

FIRE STATION SUITABILITY AND NETWORK ANALYSIS



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OUTLINE

1 INTRODUCTION &
PROBLEM STATEMENT

2 DATA

3 METHODOLOGY

4 RESULTS & DISCUSSION

5 CONCLUSION

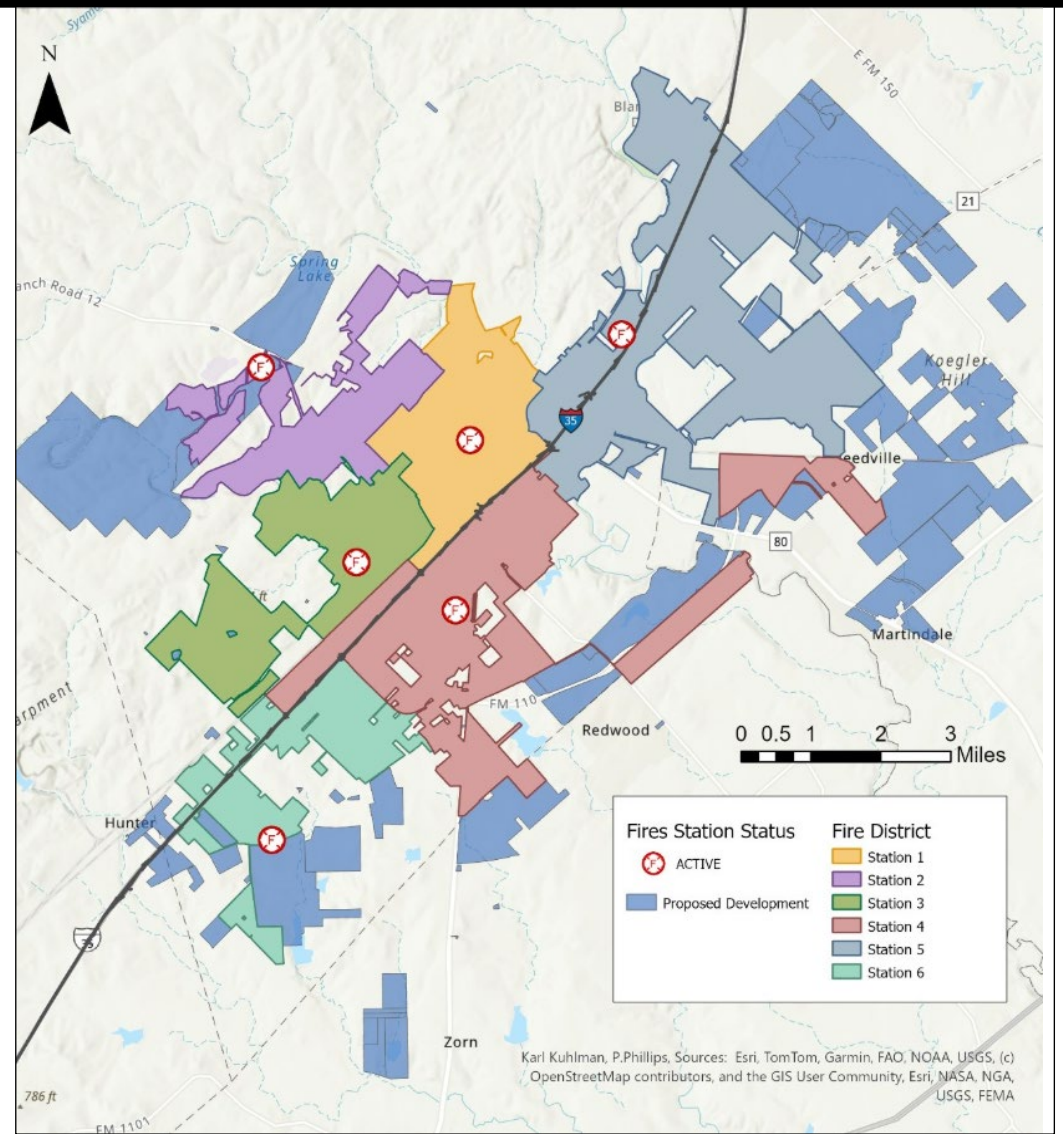
1 - INTRODUCTION

- NFPA - National Fire Protection Agency
 - 4 minutes, 90% of the time
- Informed analysis for future planning
- San Marcos -
 - 6 current fire stations
 - 1 planned
 - Population growth and proposed developments



1.1 INTRODUCTION

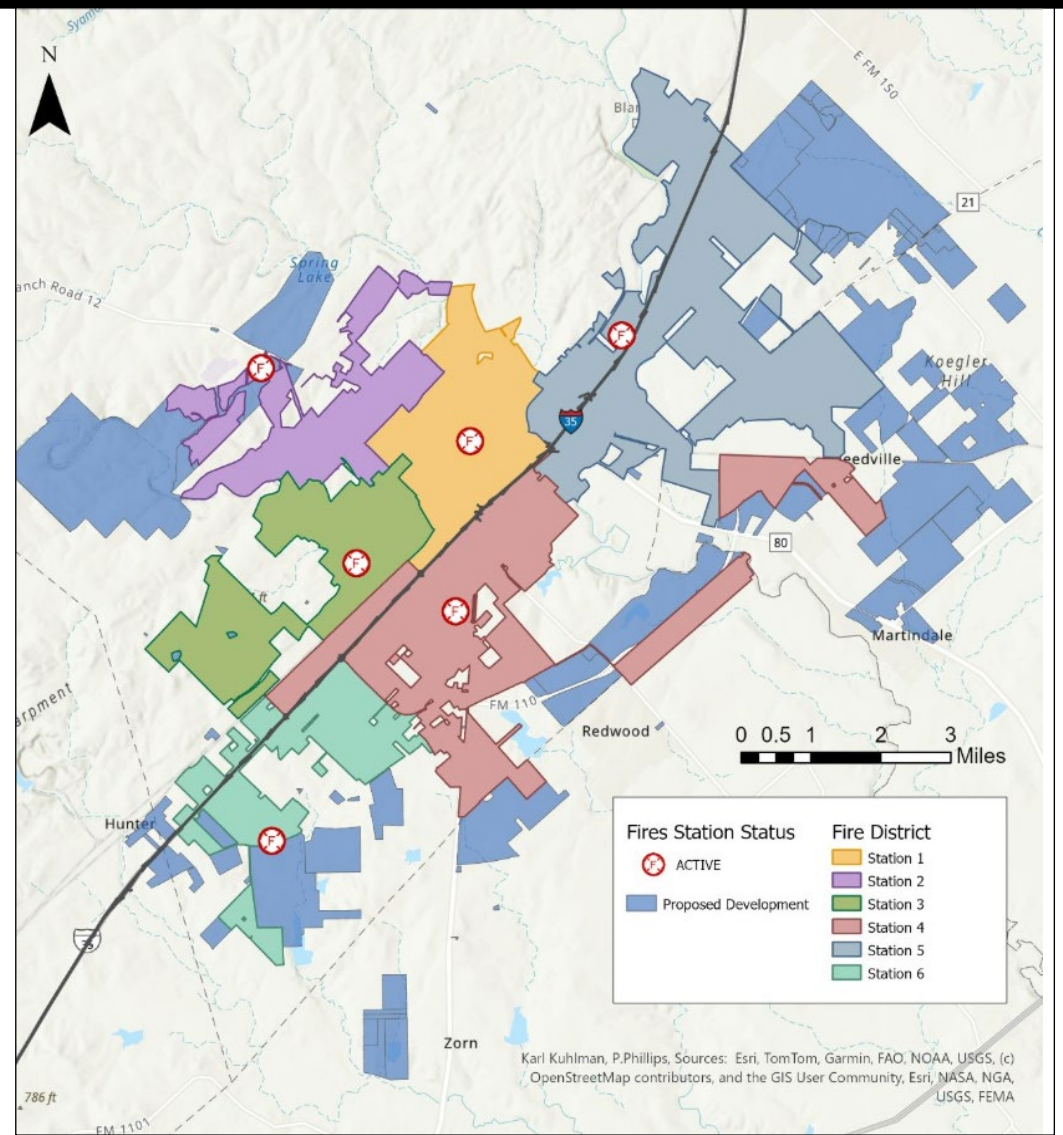
Scope – Current station locations and districts



1.2 PROBLEM STATEMENT

Finding the best location for a new fire station given:

- Irregular city limits
- Growing population & new development
- Limited resources
- NFPA standards
- Max impact



2 - DATA

- City of San Marcos (CoSM)
 - City Limits, Proposed Development, Road Network, Existing Stations, Proposed Station 7
- San Marcos Fire Department (SMFD)
 - Call data

Additional information sourced from NFPA,
TxDOT, U.S Census & USGS



3 - METHODOLOGY

3.1- Coverage Analysis



- Network analyst tools
- Drive time attributes
- Identification of coverage gaps

3.2 – District Remapping



- Improve coverage
- Remove split streets



3.3- Site Selection

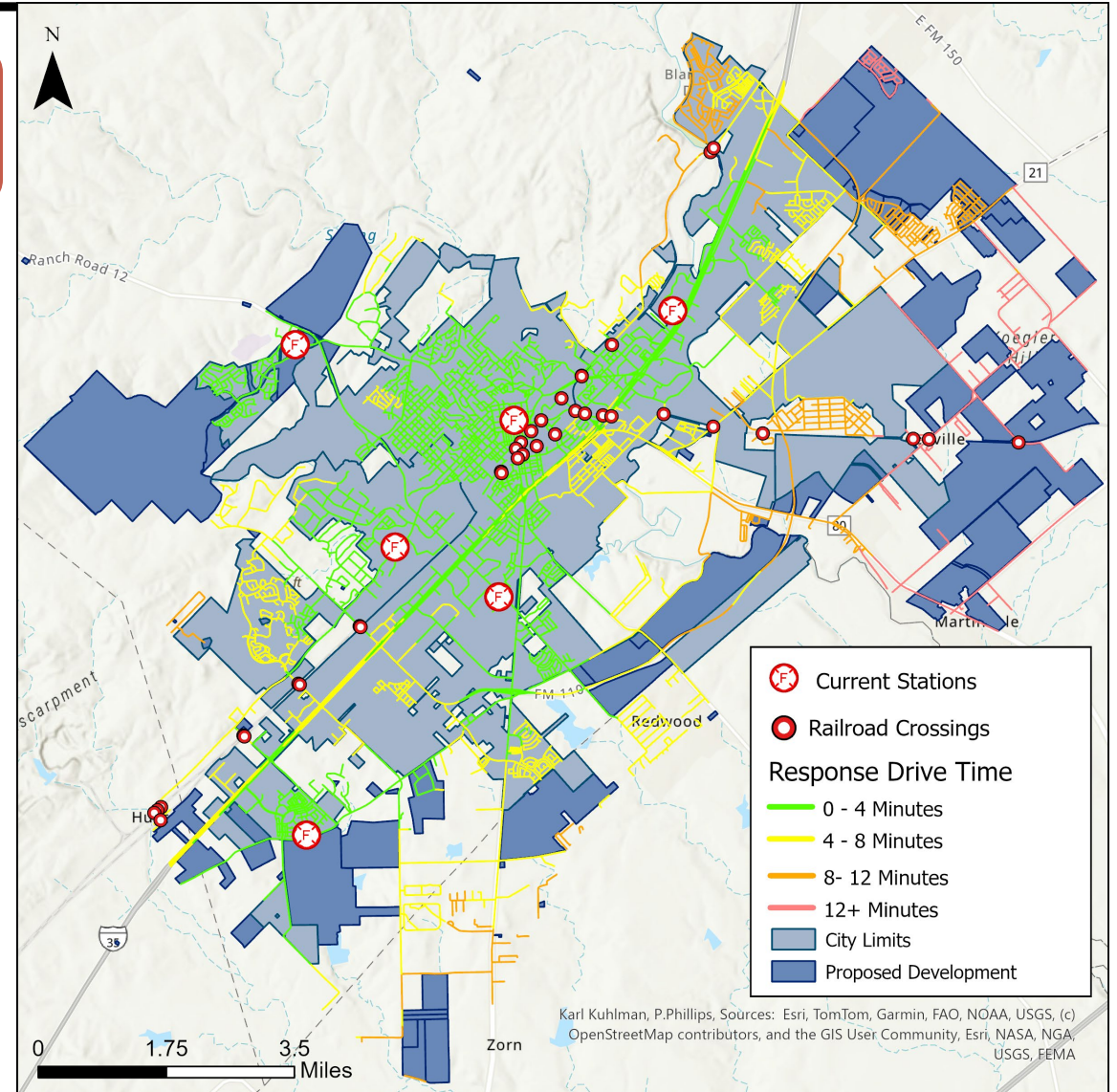


- Analyze suitability
- Location-Allocation
- Coverage metrics
- Proposal of top 2 sites

3.1 - COVERAGE ANALYSIS

- 4 Minute Drive Time
- Railway added cost

Minutes	Miles of Road Network
0-4	274.61
4-8	180.52
8-12	103.14
>12	36.50



3.2- DISTRICT REMAPPING

- Changing district boundaries based on the coverage analysis
- Only based on what the analysis says is the fastest times



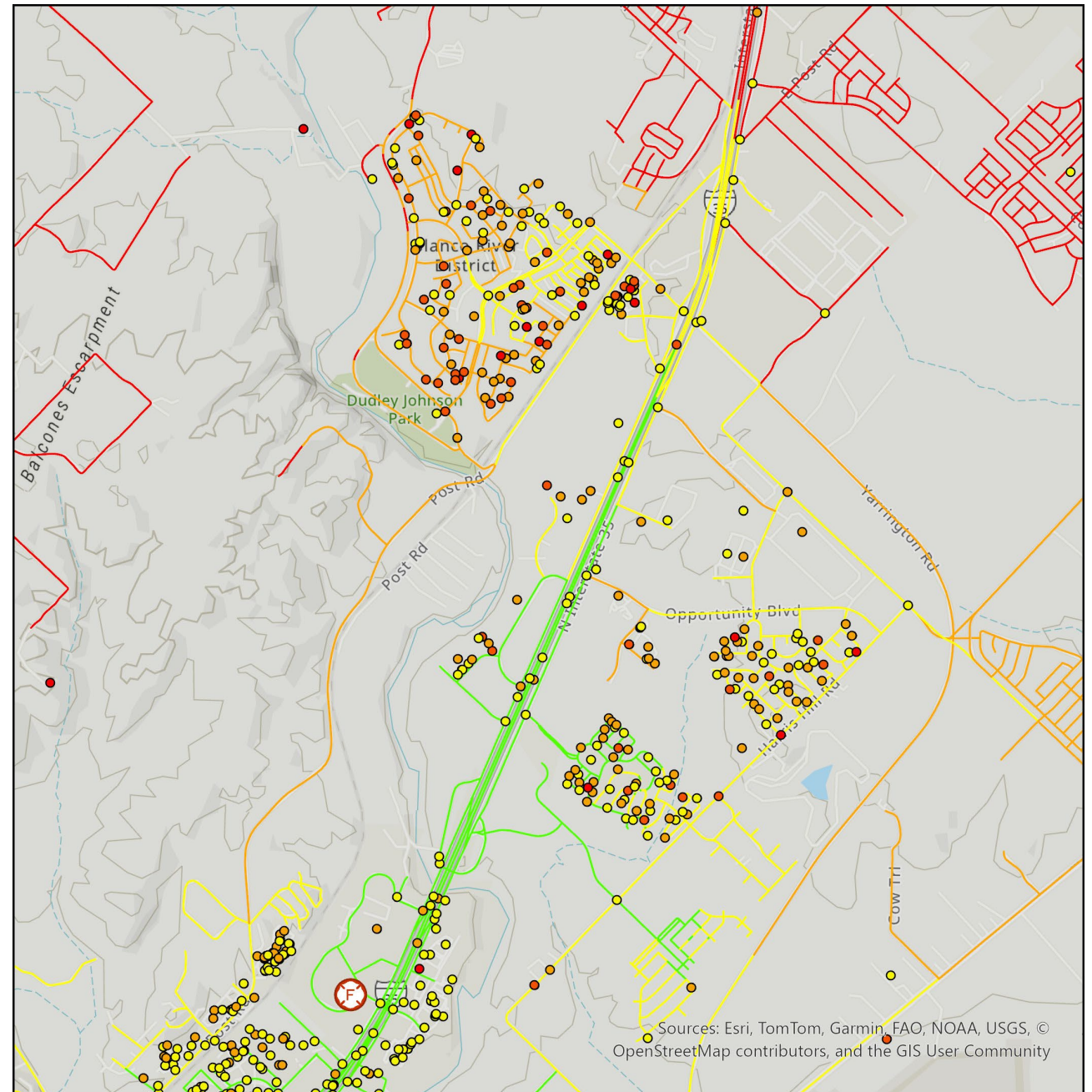
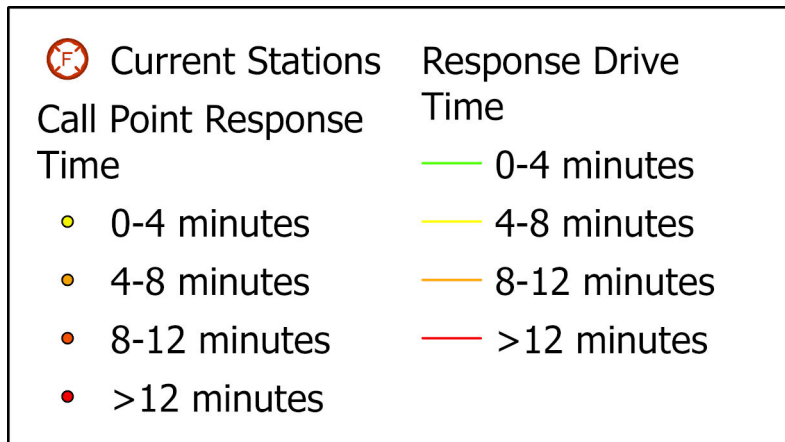
3.2 - DISTRICT REMAPPING

- Travis Elementary previously in Station 5's district, now moved to Station 1 based on travel times.



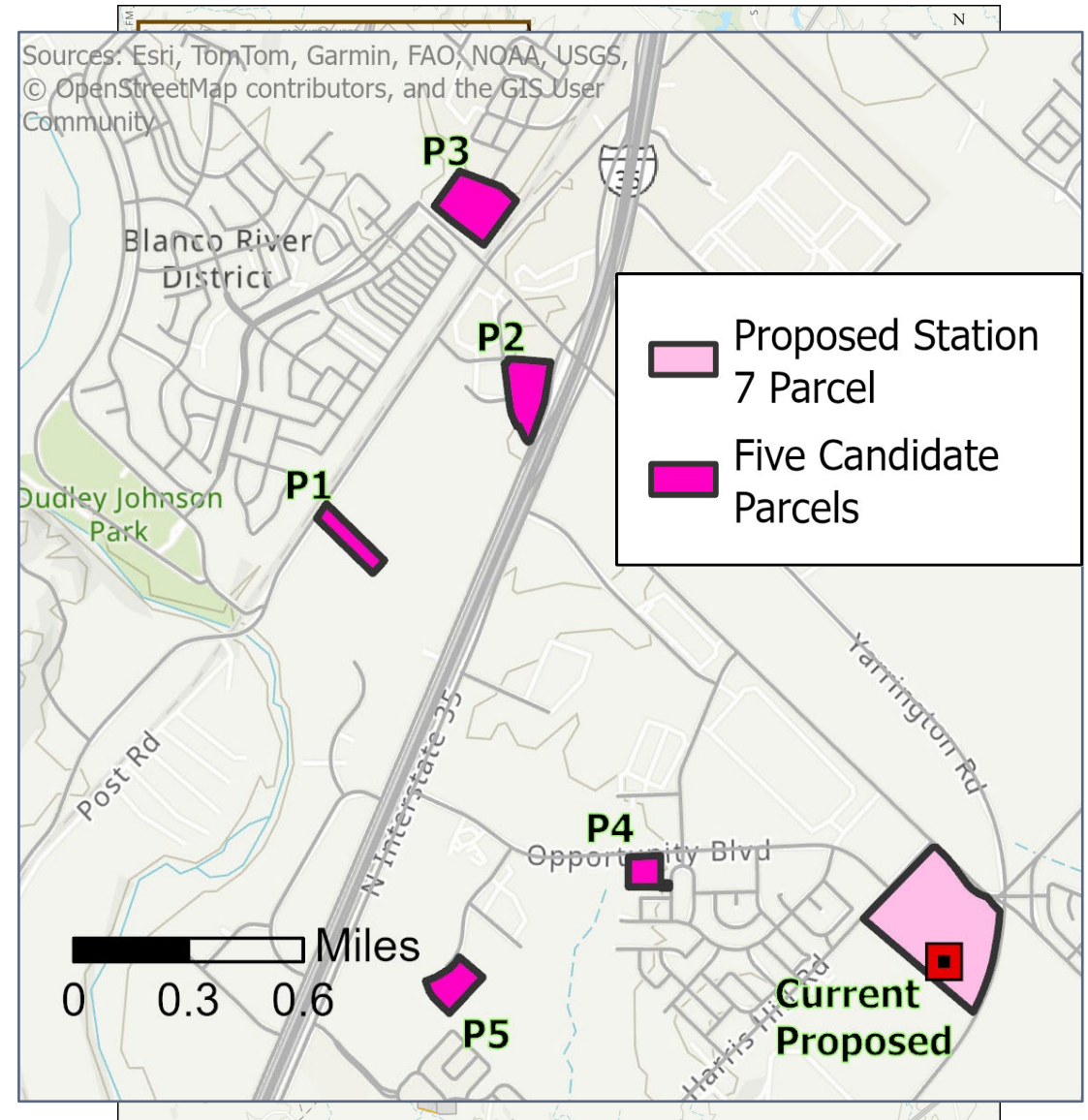
3.3 SITE SELECTION- COVERAGE GAP

- High volume of call points outside of NFPA standard
- Feedback from firefighters



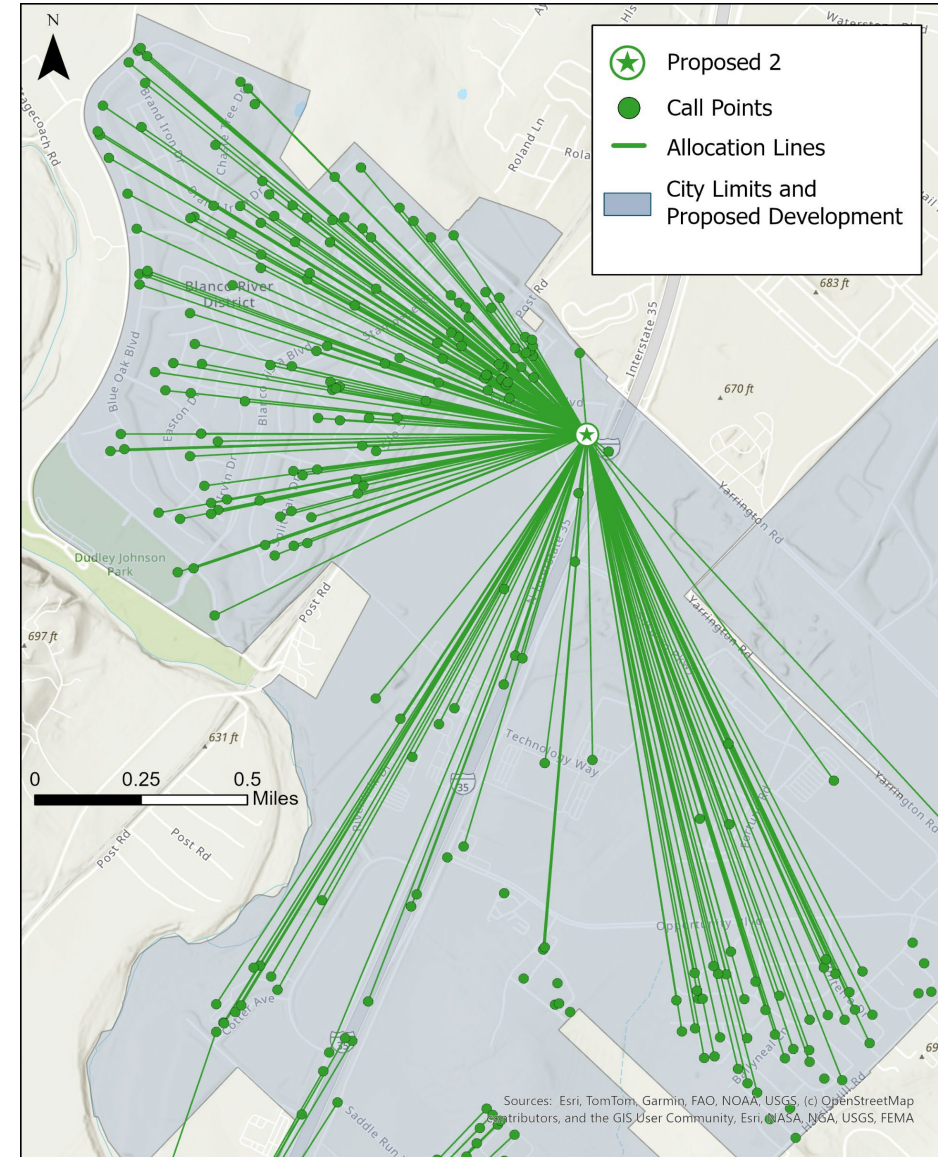
3.3- SITE SELECTION

- Narrowed down to 5 candidates
 - Analysis of call points, suitability model, address points, current coverage, excessive acreage
- Additional analysis to guide final selection
 - Calculation of coverage statistics



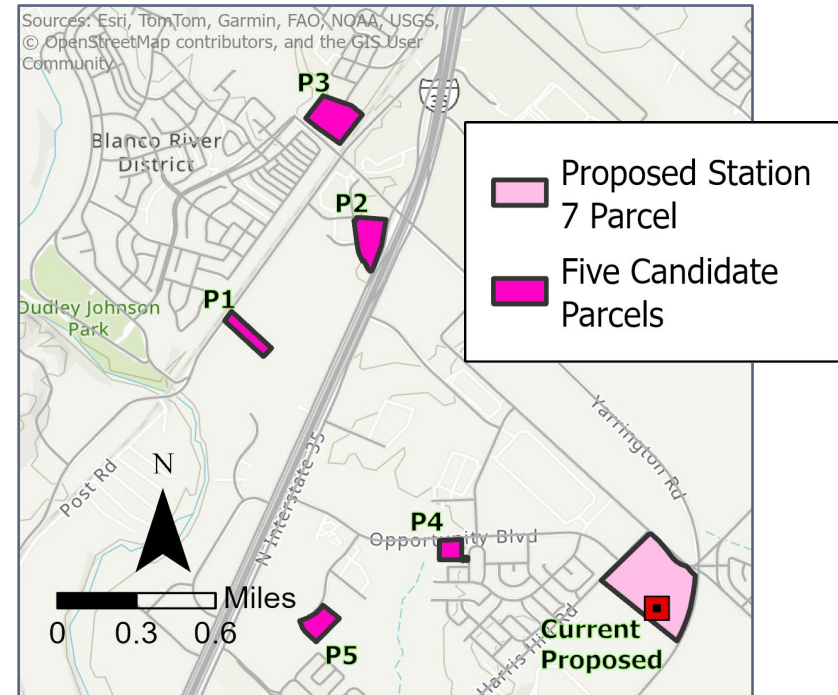
3.3 - SITE SELECTION

- Location-Allocation Tool
 - Call points, Census block population
- Calculate Geometry/Explore Statistics
 - Road network mileage



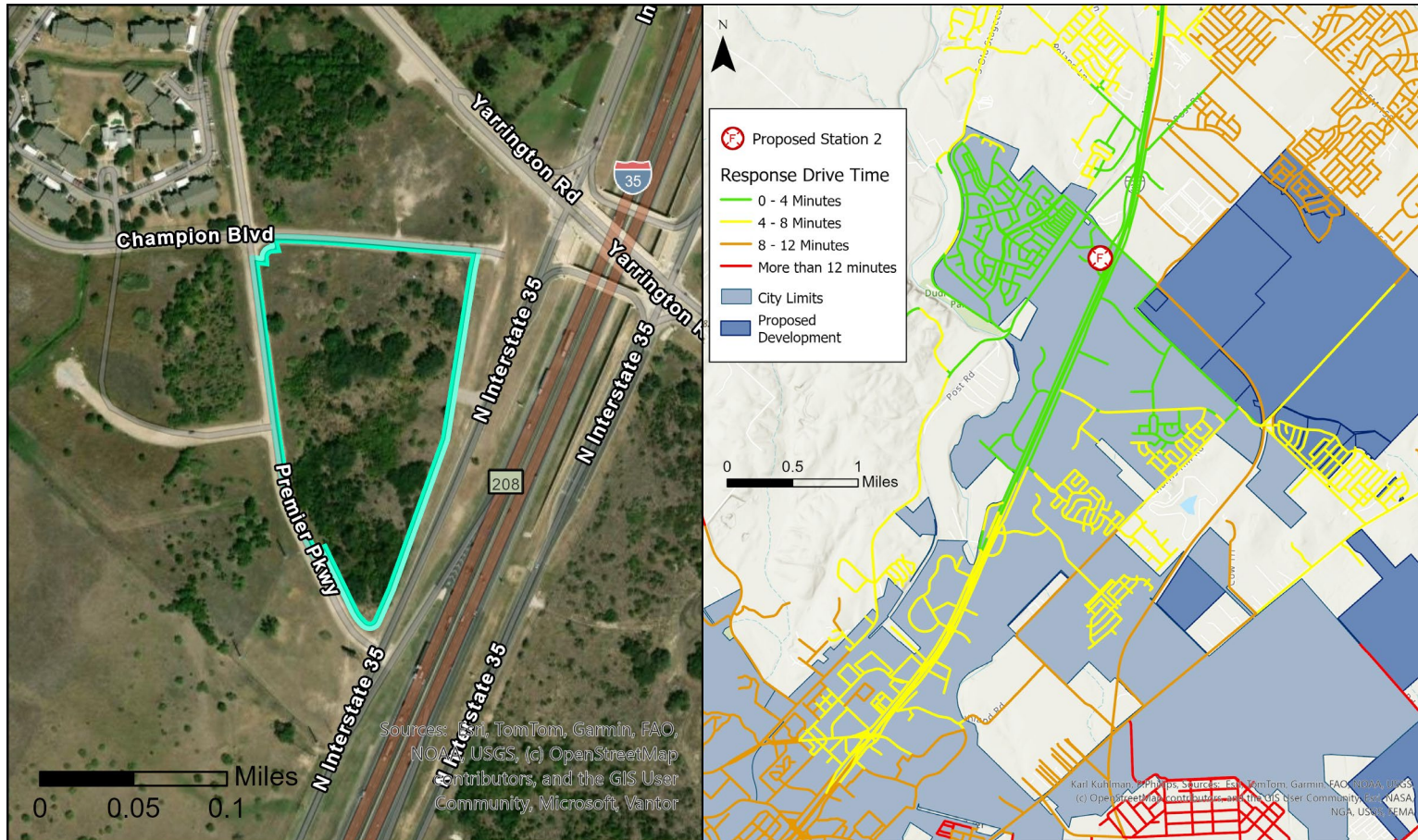
3.3- SITE SELECTION

- Coverage statistics of proposed station 7 and five candidate sites
- P2 and P3 chosen as final candidates



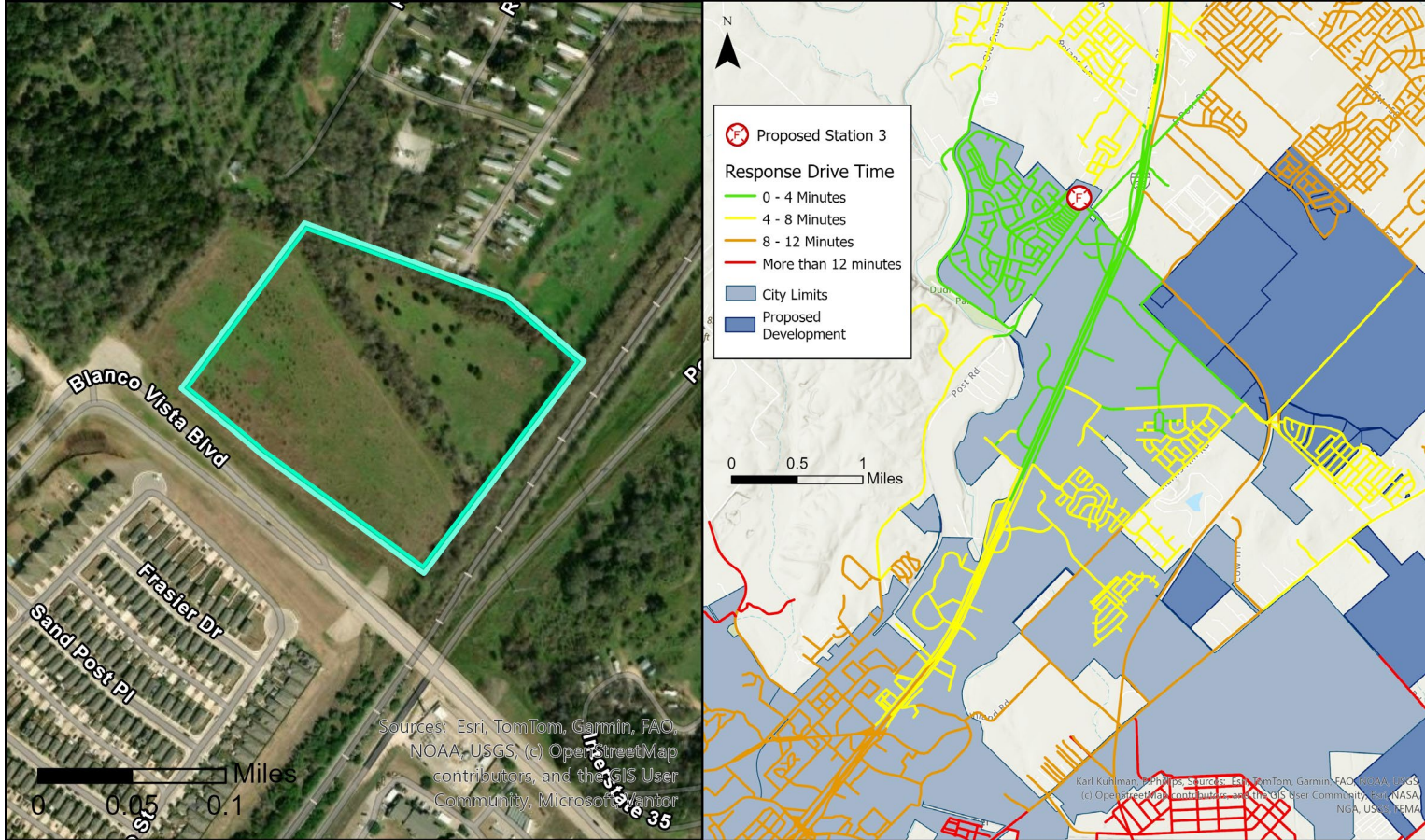
	Miles of Road Network (4 minutes)	Call Points (4 minutes)	Population (4 minutes)
Current Proposed	23.75	51	468
P1	41.03	438	4246
P2	50.90	557	4686
P3	45.45	476	4142
P4	27.72	323	2101
P5	10.55	130	375

4.1 - RESULTS-SITE SELECTION



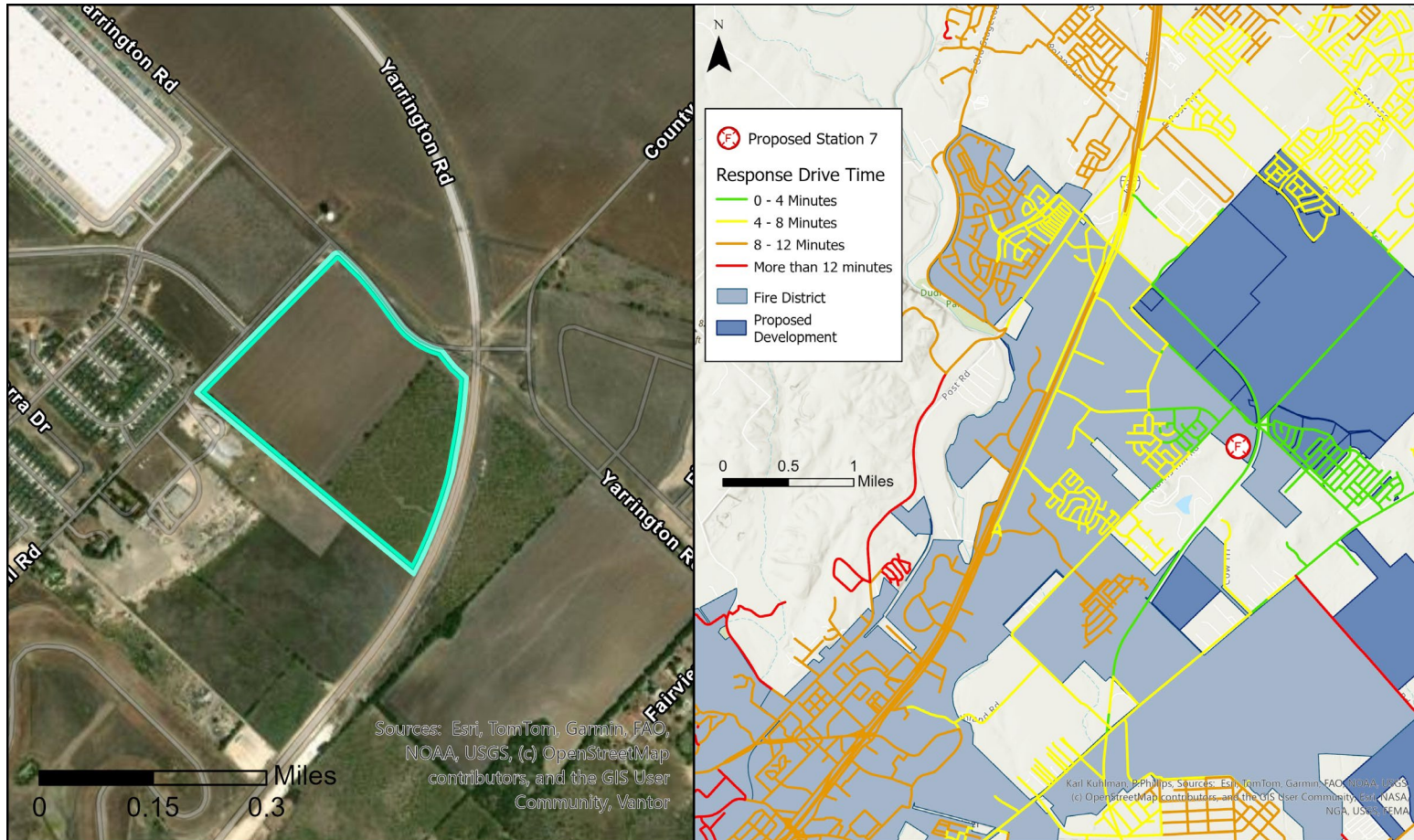
- Pros:
 - Best Coverage
 - Immediate highway access
 - Ideal acreage (4.55)
 - North side of highway (firefighter feedback)
- Cons
 - Higher tree cover
 - Currently owned by development company (potentially a pro)

4.1 - RESULTS - SITE SELECTION



- Pros:
 - Great Coverage
 - Proximity to highway
 - North side of highway (firefighter feedback)
- Cons
 - Other side of train tracks
 - Larger acreage (14.00)
 - No appraisal data available

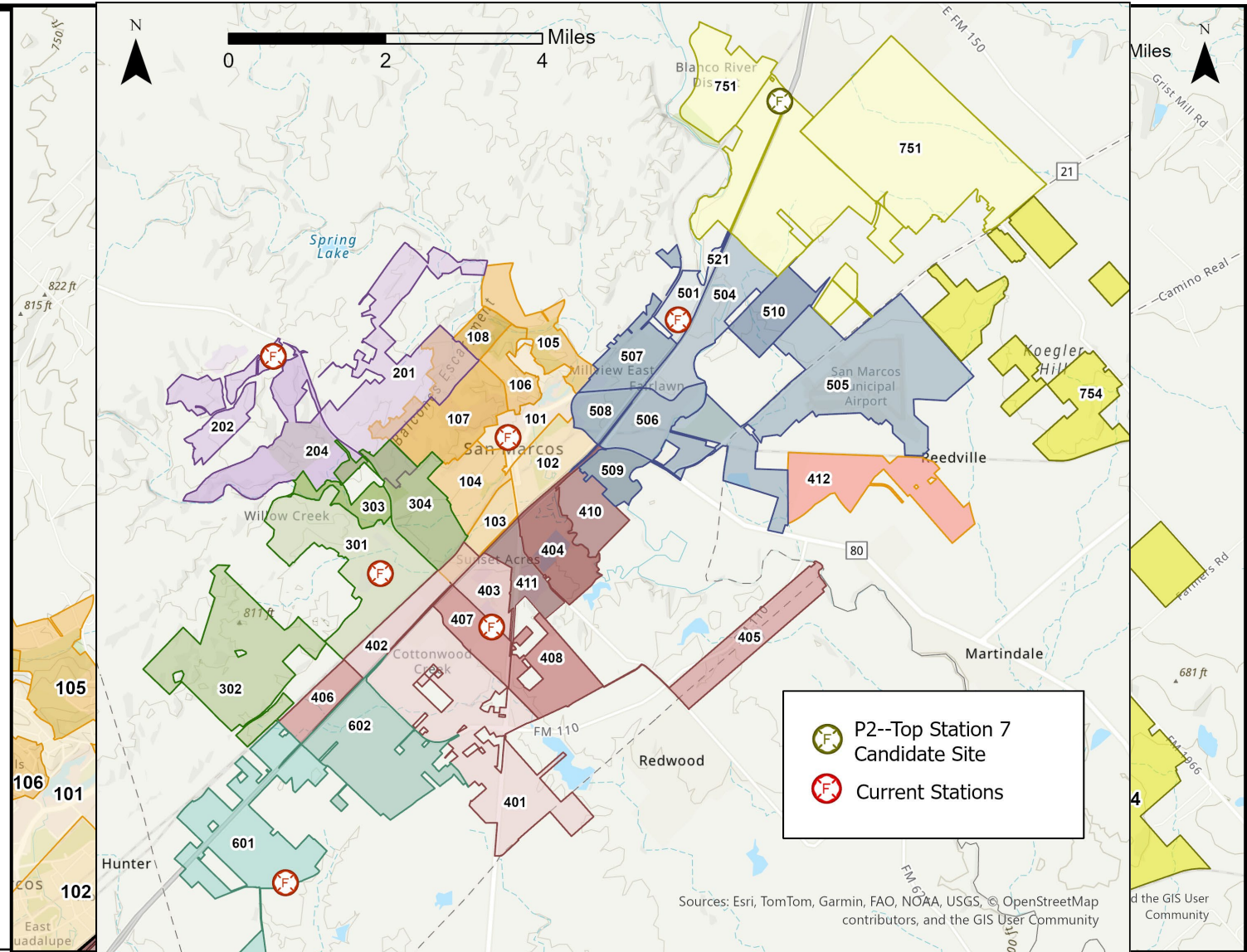
4.1 - RESULTS - SITE SELECTION



- Pros:
 - Already owned by City of San Marcos
 - High buildability
- Cons
 - Lower coverage
 - Further from highway

4.1 - RESULTS - SITE SELECTION

- Hypothetical Station 7 districts/quadrants based off of network analysis travel times



4.2- DISCUSSION-CURRENT COVERAGE ANALYSIS AND REDISTRICTING

- Lack of coverage in the north of San Marcos
 - Drive time
 - Call points
 - Population
 - Fire fighter feedback
- Redistricting
 - NFPA drivetime standards
 - Split streets

4.3- DISCUSSION-SITE SELECTION

- Alternative site could offer better coverage and ability to meet NFPA 1710 standards
- Limitations
 - Limited knowledge of ability to acquire land
 - Clipping Census blocks to be inside our area of interest
 - Location Allocation tool's auto attribution of points to the nearest road centerline
 - Road network used was missing information
 - Construction



5 - CONCLUSION

- Station 7 at any of these candidate sites would
 - Help improve current coverage
 - Account for future growth
- Key Take Aways:
 - Impact of data and technical analysis for planning
 - Challenges of meeting NFPA standards
 - Spatial model vs reality...?





THANK YOU!
