Comprehensive GIS Digital Tax Parcel Data Correction

MAKING THE CASE FOR ACCURATE GIS TAX PARCEL DATA: PUBLIC OFFICIALS GET ON BOARD FOR A PARCEL CORRECTION PILOT PROJECT.

COUNTYWIDE ANALYSIS &
PILOT-PROJECT OVERVIEW.

Introduction

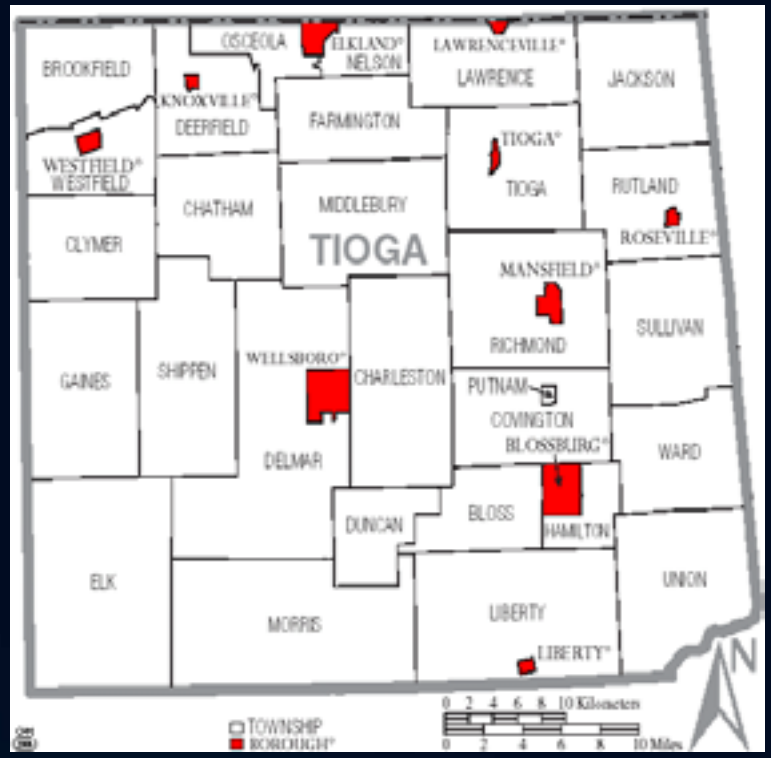
- GIS Parcel Layer Problems.
- Tax Sale Postings.
- In-House QC Review.
- Proposed Comprehensive Solution.

Presentation Outline Overview

I. Brief History of GIS Data Development
II. Quality Control Issues with GIS Data
III. Countywide Parcels: QC Analysis
IV. Pilot Project Area: Overview & Analysis
V. Scope of Work / Project Feasibility
VI. Discussion and Conclusion

Tioga County, Pennsylvania

- **General Information about Tioga County, Pa.**



Tioga County, Pennsylvania

- **General Information about Tioga County, Pa.**

Boroughs

Blossburg
Elkland
Knoxville
Lawrenceville
Liberty
Mansfield
Roseville
Tioga
Wellsboro
Westfield

Townships

Liberty Township
Middlebury Township
Morris Township
Nelson Township
Osceola Township
Putnam Township
Richmond Township
Rutland Township
Shippen Township
Sullivan Township
Tioga Township
Union Township
Ward Township
Westfield Township
Bloss Township
Brookfield Township
Charleston Township
Chatham Township
Clymer Township
Covington Township
Deerfield Township
Delmar Township
Duncan Township
Elk Township
Farmington Township
Gaines Township
Hamilton Township
Jackson Township
Lawrence Township

Tioga County, Pennsylvania

- **General Information about Tioga County, Pa. (US Census)**

Population: 41,981.

15,925 households.

11,195 families residing in the county.

Population Density, 36 people per square mile.

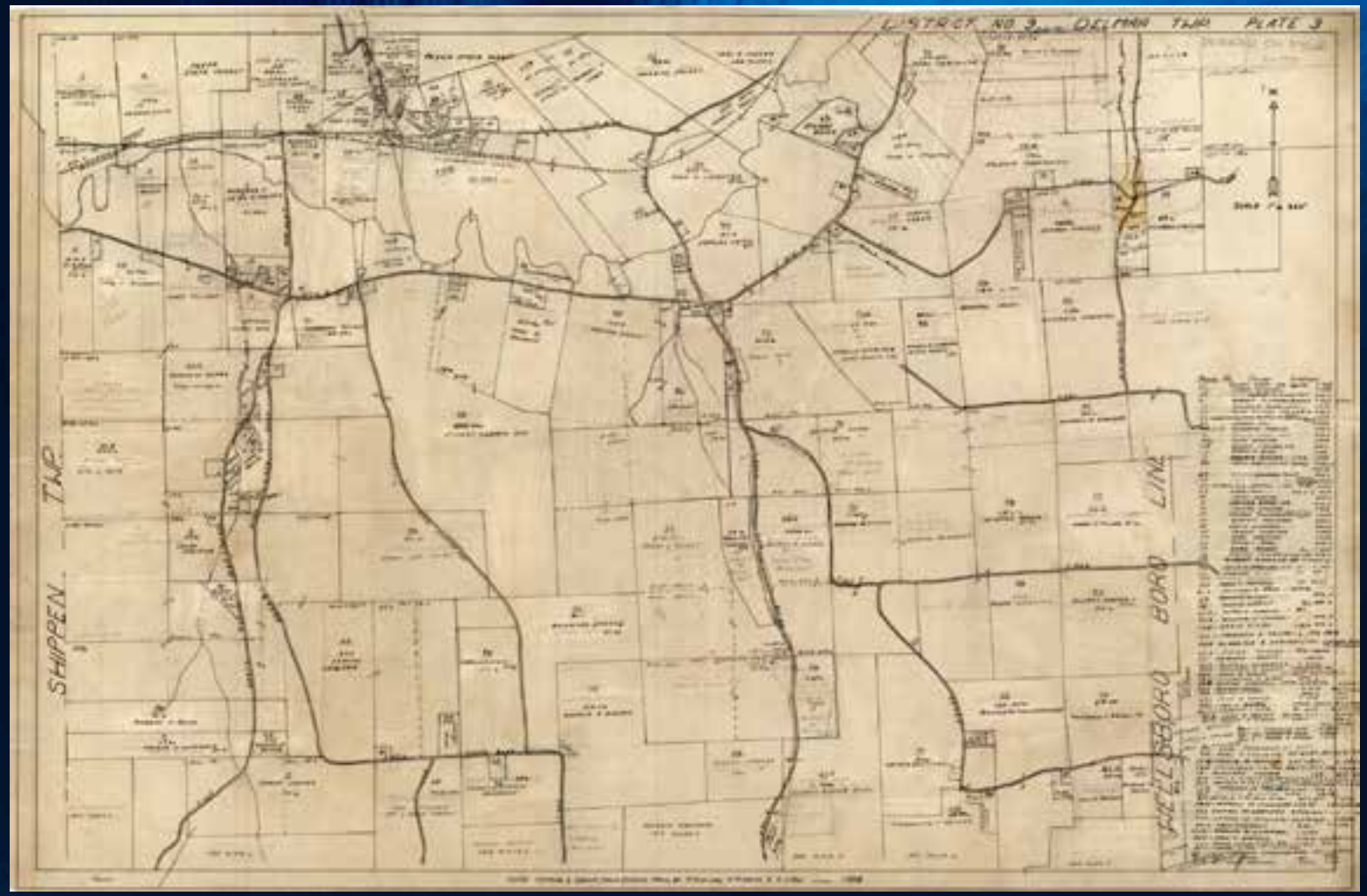
19,893 housing units.

GIS Development History

SECTION 1

I. GIS Development History

- **Original tax assessment mylars (1950s-60s)**



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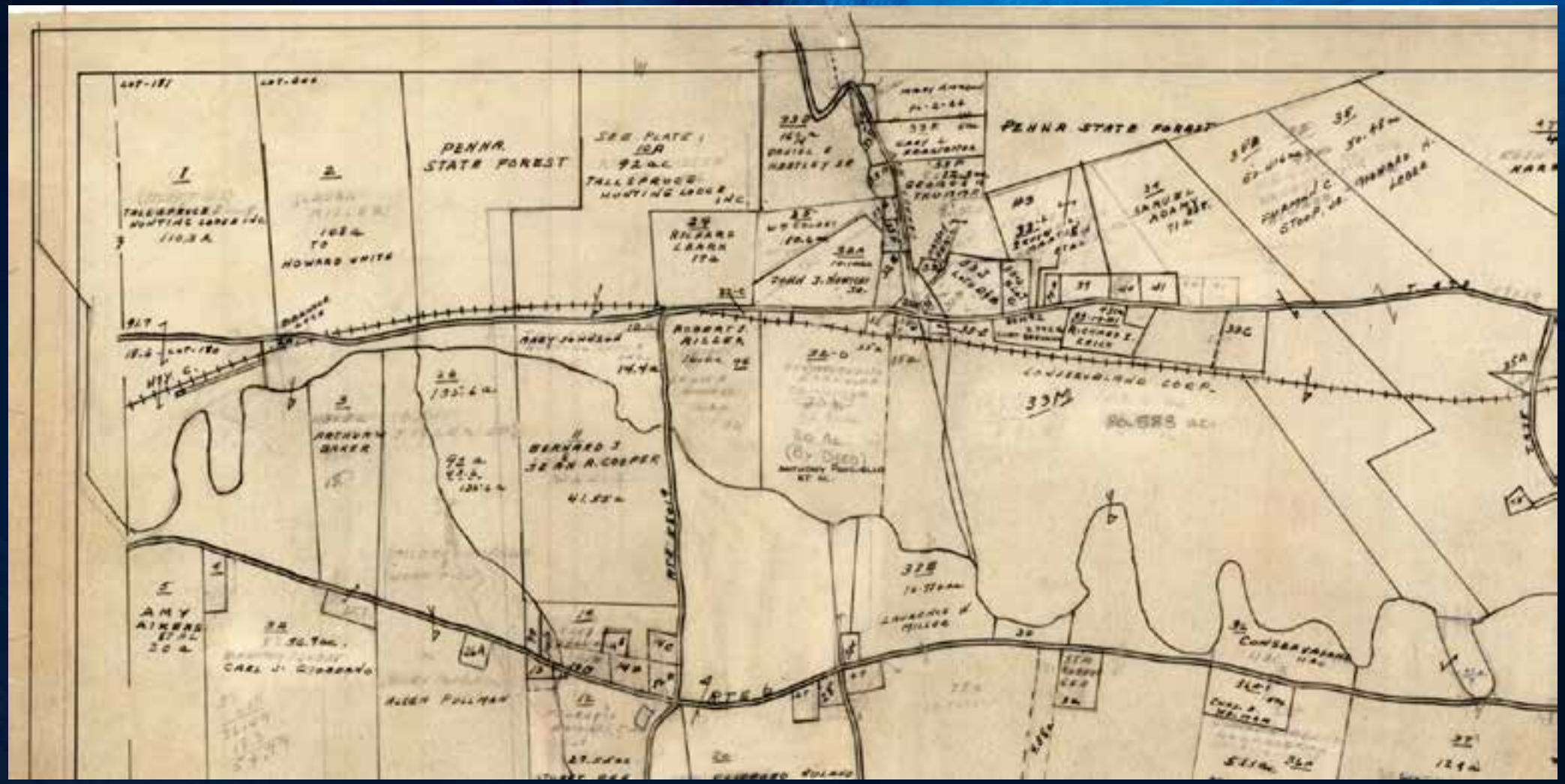
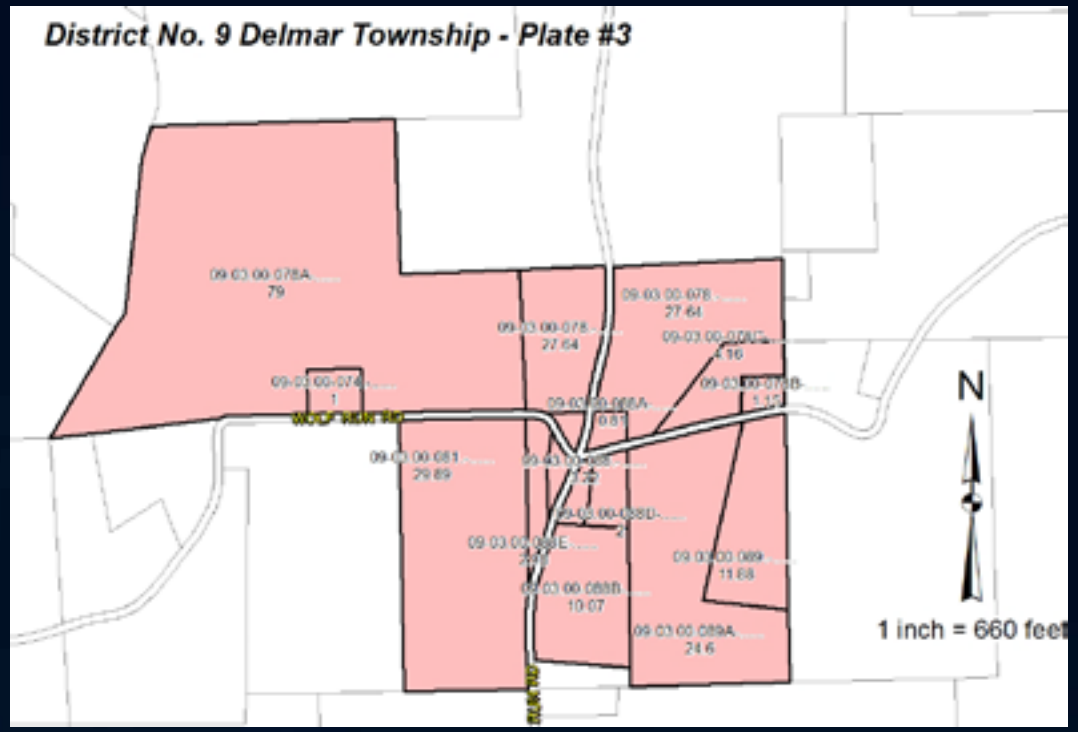


I. GIS Development History

- **Early 2000s tax parcel hard-copy maps were converted to digital format via tax plate maps, subdivision maps, etc.**



I. GIS Development History

- **GIS formats utilized to satisfy State Statute requirements per Title 53 § 8834 "Assessment Records System."**

§ 8834. Assessment records system.

It shall be the duty of the county assessment office to maintain a permanent records system consisting of:

(1) Tax maps of the entire county drawn to scale or aerial maps, which maps shall indicate all property and lot lines, set forth dimensions or areas and identify the respective parcels or lots by a number system.

(2) Property record cards identifying the property location on the tax maps and any uniform parcel identifier which may have been assigned, and acreage or dimensions, description of improvements, if any, the owner's name and mailing address and date of acquisition, the purchase price, if any, set forth in the deed of acquisition and the assessed valuation.

(3) Property owner's index consisting of an alphabetical listing of all property owners, cross-indexed with the property record cards or electronic or computerized method of searching for property owners by name.

Cross References. Section 8834 is referred to in section 8851 of this title.

I. GIS Development History

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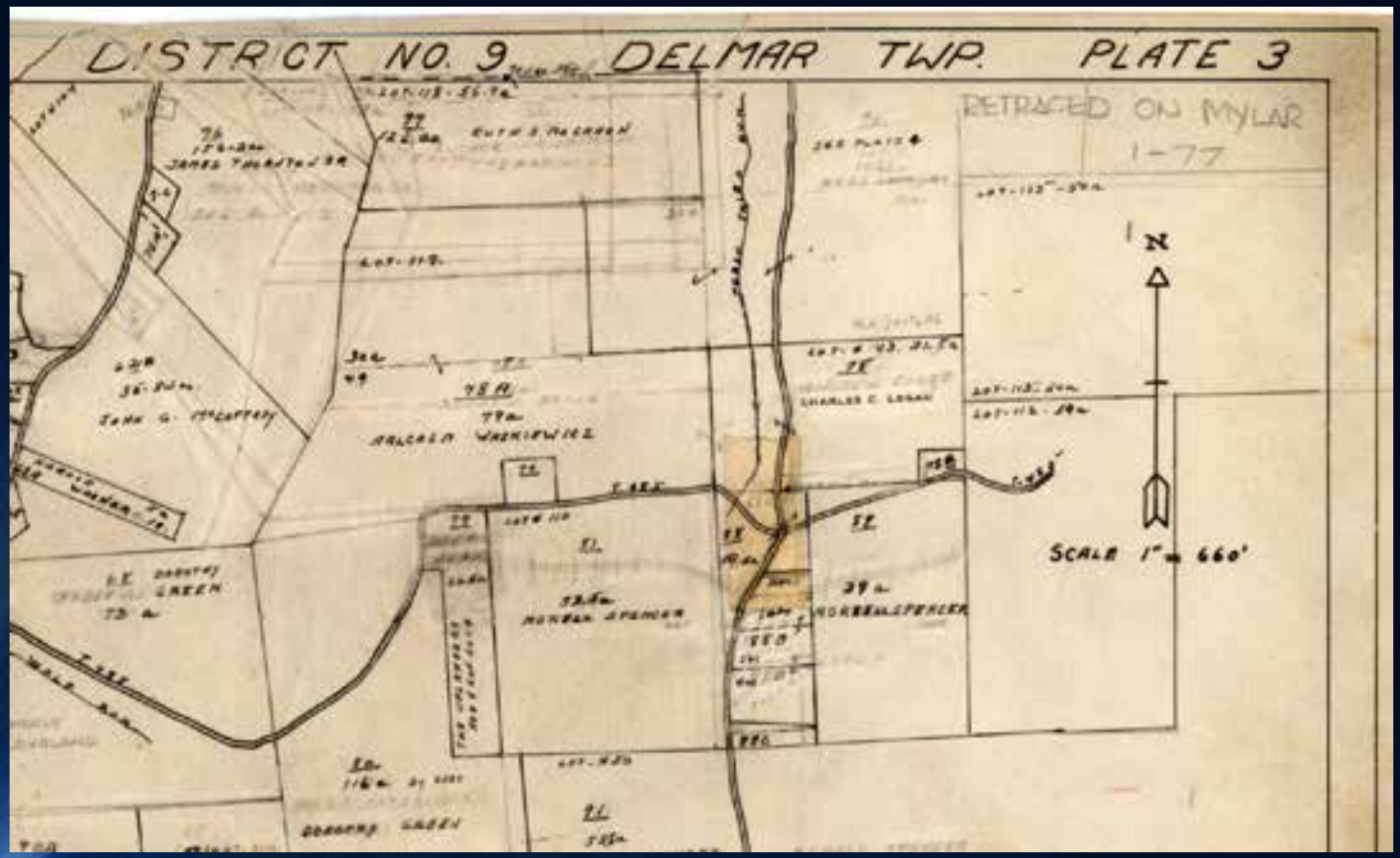
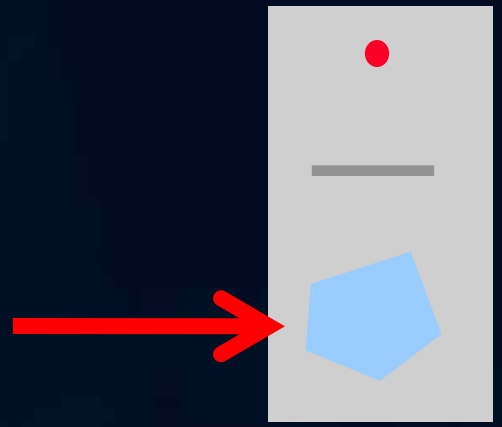


I. GIS Development History

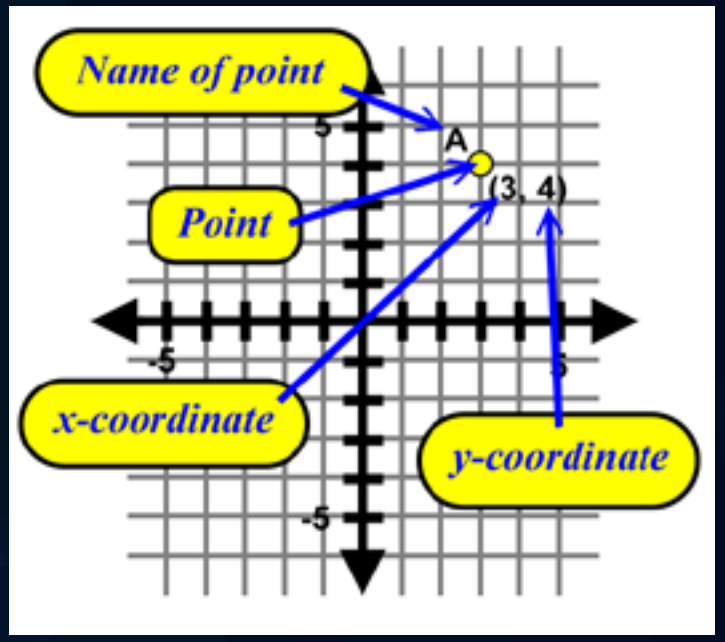
- **Vector data was created via heads-up digitizing techniques, e.g. edge matching existing sheets.**



Shape	Grantee	Owner City	Deeded Acres	State
Polygon	Stock, Denise	Wellsboro	12.36	PA
Polygon	Spencer, James	Wellsboro	7.25	PA
Polygon	Logan, Charles	Wellsboro	10.77	PA

I. GIS Development History

- **Coordinate geometry and geodetic digital data referencing not available with early GIS toolsets.**



I. GIS Development History

- **Other data sets created for system use:**
  - Road Centerlines
  - Structure Location Points (911 Addressing)
  - Municipality Boundaries
  - Zip Codes
  - Emergency Service Zones
  - Hydrology
  - Contour Intervals (Topography)
  - Soil Zones & Types
  - Building Footprints (Dimensions)

I. GIS Development History

- **System Use:**
  - County's GIS repository: Enterprise Geodatabase.
  - Managed with ArcSDE, Microsoft SQL Server & other licenses.
  - Staff competency & survey grade work.

Quality Control

SECTION 2

II. Quality Control

- **“Ground-to-Grid” coordinate system correction of vector data.**
  - NAD 1983 State Plane Pennsylvania North FIPS
  - Grid correction of +/- 7 degrees
  - ArcGIS Desktop correction capability – COGO tools

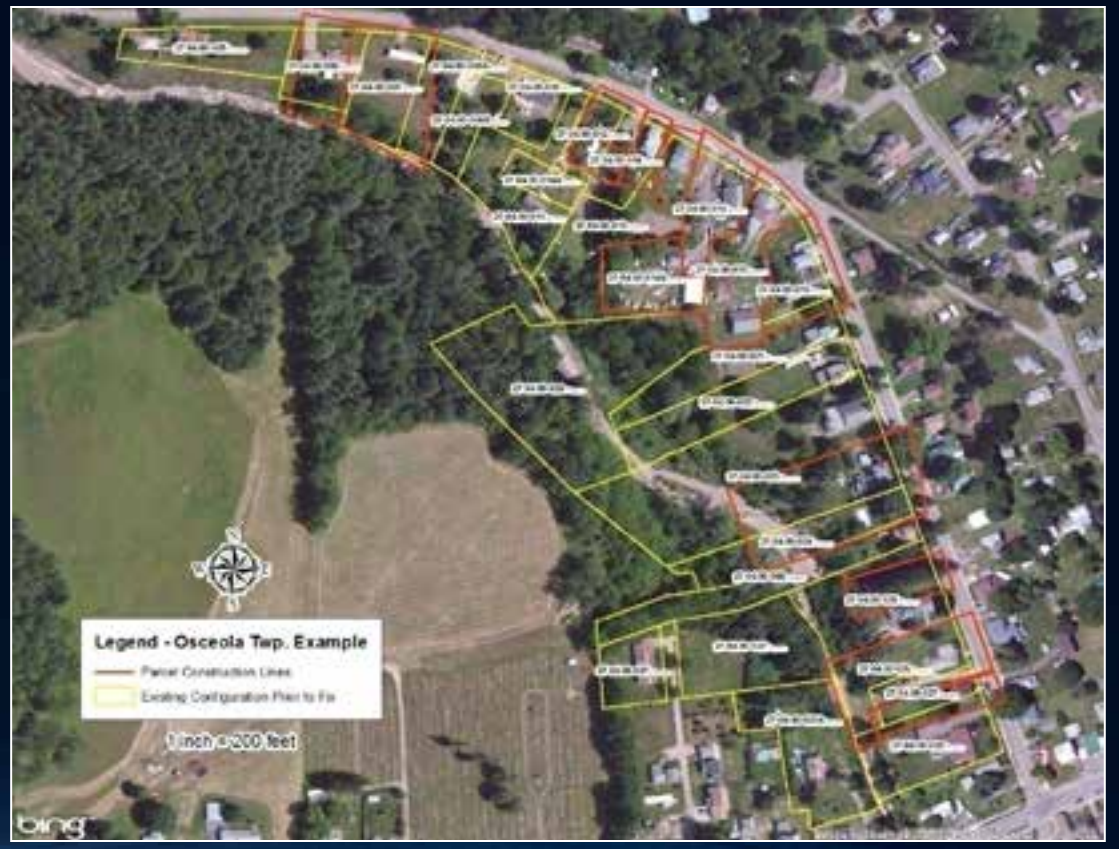
II. Quality Control

- **Osceola Township Example**

II. Quality Control

- **“Jig-Saw Puzzle Effect”**

- Correcting one area spawns a need for corrections in a much wider area



II. Quality Control

- **Overview of Area – No Aerial vs. Aerial**

II. Quality Control

- **North Side**

II. Quality Control

- **Middle Section**

II. Quality Control

- **South Section**

II. Quality Control

- **Bad Deeds**

BEGINNING at a stake in the highway known as Holden Street at the northwest corner of lands now or formerly owned by John Cole; **THENCE** westerly along said street to lands contracted to Perry R. Elliott; **THENCE** southerly along said lands of Perry R. Elliott and lands of P. C. McNeil to lands of the Estate of Morgan Seely; **THENCE** easterly along lands of said Estate to a corner; **THENCE** northerly along lands of said Estate and lands now or formerly of Russell Hackett and John Cole in an irregular line to Holden Street to the place of beginning.

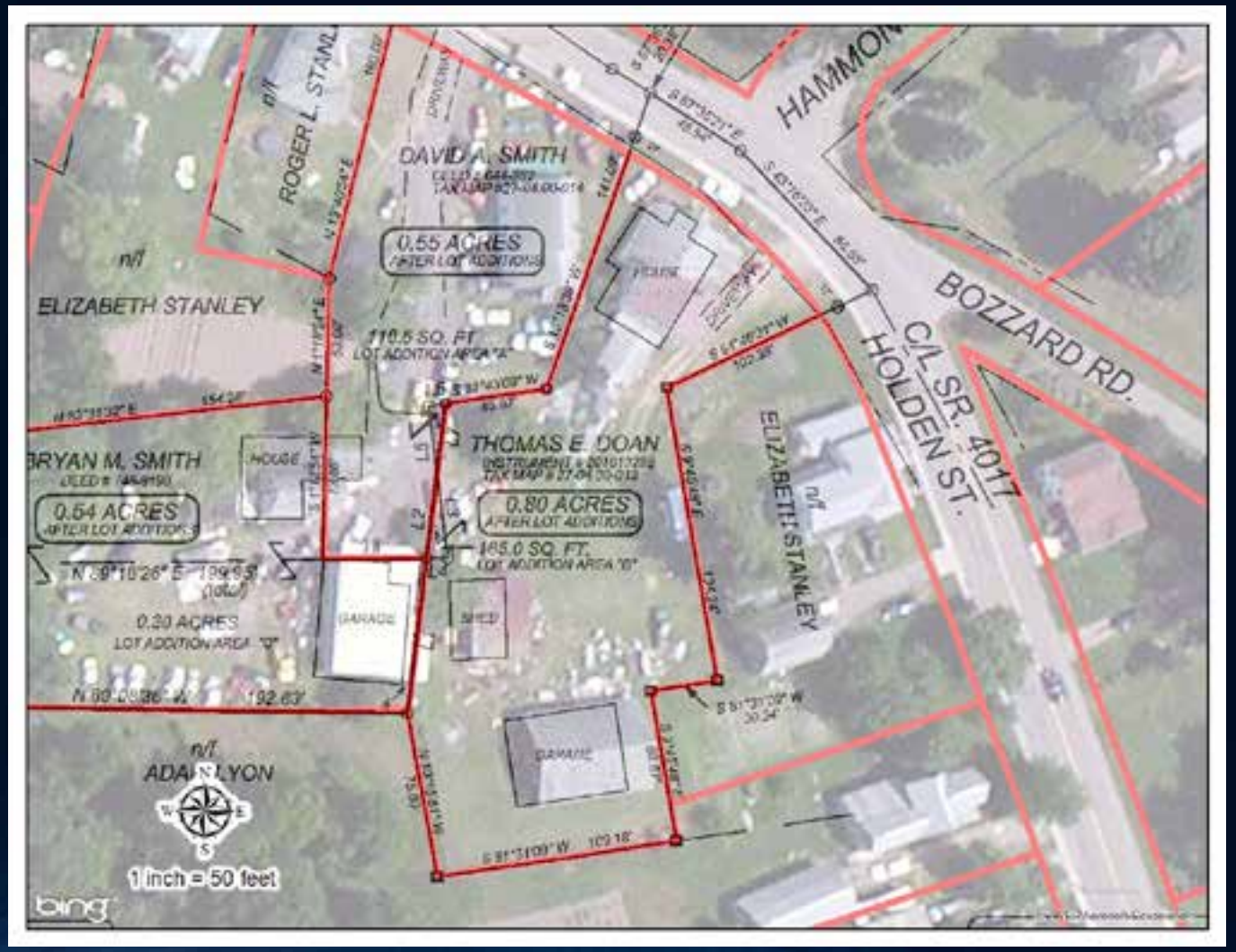
CONTAINING more or less, of an area of land, upon which are erected one frame dwelling, one frame barn and other outbuildings.

II. Quality Control

- **Survey / Geo-referencing Example**

II. Quality Control

- **Survey / Geo-referencing Example**



II. Quality Control

- **Example: County Commissioner's Property**

II. Quality Control

- **US Army Corp of Engineers (USACE) Issues**

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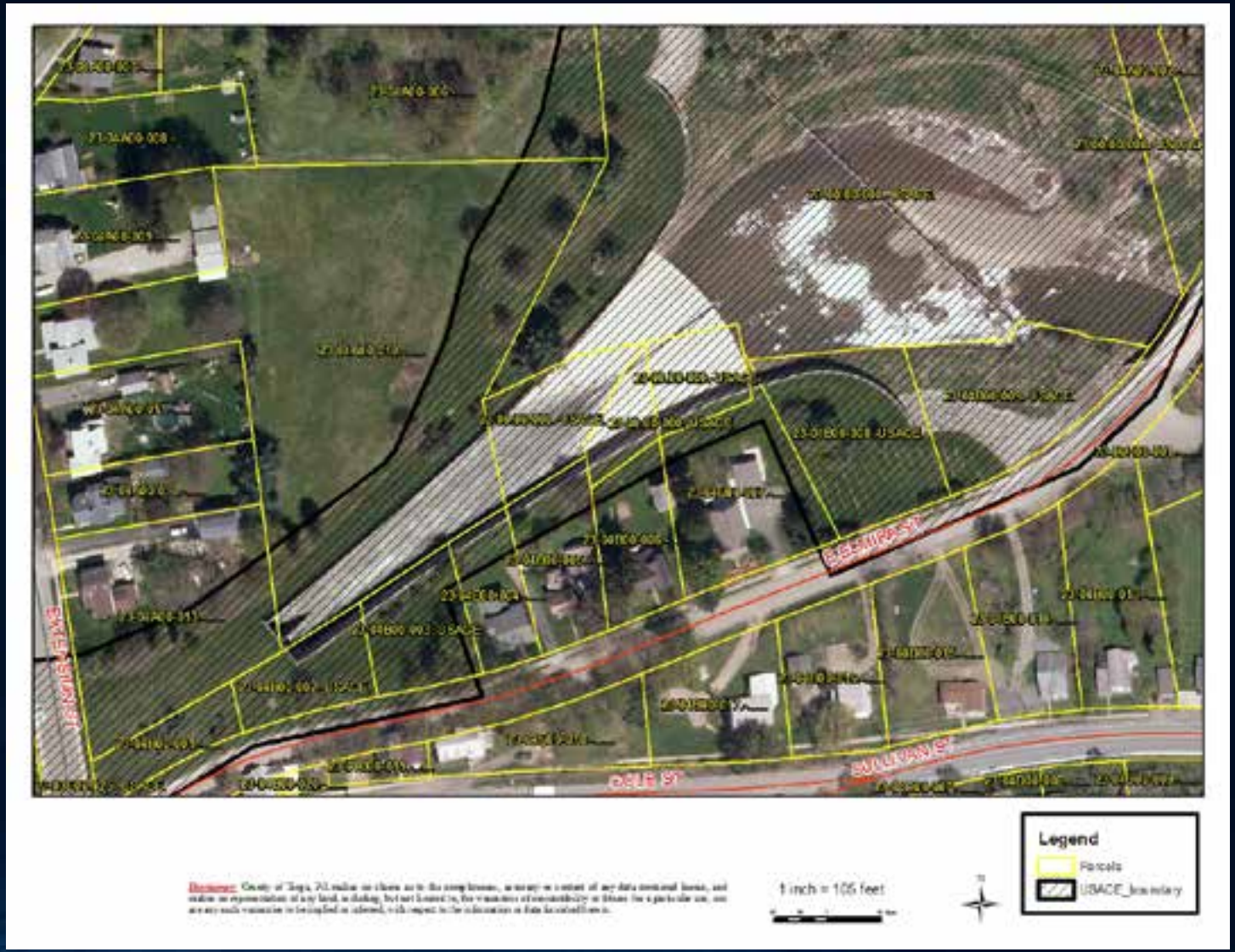

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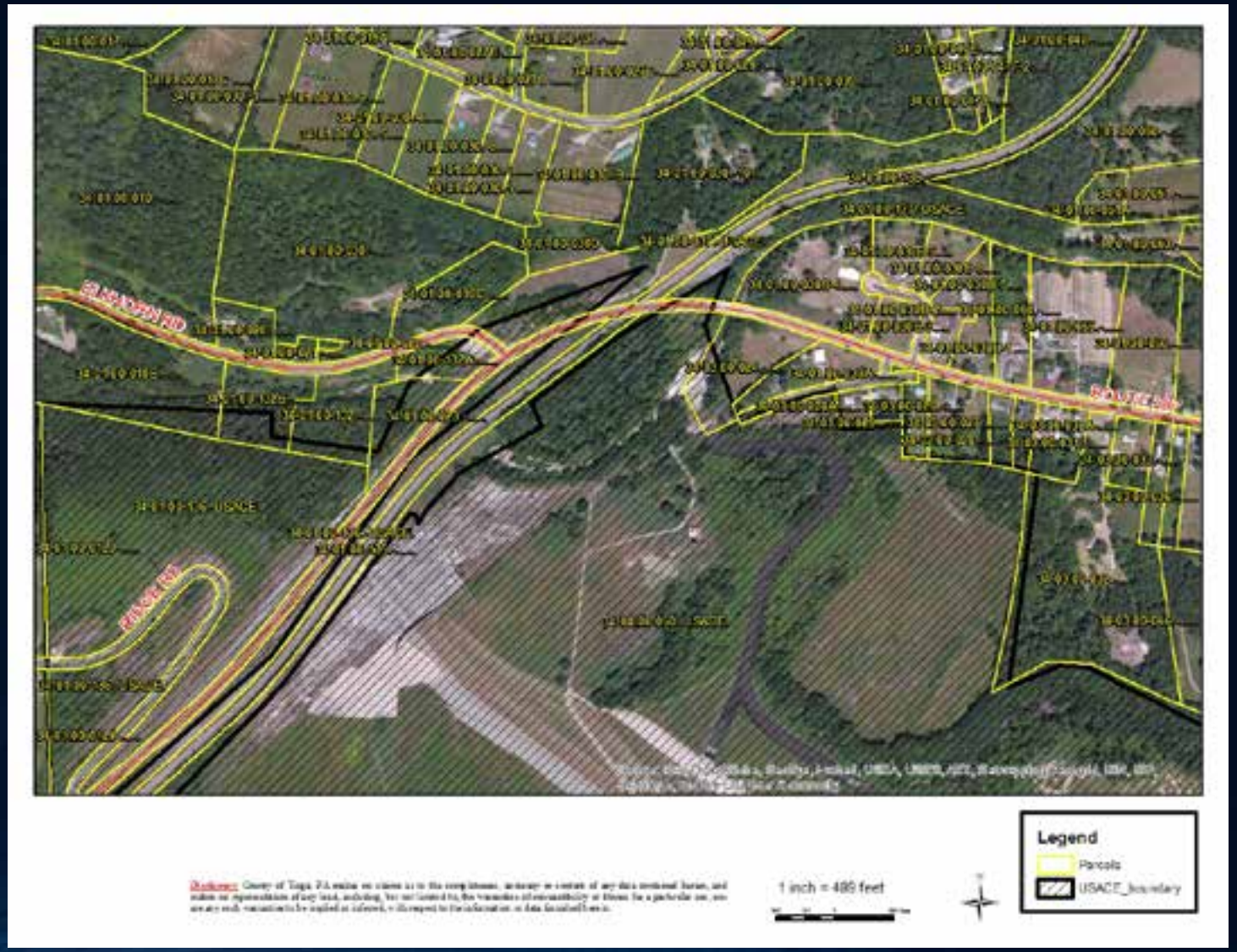

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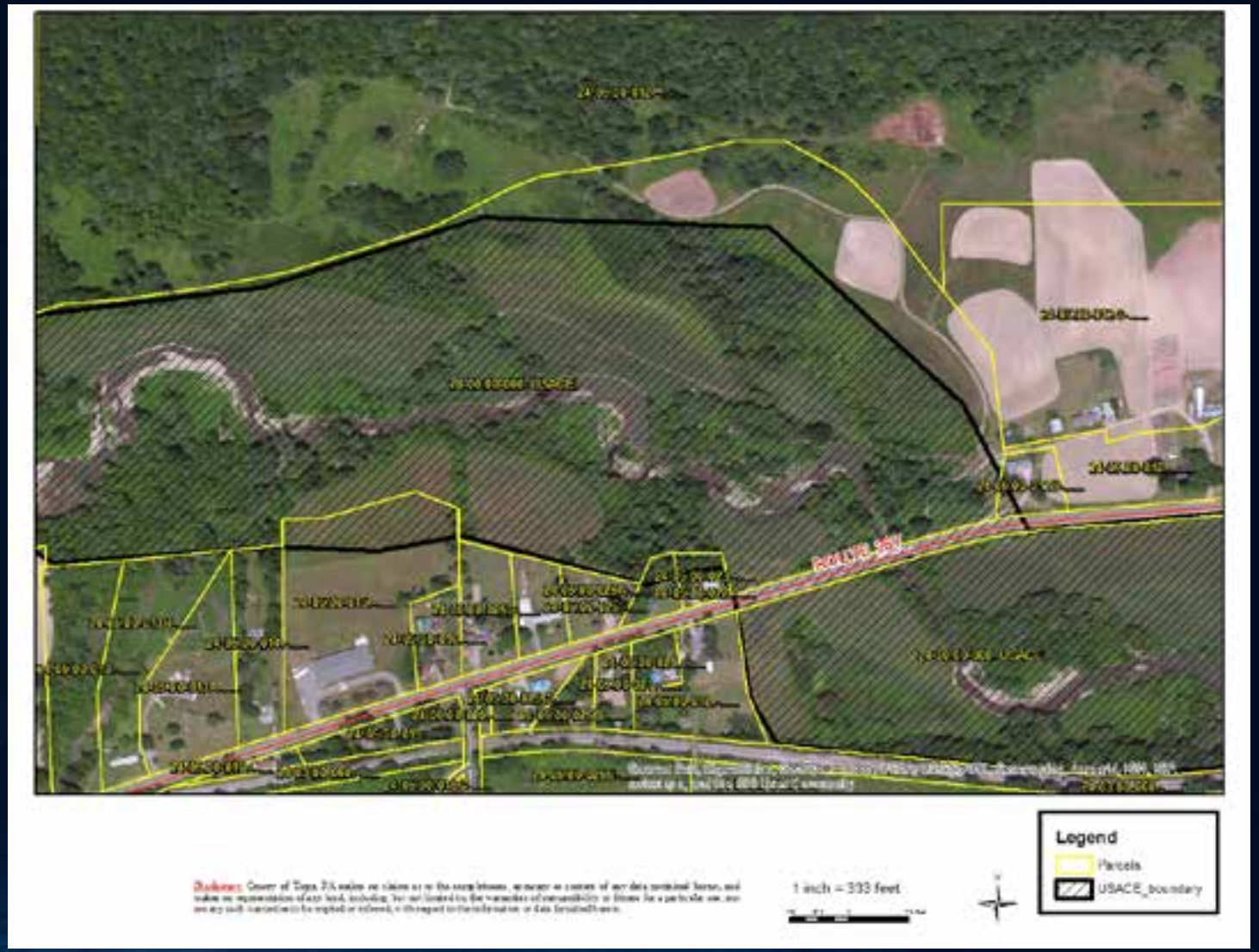

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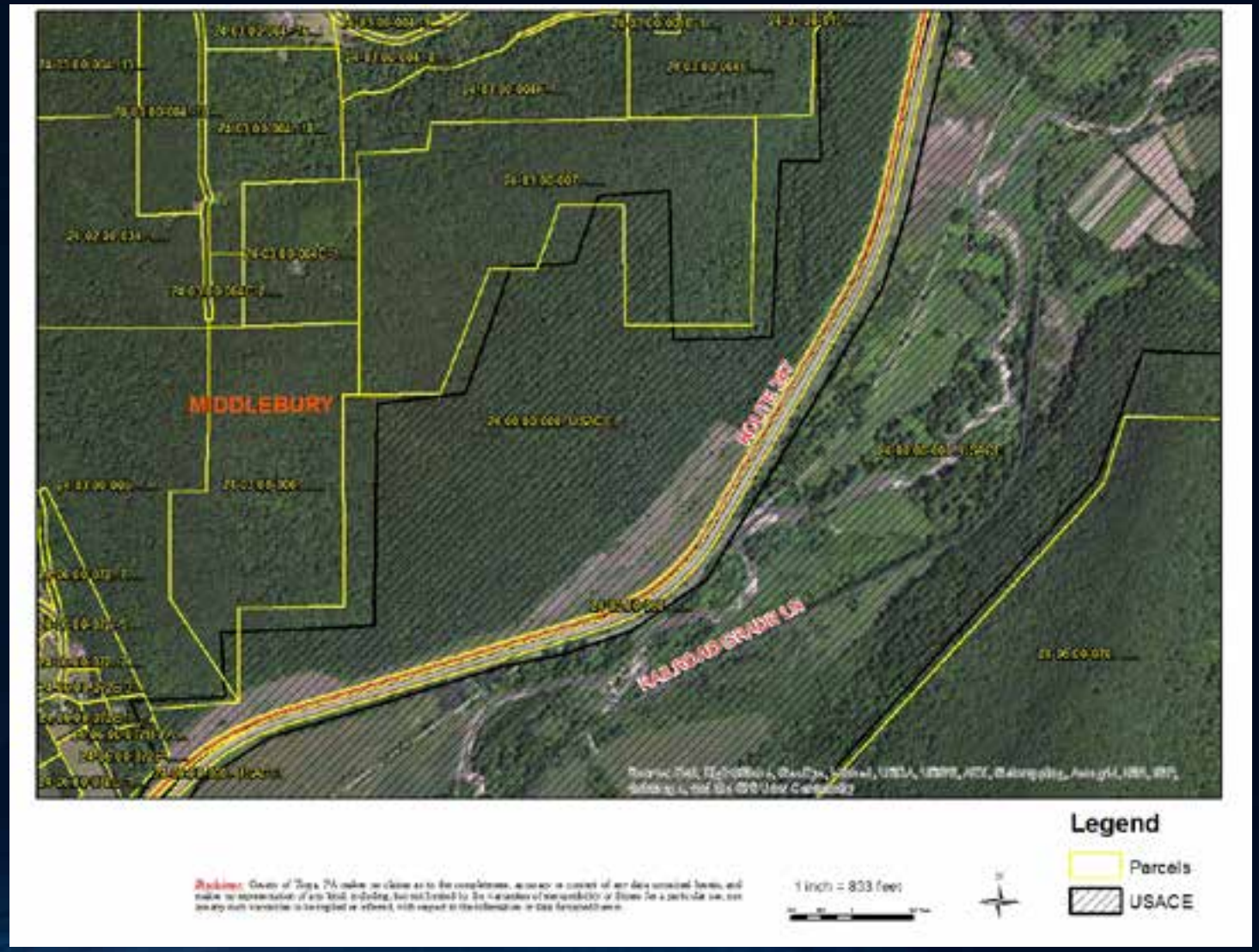
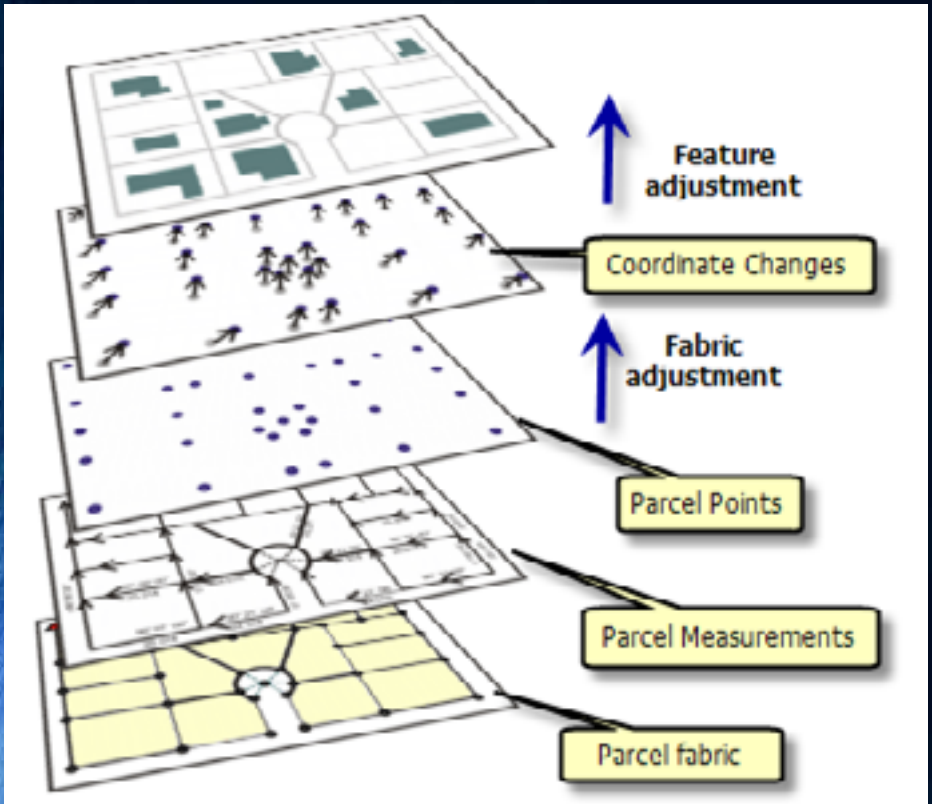


II. Quality Control: Parcel Fabric

- Migrate tax parcel data to the ESRI / **ArcGIS Parcel Fabric** editing environment.



ü **Topology defines how vector data features share geometry.**

ü **Topology defines and enforces data integrity rules.**

ü **Example: no gaps or overlaps between polygons.**

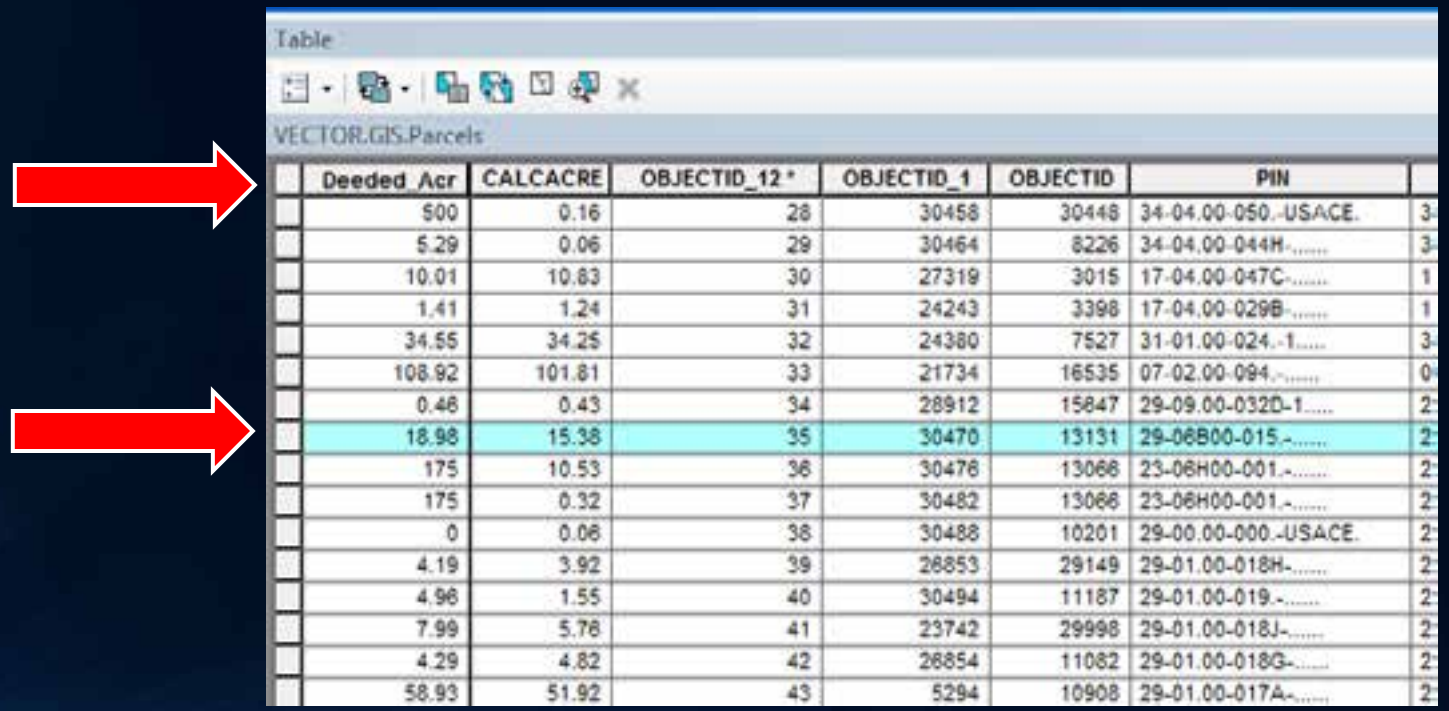
Countywide Parcel Analysis

SECTION 3

III. Countywide Parcel Analysis

- Methodology: Comparing “Deeded” vs. “Calculated” Acres in the GIS datasets.

- Example Parcel / Table.



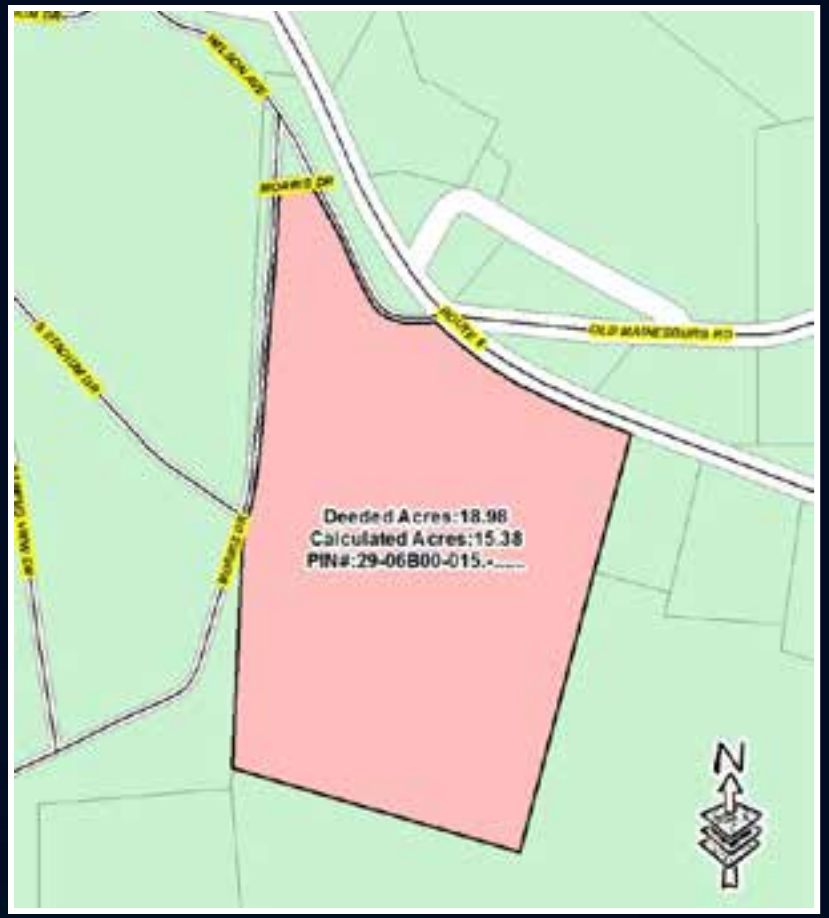
Table

VECTOR.GIS.Parcels

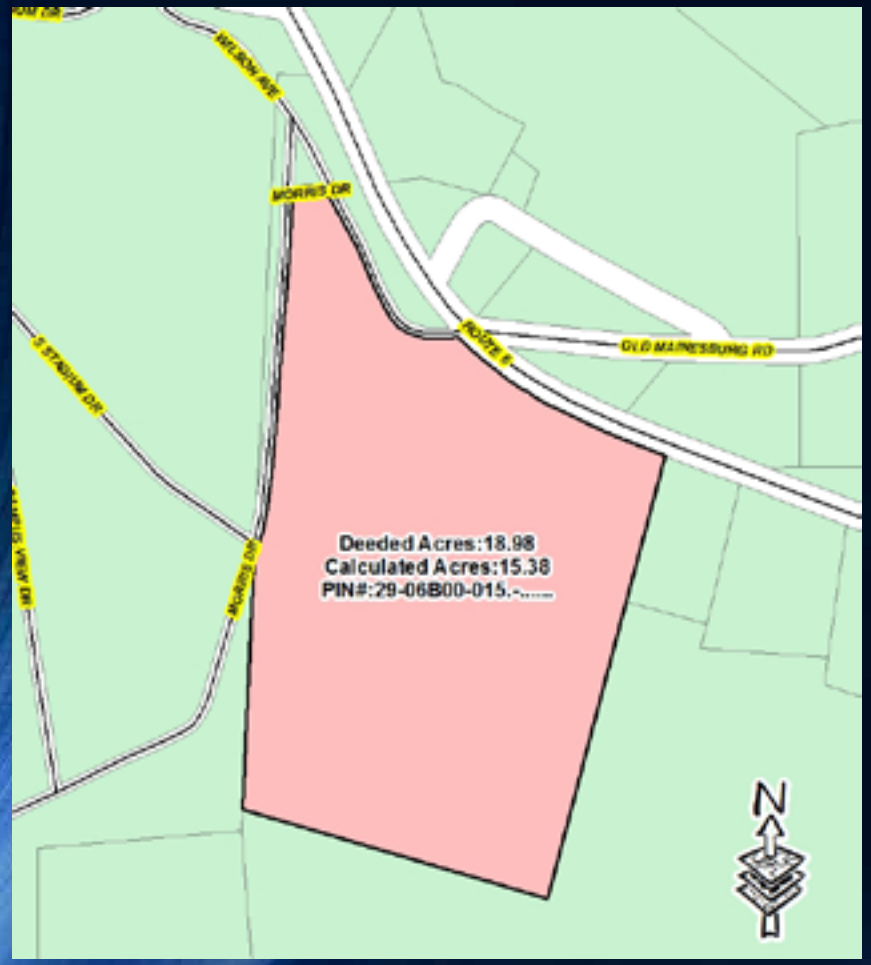
Deeded_Acr	CALCACRE	OBJECTID_12 *	OBJECTID_1	OBJECTID	PIN	
500	0.16	28	30458	30448	34-04.00-050.-USACE.	3
5.29	0.06	29	30464	8226	34-04.00-044H-.....	3
10.01	10.83	30	27319	3015	17-04.00-047C-.....	1
1.41	1.24	31	24243	3398	17-04.00-029B-.....	1
34.55	34.25	32	24380	7527	31-01.00-024.-1.....	3
108.92	101.81	33	21734	16535	07-02.00-094.-.....	0
0.46	0.43	34	28912	15847	29-09.00-032D-1.....	2
18.98	15.38	35	30470	13131	29-06B00-015.-.....	2
175	10.53	36	30476	13066	23-06H00-001.-.....	2
175	0.32	37	30482	13066	23-06H00-001.-.....	2
0	0.06	38	30488	10201	29-00.00-000.-USACE.	2
4.19	3.92	39	26853	29149	29-01.00-018H-.....	2
4.96	1.55	40	30494	11187	29-01.00-019.-.....	2
7.99	5.76	41	23742	29998	29-01.00-018J-.....	2
4.29	4.82	42	26854	11082	29-01.00-018G-.....	2
58.93	51.92	43	5294	10908	29-01.00-017A-.....	2

III. Countywide Parcel Analysis

- Methodology: Comparing “Deeded” vs. “Calculated” Acres in the GIS datasets.
- Example Parcel.
- PIN #: 29-06B.00-015
- Richmond Township

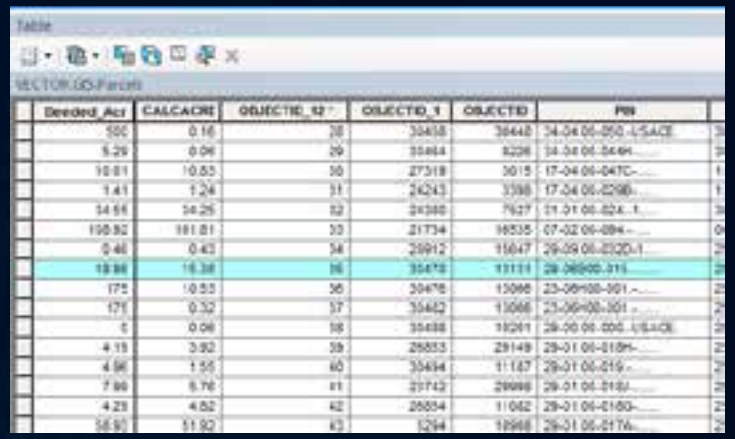


III. Countywide Parcel Analysis



- Methodology: If a parcel has a significant difference in the acres field…
- Then it is likely not drawn accurately.

III. Countywide Parcel Analysis



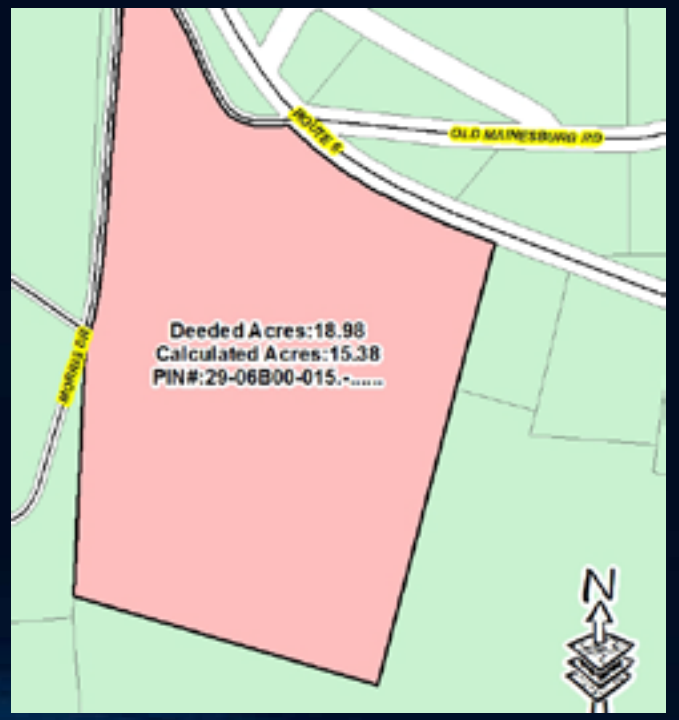
- Methodology: If a parcel has a significant difference in the acres field…
- Then it is likely not drawn accurately.

III. Countywide Parcel Analysis

- Deeded Acres – Calculated Acres = Acres Difference

18.98 – 15.38 = 3.6 Acres Difference

	Deeded_Acr	CALCACRE	OBJ
	500	0.16	
	5.29	0.06	
	10.01	10.83	
	1.41	1.24	
	34.55	34.25	
	108.92	101.81	
	0.46	0.43	
	18.98	15.38	
	175	10.53	
	175	0.32	



III. Countywide Parcel Analysis

- The area of one acre (red) overlaid on an American football field.
- One acre comprises 4,840 square yards or 43,560 square feet
- An acre is a measure of area, and has no particular width, length or shape.
- One acre is 90.75 yards of a 53.33-yard-wide American football field. The full field, including the end zones, covers approximately 1.32 acres.

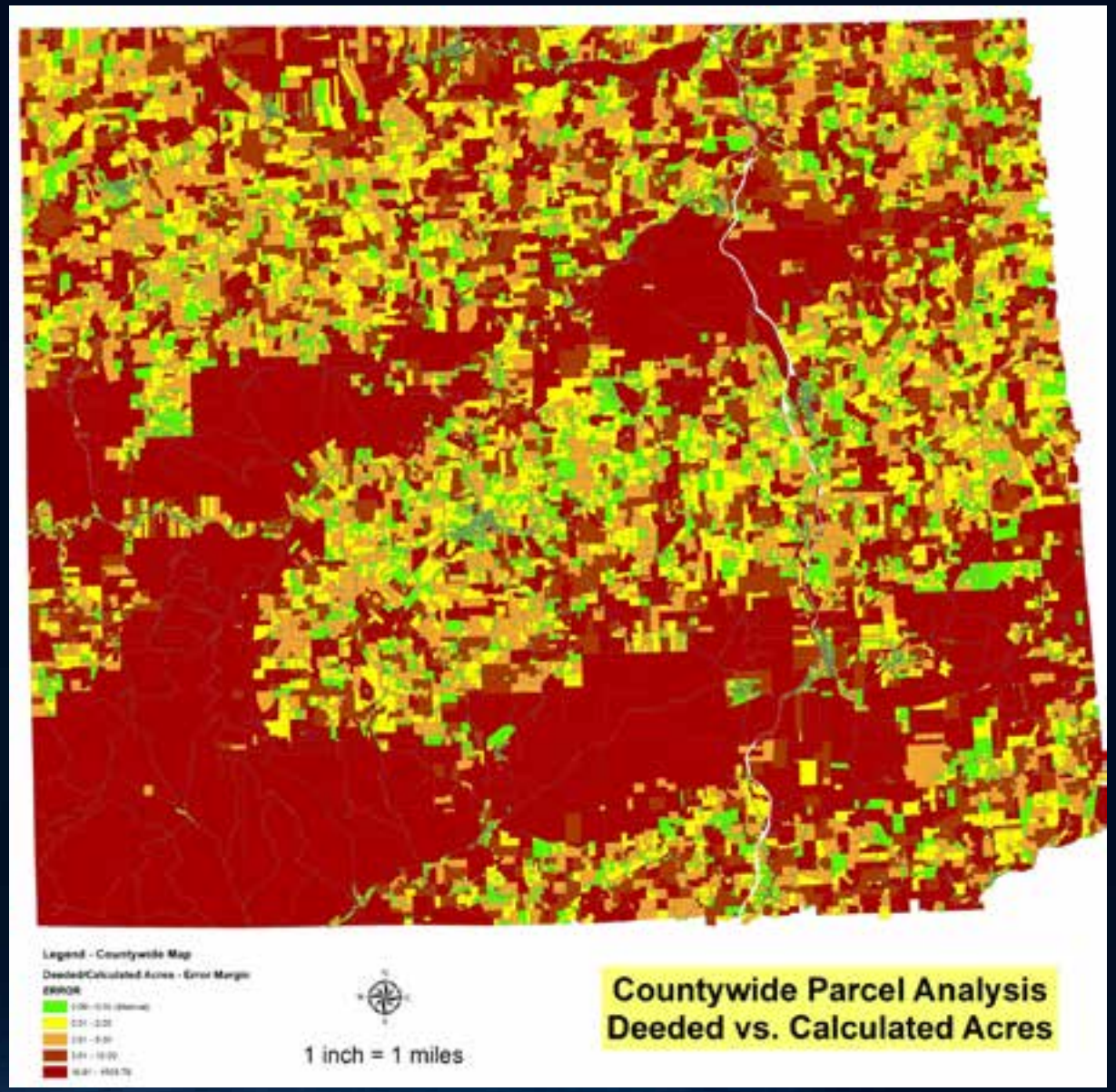
III. Countywide Parcel Analysis

- **Methodology: Comparing "Deeded" vs. "Calculated" Acres in the GIS datasets.**
  - **Not a full-proof methodology.**
  - **Parcels can be represented / drawn incorrectly and not show a significant acreage difference.**
  - **Key concept in the ESRI parcel data model.**

III. Countywide Parcel Analysis

- **Mapping Methodology**
  - **Using parcel data in tabular (non-spatial) format (e.g. Microsoft Excel)**
  - **Joining the tabular data to the County parcel map.**
  - **Results.**

III. Countywide Parcel Analysis



III. Countywide Parcel Analysis

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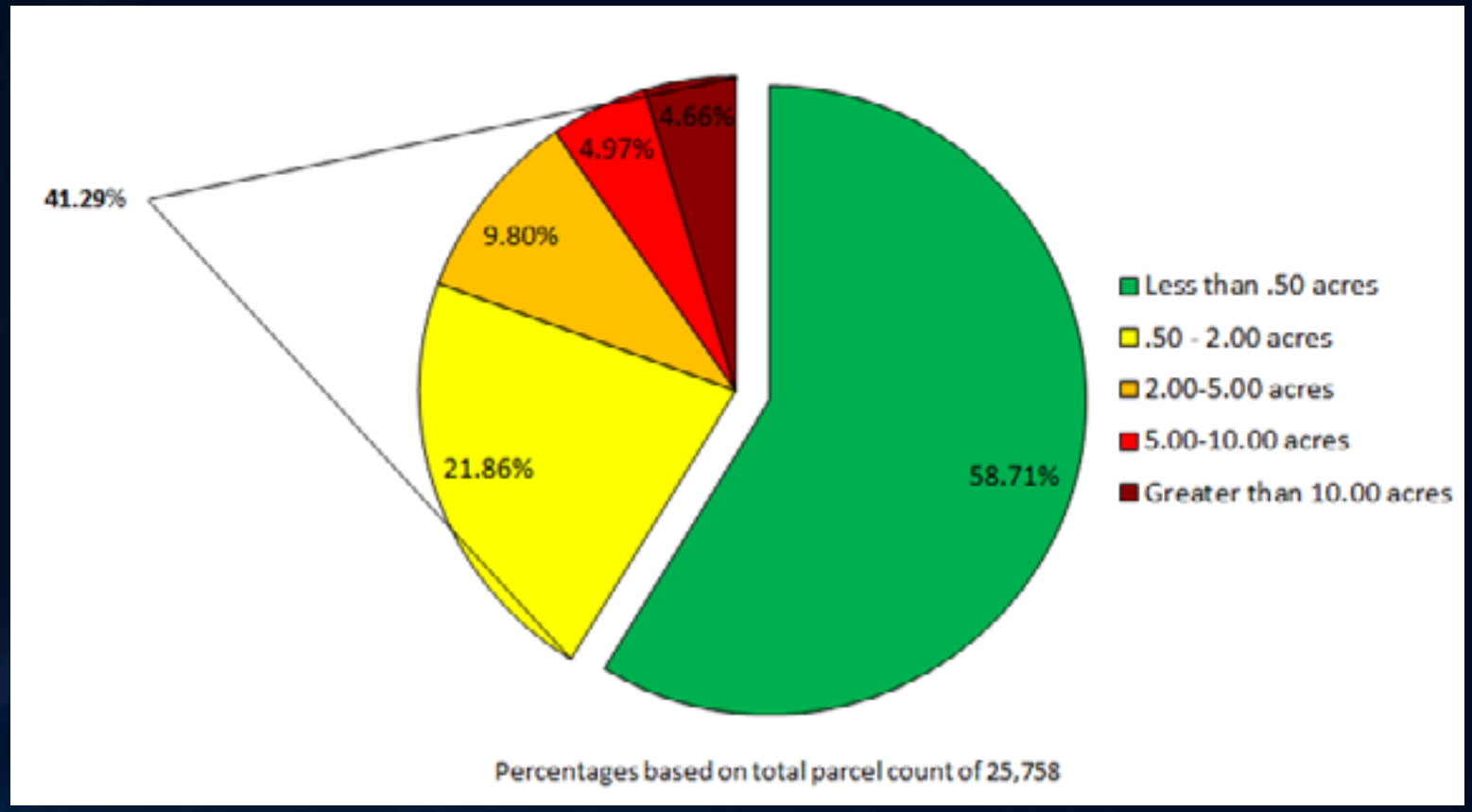


Pilot Project Area Analysis: Gaines Township

SECTION 4

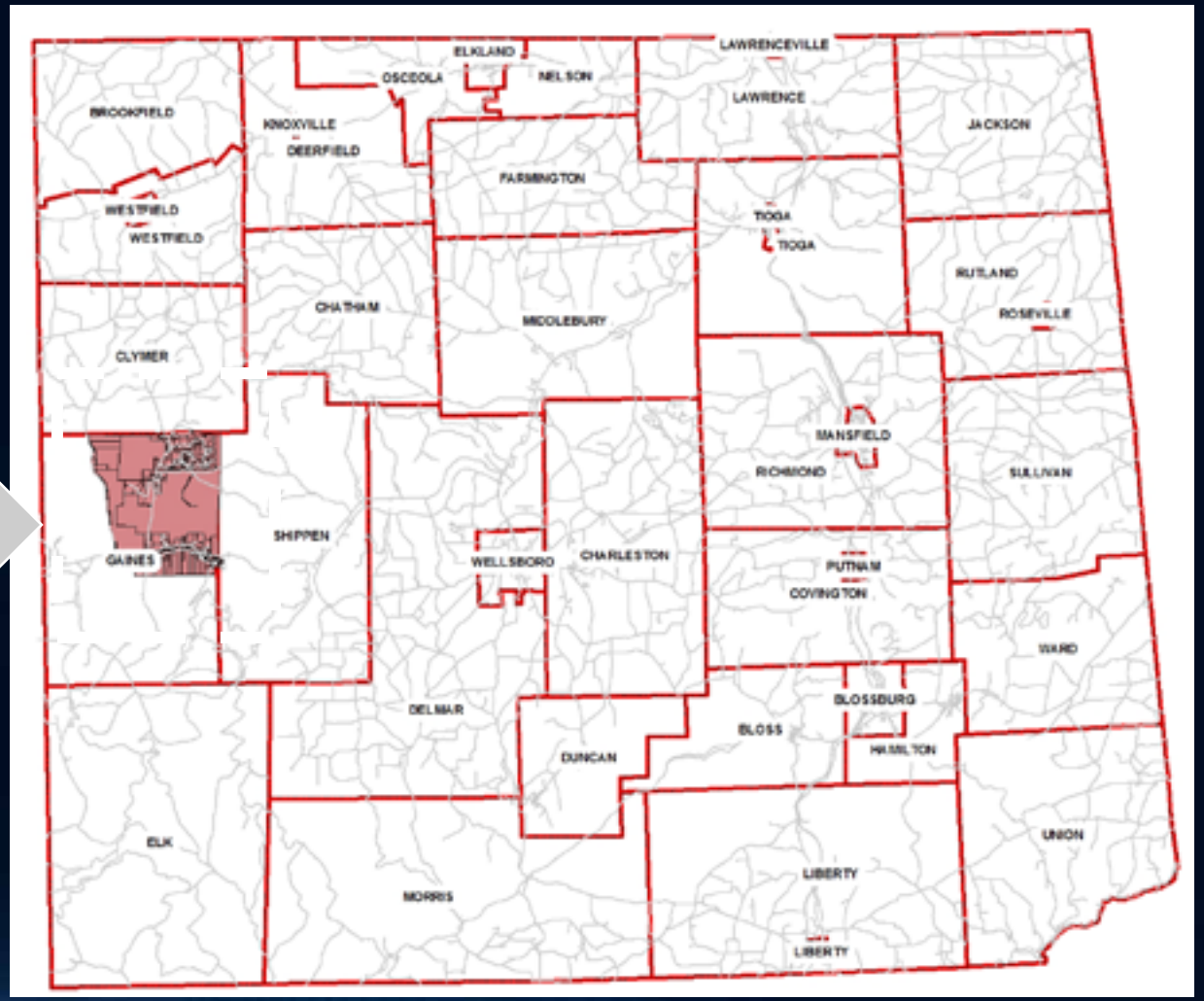
IV. Pilot Project

- **Mapping Methodology**
  - Using parcel data in tabular (non-spatial) format (e.g. Microsoft Excel)
  - Joining the tabular data to the County parcel map.
  - Results.

IV. Pilot Project

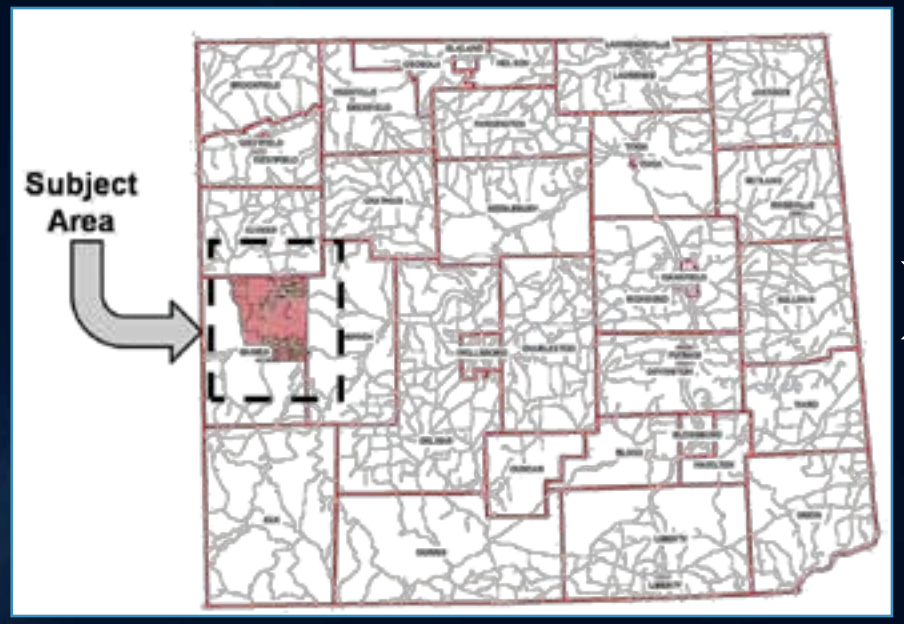
- **Project Area Location**

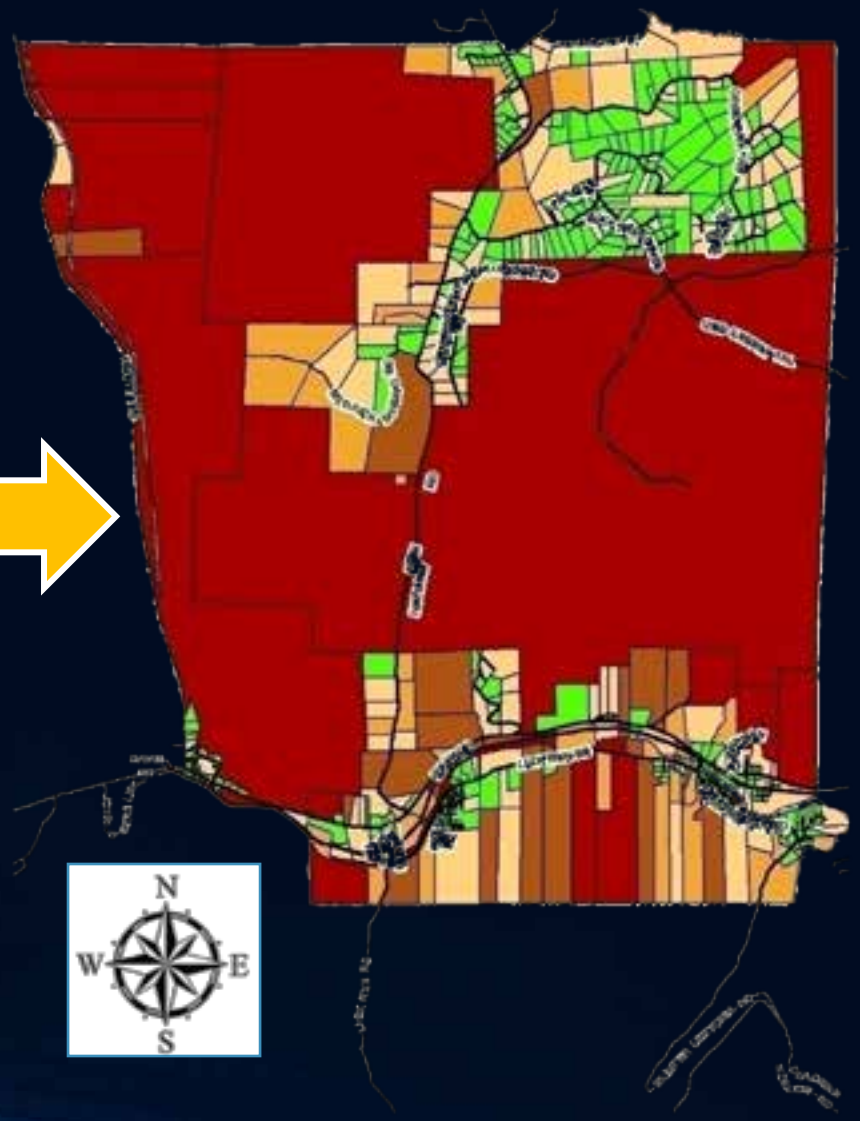
Subject Area



IV. Pilot Project

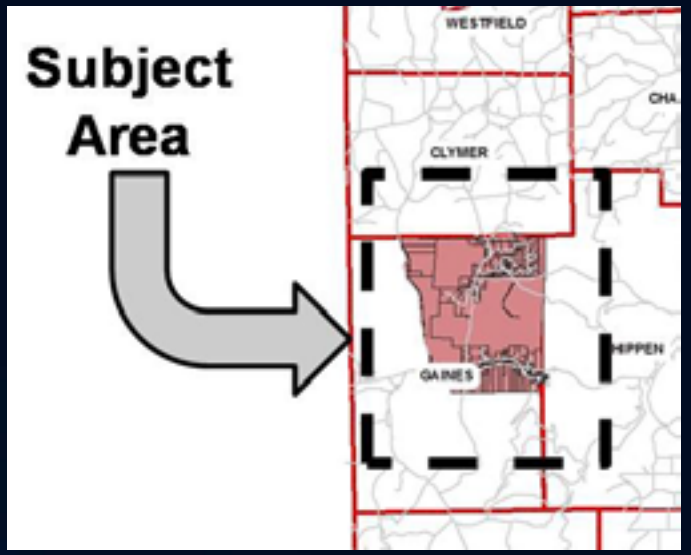
- **Project Area Location**





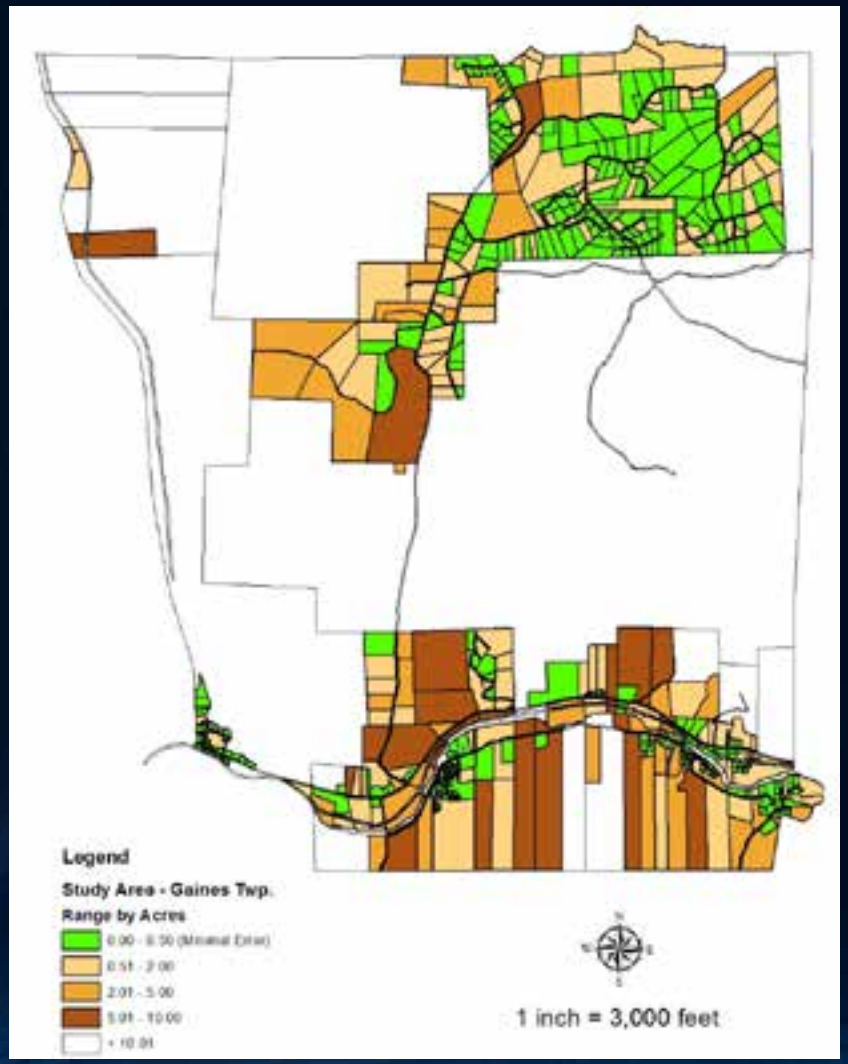
IV. Pilot Project

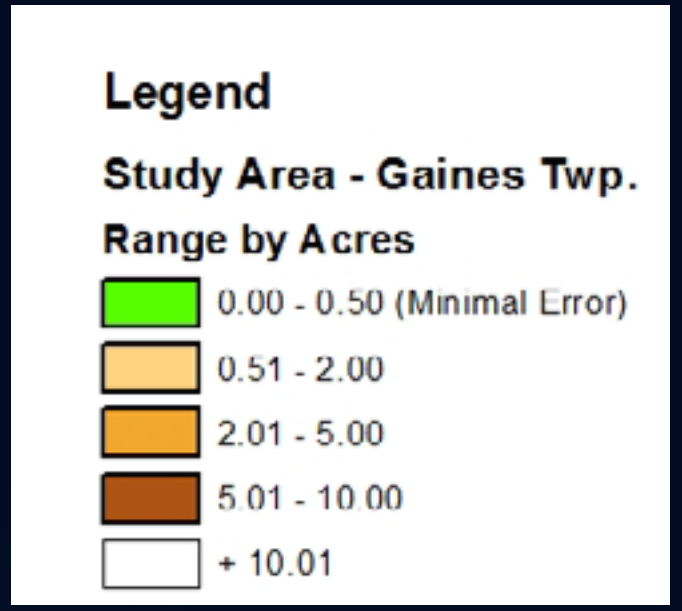
- **Pilot Project: Basic Info.**
  - 543 ownership parcels (641 Shapes).
  - Route #6 Corridor (East-West)
  - Shin Hollow Road (North-South)
  - Representative Example



IV. Pilot Project

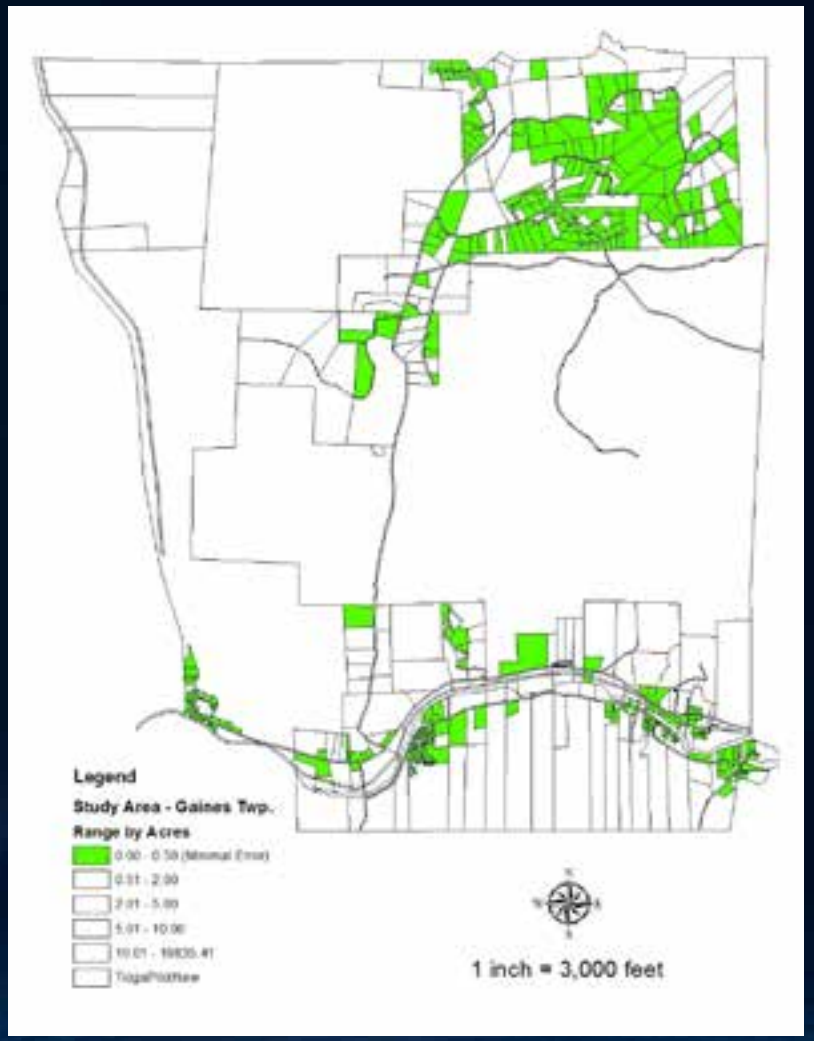
- **Pilot Project: Thematic Mapping**

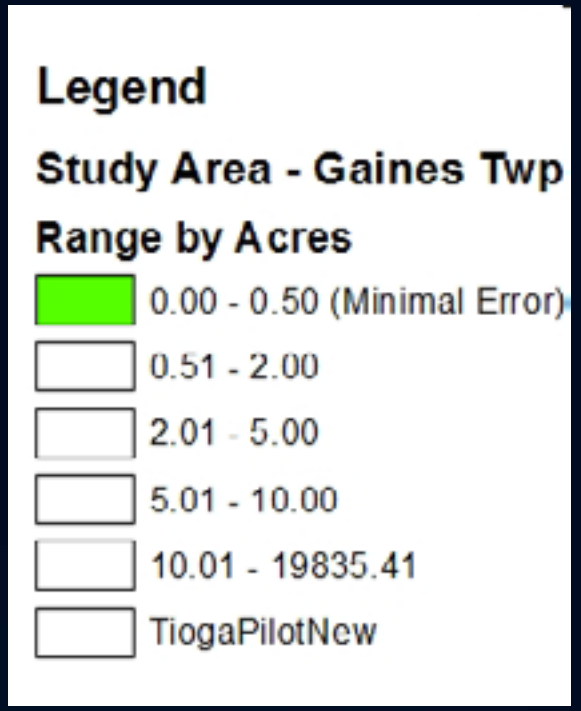




IV. Pilot Project

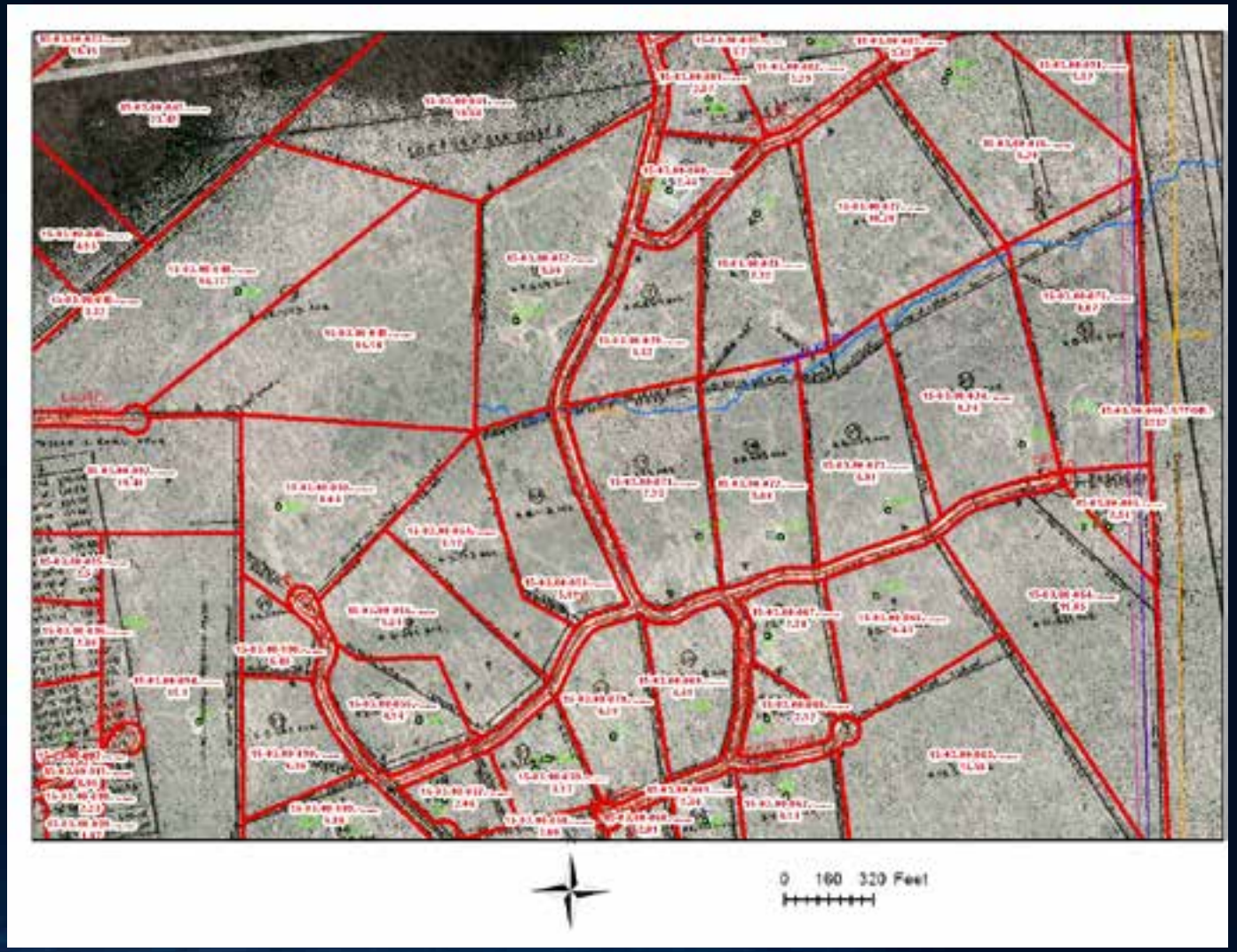
- **Pilot Project: Minimal Error (0.00 – 0.50)**





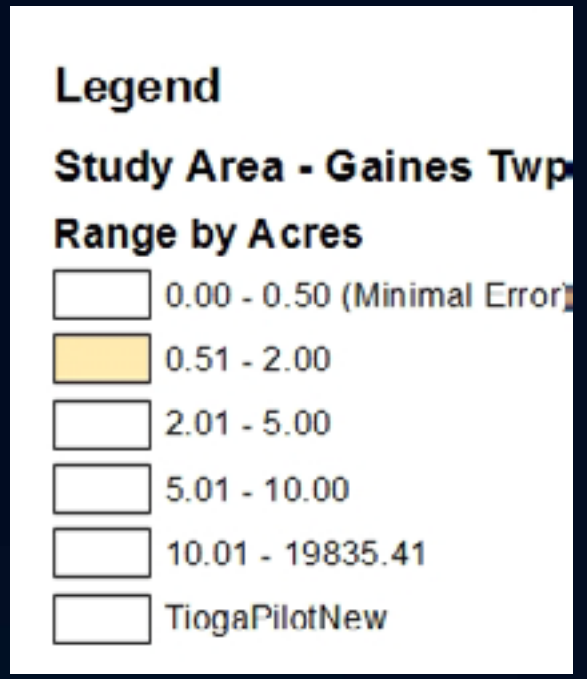
IV. Pilot Project

- **Gaines Township Subdivision**



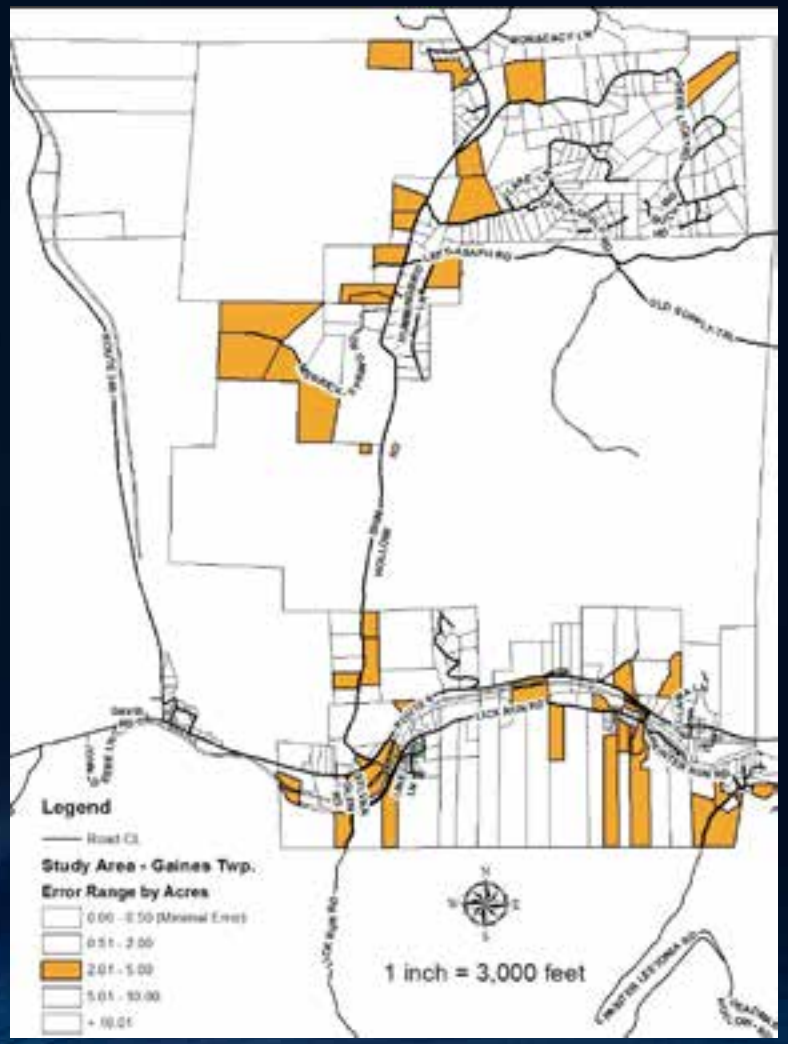
IV. Pilot Project

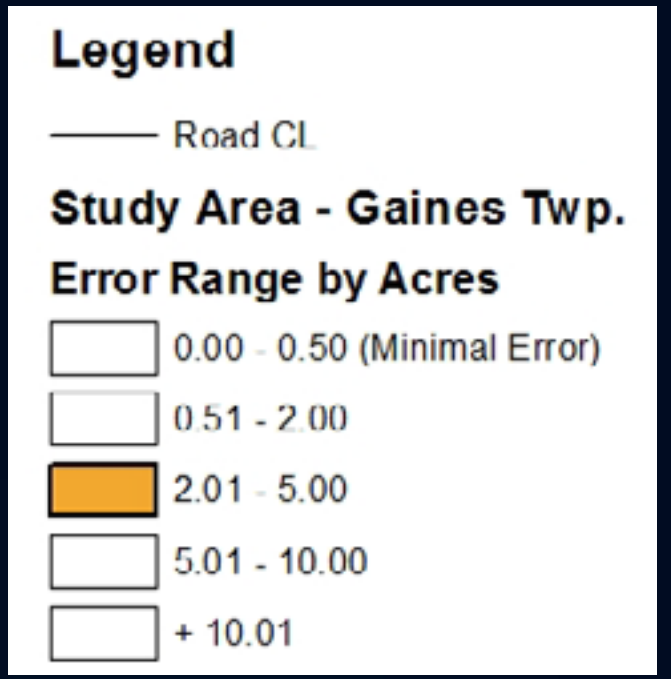
- **Pilot Project: Low Error (0.51 – 2.00)**



IV. Pilot Project

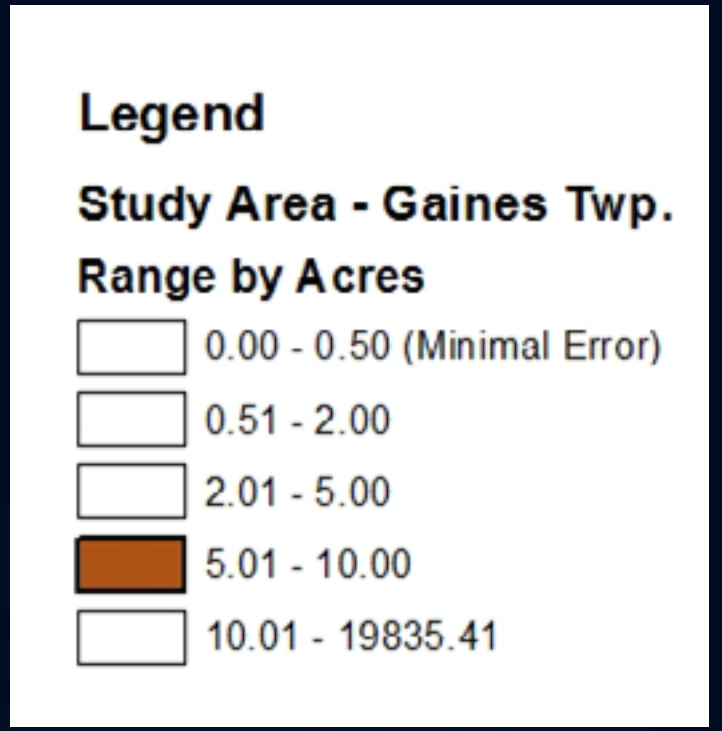
- **Pilot Project: Moderate Error (2.01 – 5.00)**





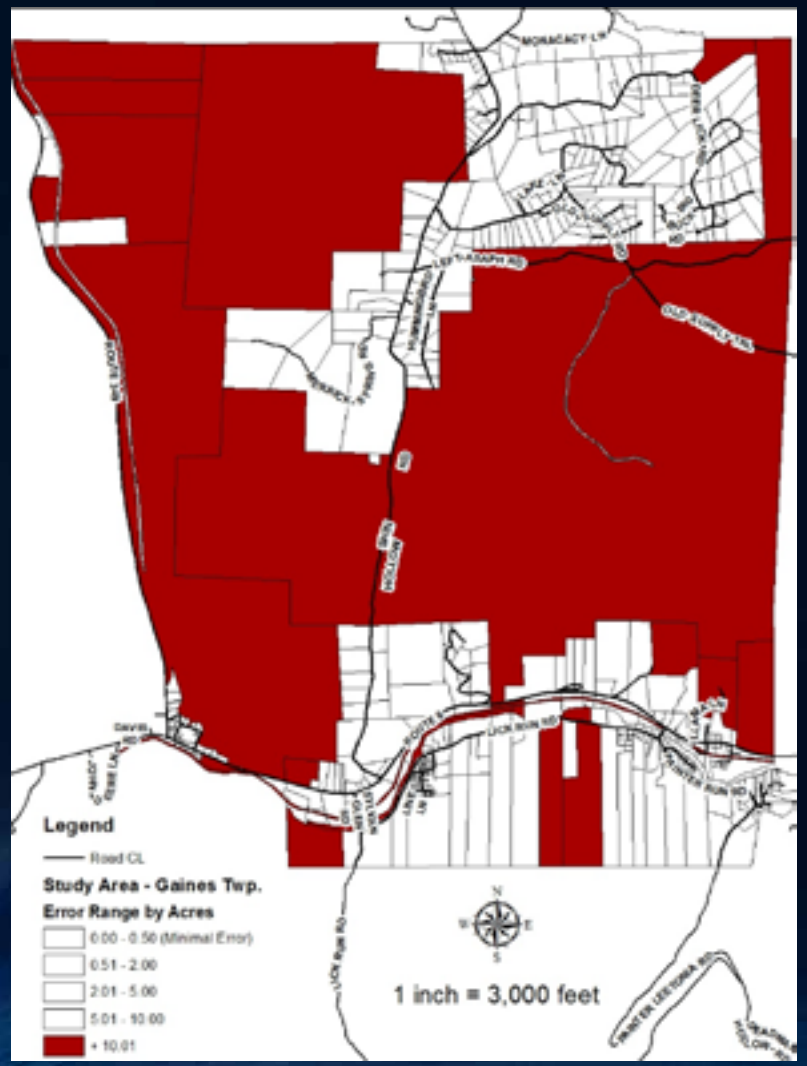
IV. Pilot Project

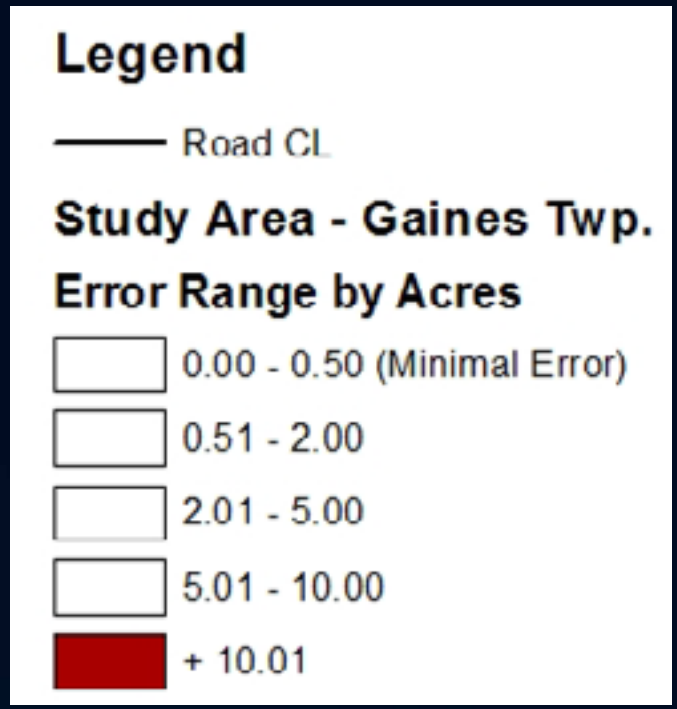
- **Pilot Project: High Error Parcels (5.01-10.00)**



IV. Pilot Project

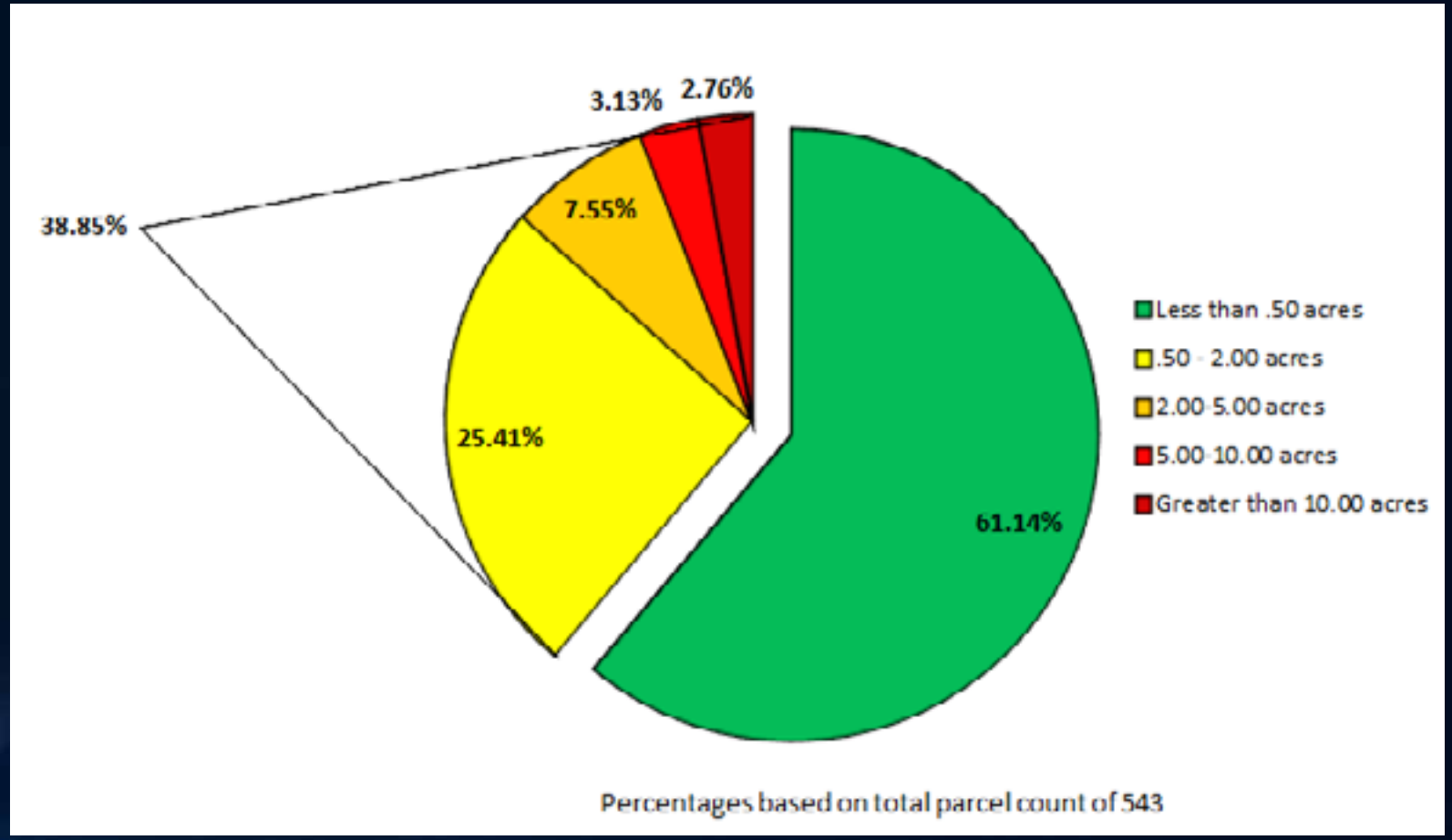
- **Pilot Project: Very High Error Parcels (+10)**





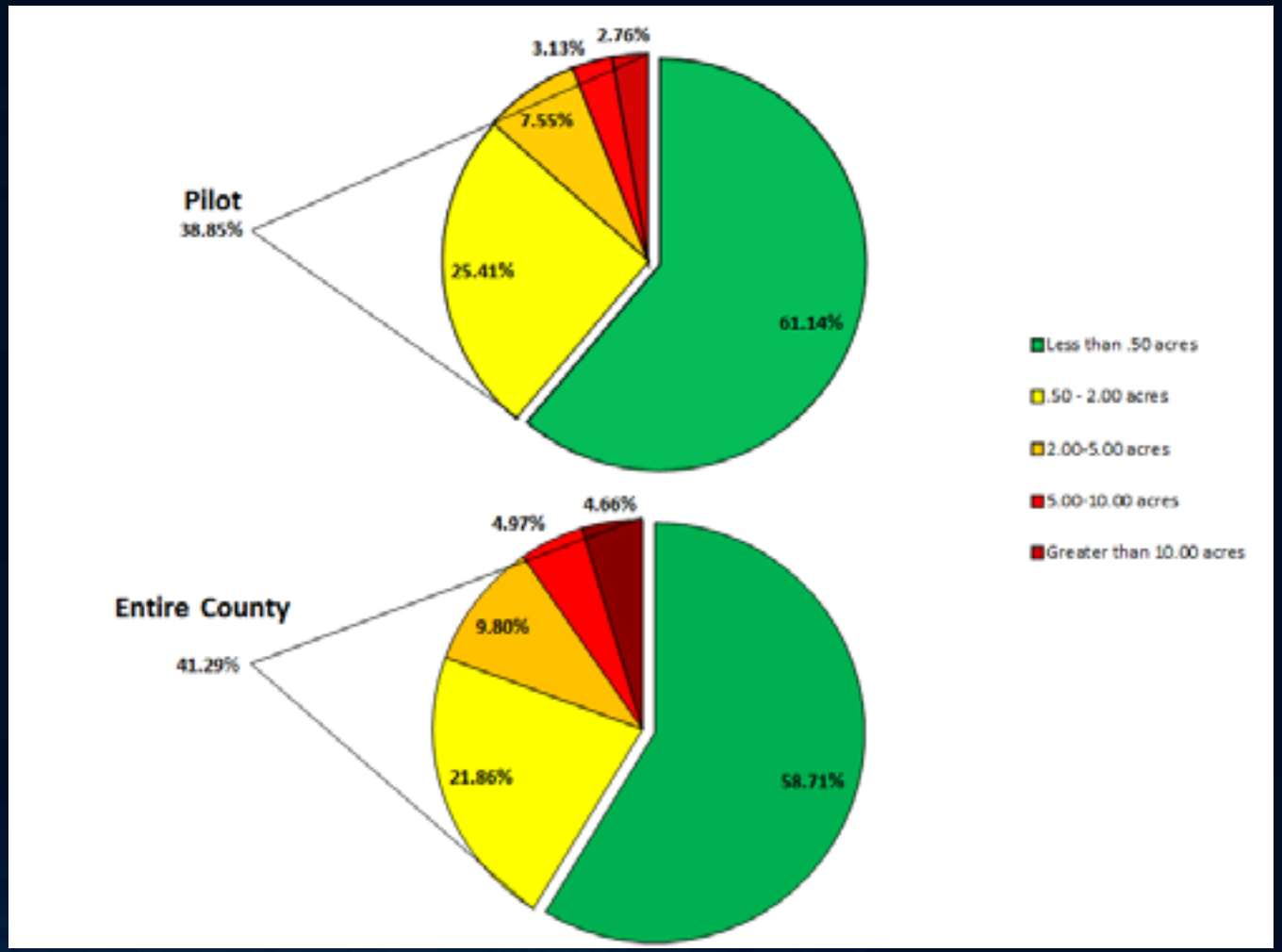
IV. Pilot Project

- **Pilot Project: Error Statistics (Pie Chart)**



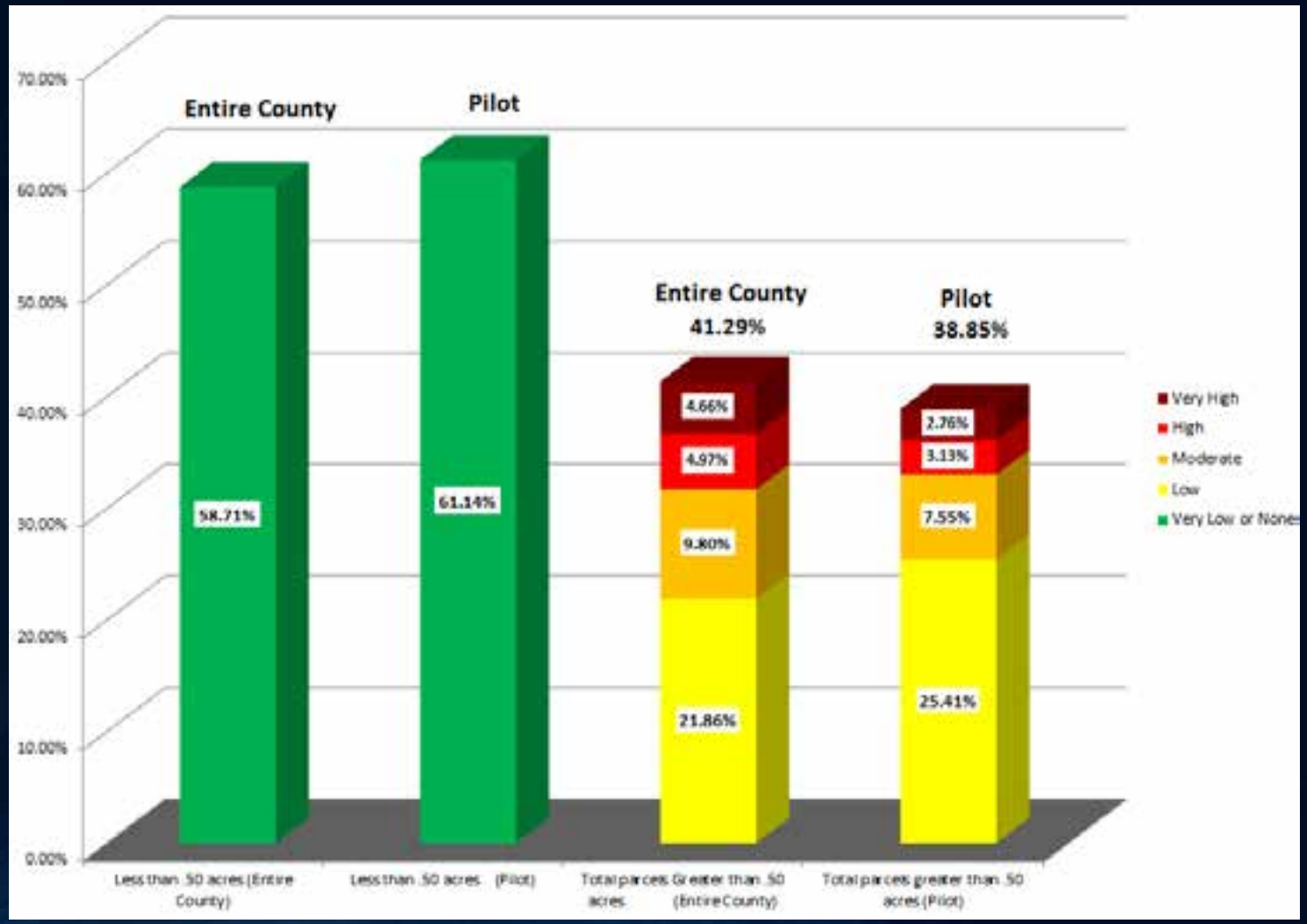
IV. Pilot Project

- **Pilot to Countywide Comparison**



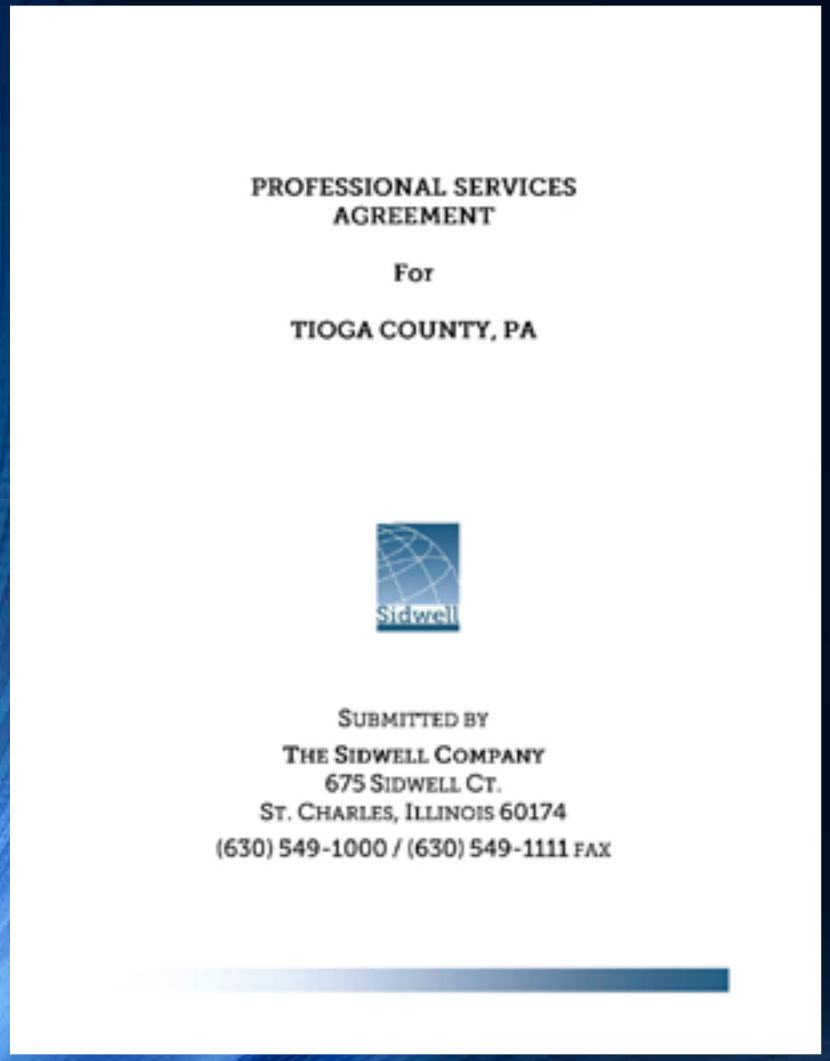
IV. Pilot Project

- **Pilot to Countywide Comparison**



IV. Pilot Project

- **Sidwell Pilot Project Proposal**



PROFESSIONAL SERVICES
AGREEMENT

For

TIOGA COUNTY, PA

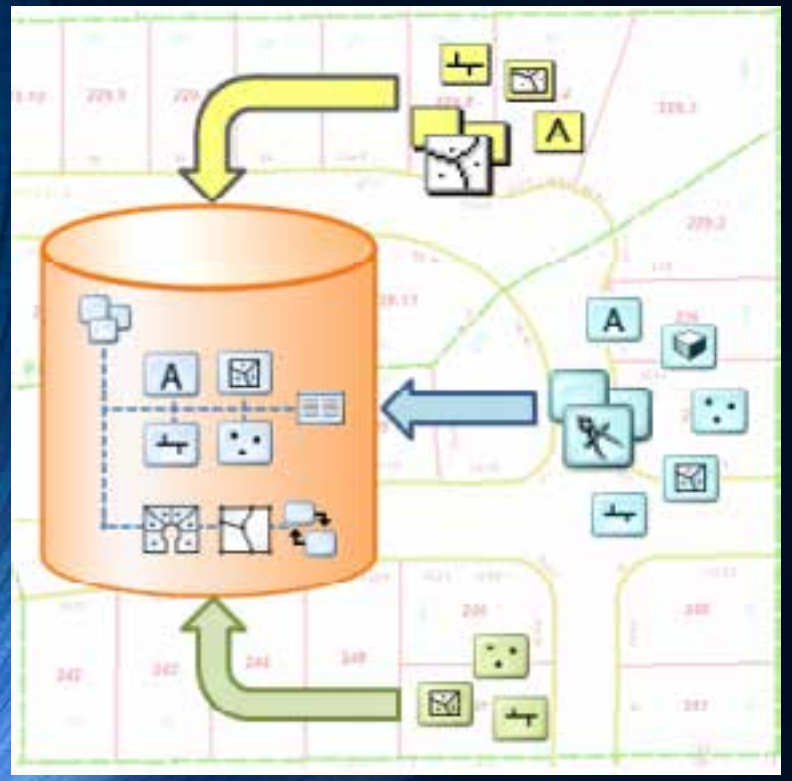
Sidwell

SUBMITTED BY
THE SIDWELL COMPANY
675 SIDWELL CT.
ST. CHARLES, ILLINOIS 60174
(630) 549-1000 / (630) 549-1111 FAX

- 543 ownership parcels (641 Shapes).
- Route #6 Corridor (East-West)
- Shin Hollow Road (North-South)
- Representative Example

IV. Pilot Project

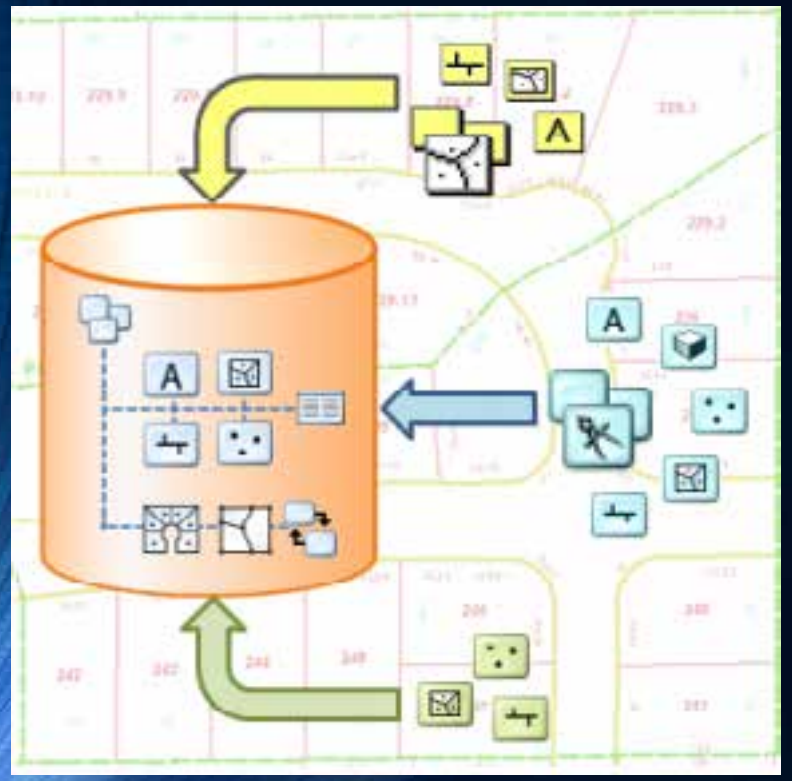
- **Pilot Project to Countywide Project**



- PGDB (Personal Geo-database).
- Parcel Fabric as a Demo.
- Combining Corrected parcels with “Legacy Map” with no further modification.

IV. Pilot Project

- **Pilot Project to Countywide Project**



- File Geodatabase to SDE.
- Data maintained at survey grade for the life of the database system.
- One-time investment.

Scope of Work: Project Feasibility

SECTION 5

V. Scope of Work

- **Items for Consideration: Workflow**
  - Gathering legal instruments for parcel corrections (e.g. deeds, surveys, etc).
  - Attribute data.
  - Data migration.
  - Generating other data sets.
  - Level of County staff involvement & time commitments.

V. Scope of Work

- **How will this project affect the other GIS datasets?**

  - Ranking: based on ESRI's "Least - Squares Adjustment."

  - 1 – Coordinate Points, e.g. P.O.B.
  - 2 – No coordinate points, but COGO closes.
  - 3 – 3 & 4 not used.
  - 5 – COGO with adjustment.
  - 6 – Distances etc. provided by documentation.

V. Scope of Work

- **How will this project affect the other GIS datasets?**
  -

V. Scope of Work: UPI Relation

- **Items for consideration – workflow:**
  -

V. Scope of Work: UPI Relation

- **Items for consideration – workflow:**
  - §
  - §
  - §
  - §

V. Scope of Work: UPI Relation

- **Items for consideration – workflow:**
  -
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V. Scope of Work: Logistics

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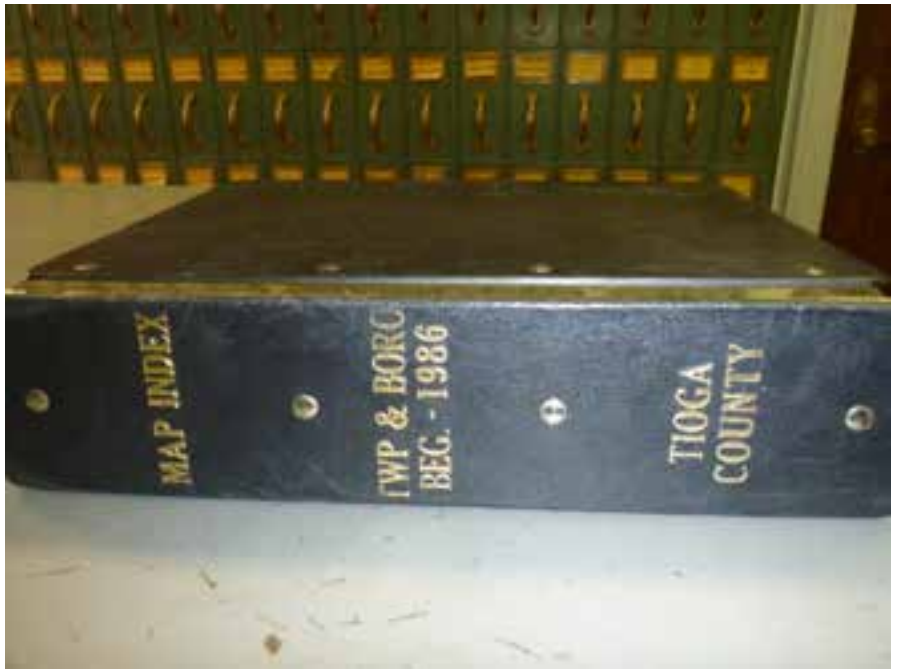
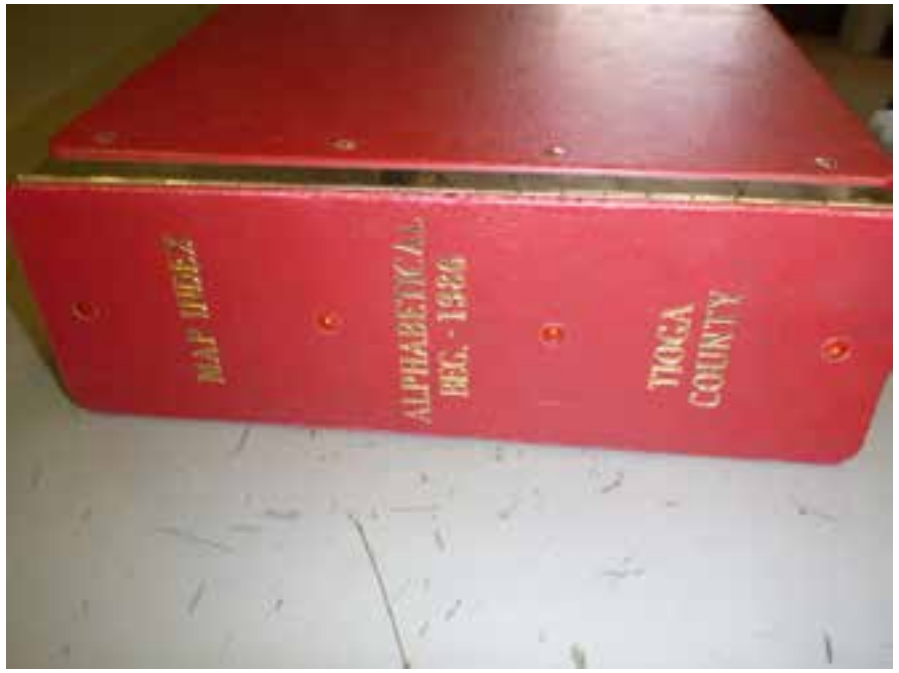
V. Scope of Work: UPI Relation

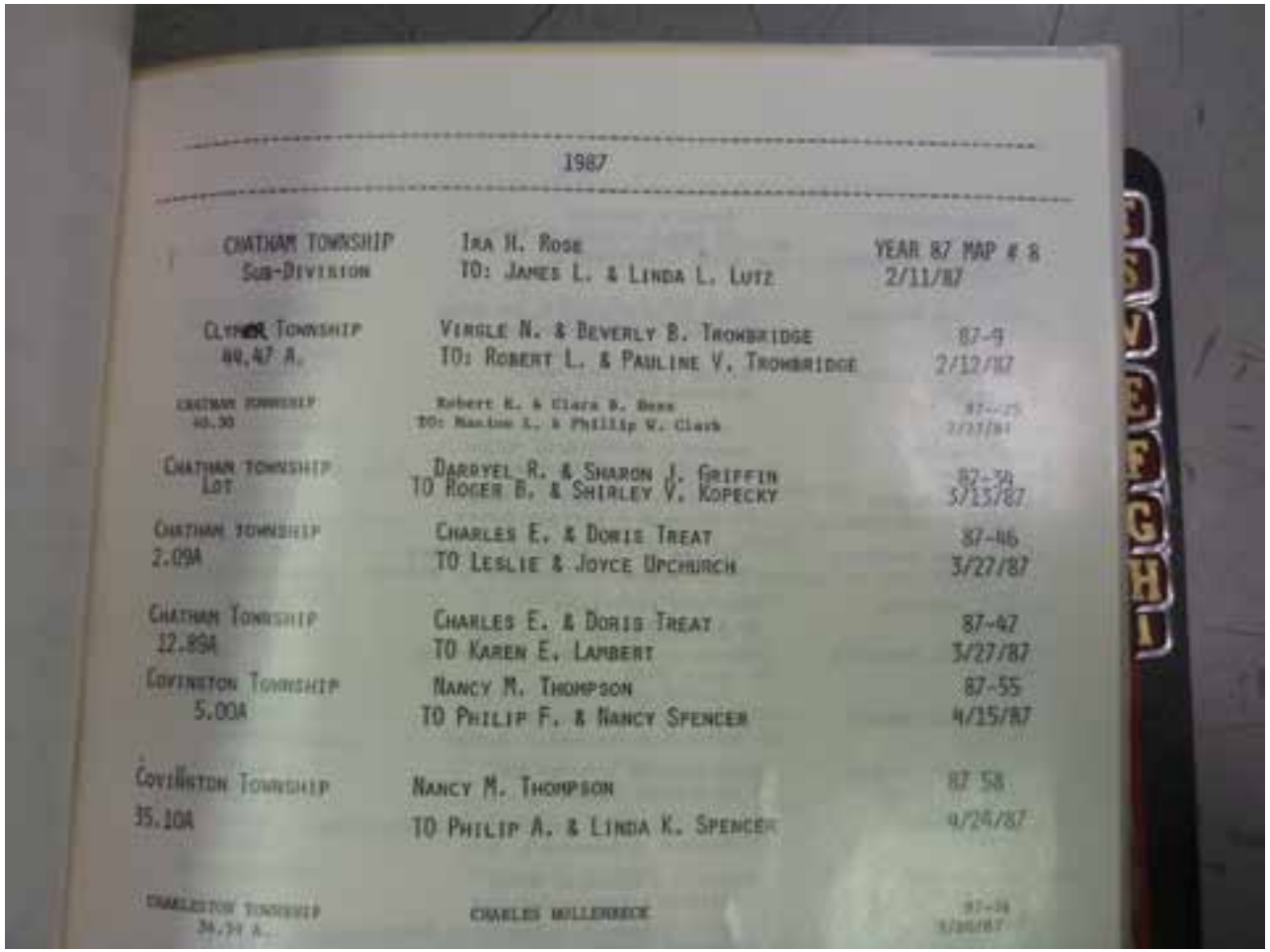
- **Recorder's Office – Survey Index Books**





V. Scope of Work: Documentation

- **Survey Index Books – Index by Township/Boro**

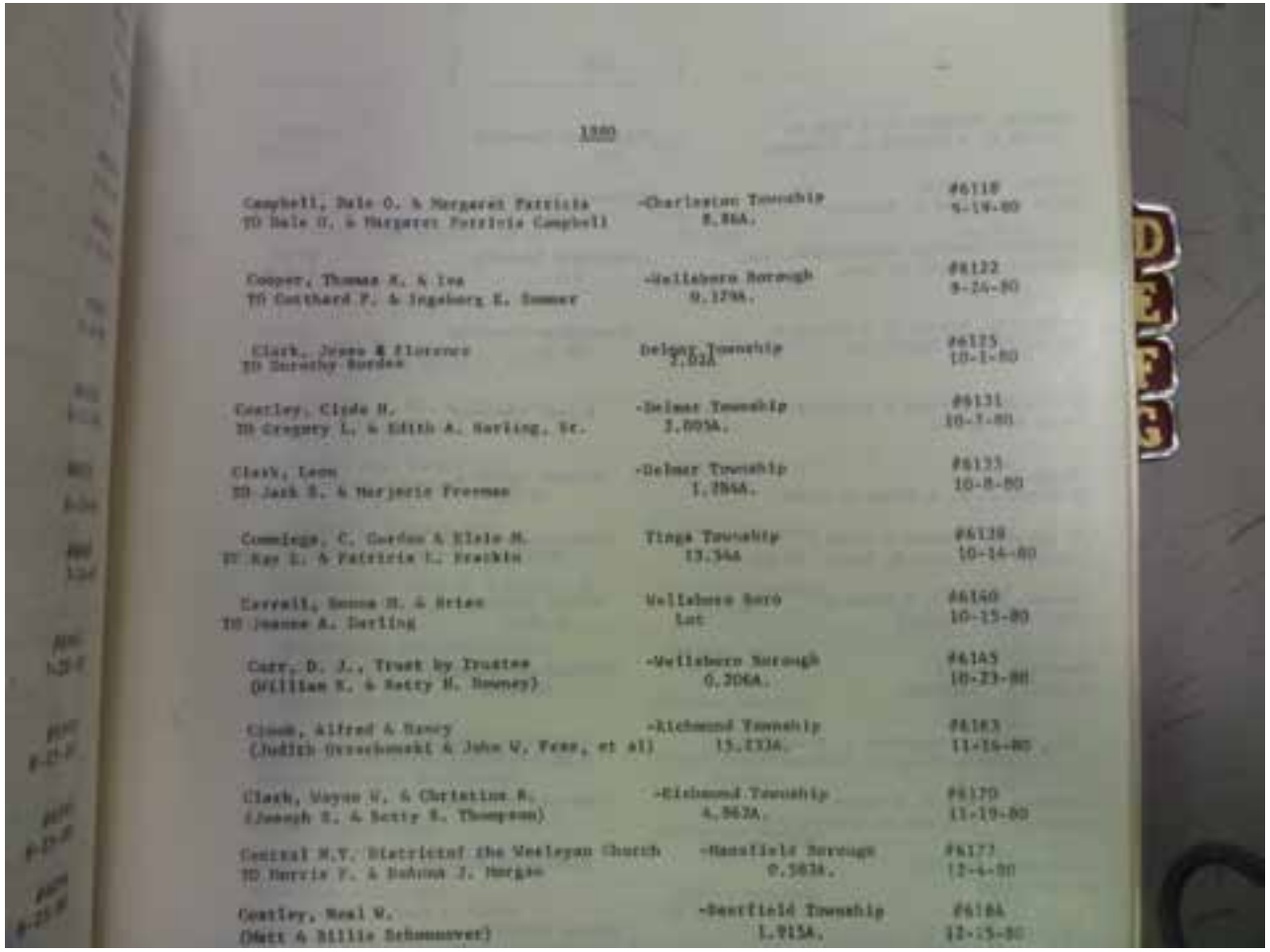


1987

CHATHAM TOWNSHIP SUB-DIVISION	IRA H. ROSE TO: JAMES L. & LINDA L. LUTZ	YEAR 87 MAP # & 2/11/87
CLINTON TOWNSHIP 40.47 A.	VIRGIL N. & BEVERLY B. TROWBRIDGE TO: ROBERT L. & PAULINE V. TROWBRIDGE	87-9 2/12/87
CHATHAM TOWNSHIP 40.30	Robert K. & Clara B. Bess TO: Marion L. & Phillip W. Clark	87-25 3/27/87
CHATHAM TOWNSHIP LOT	DARRYEL R. & SHARON J. GRIFFIN TO ROGER B. & SHIRLEY V. KOPECKY	87-39 3/13/87
CHATHAM TOWNSHIP 2.09A	CHARLES E. & DORIS TREAT TO LESLIE & JOYCE UPCHURCH	87-46 3/27/87
CHATHAM TOWNSHIP 12.89A	CHARLES E. & DORIS TREAT TO KAREN E. LAMBERT	87-47 3/27/87
COVINGTON TOWNSHIP 5.00A	NANCY M. THOMPSON TO PHILIP F. & NANCY SPENCER	87-55 4/15/87
COVINGTON TOWNSHIP 35.10A	NANCY M. THOMPSON TO PHILIP A. & LINDA K. SPENCER	87 58 4/24/87
CHARLESTON TOWNSHIP 34.31 A.	CHARLES MILLENBECK	87-34 3/30/87

V. Scope of Work: Documentation

- **Survey Index Books – Index by Owner Name**

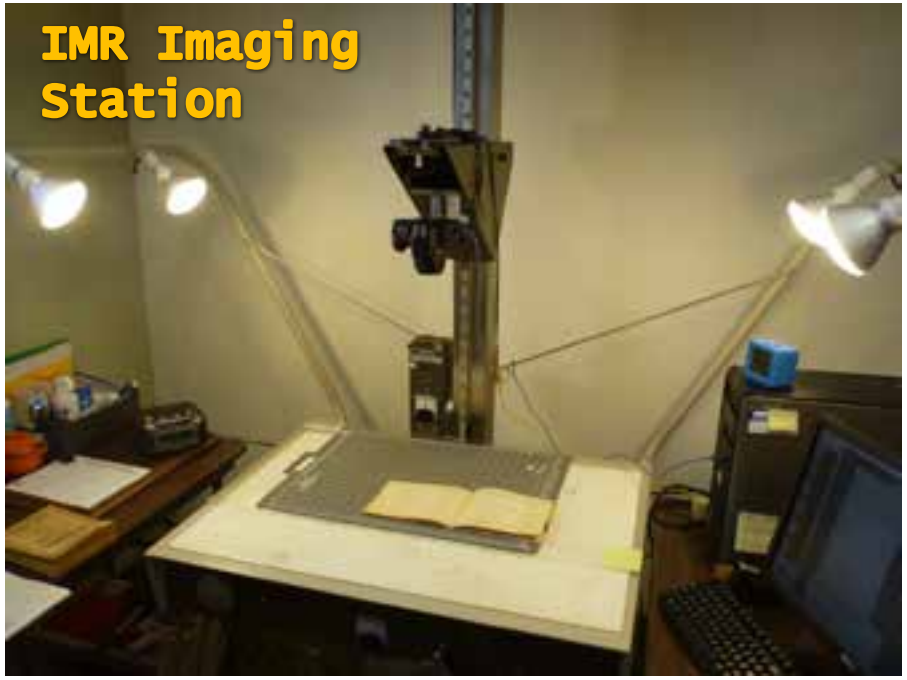


1980

Campbell, Dale O. & Margaret Patricia TO Dale O. & Margaret Patricia Campbell	-Charleston Township 8.86A.	#6118 6-14-80
Cooper, Thomas K. & Iva TO Gotthard F. & Ingeborg E. Sommer	-Wellsboro Borough 0.179A.	#6122 9-24-80
Clark, Jesse W & Florence TO Dorothy Gordon	Delmar Township 2.02A	#6125 10-1-80
Costley, Clyde H. TO Gregory L. & Edith A. Darling, Sr.	-Delmar Township 3.005A.	#6131 10-7-80
Clark, Leon TO Jack E. & Marjorie Freeman	-Delmar Township 1.284A.	#6133 10-8-80
Cummings, C. Gordon & Elsie M. TO Ray L. & Patricia L. Frankin	Tioga Township 13.54A	#6138 10-14-80
Carvell, Donna M. & Brian TO Joanne A. Darling	Wellsboro Boro Lot	#6140 10-15-80
Carr, D. J., Trust by Trustee (William E. & Betty H. Downey)	-Wellsboro Borough 0.206A.	#6145 10-23-80
Crook, Alfred & Nancy (Judith Orzechowski & John W. Fess, et al)	-Richmond Township 13.23A.	#6163 11-14-80
Clark, Wayne H. & Christine R. (Joseph E. & Betty E. Thompson)	-Richmond Township 4.963A.	#6170 11-19-80
Central N.Y. District of the Wesleyan Church TO Harris F. & Bobbie J. Morgan	-Mansfield Borough 0.583A.	#6177 12-4-80
Costley, Neal W. (Matt & Billie Schoonover)	-Deerfield Township 1.915A.	#6184 12-15-80

V. Scope of Work: Documentation

- **Survey Index Books – Scanning Options**



V. Scope of Work: Documentation

- **Sidwell Pilot Project Proposal.**

PROFESSIONAL SERVICES AGREEMENT

For

TIOGA COUNTY, PA

1. Sidwell agrees that information provided by Tioga County including copies of deeds, subdivision maps, surveys, index books, tax maps, assessment records, and any other records of pertinence will be used exclusively for completing this project; and that the information is being provided to Sidwell for the sole purpose of completing afore mentioned project as outlined in this professional services agreement.

2. The Sidwell Company also agrees that they will not sell or distribute any digital data, documents or other types of information provided by Tioga County applicable to this project. The Sidwell Company may release the data to a 3rd party for additional provision of services as they deem necessary during the course of the project. However, said company shall also be responsible for holding any 3rd party entities responsible for the disclaimer stipulations and liabilities as outlined in this section.

3. It is understood that all GIS, tabular, and digital ortho-photo data is the exclusive property of Tioga County and that Sidwell is prohibited from using said data for any other purpose than to fulfill the terms of this Agreement without the expressed written consent of the County.

V. Scope of Work: Discussion

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Discussion & Conclusion

SECTION 6

VI. Discussion & Conclusion

- **Pros**
  - Ownership parcel lines will accurately match other GIS layers, e.g. updated imagery.
    -
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    -
    -
  - Businesses that rely on accurate parcel data.
    -
    -
    -

VI. Discussion & Conclusion

- **Pros**
  -
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  -
  -

VI. Discussion & Conclusion

- **Pros**
  - Increasing revenue.
    -
    -
  - Staff efficiency.
    -
    -

VI. Discussion & Conclusion

- **Cons**
  -
  -
  -

VI. Discussion & Conclusion

- **Question and Answer:**
  -
  -
  -
  -

VI. Discussion & Conclusion

- **Question and Answer**
  - **What are the advantages for other Departments within the County?**
    -
    -
    -

VI. Discussion & Conclusion

- **Question and Answer**
  - **What are the advantages for the County's municipalities.**
    -
    -

VI. Discussion & Conclusion

- **Question and Answer**
  - **How will this benefit the general public and citizenry?**
    -
    -
    -

Current Project Status

- **Pilot Project Completed**
  -
  -
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Current Project Status

What we learned…

End Presentation

THANK YOU