Using Survey123 and ArcGIS Pro to Calculate Areas of Potential Effects (APE) for Historical Sites

Presented by
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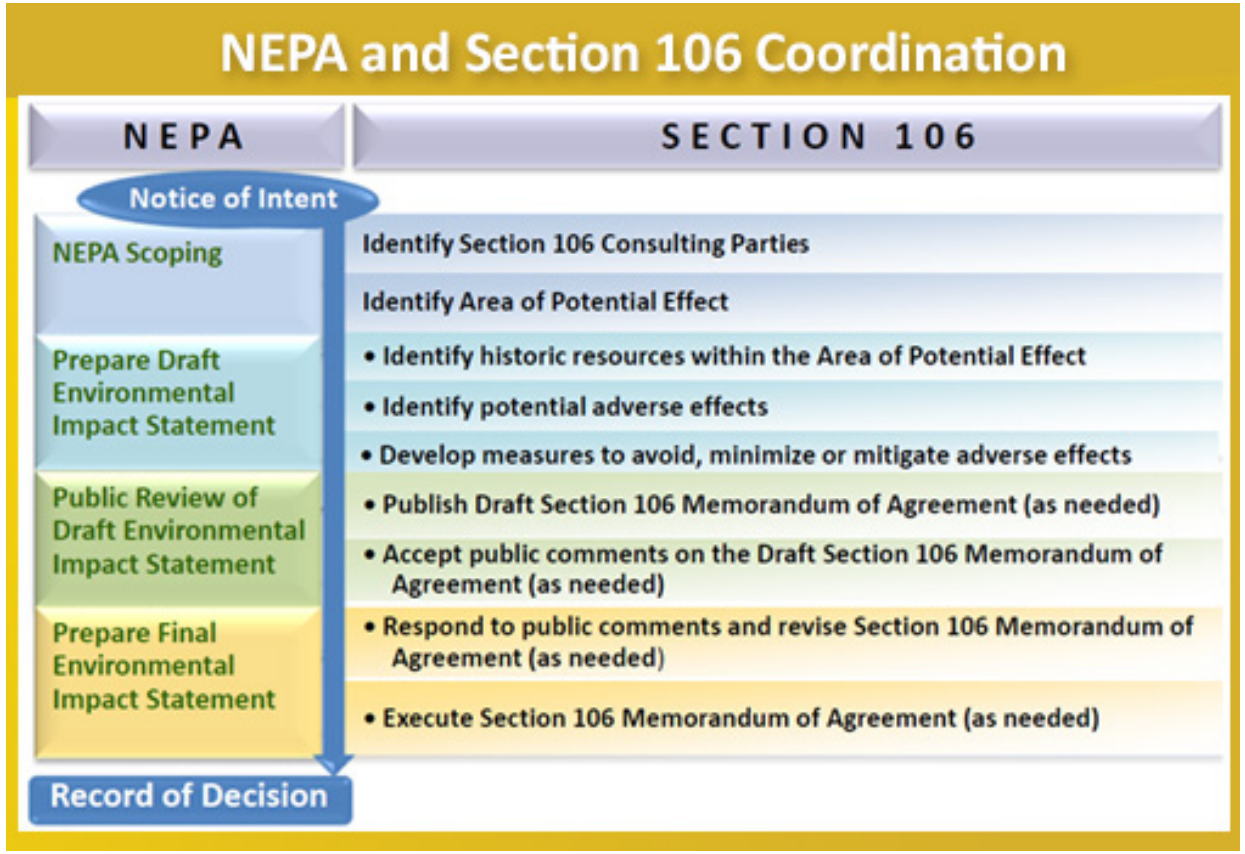
Overview

- Project History
- Integrating Survey123 with WebApp Builder
- Setting up ArcGIS Pro Tasks
- Generating Reports and Disseminating Data

Project History

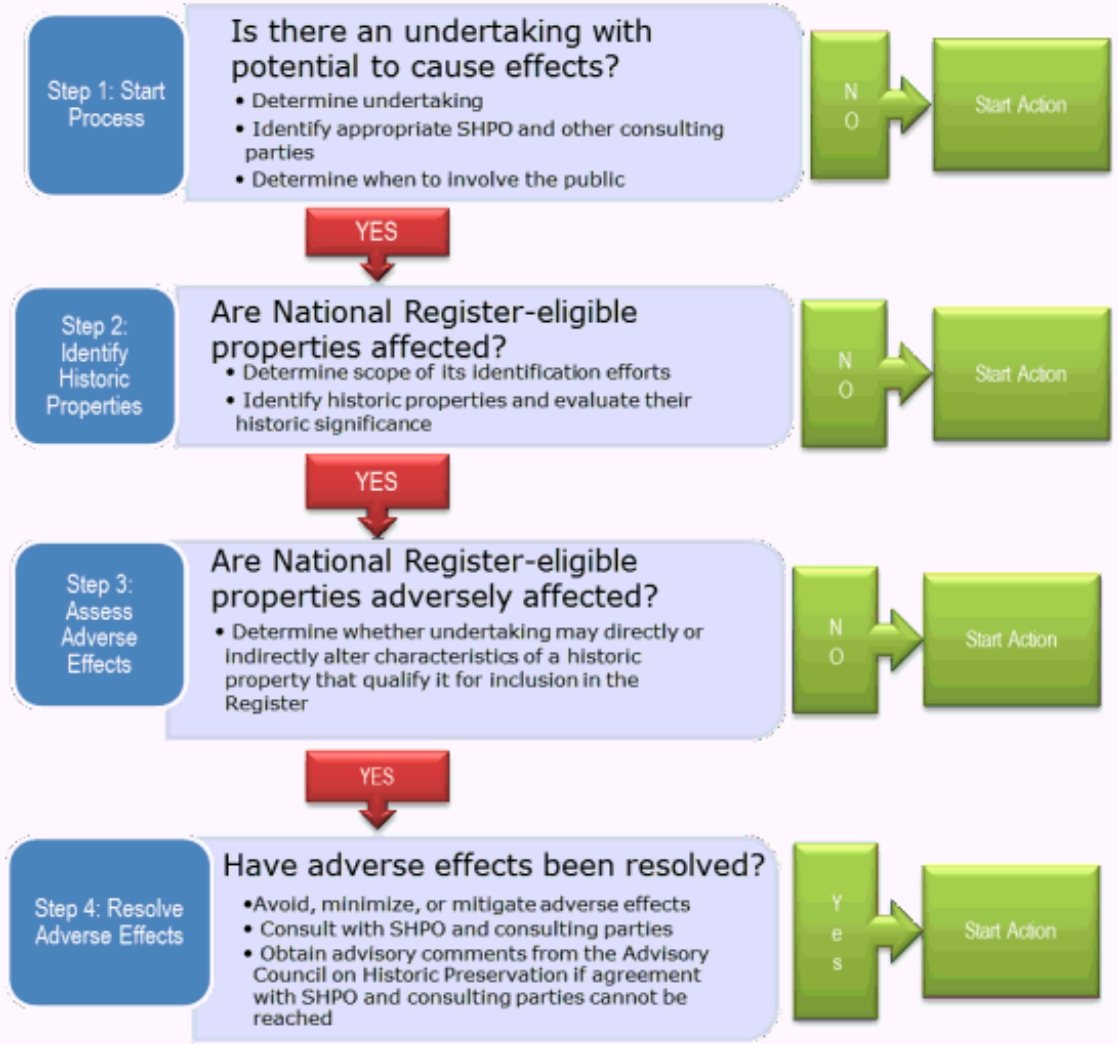
Project History

- Section 106 of the National Historic Preservation Act
- Determine Historic Parcels within APE
- New modified approach to identify APE was agreed on by Federal Highways Administration (FHWA), Georgia Department of Transportation (GDOT), and Georgia State Historic Preservation Officer (GA SHPO)



Workflows

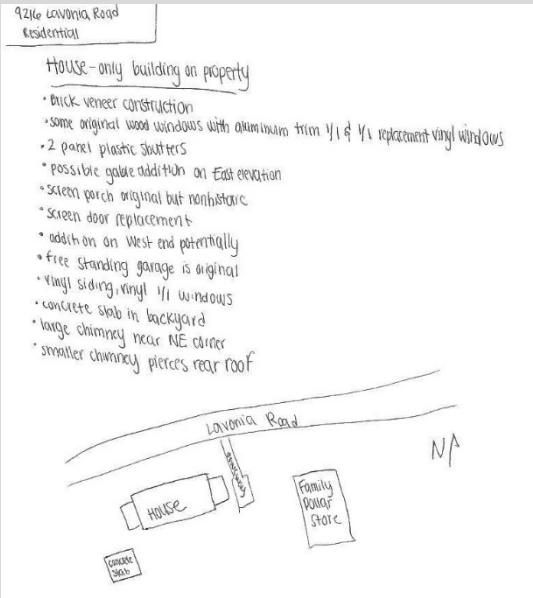
- Collect information about a property
- Initially was done on paper - was not a location based process
- Post processing included using the Measure tool in Google Earth or ArcMap (Could take months to complete the entire process)

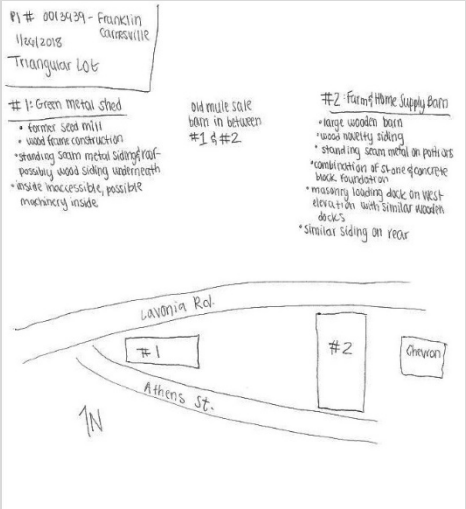


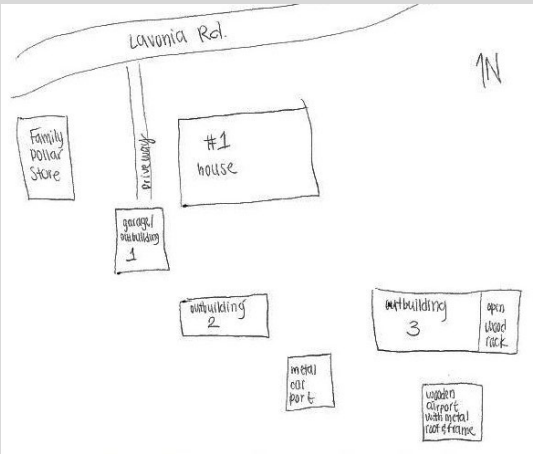
Previous Collection Efforts

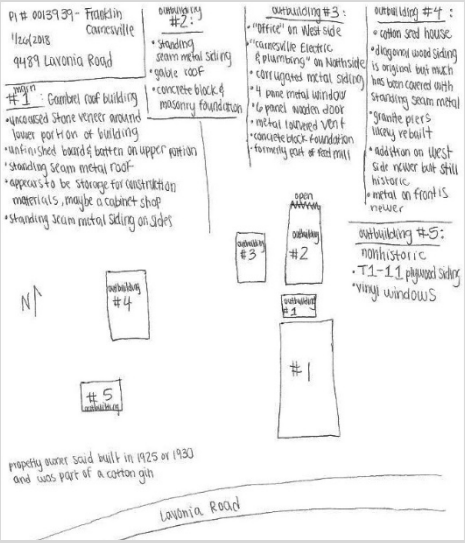
- Prior to having GIS involved, the field teams used hand drawings to layout their notes
- Problems:
  - Field notes can go missing or get damaged
  - Can be illegible
  - Not location based
- Surveyed points would be required by a surveyor to evaluate the potential impact calculations
- If a surveyor wasn't available, points were digitized from an aerial – which skews the accuracy of the data

Post-process would take about 50-60 hours to complete









Using a GIS Solution for Data Collection

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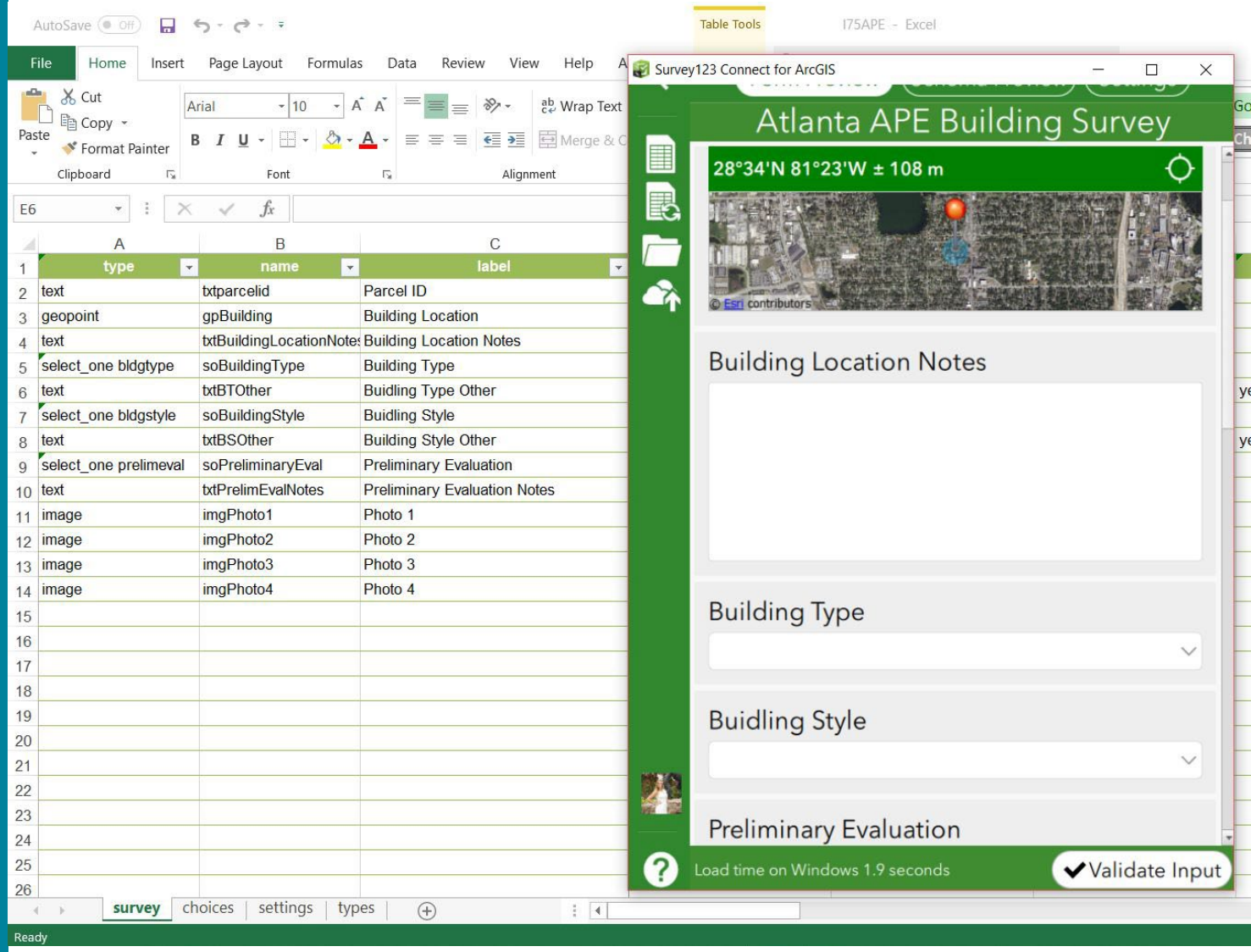
Using a GIS Solution for Data Collection

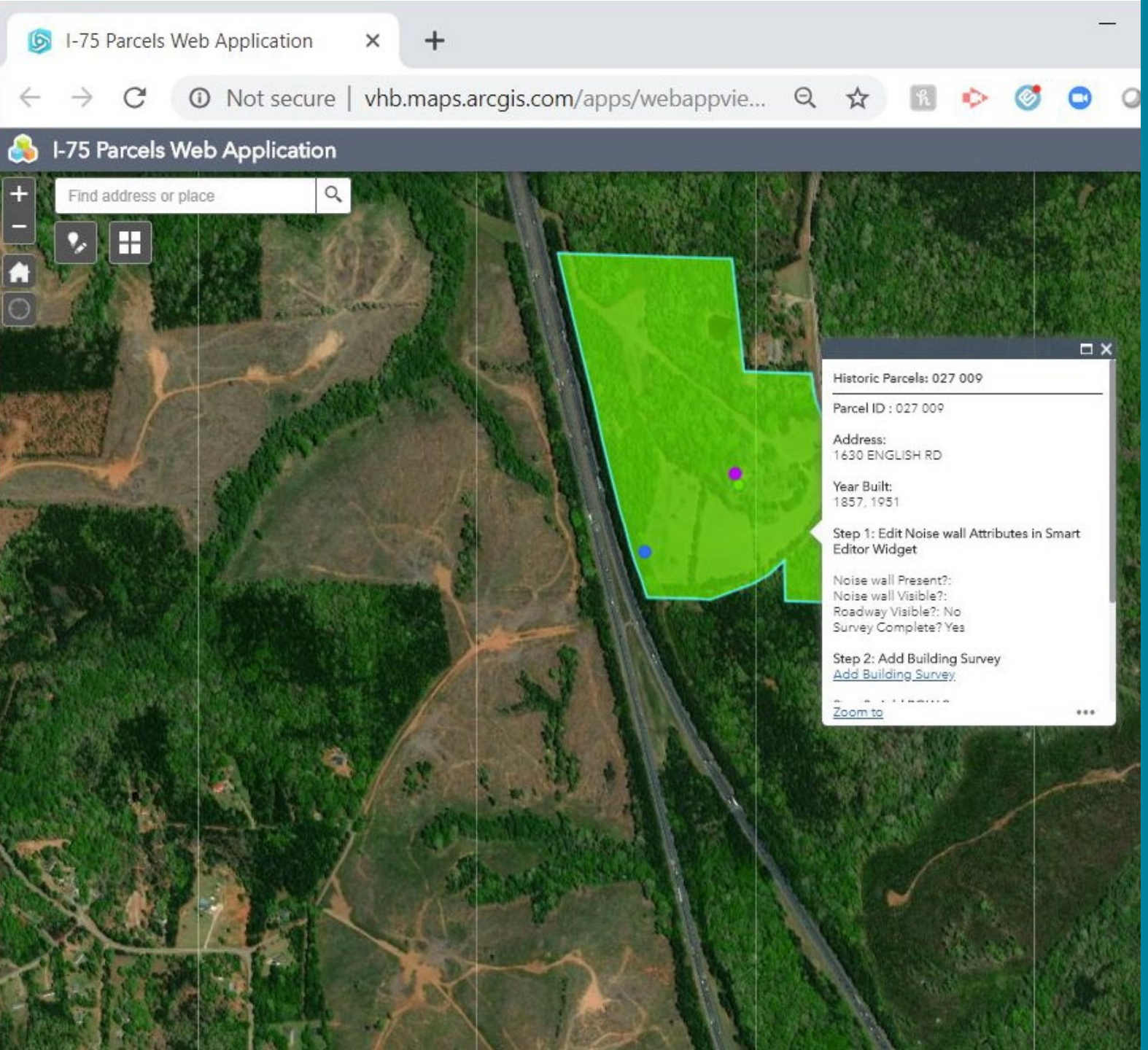
- The team needed to collect the information
  - About the Historic Parcel
  - Building Surveys
  - ROW Surveys
  - Feature Surveys
- Used an integration of Survey123 within a webapp to collect data and update attribute data
- Streamlined the calculation and output processes to reduce time and produce a high quality product

Set up Surveys using SurveyConnect

- Survey123 was set up to collect information the field team would typically take notes on paper
- At least three survey forms were needed for each property
- The surveys were built through SurveyConnect using an excel spreadsheet
  - They contained questions with built in logic, domains, a point location, and had the ability to take photos

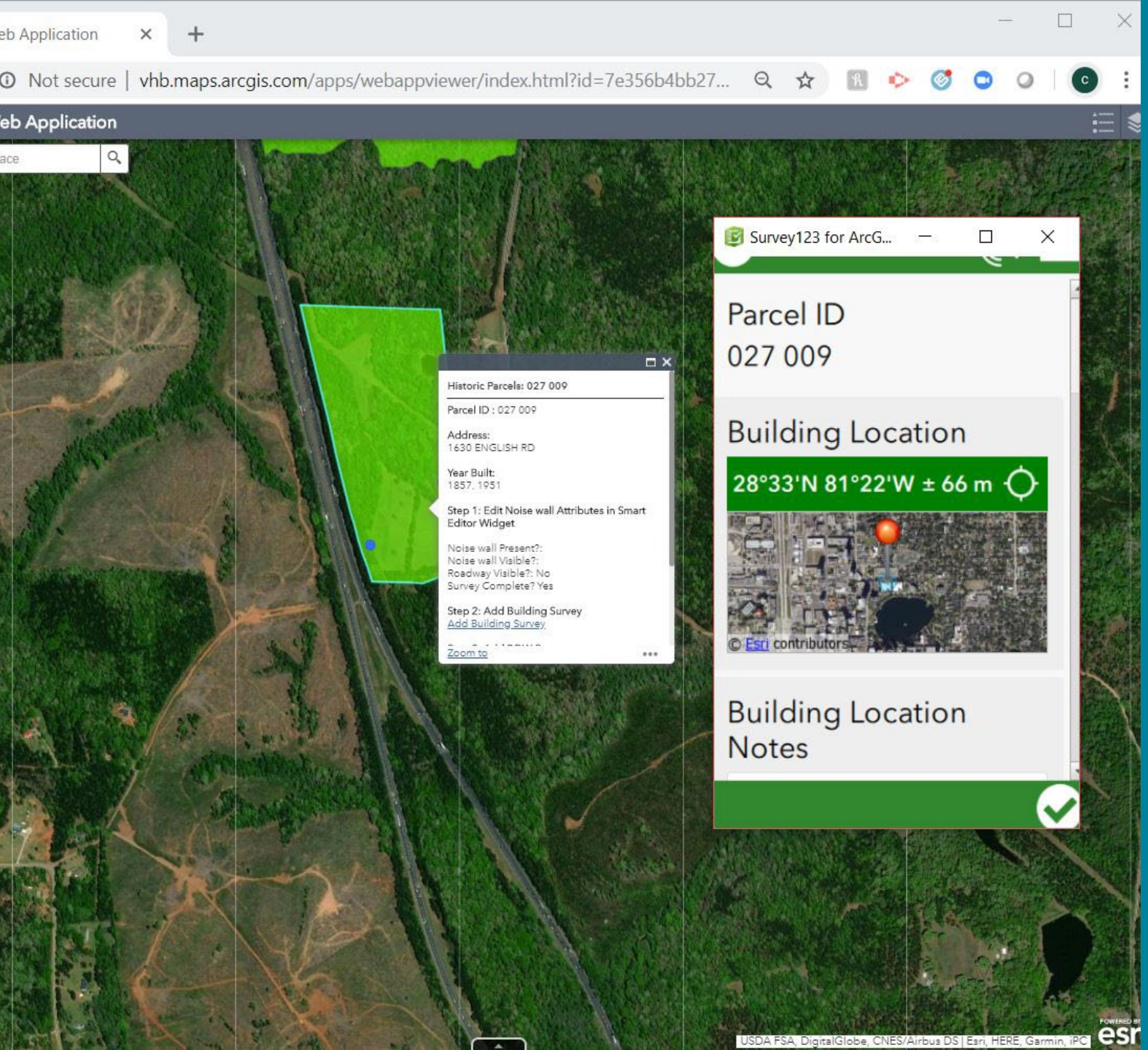


type	name	label
text	txtparcelid	Parcel ID
geopoint	gpBuilding	Building Location
text	txtBuildingLocationNotes	Building Location Notes
select_one bldgtype	soBuildingType	Building Type
text	txtBTOther	Buidling Type Other
select_one bldgstyle	soBuildingStyle	Buidling Style
text	txtBSOther	Building Style Other
select_one prelimeval	soPreliminaryEval	Preliminary Evaluation
text	txtPrelimEvalNotes	Preliminary Evaluation Notes
image	imgPhoto1	Photo 1
image	imgPhoto2	Photo 2
image	imgPhoto3	Photo 3
image	imgPhoto4	Photo 4



Using Survey123 within WebApp Builder

- Through WebApp Builder, we configured the pop-up to outline the steps for the data collection process
- Steps directed the user to access specific surveys for each property
- Steps also walk the user through the process of updating the attributes about the property

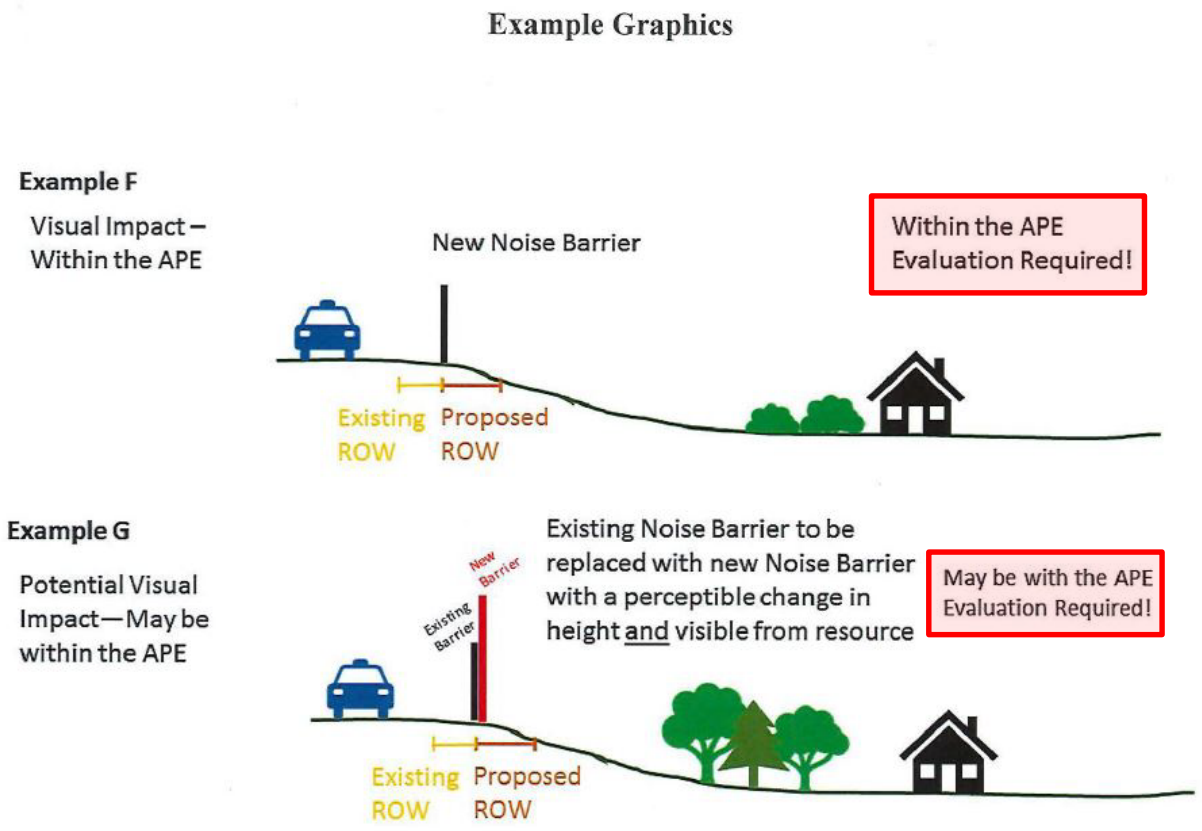


Using Survey123 within WebApp Builder

- The parcel id was passed to the “Parcel” field in each survey form through webapp builder
  - Reducing the risk of keystroking the wrong id in the field
- Survey123 opens from clicking the hyperlink
- Survey points display in web-app after survey is submitted

Post-processing the Data Collected

- After the surveys were complete, the analysis began
- Historians needed to know the visual impact of the historic site based on the presence of a noise wall
- If a noise wall is present but not visible, it is included in the APE
- If the noise wall is present AND is visible, it is not in the APE



Performing Calculations

- Historians needed to know the percent of encroachment of a proposed ROW versus the existing ROW
- If the percent of change is 25% or greater, the property is considered in the APE as a physical impact
- Math calculations were run for each point collected, for every site
- Updates in proposed ROW meant they would need to re-calculate

Determining the Distance – Example 1

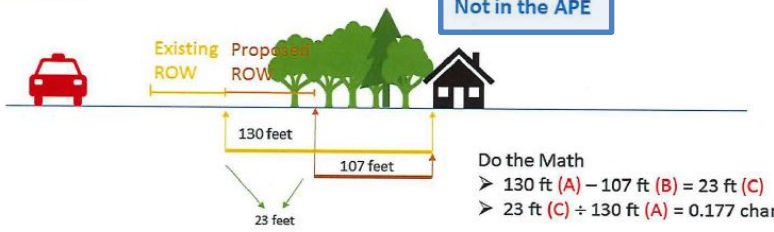
(A) Distance from Existing ROW to Feature – (B) Distance from Proposed ROW to Feature = (C) X ft change

(C) X ft Change ÷ (A) Distance from Existing ROW to Feature = (D) % change

A - B = C
C ÷ A = D (%)

Is proposed ROW 25% Closer to a Structure? NO
Will Visual Buffer remain intact? Yes

Not in the APE



Do the Math
- 130 ft (A) – 107 ft (B) = 23 ft (C)
- 23 ft (C) ÷ 130 ft (A) = 0.177 change or 18% (D)

Determining the Distance – Example 2

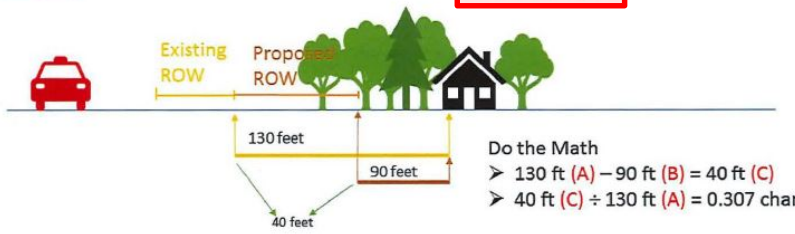
(A) Distance from Existing ROW to Feature – (B) Distance from Proposed ROW to Feature = (C) X ft change

(C) X ft Change ÷ (A) Distance from Existing ROW to Feature = (D) % change

A - B = C
C ÷ A = D (%)

Is proposed ROW 25% Closer to a Structure? Yes

Within the APE



Do the Math
- 130 ft (A) – 90 ft (B) = 40 ft (C)
- 40 ft (C) ÷ 130 ft (A) = 0.307 change or 31% (D)

Setting up ArcGIS Pro Tasks

Setting up ArcGIS Pro Tasks

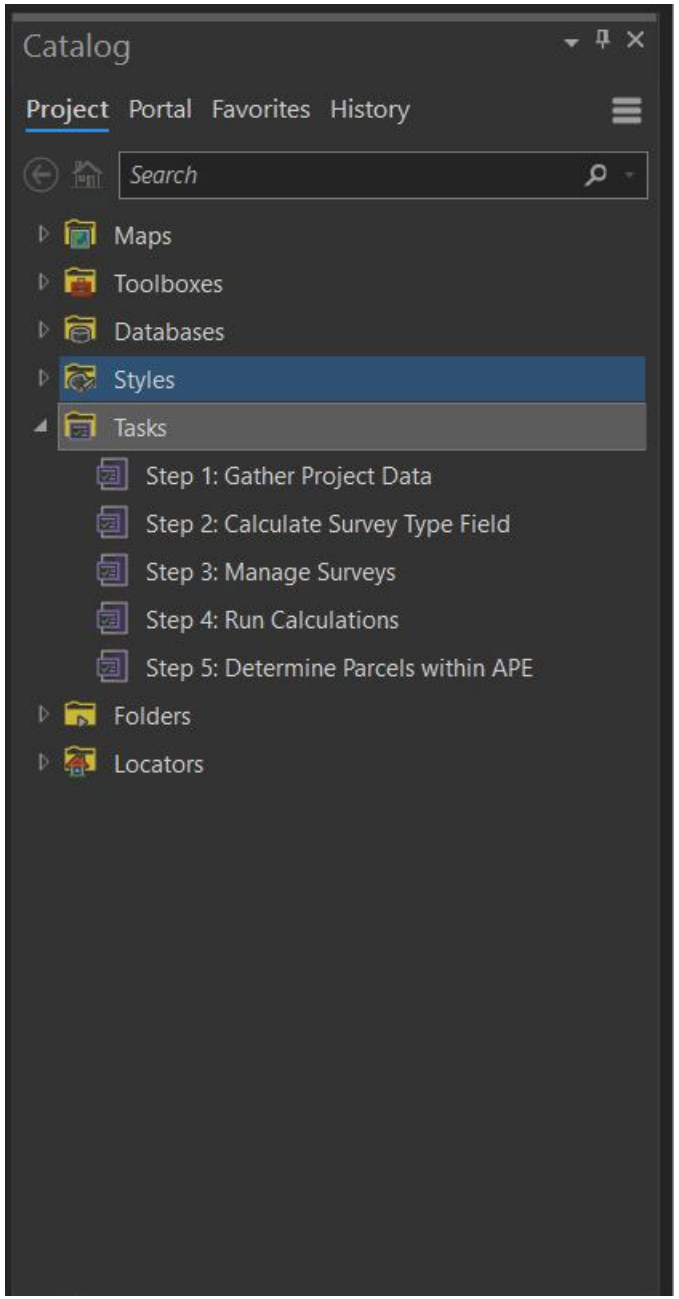
What is a task?

"A task is a set of preconfigured steps that guide you and others through a workflow or business process. A task can be used to implement a best-practice workflow, improve the efficiency of a workflow, or create a series of interactive tutorial steps."

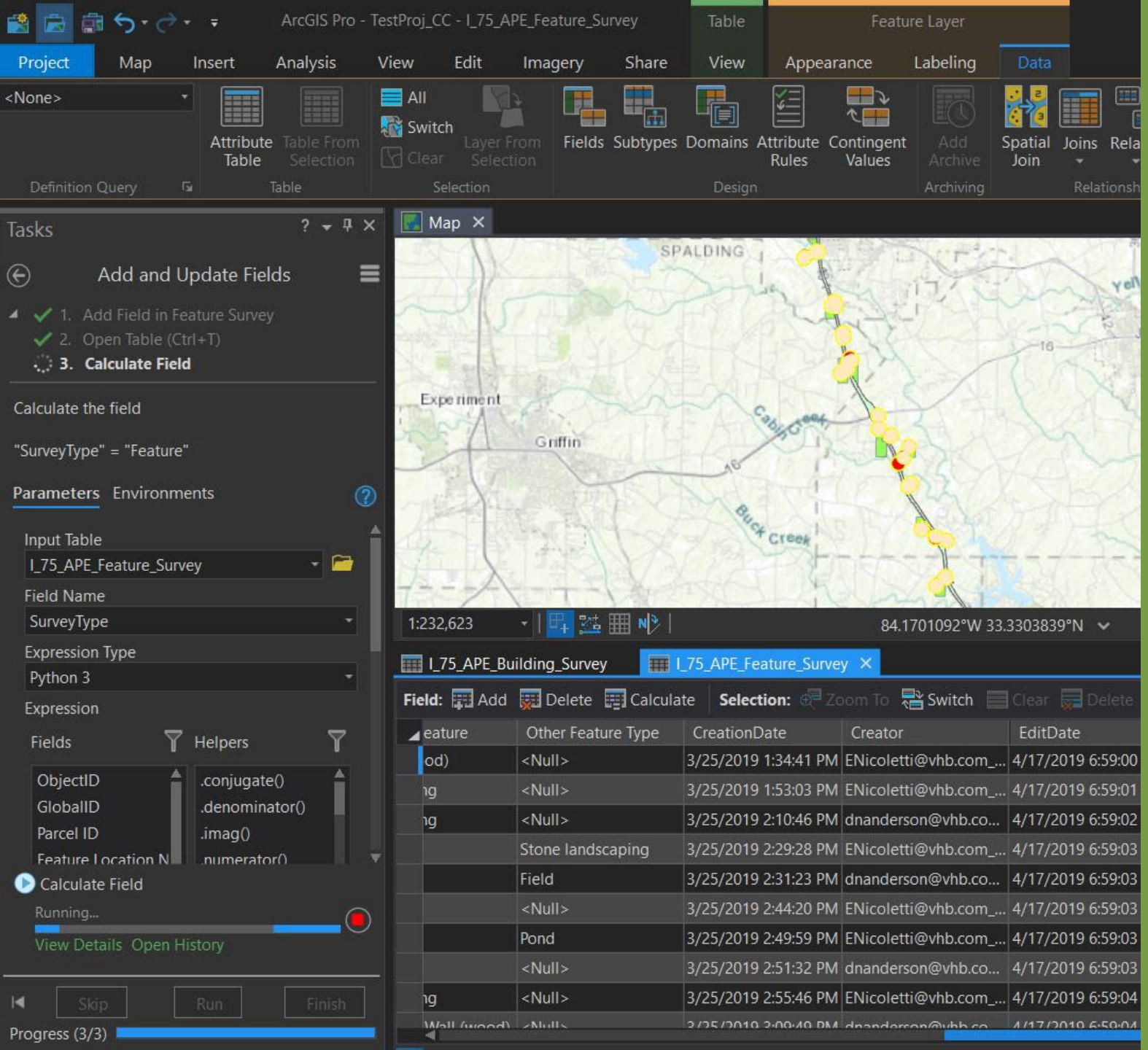
- Esri

Tasks vs. Model Builder

- Similar in concept, but have different capabilities
  - Tasks outline a workflow process
- Can be run multiple times, or has the option to skip the step
- ModelBuilder automates geoprocessing workflows
- ModelBuilder can be run within a Task

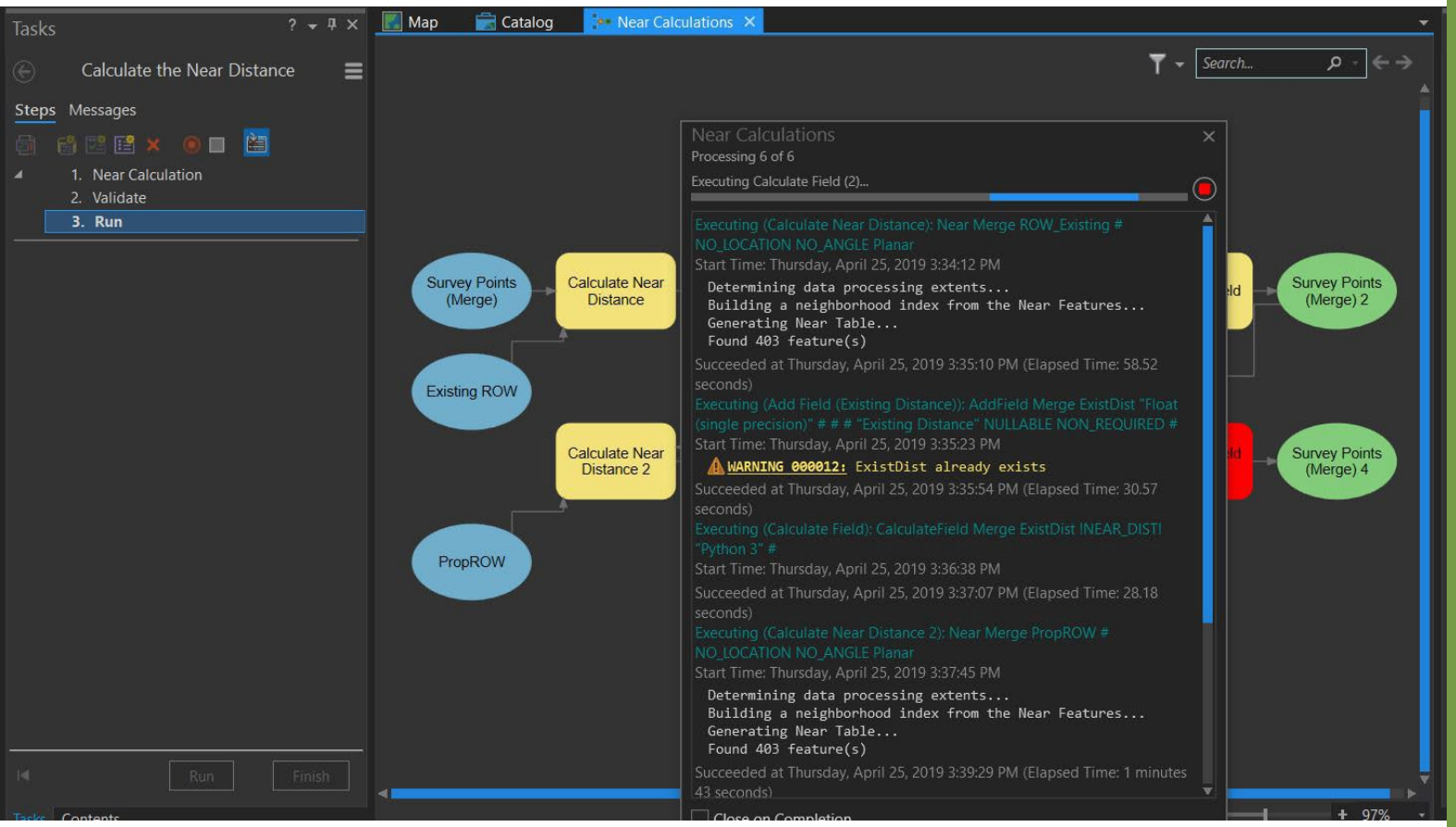


ArcGIS Pro Tasks



- Allows for the analysis process to be re-run
- Allows for more than one person to pick up the project and run the tasks
- Important with new parcels coming in/out of the study area
- Essential for updates to the proposed ROW and running the calculations

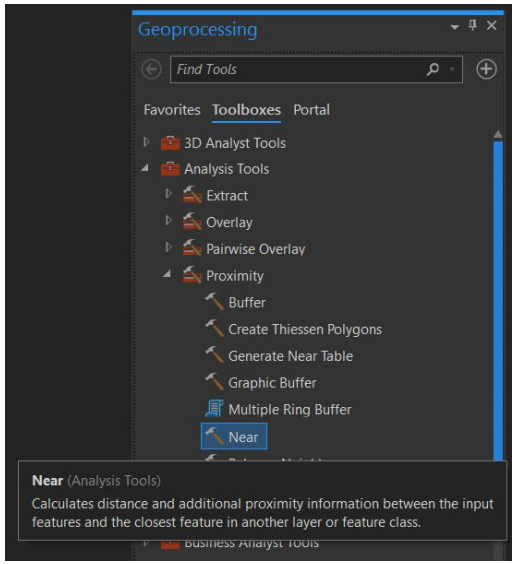
Model Builder within a Task

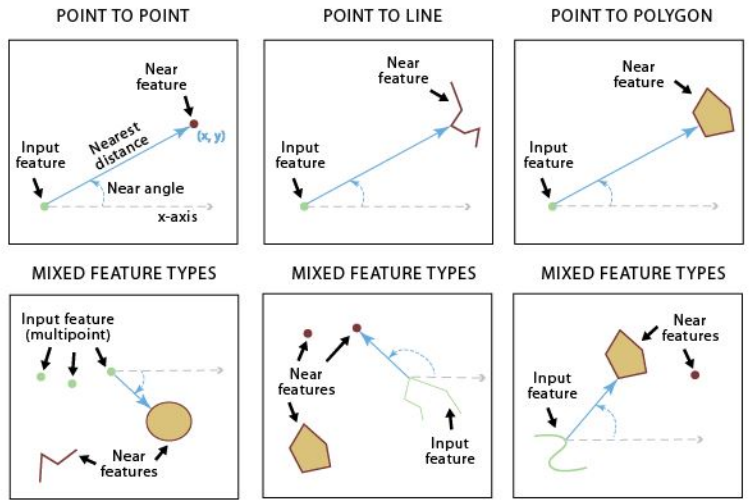


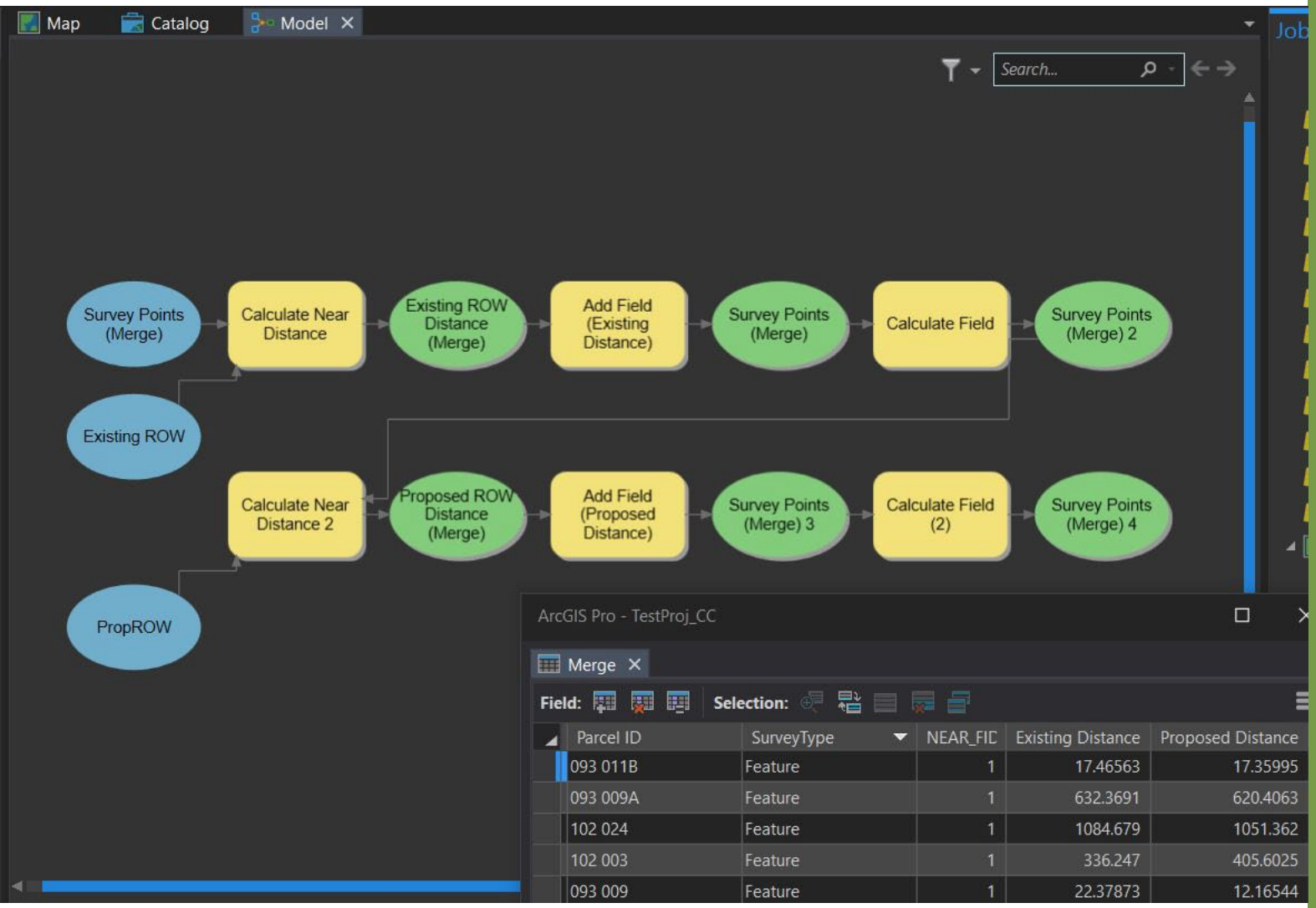
- Within step 4, a model runs the calculations to determine which surveys are closest to the ROW
- Calculates the percent of change of the ROW
- Then determines which parcels are within the APE

Using the ‘Near’ Function

- The Near function was used in a model to calculate the distance to
  - the existing ROW
  - the proposed ROW







Parcel ID	SurveyType	NEAR_FID	Existing Distance	Proposed Distance
093 011B	Feature	1	17.46563	17.35995
093 009A	Feature	1	632.3691	620.4063
102 024	Feature	1	1084.679	1051.362
102 003	Feature	1	336.247	405.6025
093 009	Feature	1	22.37873	12.16544

Running the Calculations

- The result of the model is a point feature class that contained
  - The type of survey that was being impacted for each parcel
  - The distance from the point to the existing ROW
  - The distance from the point to the proposed ROW
- Again, originally this was calculated one-by-one, by hand, using the measure tool in Google Earth or ruler in ArcMap

What once took 60 hours, can now be run in seconds!

Determining Which Parcels are Within the APE

- The parcels are considered to be within the APE if the new ROW is physically impacting or visually impacting the site.
  - Inside APE due to:
    - ROW calculations
    - Surveys located within proposed ROW
    - Noise wall presence/visibility

Generating Reports and Disseminating Data

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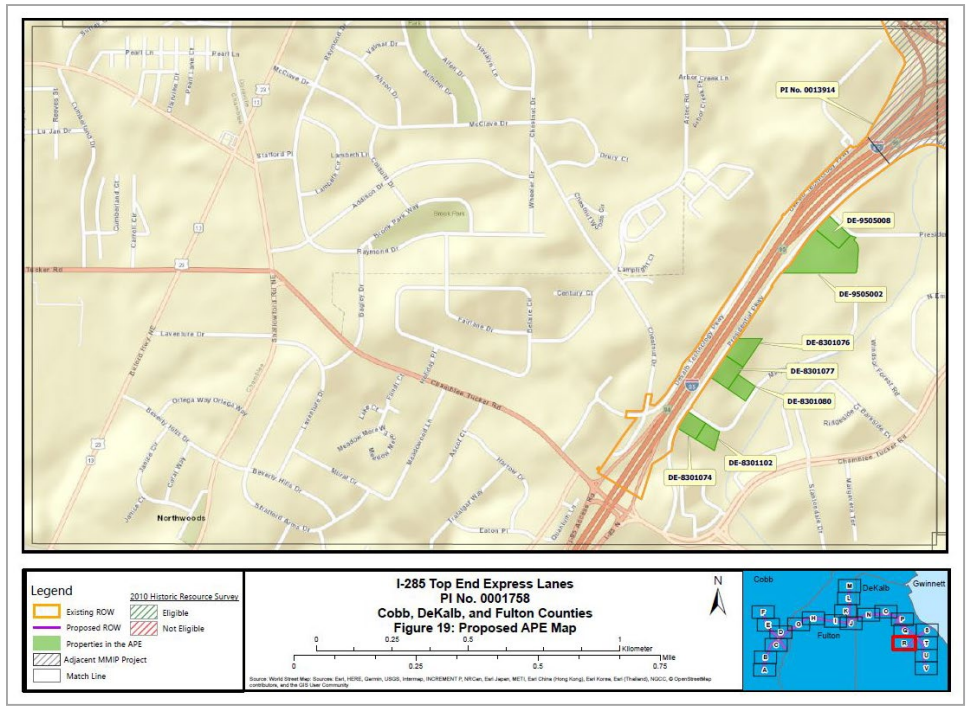
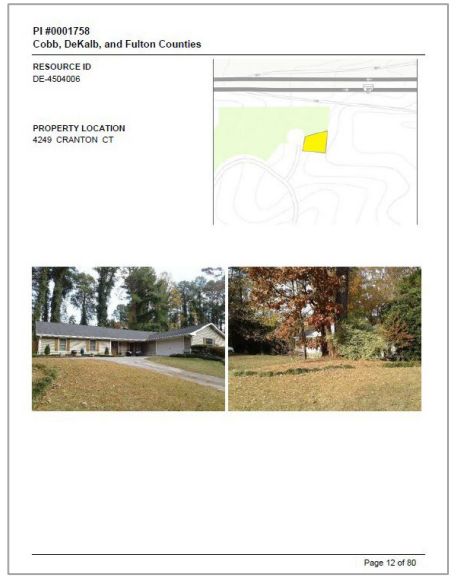
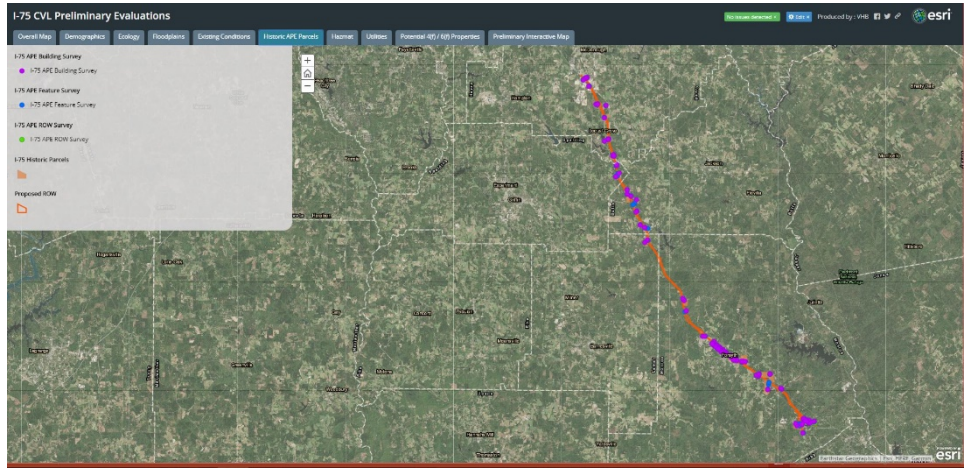
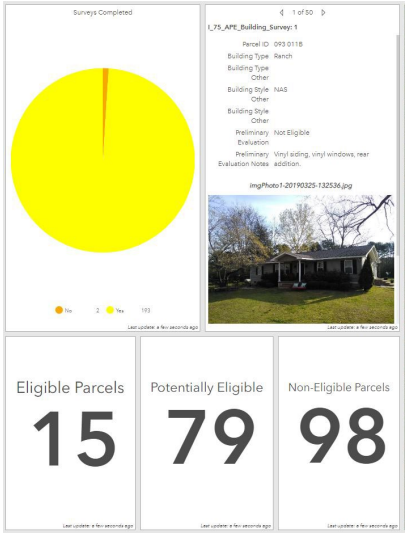
Generating Reports and Disseminating Data

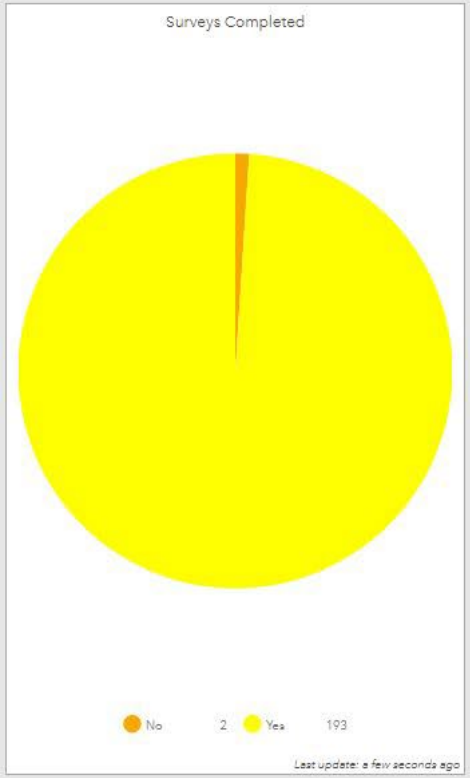
- Reports pull in information from the parcel feature class, building surveys, and ROW surveys
- Along with the physical submitted copy, a dashboard was also created to share with stakeholders
- Furthermore, this information was put into a story map to highlight all the impacts along the study corridor that the team collected using GIS











1 of 50

I_75_APE_Building_Survey: 1

Parcel ID	093 011B
Building Type	Ranch
Building Type Other	
Building Style Other	NAS
Building Style Other	
Preliminary Evaluation	Not Eligible
Preliminary Evaluation Notes	Vinyl siding, vinyl windows, rear addition.

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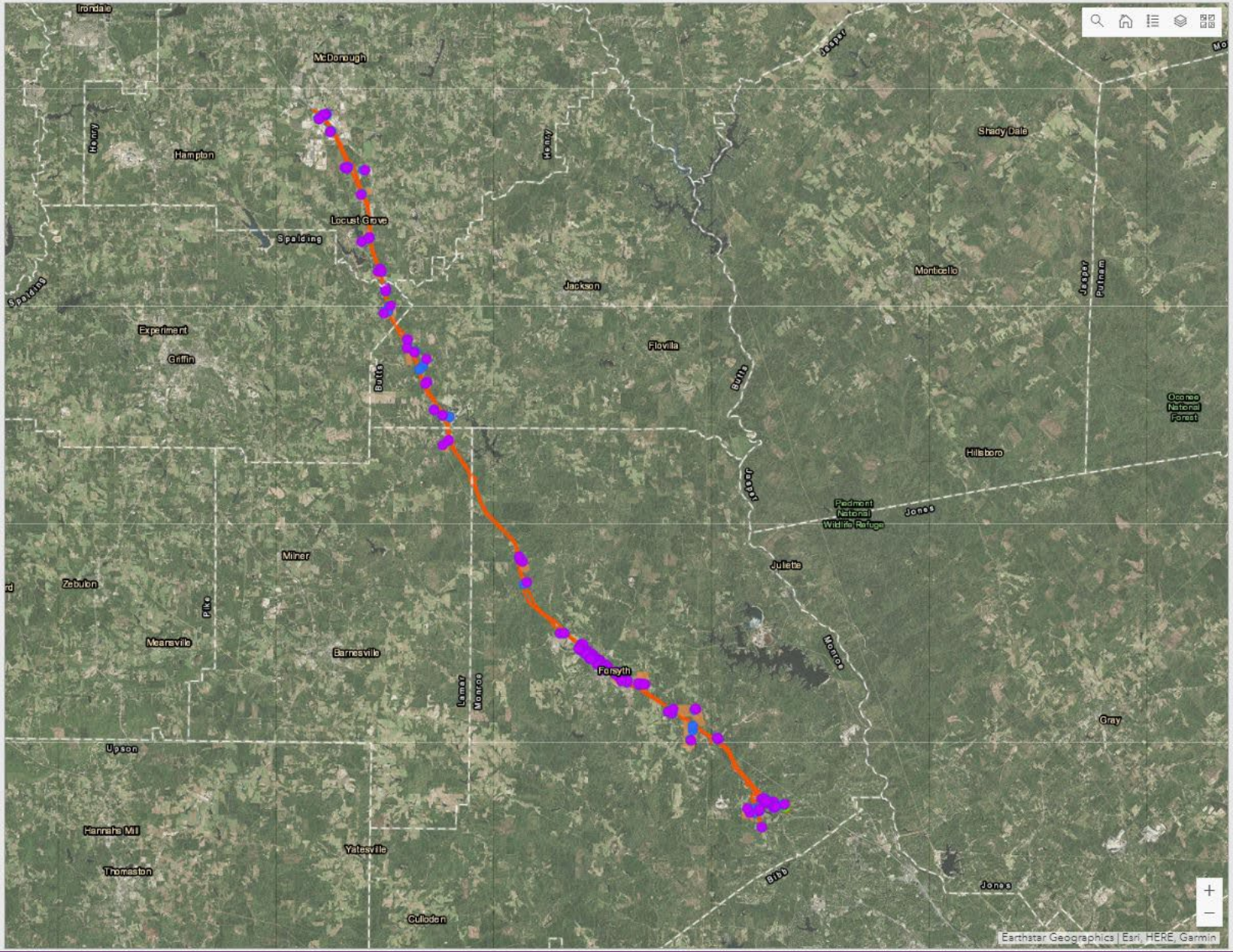

Eligible Parcels

15

Last update: a few seconds ago

Potentially Eligible

79

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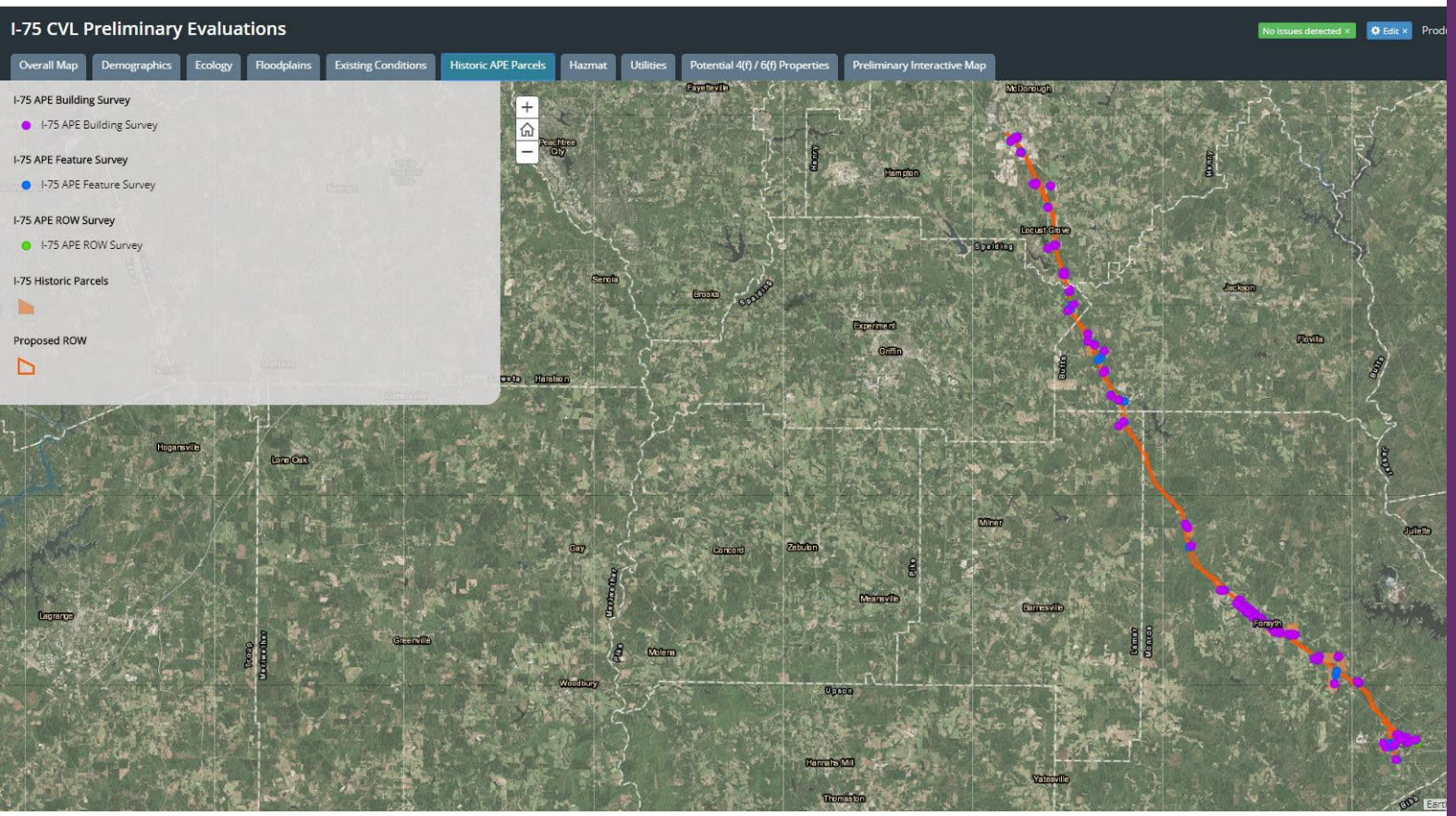
Non-Eligible Parcels

98

Last update: a few seconds ago

QA/QC Dashboard



Conclusion

- Using GIS has streamlined the data collection and post processing calculation efforts, and has also shown its value with displaying information to the stakeholders
- Post-collection efforts were displayed in a story map along with other field collection efforts
- A dashboard was also created to highlight how many surveys were collected and how many properties fell into the Historic APE

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