width facing the water shall not exceed 55 percent of the lot width for principal structures located outside the shoreline setback. The structure width facing the water for principal structures located inside the shoreline setback is limited to 40 percent of the lot width.

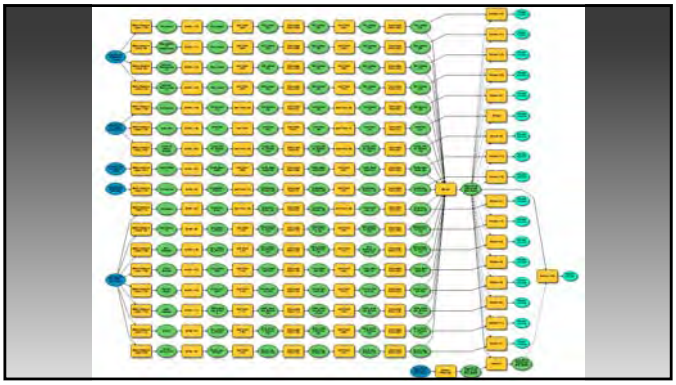
Shore Setback and Shore Impact Zone Requirements

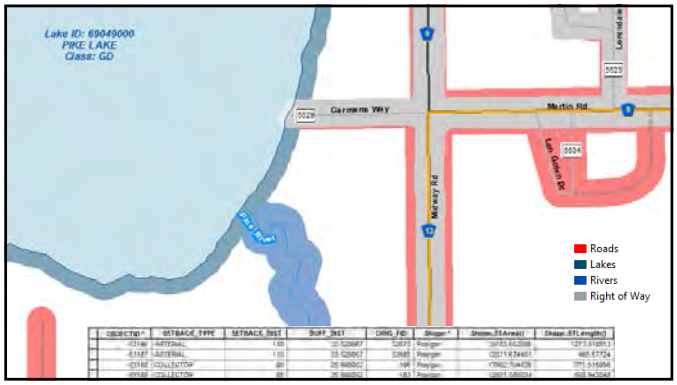
Shore Setback and Shore Impact Zone Requirements- The following setbacks shall apply from protected waters or waters designated through county adopted land use plans:

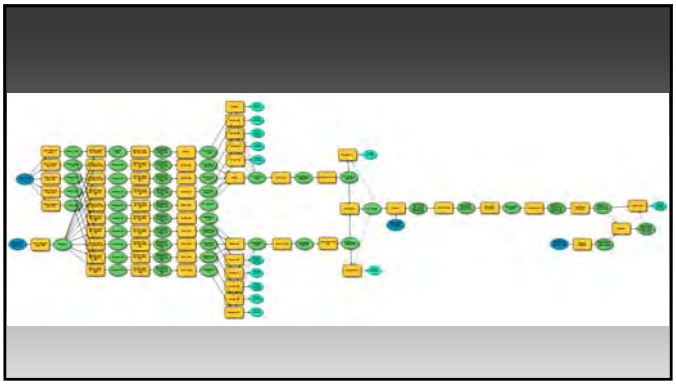
Classification	Setback in feet	Shore Impact Zone in feet
Natural Environment Lakes	150	75
Recreation Development Lakes	100	50
General Development Lakes	75	50
Mine Pit Lakes	150	75
Trout Streams	150	75
DNR Remote Rivers	200	100
Forested Rivers	150	75
St. Louis County Primitive Rivers	300	150
St. Louis County Remote Rivers	200	150
St. Louis County Urban Rivers	100	75
Rural Agricultural Rivers	200	150
Recreational Rivers	150	75
All other protected lakes and rivers	100	75

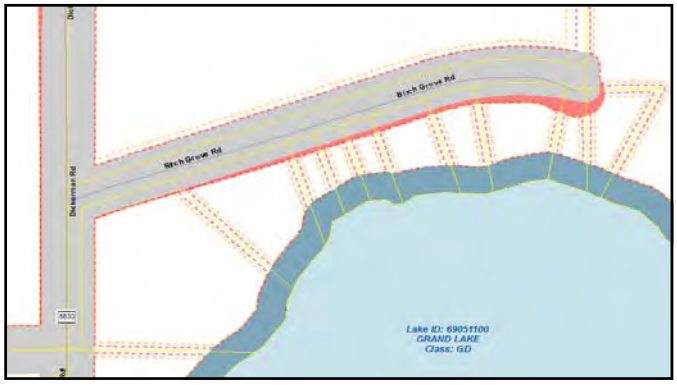
Special Vermilion River Standards: In accordance with the Vermilion River Plan as adopted by the St. Louis County Board of Commissioners, a 100 foot shore setback is permitted in the forested sections of the Vermilion River if the remote river dimensional standards are met which require 4.5 acre minimum lot size and 400 feet of width. The Director may establish procedures to implement this provision.

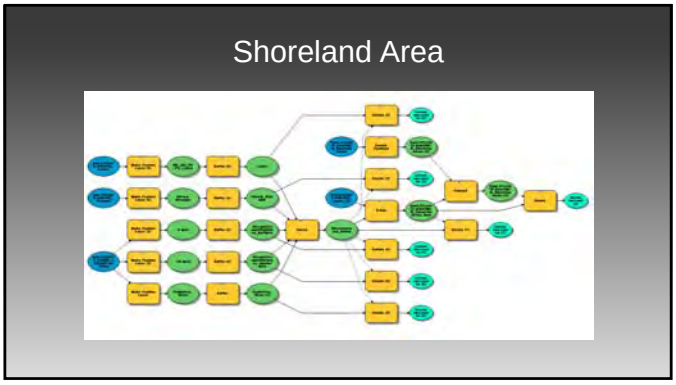
The North Shore Management Plan area setback shall be 40 feet from Lake Superior Vegetation Line and 75 feet from streams that are not Trout Streams or are classified under another district.



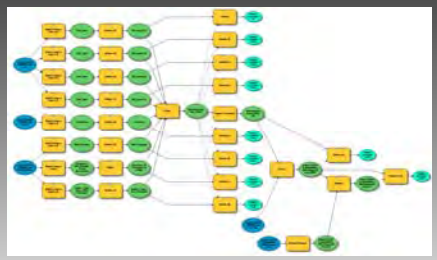


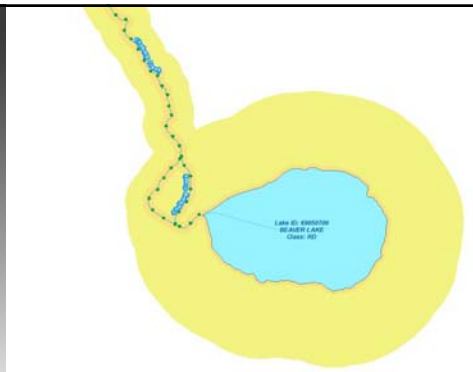




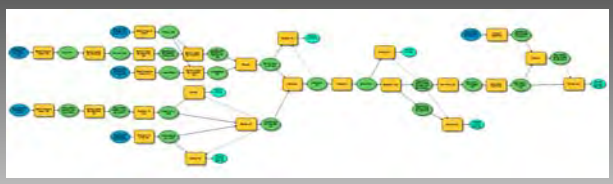


Shore Impact Zone

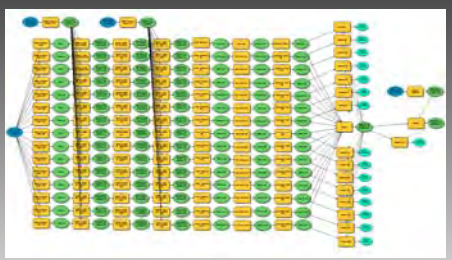




Shoreline Frontage



Non-Conforming Parcels



Geoprocessing Outputs

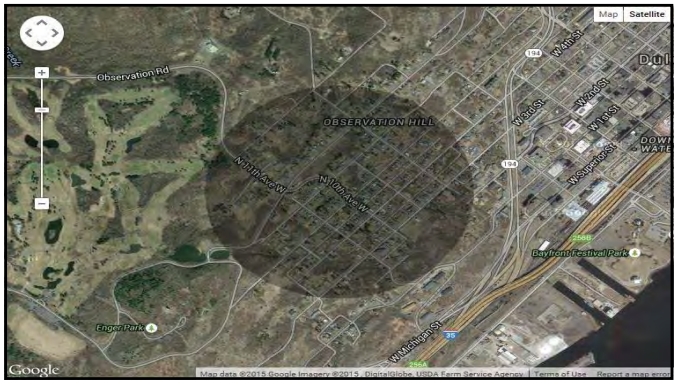
- Setbacks
- Buildable Area
- Shoreland Area
- Shore Impact Zone
- Shoreline Frontage
- Non-Conforming Parcels

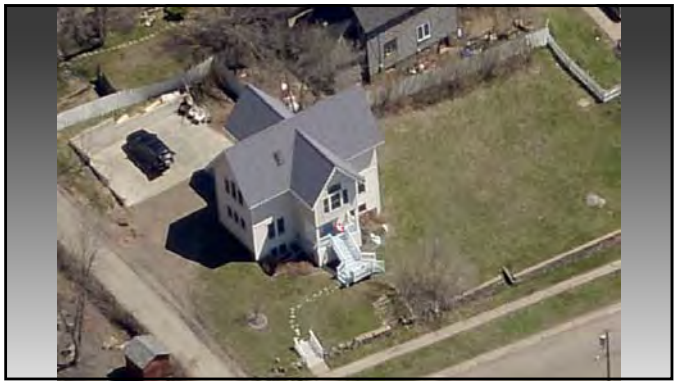
Coming Soon

- Shoreland Bluffs
  - Known issues – computer memory limitations; clip DEM into smaller sections less than 500 MB in size.
- CLOD (Closed Landfill Overlay District)

Welcome home! Enjoy your vacation in our beautiful home on Wynne Lake!!!

Location
Map
Satellite
Google


Map
Satellite
Observation Rd
OBSERVATION HILL
N 11th Ave W
W 4th St
W 3rd St
W 2nd St
W 1st St
W Superior St
Bayfront Festival Park
Enger Park
W Michigan St
Google



QUESTIONS?

David Yapel
GIS Manager
yapeld@stlouiscountymn.gov
218-725-5017

Ryan Logan
Planner I
loganr@stlouiscountymn.gov
218-725-5014

PICTOMETRY AERIAL IMAGERY

St. Louis County Project Overview

Oblique "Bird's Eye" Aerial Photography

About: Pictometry is a unique type of aerial photography that combines traditional orthographic (from directly above) images with oblique (45 degree angle or "bird's eye") images to produce a set of imagery ideally suited for County GIS and other mapping operations. Pictometry offers a suite of software that integrates well with St. Louis County's GIS and enables users to visualize and measure distances, heights, areas, and other characteristics of buildings and landscapes from as many as 12 different angles.

Time Period and Coverage of Data Content: St. Louis County first obtained Pictometry imagery in 2007, and then in 2009, for several municipal area projects. All of St. Louis County was photographed in early May, 2013. This timeframe assured "leaf off" conditions for maximum visibility of features. Most of St. Louis County was captured at a 9-inch pixel resolution, with several areas captured at enhanced 3-inch pixel resolution. The County's Land Records Work Group has recommended funding a Pictometry imagery capture for Spring 2016 that will include enhanced 3-inch imagery in many municipalities and high-density development areas.

Oblique "Bird's Eye" View (4-Way): All locations can be viewed at a 45 degree angle from multiple directions. Pictured is Duluth aerial lift bridge (from east).

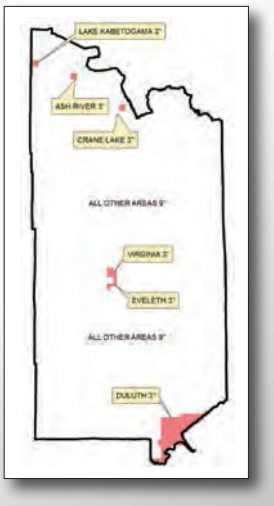
Orthographic View: Traditional "ortho" images depict all areas as seen from directly above. Pictured is Duluth aerial lift bridge from above.

Imagery Resolution

9-Inch Ortho/Oblique: 2013 imagery available throughout most areas of St. Louis County.

3-Inch Ortho/Oblique: 2013 enhanced resolution available in select areas (Duluth, Virginia, Eveleth, Crane Lake, Kabetogama Lake, and Ash River areas).

2013 Project: All of St. Louis County captured at 9-inch resolution with select (red shaded areas) municipalities and high-density lakeshore development captured at 3-inch resolution.



BENEFITS OF PICTOMETRY IMAGERY

Examples of Pictometry Analytics

MEASURE AREA & DISTANCE

MEASURE HEIGHT

MEASURE ELEVATION, GRADE

Pictometry is used by many departments at St. Louis County, in both the desktop and mobile environments. ***Assessment/ Appraisal, Planning/Land Use, Public Safety, Land/Minerals/ Forestry, Septic/Environmental, Property Management*** and other key business lines within the county benefit from the quality of decision support resources provided by Pictometry imagery.

LAND & PROPERTY

- Finding unpermitted structures, buildings that have not been assessed, or have been taken down
- Viewing appraisal subjects where access is restricted (airport, reservation, etc.) or where entry has been refused
- Reviewing parcels from the air before inspections so staff know where to devote time & attention
- Improved locational awareness -- ability of staff to see what parcel they are on when inspecting properties -- in relation to other parcels
- Verifying wall height changes on large commercial/industrial buildings
- Identifying and measuring cell towers & billboards
- Determining structure use / purpose
- Measuring lake frontage and lot sizes and setback distances
- Determining lot buildable area
- Evaluating property dimensions for septic systems and replacement areas
- Ability to view all sides of a building from different angles
- Locating trails and access routes to remote properties
- Measuring tree heights and evaluating forest health conditions
- Identifying illegal harvest sites, trails, shooting lanes, or other unpermitted activities in forested areas

PUBLIC SAFETY

- Situational awareness for communication between 911 dispatchers, callers, and responding units
- Identifying accesses/exits, escape routes, obstacles, and neighboring property details for raids or criminal apprehension
- Crime scene reconstruction and pictorial evidence for court presentations
- Search and Rescue operations and coordination
- Pre-planning for emergency response and hazard mitigation

TRANSPORTATION, ENGINEERING, DEVELOPMENT

- County facility inventory and management
- Prepare engineering designs and feasibility studies
- Calculate acreage, square footage, elevation, grade and distance
- Locate, inventory, and map utility infrastructure
- Imagery to support environmental impact statements

Illegal shooting lanes on tax forfeit lands.

Post-flood damage assessment.

Assignment and verification of addresses at remote properties.

Unpermitted private boat launch w/ evidence of runoff plume.

An armed murder suspect was apprehended in this house. Law enforcement utilized Pictometry to identify locations of doors, windows, fences and other features before entering the property.

Pictometry was used to inventory all 170+ boat accesses in just 2 days. The discovery of 457 previously undocumented trailer parking spaces, along with 5 additional boat accesses may yield up to $63,000 in future AIS funding cycles.

Revision 08-2015
Planning and Community Development Department

Permitting Workflow

Landuse Permitting by Structure

Office Review- Permit Review

GUIDING PRINCIPALS

1. Access: Land Use and SSTS see each others data.
2. Review: Every Septic and Land Use Permit gets full review.
3. Approvals: SSTS, Land Use, 911 can approve permits separately for their respective line of business, but permit gets reviewed together.
4. Withdrawn Permit: Allow Planners (Via request) to change status to withdraw permit at any time during review process. If applicant applies online, they will need to request permit to be withdrawn.

LEGEND

- Resident Action
- County Action
- FastTractGov Action
- Action Needed

Pre

GENERAL
Complete general details about property prior to reviewing.

Parcel and Property Review

1 ZONING DISTRICT

a DIMENSION STANDARD
Does parcel meet "current" Dimensional standards?
1. Width at Shore
2. Width at Building
3. Acreage

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

b USES ALLOWED
Does proposal meet use(s) allowed in zone district?
1. Ordinance 62

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

2 PARCEL CREATION
Does proposal meet subdivision requirements for Ordinance 62 and 60?

N → **2a LOT OF RECORD**
Does it meet Lot of Record Criteria (MCIS/Recorders)

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

Y → (to 3)

3 STRUCTURE

a STRUCTURE
Do structures meet "current" Dimensional standards?
1. Building Coverage
2. Lot Coverage
3. Length
4. Width
5. Height

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

b SETBACK
Do structures meet setback requirements?
1. Property Line
2. Shoreline
3. Rd Centerline
4. SSTS Setback
5. Well Setback
6. ROW Setback
7. Closed Landfill or Dump

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

4 LEGAL ACCESS
Is there legal access to parcel?

List Access Type (CRM):
Federal, State Hwy County, Town, User, minimum maintenance, public easement, cartway, platted road, private easement, water

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

5 MN POWER & LEASE
Is Minnesota Power review complete?
1. Is uploaded approval document attached?

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

Environmental Review

6 DESIGNATED 100 YEAR FLOODPLAIN
Is proposed structure(s) out of the floodplain?
1. FEMA Floodplain GIS
2. FEMA Floodplain- Paper

N → **6a FLOODPLAIN PERFORMANCE STANDARDS & EXEMPTIONS**
Does proposal meet standards for permitted uses?
1. FEMA- LOMA Review (Download FEMA/ Applicant attach Doc-FTG)
2. Contour/Topo Map
3. Elevation Survey (Attach Document-FTG)
4. Wet/Dry Proof (Attach Document-FTG)

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

Y → (to 7)

7 WETLANDS
Has all wetland issues been resolved?
1. Wetland NWI- GIS
2. Air Photo- GIS
3. Topography- GIS
4. Recorded Plat
5. Wetland Delineation

N → **7a WETLANDS EXEMPT (Federal & State)**
Are the wetlands exempt from federal and state requirements?
1. Exempt from Regulations
2. Replacement Plan (Attach Document-FTG)

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

Y → (to 8)

8 BLUFF
Does proposed structure(s) meet Bluff Impact Zone and Bluff setback standards?
1. Contour/ topography (Quads)- GIS
2. Setback 30'

N → **8a BLUFF AREA STANDARDS (Shallow Soils)**
Can structure be placed on bluff? (all standards must be met)
1. Suitable Septic
2. Vegetation Screening & Soil Integrity Maintained
3. No Building Alternative Exists
4. Shallow Soils
5. Elevation Survey (Attach Document-FTG)
6. Site Inspection

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

Y → (to 9)

9 ENVIRONMENT
Does proposal not require an EAW?

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

Y → (to 10)

10 SANITARY DISTRICT
Is sanitary district review complete?
1. Is uploaded approval document attached?
2. Is it approved by local sanitary district?
3. Has sanitary authority verified that the proposal will not negatively impact SSTS/ Sanitary line or replacement area?

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

Y → (to 11)

11 SEPTIC (SSTS)
Is proposal exempt from SSTS Review?
Criteria:
- Shoreland
- Less that 2.5 Acres
- Adding Bedroom

Action:
1. Place in SSTS Queue for review.

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

Y → (to 12)

12 FLIGHT ZONE OR PATH
Is local authority review complete?
1. Is uploaded approval document attached?
2. Is it approved by local Airport.

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

Y → (to 13)

13 HISTORIC
Is the structure/ use further than 50 feet from a cemetery or located in a manner that impacts a designated historic site.

N → **If No (Fail),** Update FTG Admin. Review Dashboard- **Next Step**

Y → (to 14)

Misc

14 Variance Workflow
Conduct additional variance workflow if variance request.

Y → (to 15)

Variance

15 CUP Workflow
Conduct additional CUP workflow for conditional use permits.

Y → (to 17)

CUP

Interim Use

16 Interim Use Workflow
Conduct additional Interim Use workflow for interim use permits.

Y → (to 17)

Preview

17 PREVIEW
Is Letter ok to send?

Review letter and application prior to sending to applicant?

1. PDF Letter Review

N → **13a UPDATE NOTES**
Preview letter and update database until desired result. Is it correct?

Y → (to Send)

Send

17. Permit Issued PDF
1. Permit issued on template

17a. Sorry Letter PDF
1. Letter send stating the more information needed.
2. Stacks all information from review into letter.

17b. MN Power PDF
1. Email PDF of Application indicating **"Application Approved"** and confirming that they have already reviewed and approved application.
2. Email applicant advising them it was sent to MP. Copy will come from them

17c. Municipal Sanitary District PDF
1. Email PDF of Application indicating **"Application Approved"** and confirming that they have already reviewed and approved application.

17d. Wetlands PDF
1. Email PDF of Application indicating **"Application Approved"** and confirming that they have already reviewed and approved application.

PDF Address
1. Email PDF of Application to 911, if 911 address needed via checkbox and approved.
2. Notify Applicant that 911 has been notified and they will assign address and communicate with you directly.

Up to 5 Business Days, 95% of Time

Key Performance Indicators

1. Objective: Improve and streamline the building permit application process
KPI: Percent of permit applications, not requiring review by agencies, processed within five business days. Target = 95%

2. Objective: Improve and streamline the BOA and PC building permit application process
KPI: Percent of permit applications submitted for Planning Commission or Board of Adjustment review that require only one hearing for a decision.
Target = 90%