ASSESSING THE IMPACT OF HURRICANE HARVEY THROUGH TWITTER DATA

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Intro:

- Request to Estimate Students Affected by Hurricane Harvey
- FEMA Map Issues
- Social Media Activity

Presentation Progression

- Discuss Data and Methods
- Share Preliminary Results
- Dream About Next Steps
- Contemplate Implications

FEMA Flood Estimate Data

- Area of Interest

  The initial analysis focused on impacted counties in twelve counties in Texas.

- Data Sources

  The parcel data was used from HIFLD. The Land Use code used to derive a structure type.

  Inundation extents were created based on event data and is further described in another document. The inundation data layer was used to assign a Z value (Raster value) and associated damage level.

- Assumptions

  Parcel centroid is where the building was located.

  Elevation of structure not taken into account

  Vacant parcels removed

  Methodology **does not account for flooding as a result of storm water backups, irrigation ditch failures, flooding from dam or levee breaks, use of spillways and weirs, or resulting wind damage.**

FEMA Flood Estimate Data

August 28th – September 2nd , 2017

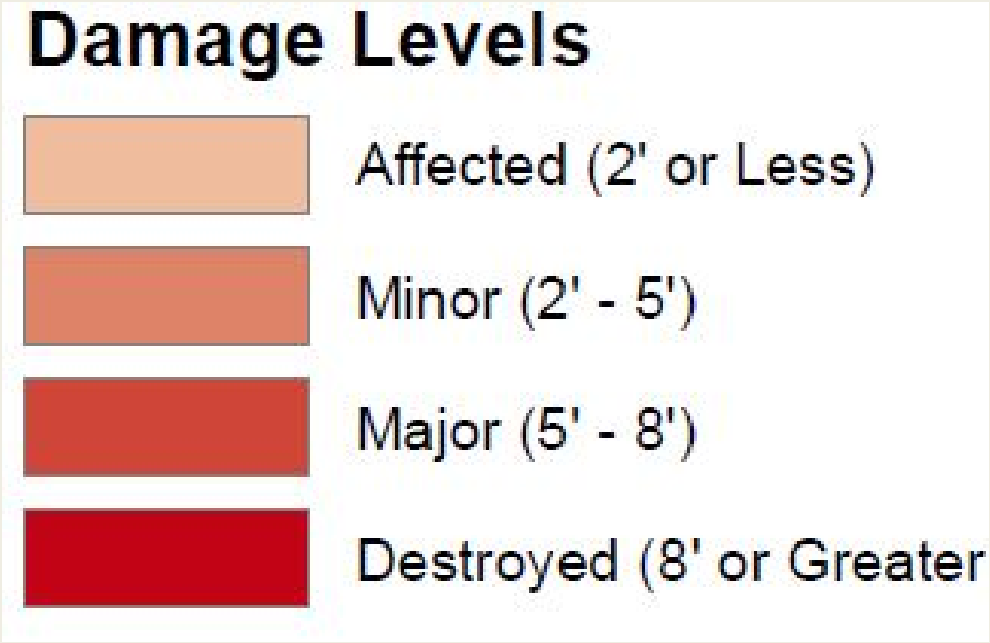
Parcels – 1,382,639

318,730 - (23.05%)

39,060 - (2.85%)

69,084 - (4.99%)

221,975 - (16.05%)



Parcel Data

- Homeland Infrastructure Foundation – Level Data

  HIFLD – 2017 Parcel Data

FULLNAME	LFROMHN	LTOHN	RFROMHN	RTOHN	ZIPL	ZIPR	EDGE_MTFCC	ROAD_MTFCC	PARITYL	PARITYR	PLUS4L	PLUS4R	LFROMTYP	LTOTYP	RFROMTYP	RTOTYP	OFFSETL	OFFSETR
Cromwell St	2401	2699	2400	2698	77093	77093	S1400	S1400	O	E							N	N

Twitter Data

- Geolocation Function

  Less Than 2% of Users Opt In

- Request

  Dates:

  August 25th – September 8th, 2017

  Includes:

  'Rescue?' OR 'Urgent' OR @USCG OR @CajunNavy

  & 'Houston' OR 'Harvey' OR 'Hurricane?'

  Excludes:

  'Pray?' OR 'Steve' Or 'Weinstein' OR 'Thinking & Victims'

- Gnip, Inc.
- Over 1 Million Tweets

Louisiana SPCA
@LASPCA

Follow

Making space for possible animal rescue efforts from #HurricaneHarvey. @atlantahumane was able to take about 30 of our adoptables.

3:21 PM - 26 Aug 2017

25 Retweets **31** Likes

3 25 31

Tweet your reply

Hector Moreno
@Smokey91199

Follow

Anyone with any type of rescue experience should try and get to those areas that are shut off. Don't wait for govt. NOW! #HurricaneHarvey

11:20 AM - 26 Aug 2017

Tweet your reply

Methods

- Parcel Data
  - *Parcel vs. Street Geocode*
  - *Cleaned Parcels*
- FEMA Flood Data
  - *Created Parcel Level Damage Estimates*
  - *Mapped Parcel Damage*
- Twitter Data
  - *Found Addresses*
  - *Geocoded Address*
- Compare Two Estimate Sources
- Kernel Density/Buffering to Improve

Methods – Twitter Data

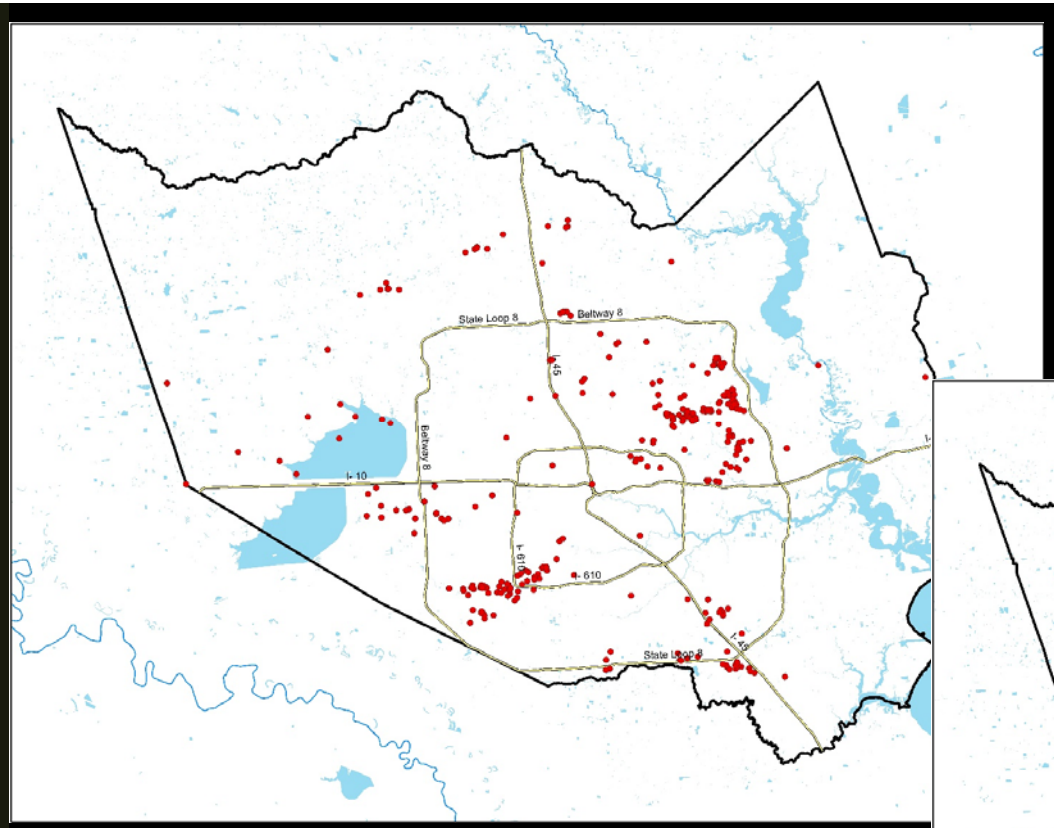
- Find Any Tweet With Numbers
- Keep Tweets With Evidence of Street Endings

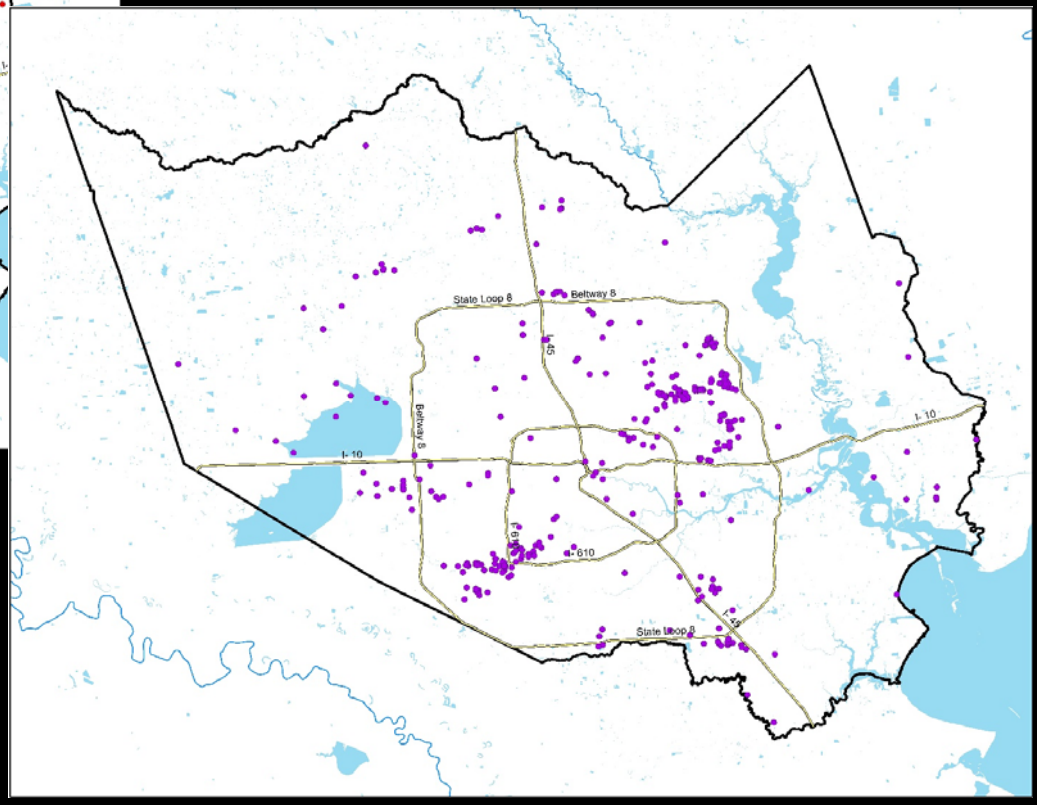
  Ln, Rd, St, Court, Blvd, Hwy, Sq, Plaza, Cir
- Find City Names and Zip Codes

```
#Mark Evidence of Street Endings
add$st_type<-ifelse(grepl("[Ff][Mm] [0-9]", add$text_new), "FM", ifelse(grepl("( [Dd][Rr] )|([Dd][Rr][Ii][Vv][Ee])", add$text_new), "Dr",
              ifelse(grepl("( [Ll][Nn])|( [Ll][Aa][Nn])", add$text_new), "Ln",
              ifelse(grepl("( [Rr][Dd])|( [Rr][Oo][Aa][Dd])", add$text_new), "Rd",
              ifelse(grepl("( [Cc][Ii][Rr])|([Cc][Rr] )", add$text_new), "Cir",
              ifelse(grepl(" [Bb][Ll][Vv][Dd]", add$text_new), "Blvd",
              ifelse(grepl("( [Cc][Oo][Uu][Rr][Tt])|( [Cc][Tt])", add$text_new), "Court",
              ifelse(grepl(" [Tt][Ee][Rr][Rr][EeAa][Cc][Ee]", add$text_new), "Terrace",
              ifelse(grepl("( [Aa][Ll][Ll][Ee][Yy])|( [Aa][Ll][Yy])|( [Aa][Ll][Ll][Yy])", add$text_new), "Aly",
              ifelse(grepl("( [Ss][Qq][Uu][Aa][Rr])|( [Ss][Qq])", add$text_new), "Sq",
              ifelse(grepl("( [Pp][Ll][Aa][Zz][Aa])", add$text_new), "Plaza",
              ifelse(grepl("( [Hh][Ii][Gg][Hh][Ww][Aa][Yy])|( [Hh][Ww][Yy])", add$text_new), "Hwy",
              ifelse(grepl("( [Ss][Tt] )|( [Ss][Tt][.])|( [Ss][Tt][Rr])", add$text_new), "St", ""))))))))))))
```

Results

- 1,359 Useable Addresses
- 980 (72.11%) Match – Street
- 913 (67.18%) Match – Parcel


State Loop 8
Beltway 8
I-45
Beltway 8
I-10
I-610
I-610
State Loop 8
I-45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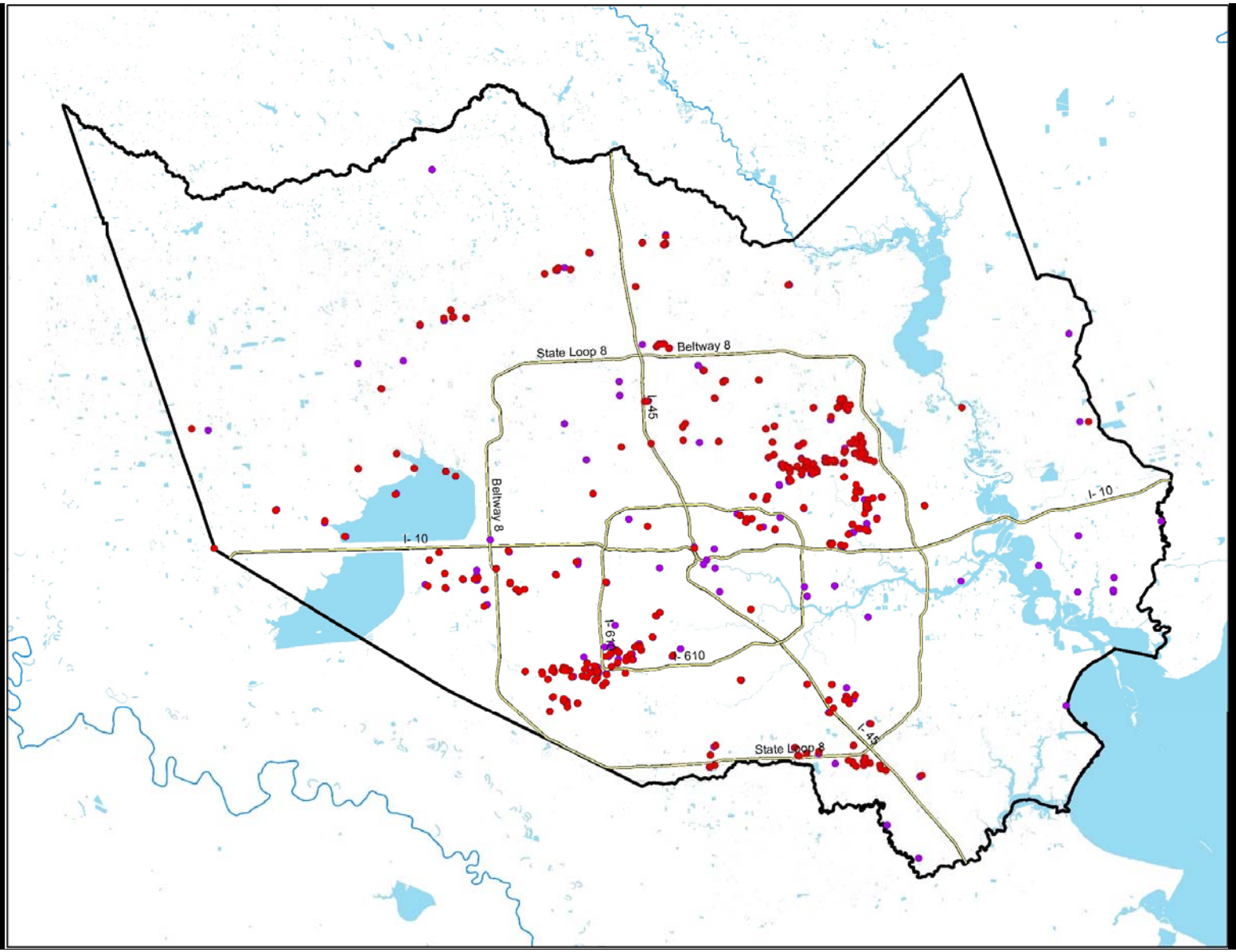
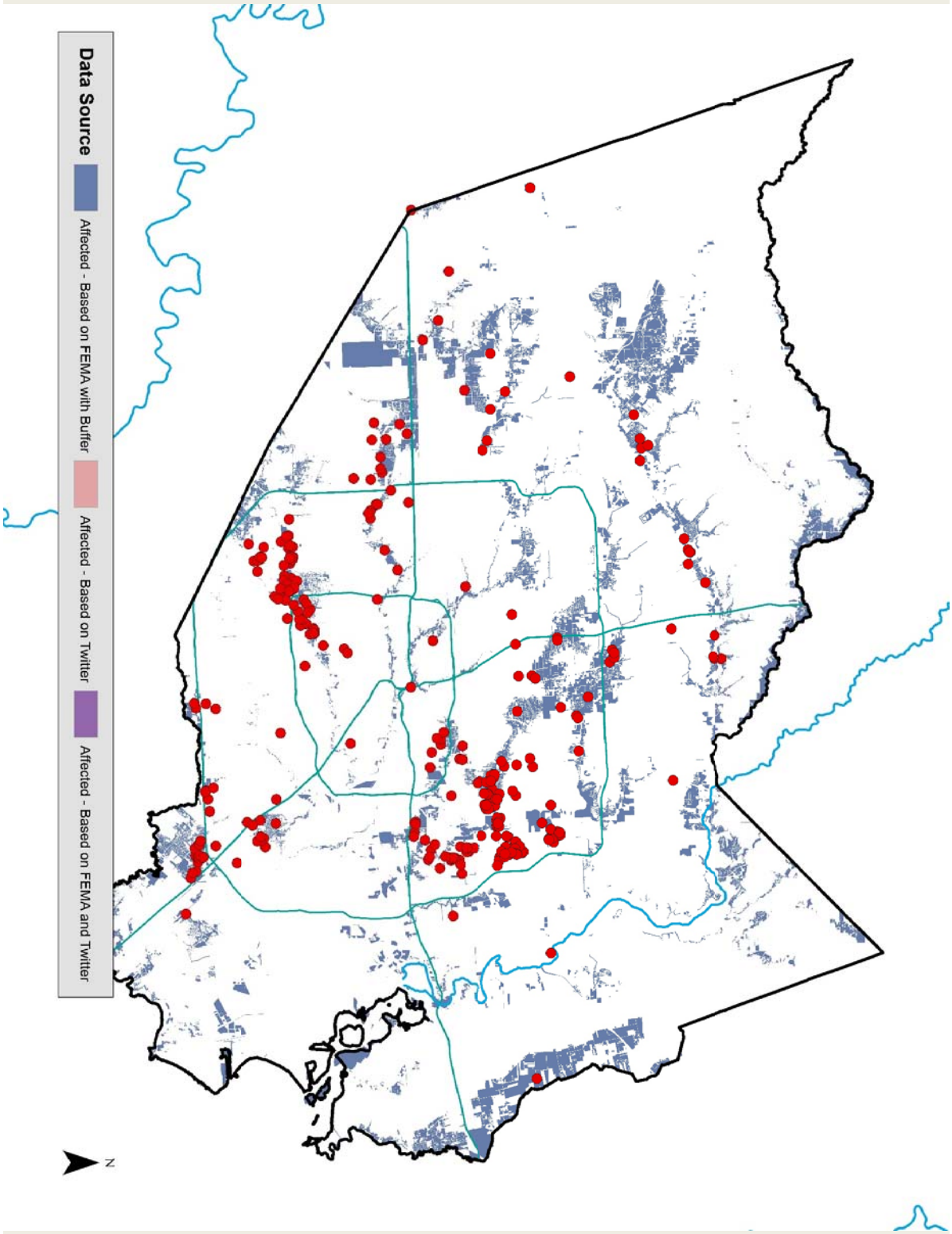
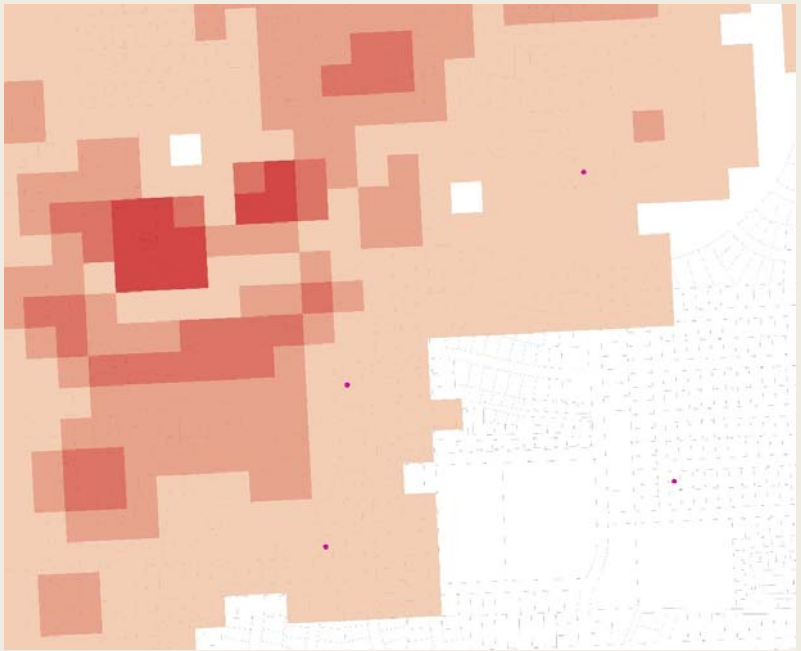

State Loop 8
Beltway 8
I- 45
Beltway 8
I- 10
I- 10
I- 610
I- 610
I- 45
State Loop 8

Results - Damage



Methods – Kernel Density/Buffering

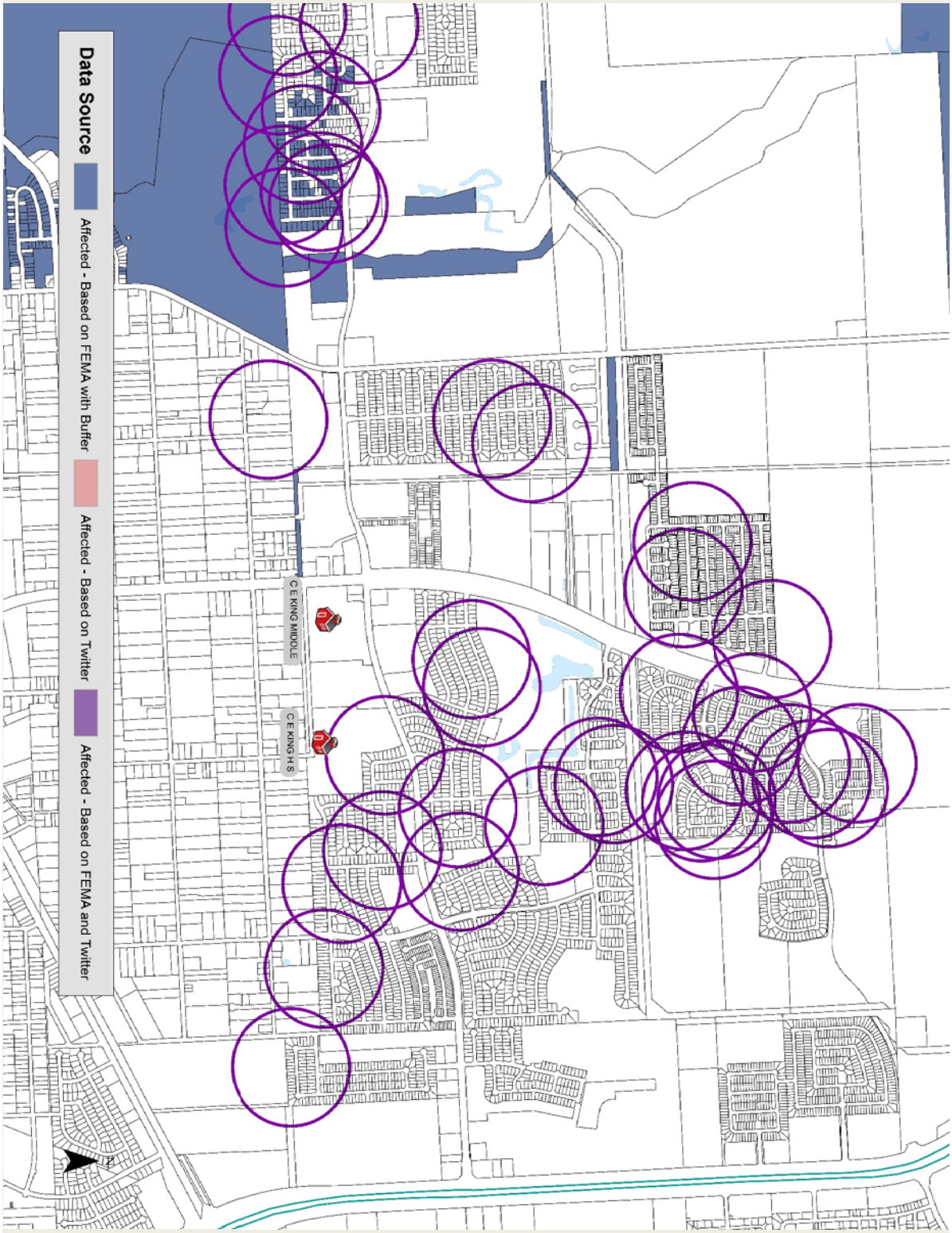
- Raster Shapefile
  - *25 Meters (Average Parcel Width)*
  - *50 Meters*
  - *100 Meters*
- Search Radius
  - *75 Meters*
  - *100 Meters*
  - *150 Meters*
- Function
  - *1,0*



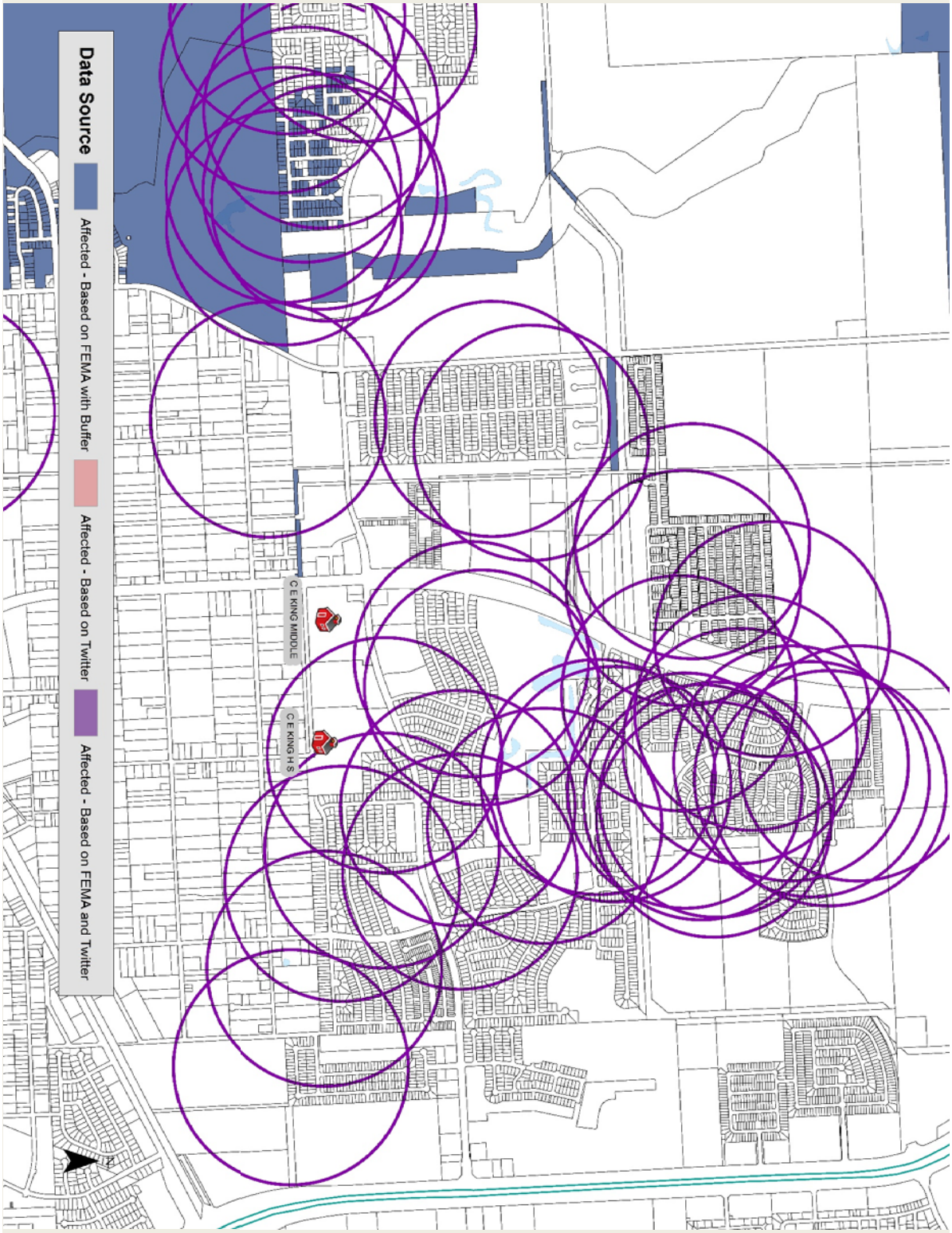
Methods – Kernel Density/Buffering

- Parcel Buffer
  - *75 Meters*
- Twitter Buffer
  - *250 and 500 Meters*

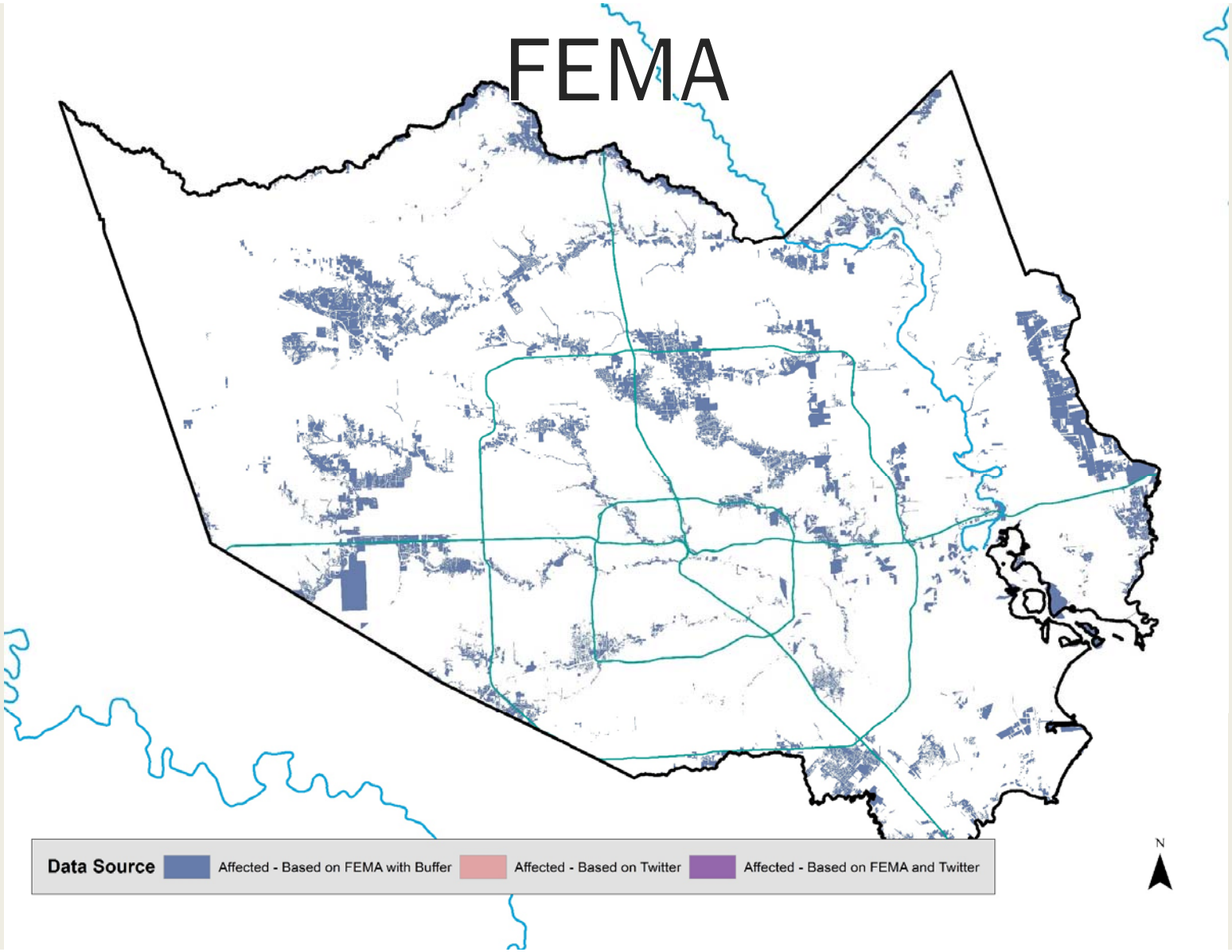
Results – Buffering Points



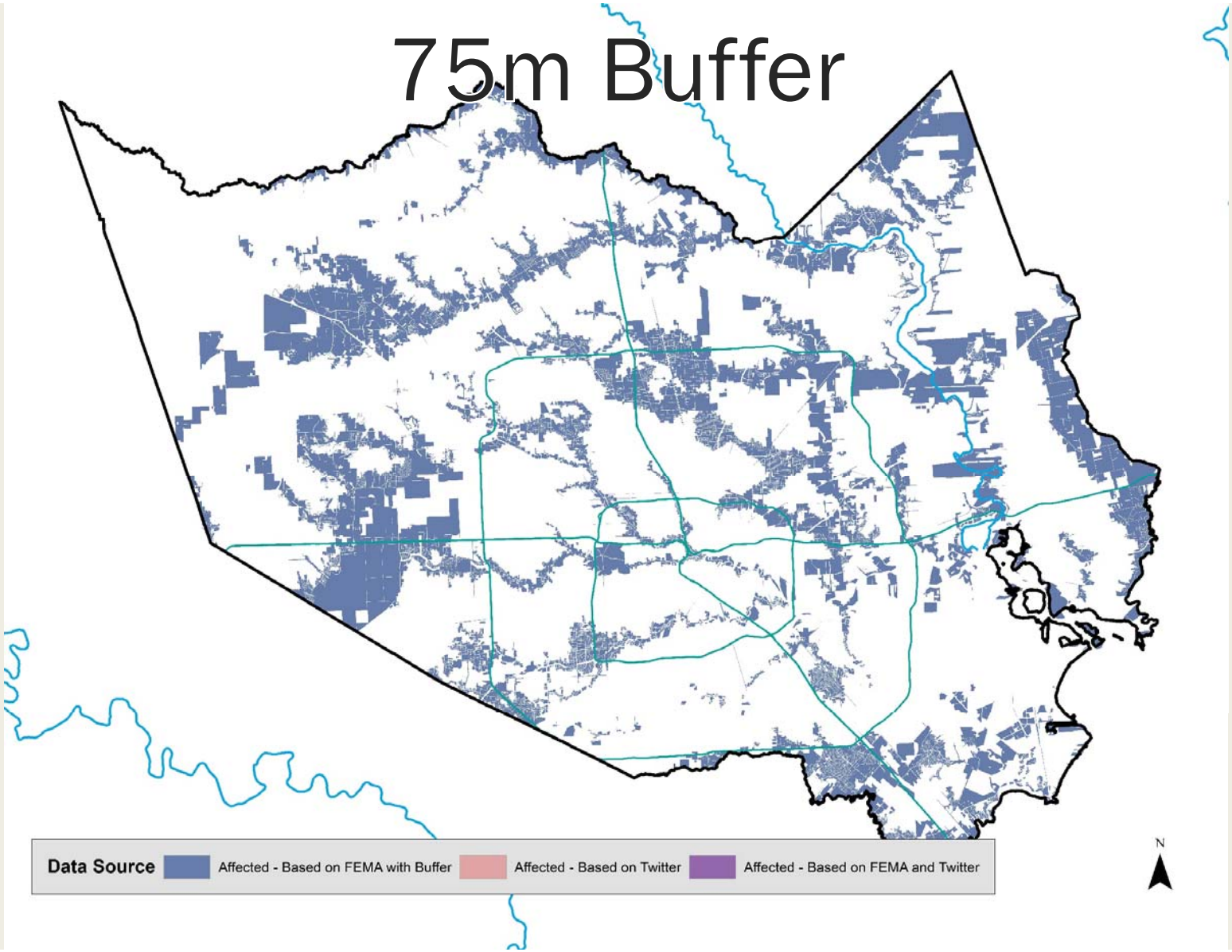
Results – Buffering Points



Results – Parcel Buffer

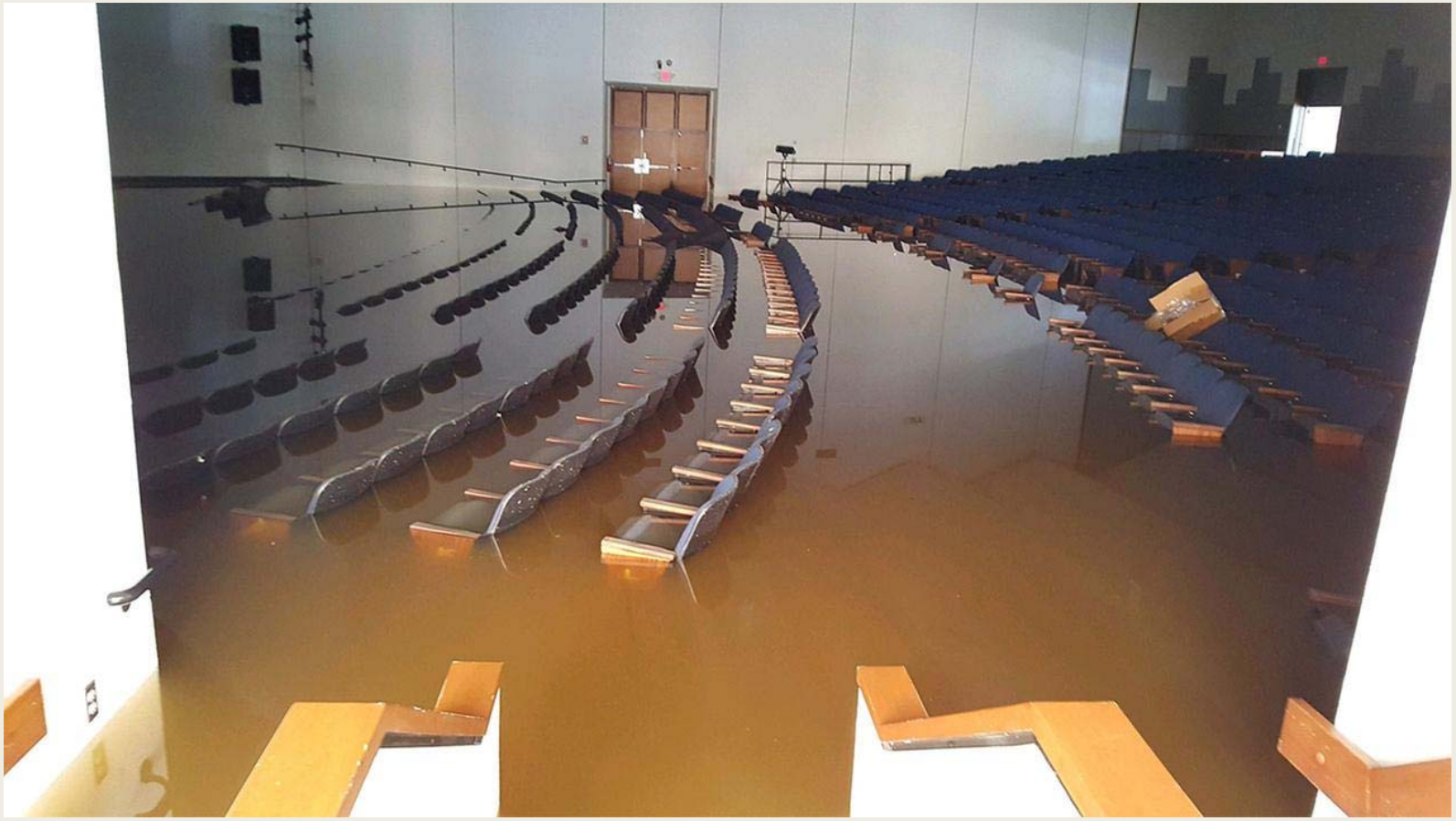


Results – Kernel Density



HOW TWITTER HELPS IMPROVE ESTIMATES

Results – Twitter Improving Estimates



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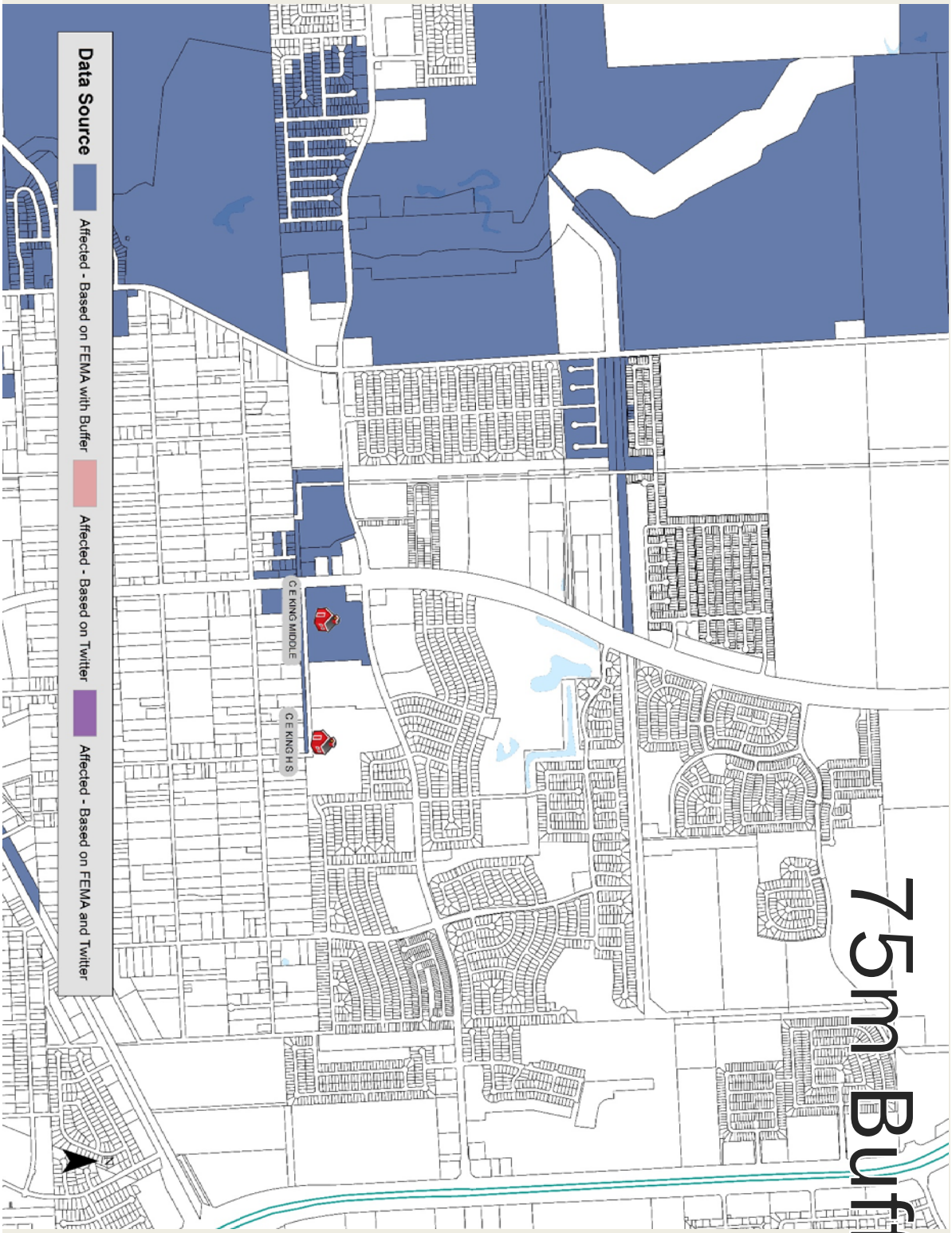

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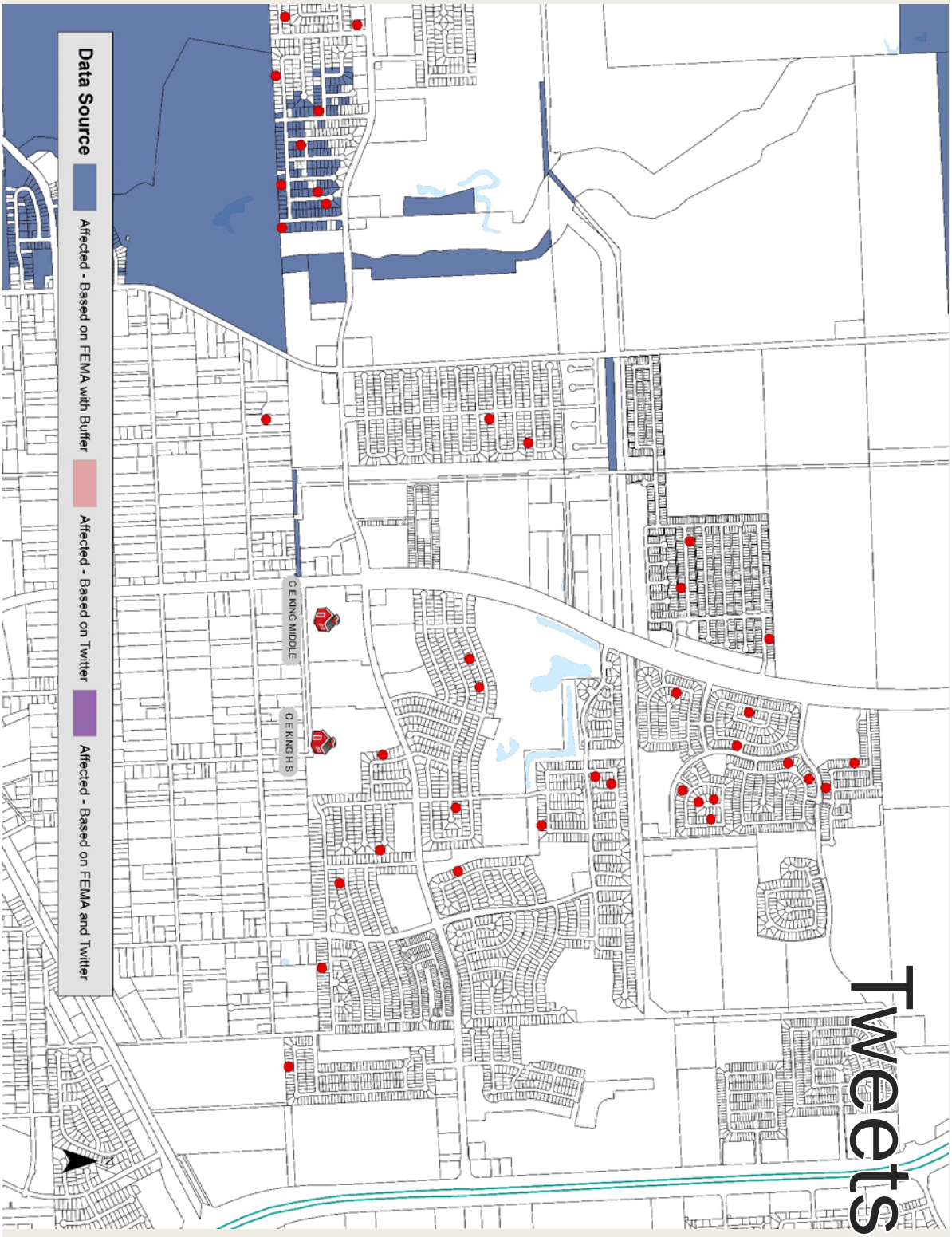

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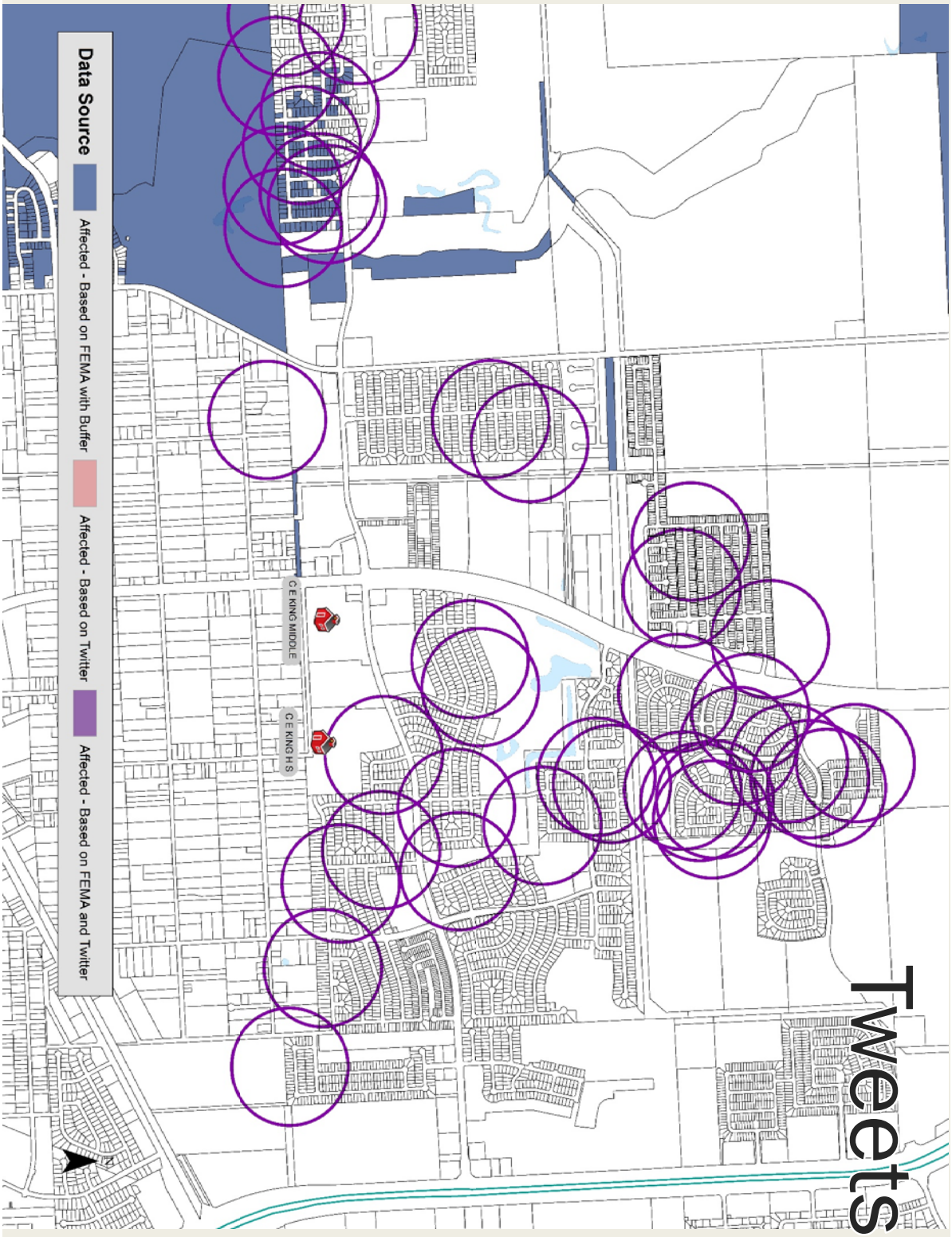

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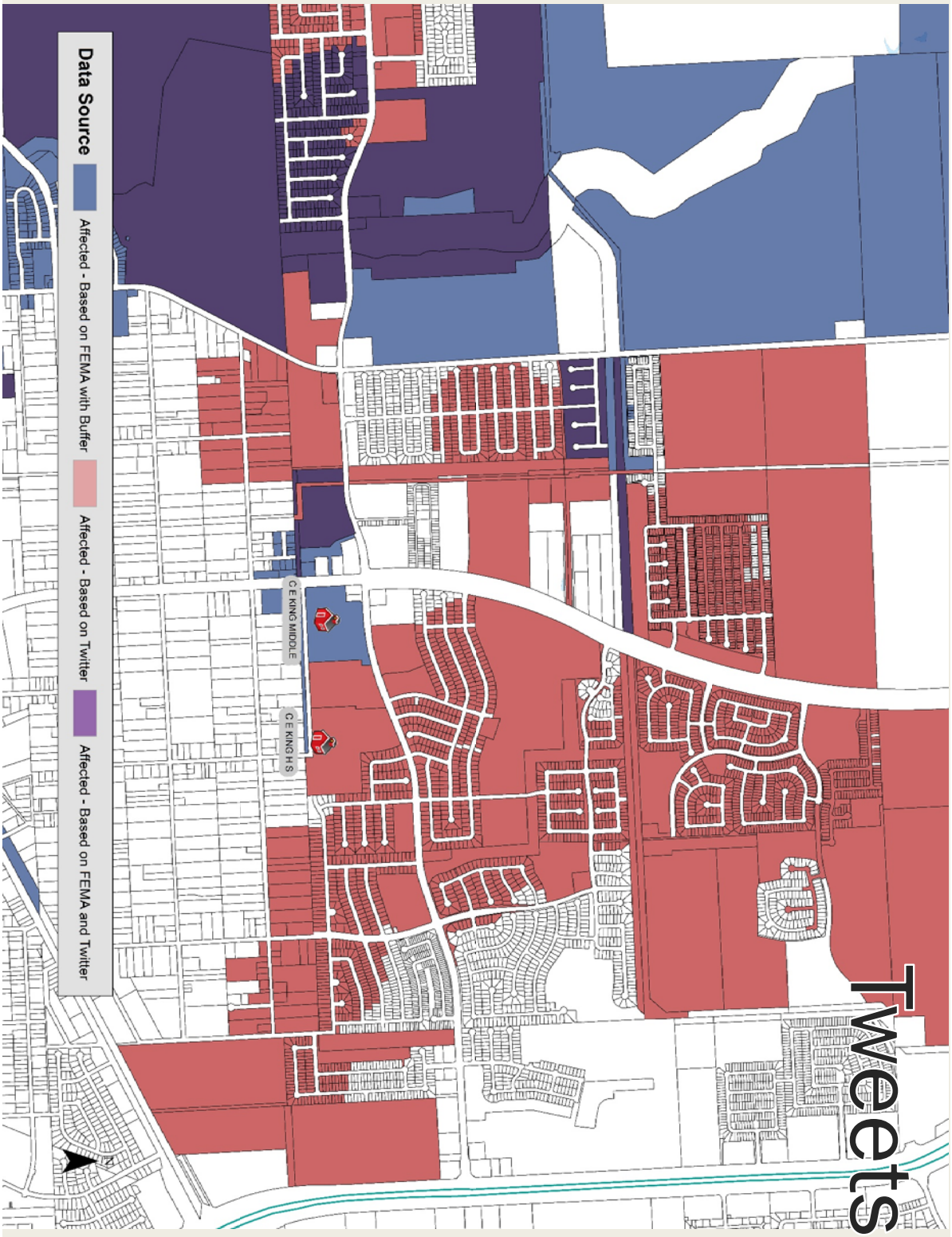

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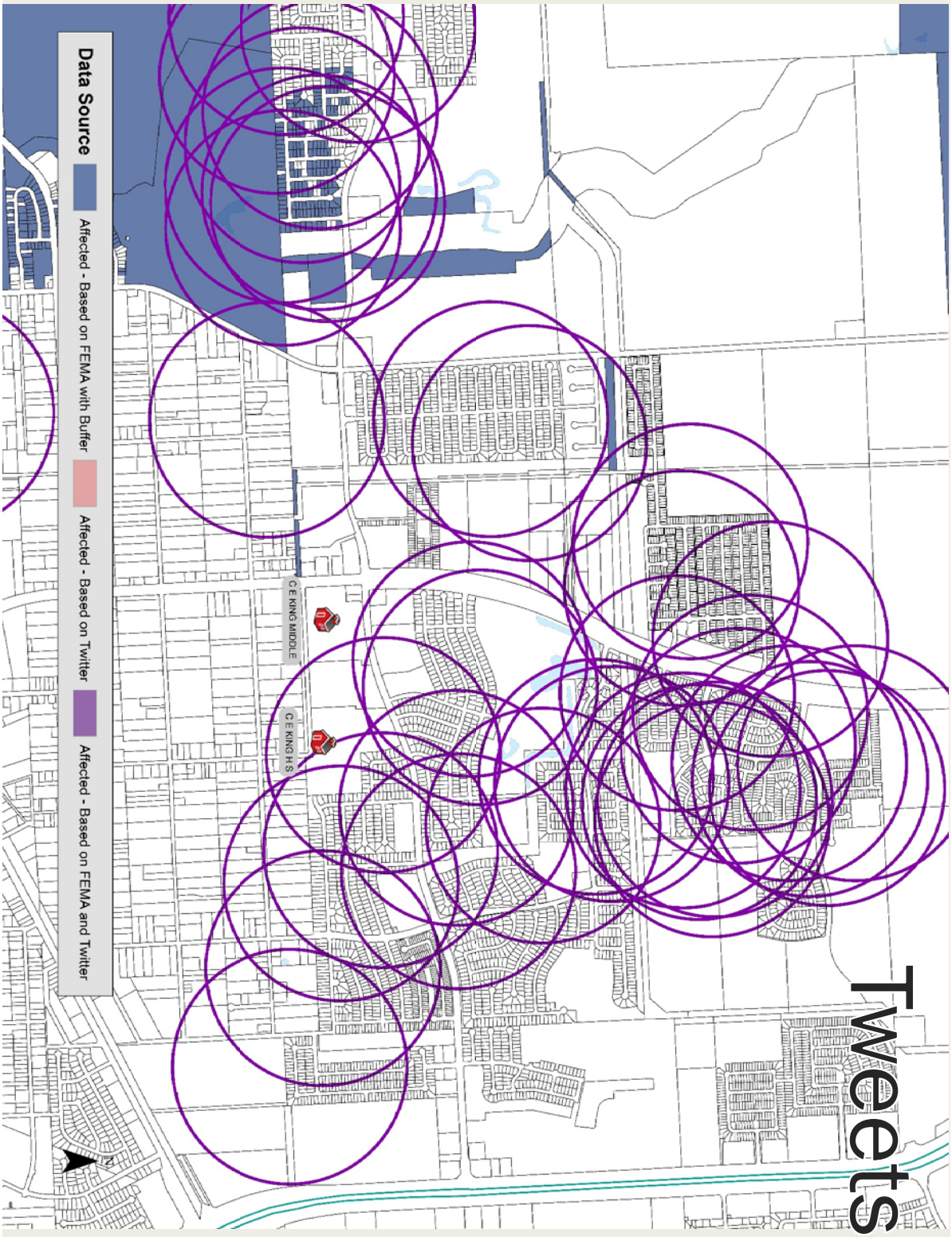

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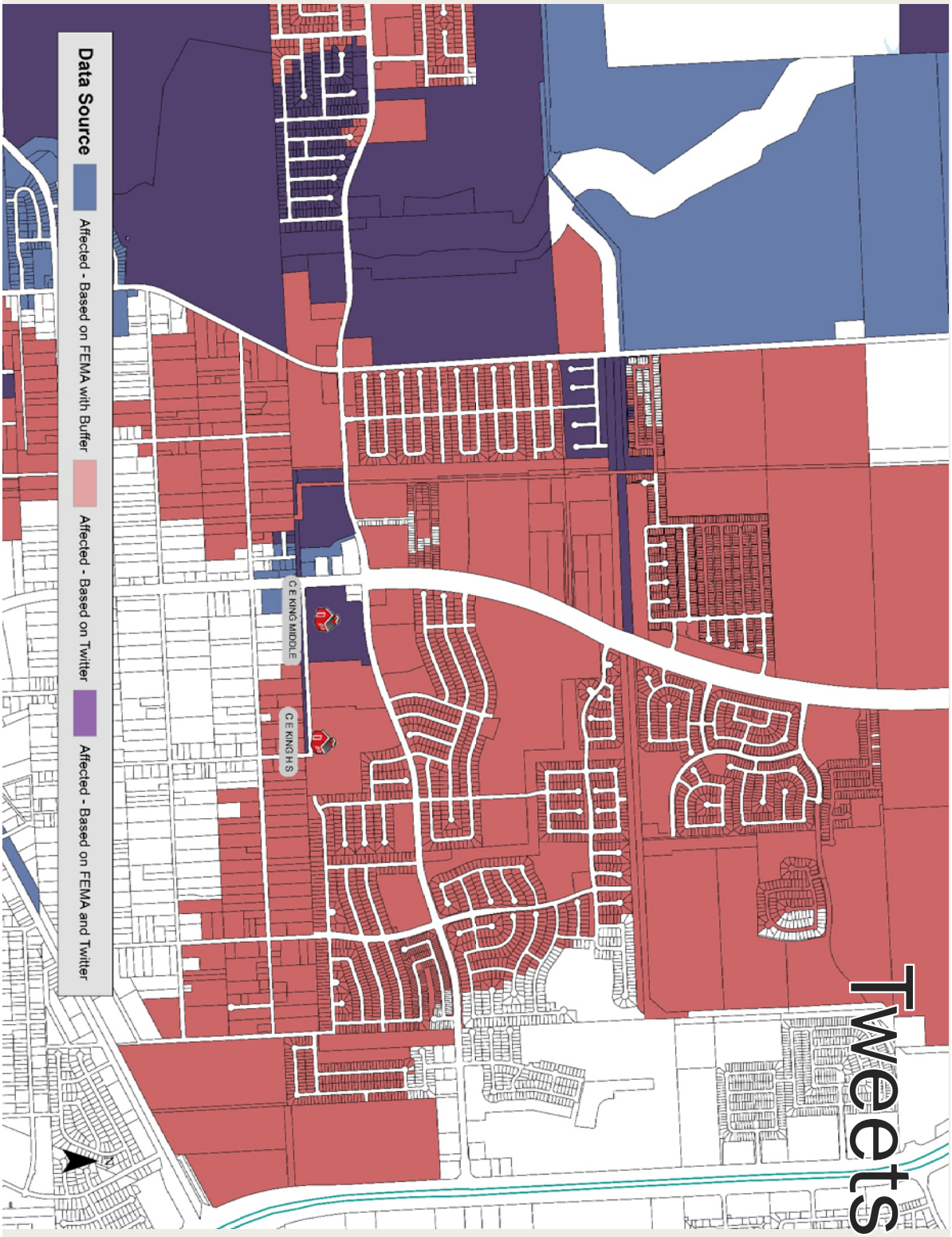

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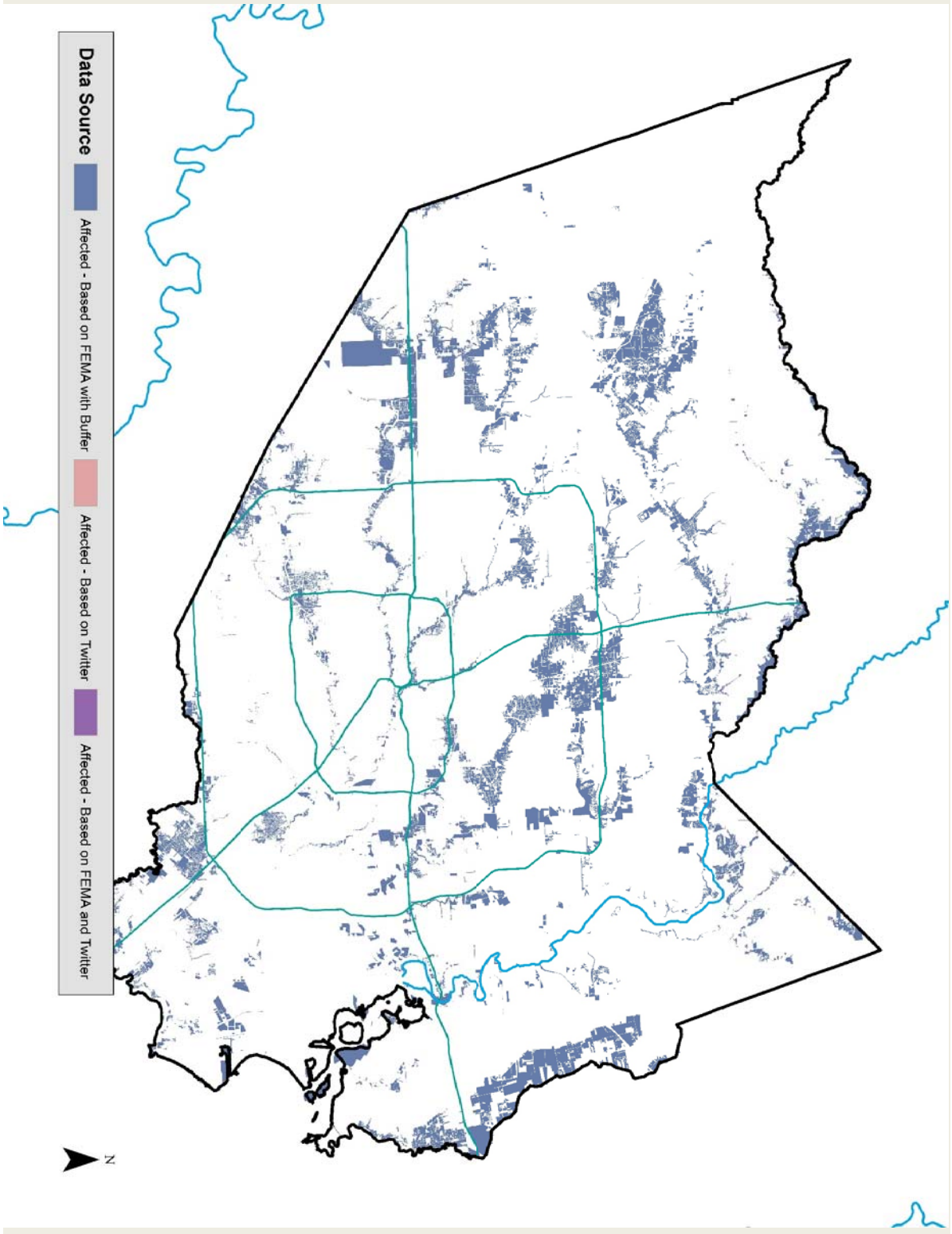

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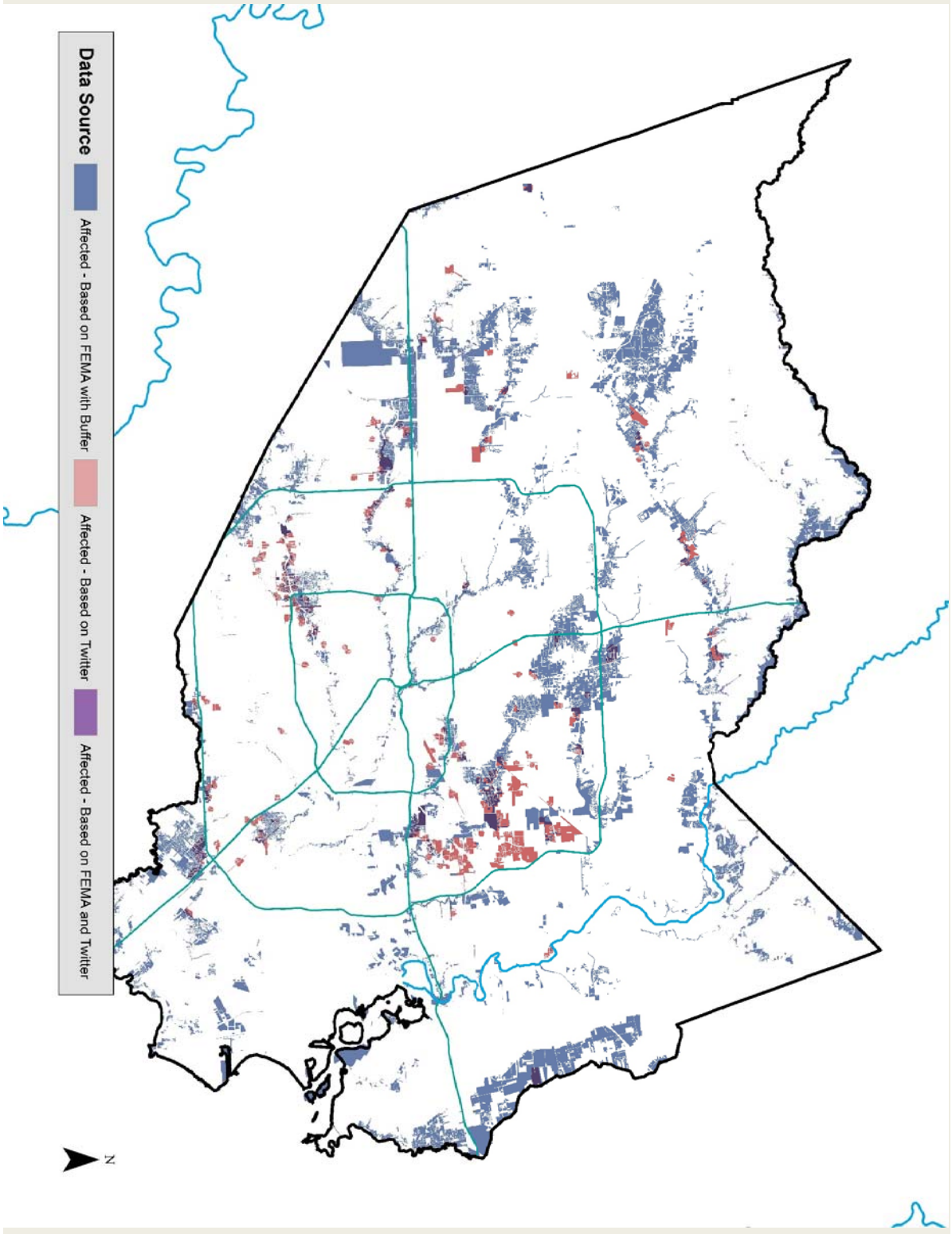

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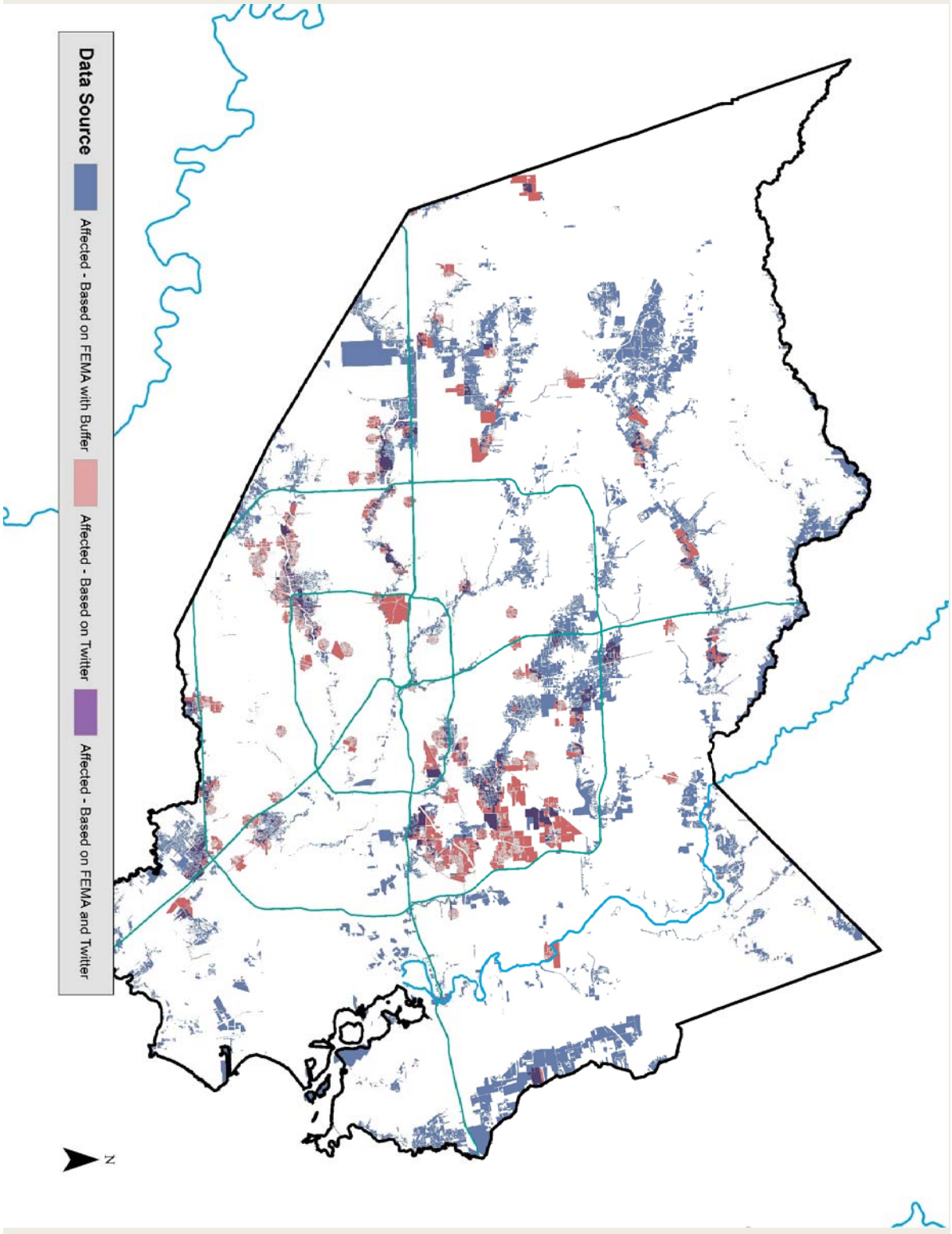
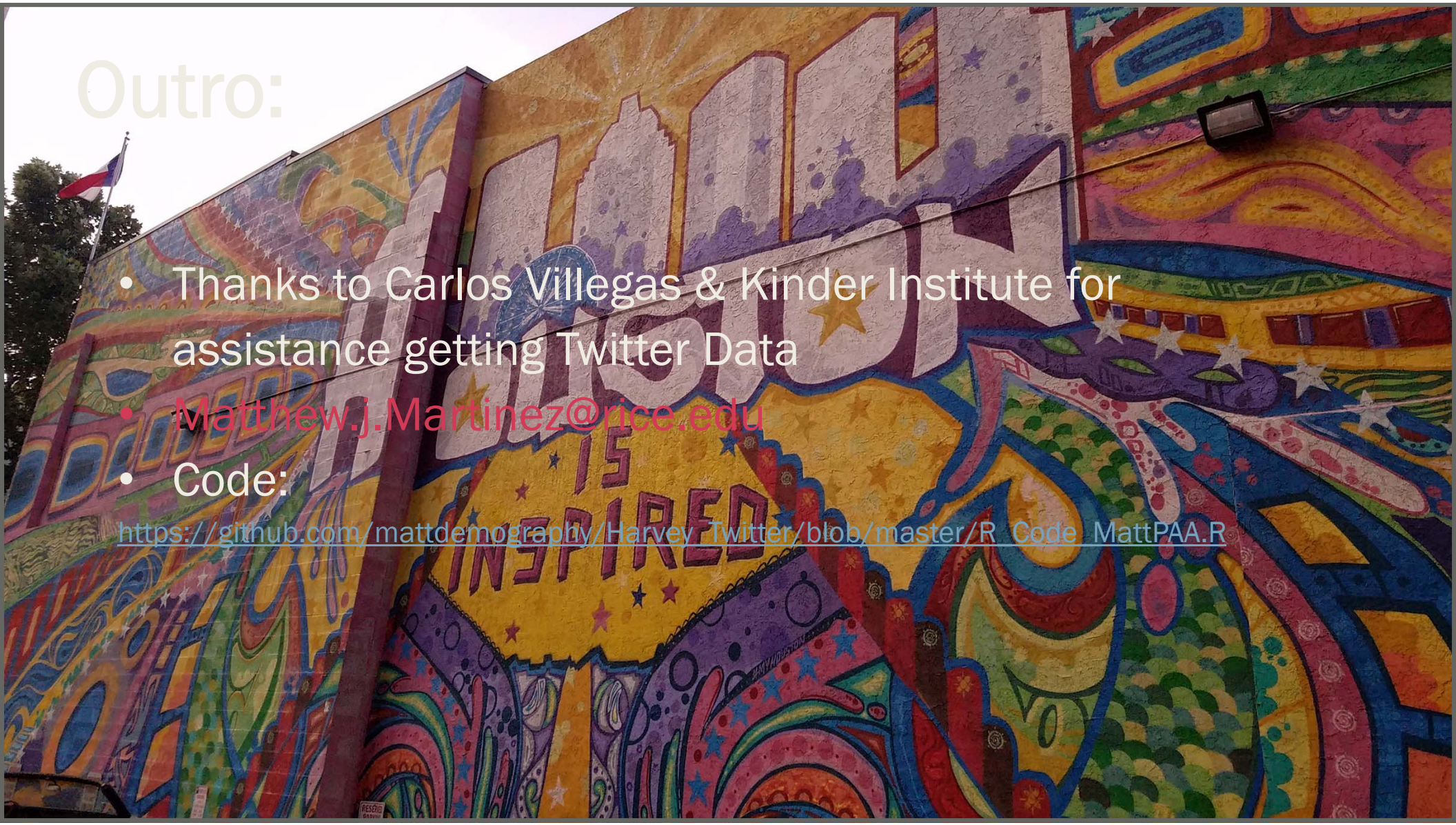


Next Steps

- Twitter Geocoding
  - *Clean More Data*
  - *Generate Better Matches*
  - *Grab Intersections*
- Other Public Data
  - *9-1-1*
  - *3-1-1*
- Estimate Students Affected

IMPLICATIONS

Outro:



- Thanks to Carlos Villegas & Kinder Institute for assistance getting Twitter Data
- Matthew.j.Martinez@rice.edu
- Code:

https://github.com/mattdemography/Harvey_Twitter/blob/master/R_Code_MattPAA.R