



Chemical Hazard Procedures and Planning for Victoria County LEPC

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Introduction and Background



- Who are LEPC?
- What are the responsibilities of the LEPC

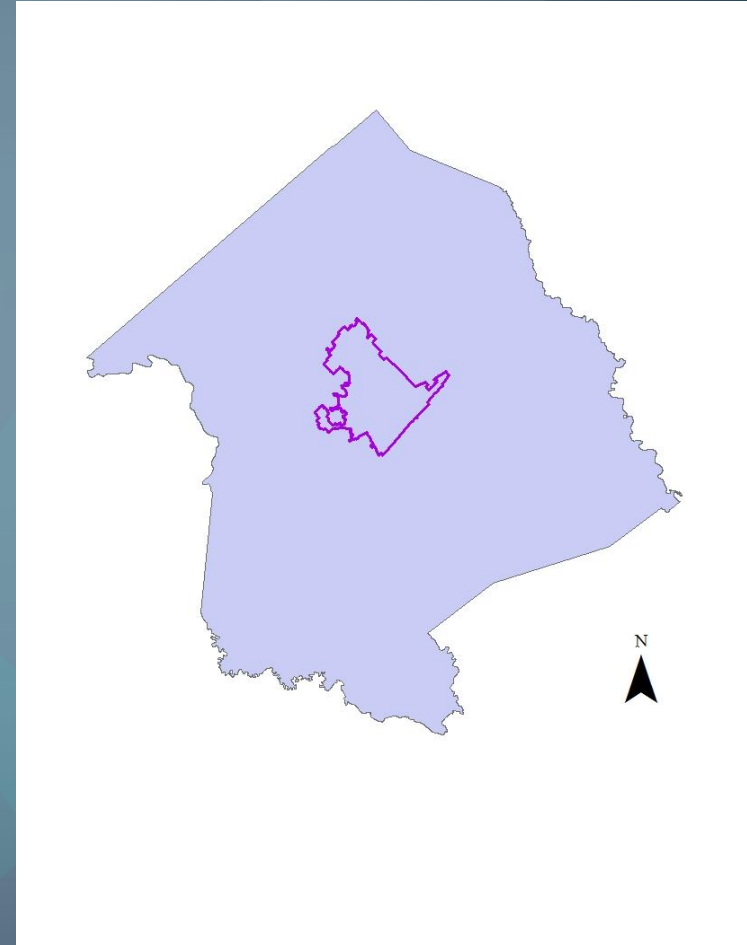
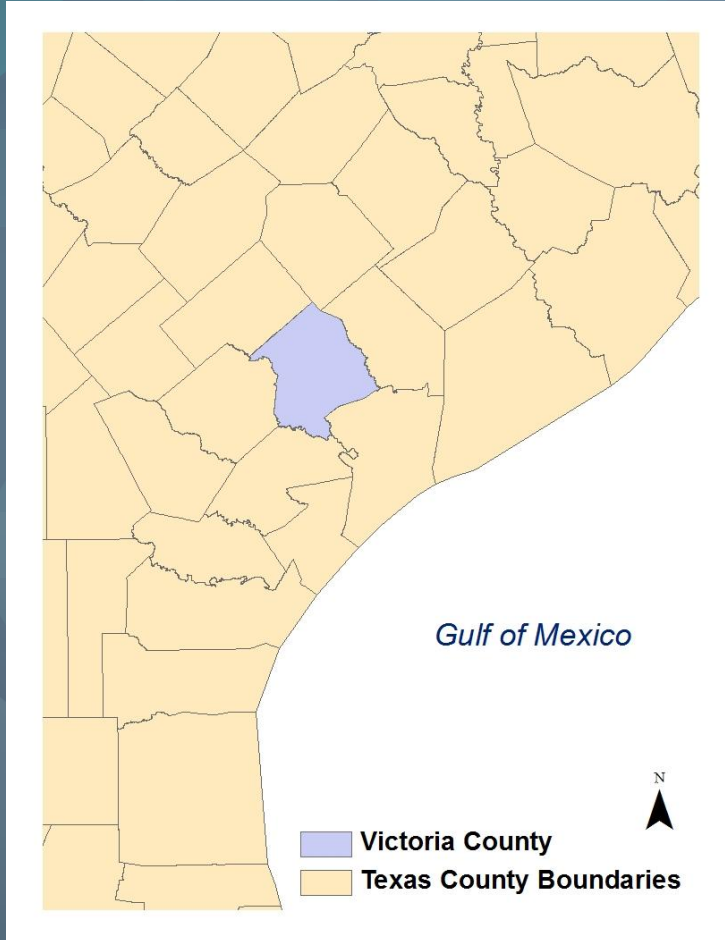
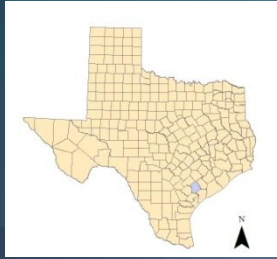
Problem Statement

The LEPC has asked STEP to:

- Provide them with spatial analysis through analytical maps to aid in a organized evacuation plan in the case of a chemical incident.
- Provide tools that would help in the organization of on-site and off-site planning during an emergency situation.
- Identify vulnerable infrastructures in the case of a chemical incident through buffer analysis.

Scope of Project

Victoria County & Victoria City Boundary



Objective



- Gather and create all necessary data
- Construct layers for analysis
- Supply LEPC with well interpreted information to aid in the case of a chemical disaster

Data Sources

Victoria County's LEPC

- Victoria City limit
- County boundary
- County parcels
- Hydrology (rivers, lakes, etc.)
- Street centerline
- HazMat transportation route

CHEMgroup

- EPA TIER II sites, 2009

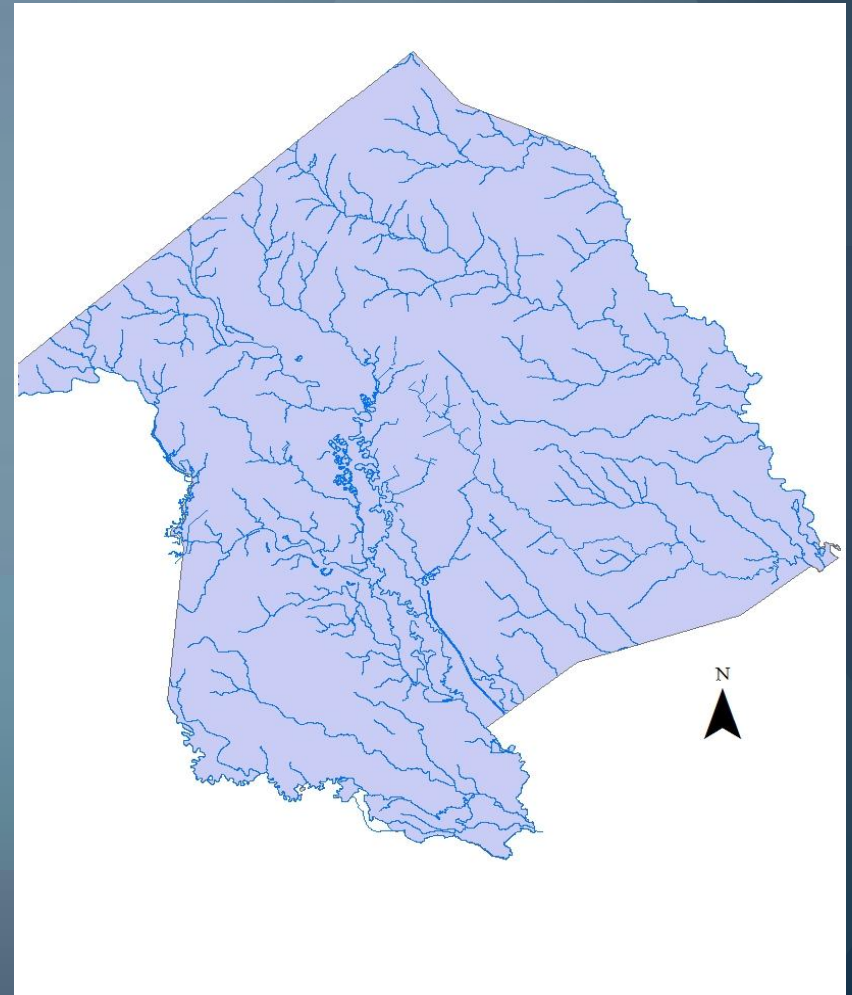
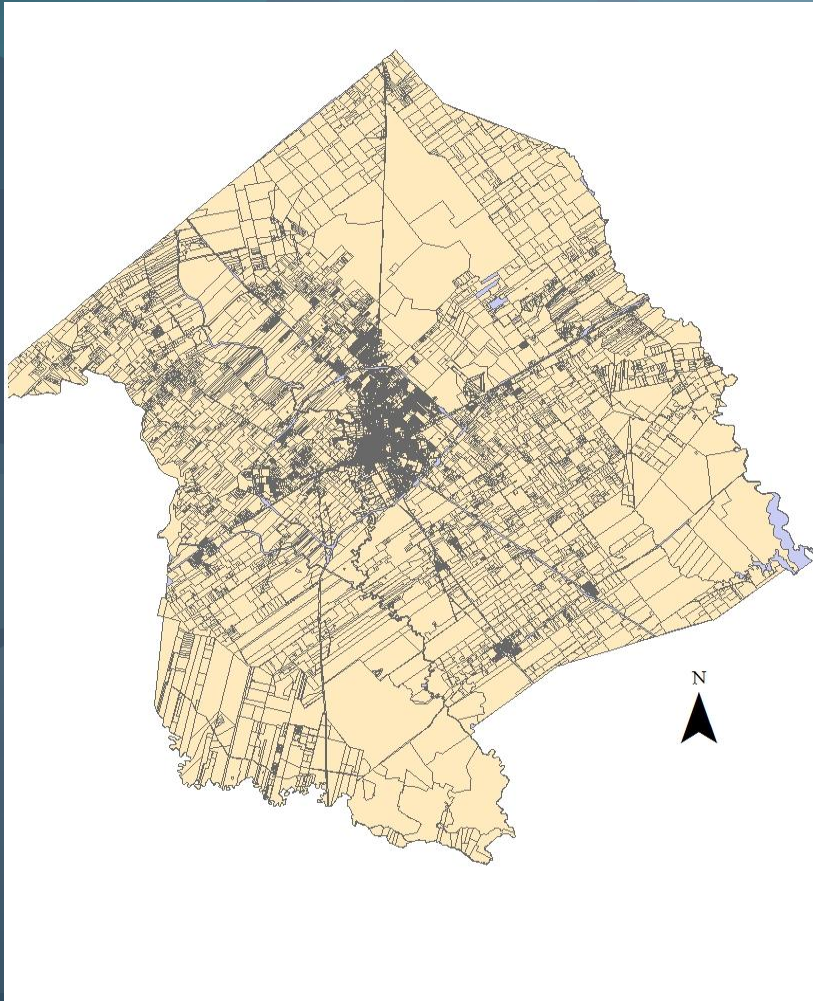
STEP & Victoria County Appraisal Office

- Critical Infrastructures
- Population at risk/population densities

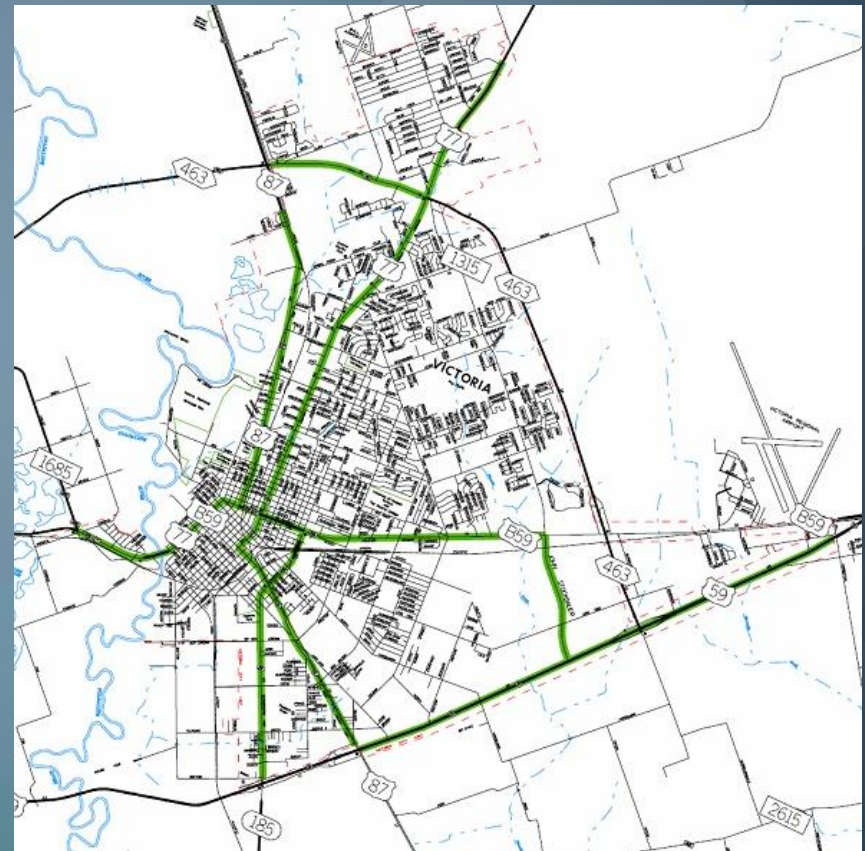
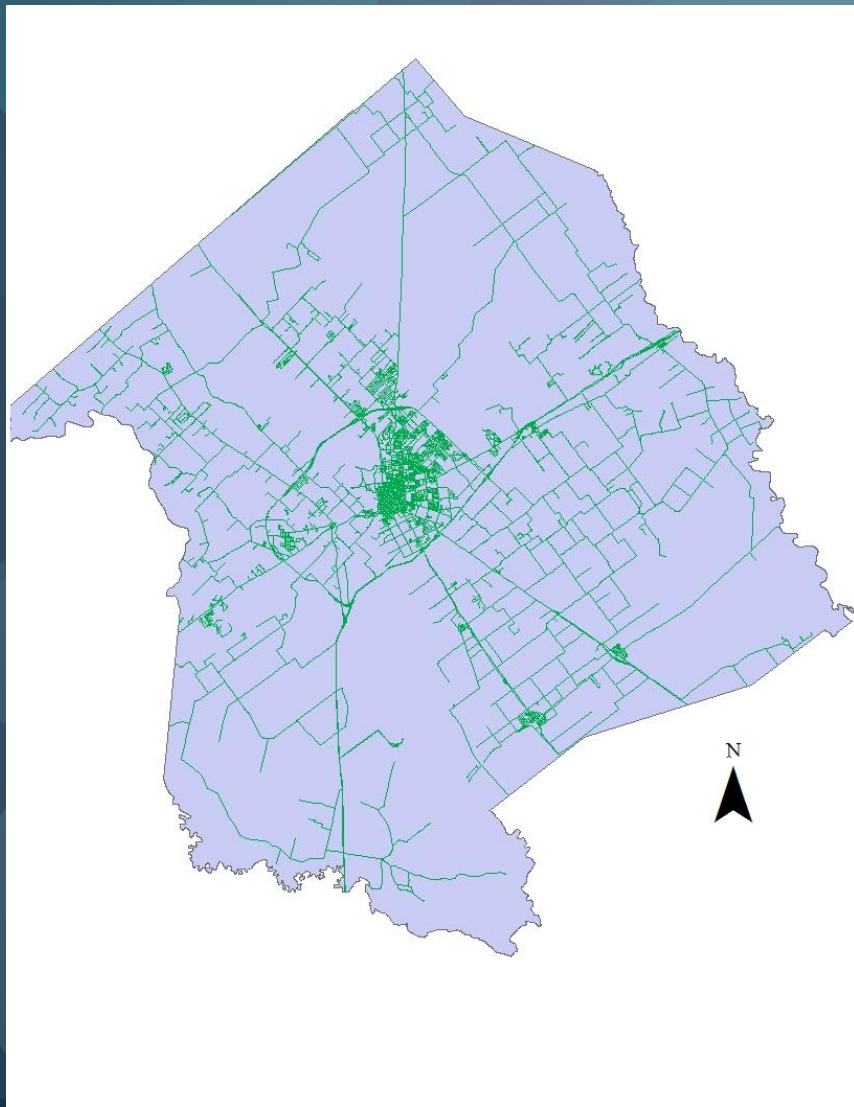
Victoria County GIS Department

- First responders
- Fire and police precincts
- Population at risk/population densities
- Evacuation sites

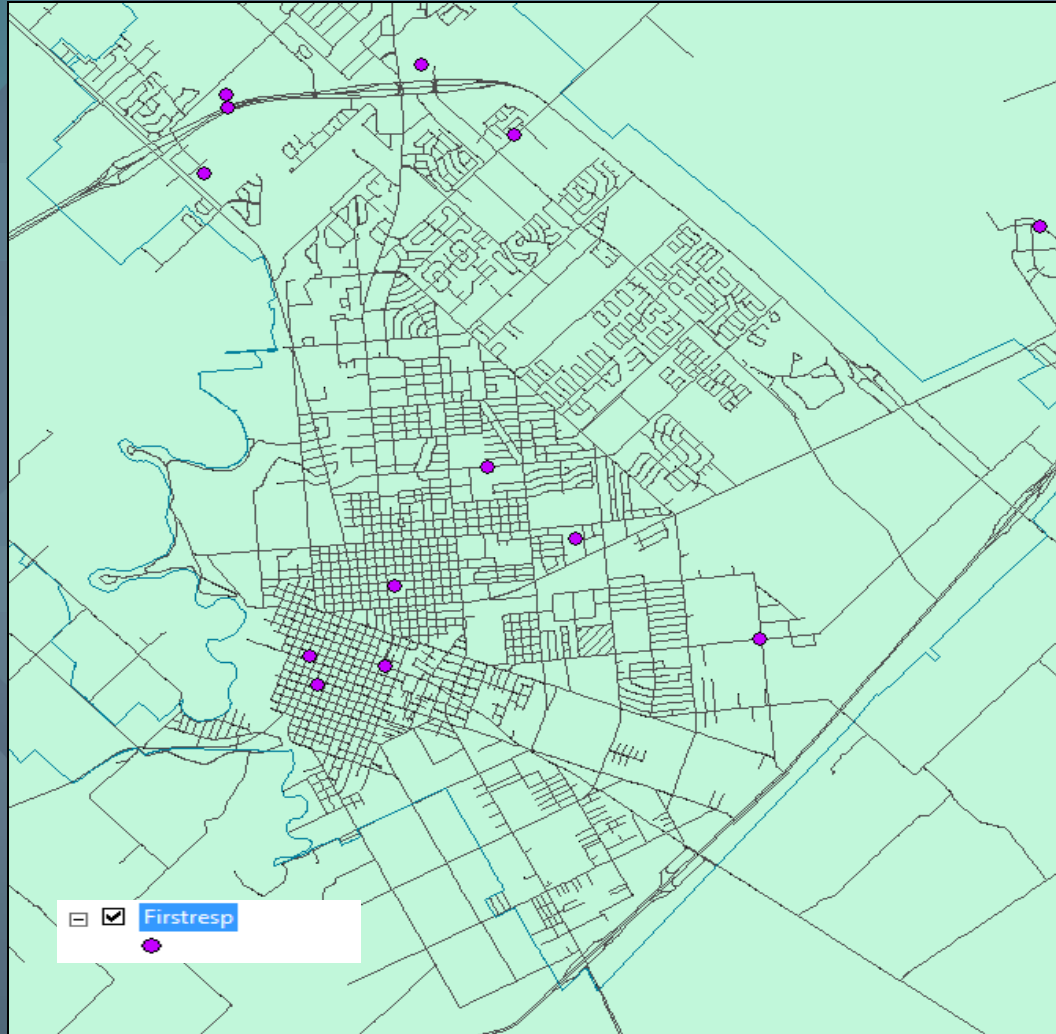
County Parcels and Hydrology



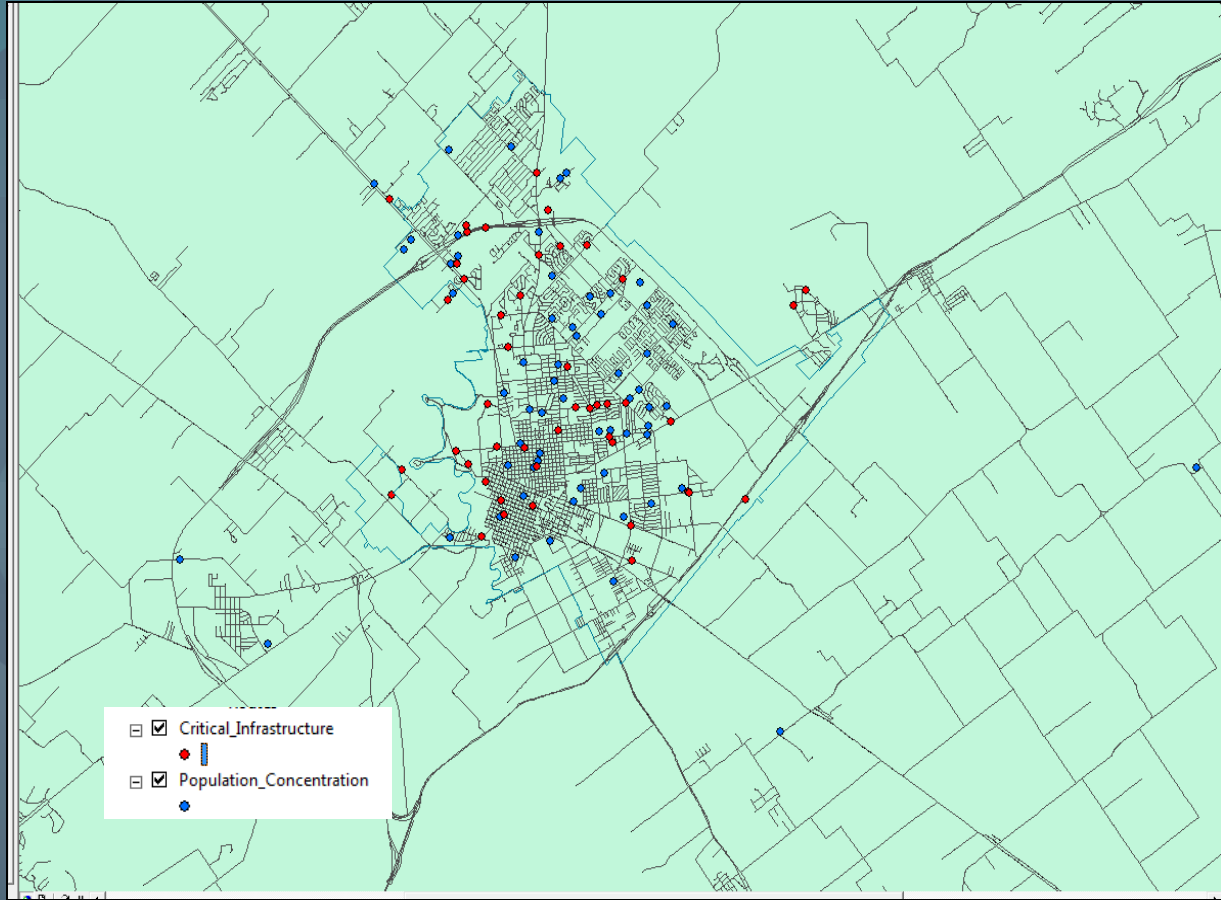
Street Centerline & HazMat Route



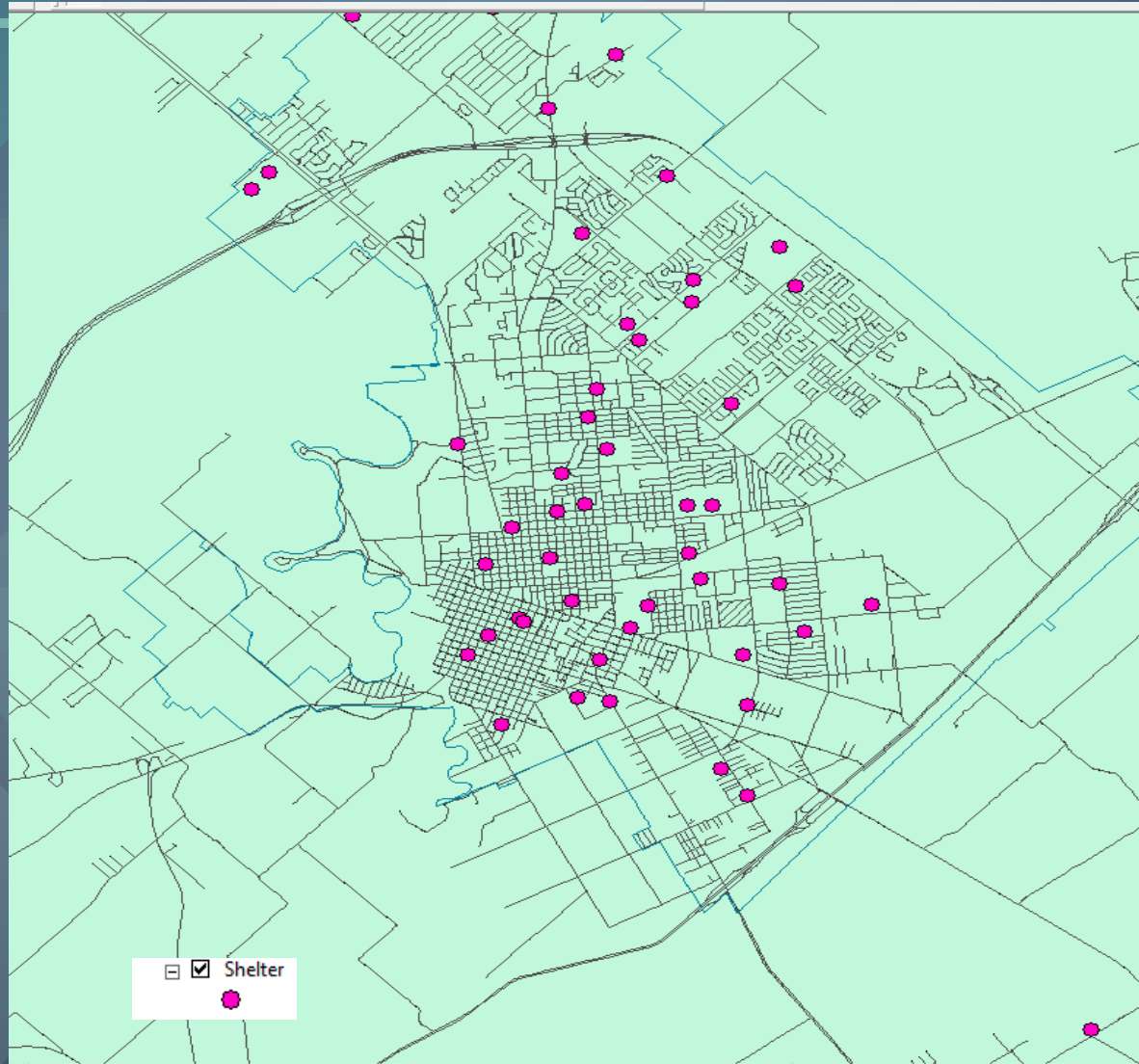
First Responders



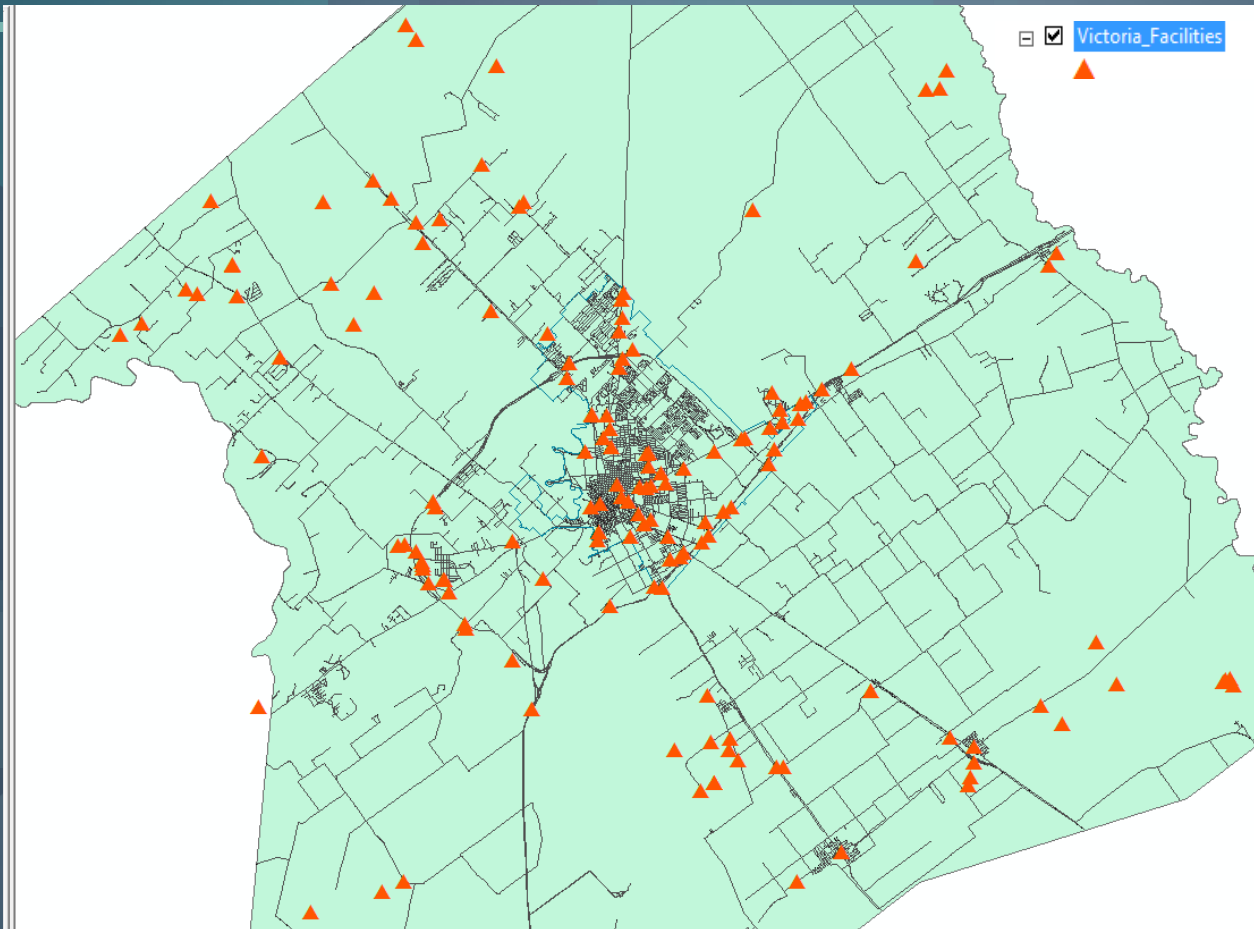
Populations at Risk & Critical Infrastructure



Evacuation Centers



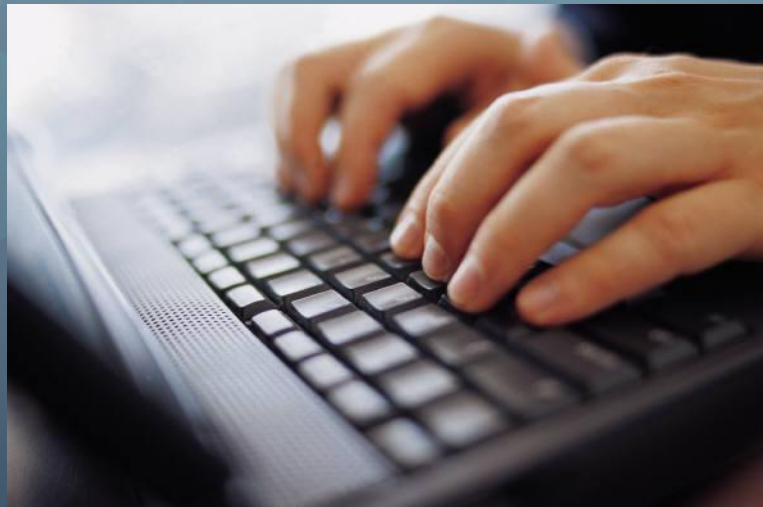
Chemical Hazard Sites



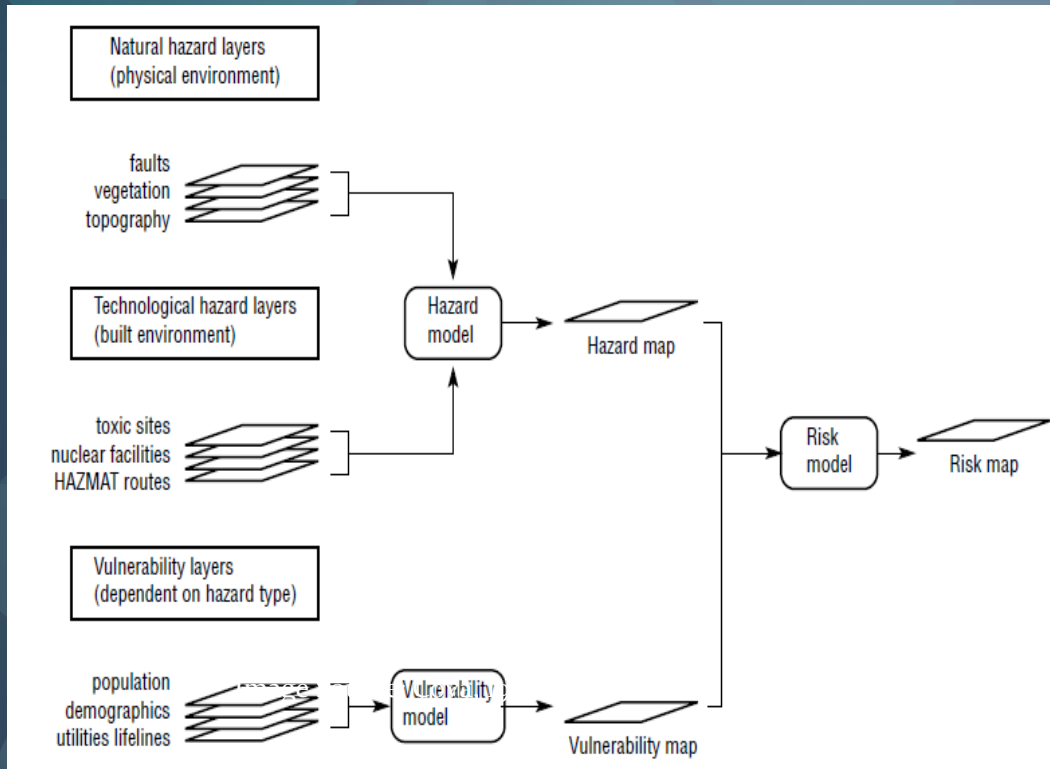
C.H.E.M. Group
Chemical Hazard Emergency Management: GIS Solutions

Data Acquisition

- Victoria County's LEPC
- Victoria County GIS department
- Victoria County appraisal district → STEP
- CHEMgroup



Methodology



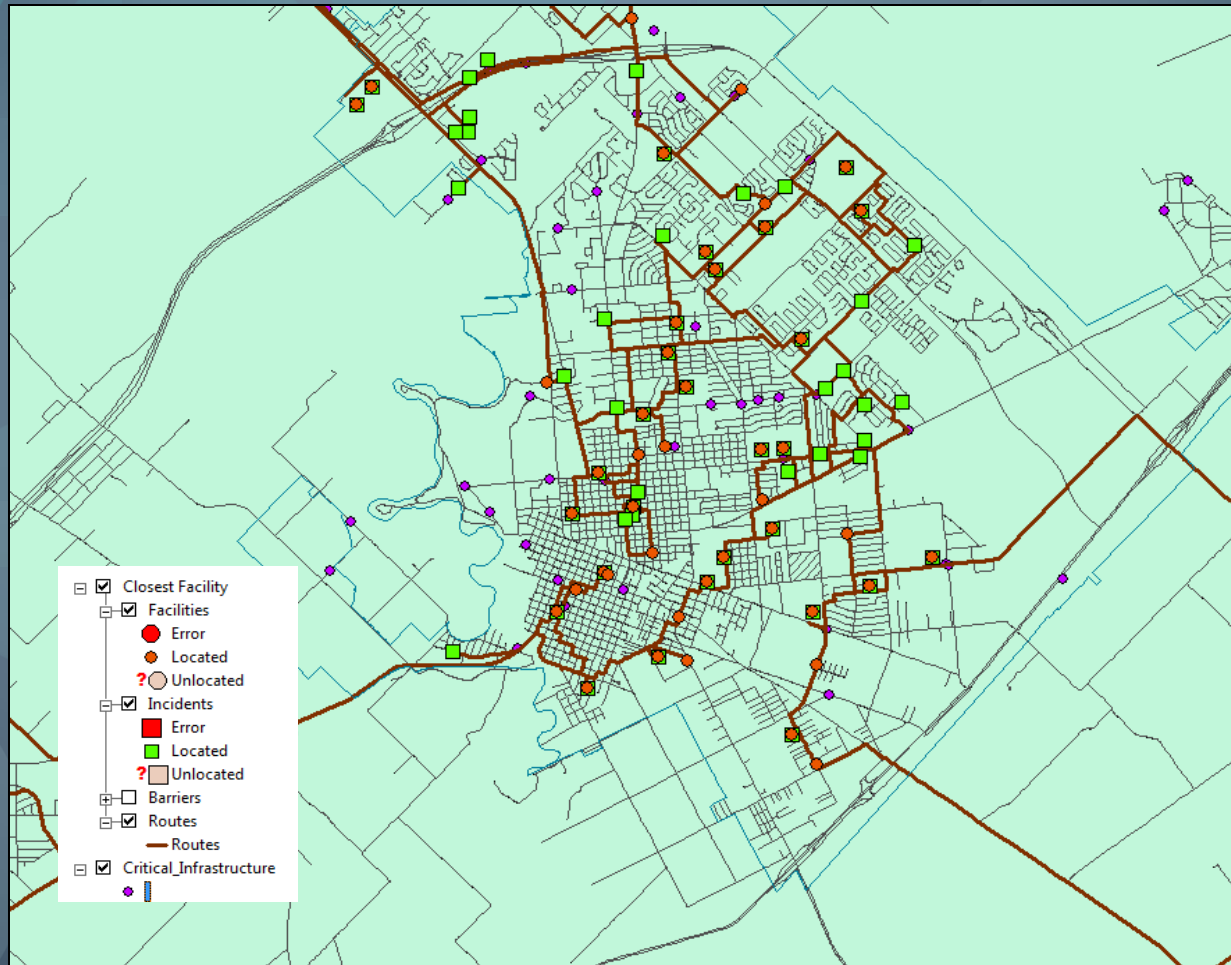
Objective 1: Consolidate Data

- Create data – KMZ Files
- Data layers
 - Population Concentrations
 - Evacuation Shelters
 - Critical Infrastructure
- Ensure data accuracy
- Create street network

Objective 2: Data Analysis

- Closest Facility Network – Population Concentrations to Evacuation Shelters
 - Supplemental table 1
- Hazard Site Risk Assessment
 - Population Concentrations, Critical Infrastructure, Hydrology features
 - Supplemental Table 2 & Graphs

Results



Results

Evacuation Shelters & Routes



ID #	Population Concentrations	Primary Shelter	Route to Primary	Secondary Shelter	Route to Secondary
SCHOOLS					
1	ALOE ELEMENTARY SCHOOL	Nazareth Academy	1-A	De Leon Plaza	1-B
2	CADE MIDDLE SCHOOL	Victoria West High School	2-A	Victoria Mall	2-B
3	CHANDLER ELEMENTARY SCHOOL	Ted B. Reed Park	3-A	Greenbelt Park	3-B
4	DE LEON ELEMENTARY SCHOOL	Victoria East High School	4-A	Rowland Elementary School	4-B
5	DUDLEY ELEMENTARY SCHOOL	Martin Luther King, Jr. Park	5-A	Victoria Community Center Par	5-B
6	FAITH ACADEMY	Howell Middle School	6-A	Greenbelt Park	6-B
7	FW GROSS MONTESSORI SCHOOL	Hopkins Academy	7-A	Nazareth Academy	7-B
8	GUADALUPE ELEMENTARY SCHOOL	Martin Luther King, Jr. Park	8-A	Dudely Elementary School	8-B
9	HOPE ELEMENTARY SCHOOL	Patti Welder Middle School	9-A	Profit High School	9-B
10	HOPKINS ACADEMY	Hopkins Park	10-A	Brownson Park	10-B
11	HOWELL MIDDLE SCHOOL	Faith Academy	11-A	Rowland Elementary School	11-B
12	JUAN LINN ELEMENTARY SCHOOL	Queen City Park	12-A	St. Joseph's High School	12-B
13	MISSION VALLEY ELEMENTARY SCHOOL	Victoria West High School	13-A	Cade Middle School	13-B
14	MITCHELL GUIDANCE CENTER	Memorial Park	14-A	De Leon Plaza	14-B
15	NAZARETH ACADEMY	De Leon Plaza	15-A	Mitchell Guidance Center	15-B
16	NORTHSIDE BAPTIST SCHOOL	Shields Elementary School	16-A	Our Lady of Victory School	16-B
17	O'CONNOR ELEMENTARY SCHOOL	Meadowlane Park	17-A	Torres Elementary School	17-B
18	OUR LADY OF VICTORY SCHOOL	Shields Elementary School	18-A	Victoria Christian School	18-B
19	PATTI WELDER MIDDLE SCHOOL	Brownson Park	19-A	Hope Elementary School	19-B
20	PROFIT HIGH SCHOOL	Hope Elementary School	20-A	Boulevard Park	20-B
21	ROWLAND ELEMENTARY SCHOOL	Greenbelt Park	21-A	Faith Academy	21-B
22	SCHORLEMMER ELEMENTARY SCHOOL	Vickers Elementary School	22-A	Victoria Mall	22-B
23	SHIELDS ELEMENTARY SCHOOL	Our Lady Of Victory School	23-A	Northside Baptist School	23-B
24	SMITH ELEMENTARY SCHOOL	Shields Elementary School	24-A	Howell Middle School	24-B
25	ST JOSEPH'S HIGH SCHOOL	Queen City Park	25-A	Juan Linn Elementary School	25-B
26	STROMAN MIDDLE SCHOOL	Victoria Community Center Par	26-A	O'Conner Elementary School	26-B
27	THE VICTORIA COLLEGE	University of Houston-Victoria	27-A	Boulevard Park	27-B

1

Aloe Elementary School

1-A

Shelter: Nazareth Academy

1:	Start at ALOE ELEMENTARY SCHOOL	
2:	Go southeast on CHAPARRALDR toward SW MOODY ST	0.1 mi
3:	Turn left on SW MOODY ST	3.9 mi
4:	Continue at WOLFRAM ST to stay on SW MOODY ST	0.5 mi
5:	Turn right on W MURRAY ST	<0.1 mi
6:	Turn left on S GLASS ST	0.1 mi
7:	Turn right on W CHURCH ST	<0.1 mi
8:	Finish at NAZARETH ACADEMY	
Total distance: 4.8 mi		

1-B

Shelter: De Leon Plaza

1:	Start at ALOE ELEMENTARY SCHOOL	
2:	Go southeast on CHAPARRALDR toward SW MOODY ST	0.1 mi
3:	Turn left on SW MOODY ST	3.9 mi
4:	Continue at WOLFRAM ST to stay on SW MOODY ST	0.5 mi
5:	Turn right on W MURRAY ST	<0.1 mi
6:	Turn left on S GLASS ST	0.3 mi
7:	Turn right on W CONSTITUTION ST	0.1 mi
8:	Finish at De Leon Plaza	
Total distance: 5.1 mi		

Results

The screenshot displays the ArcGIS interface with a map of a city area. Three data tables are overlaid on the map, showing the results of various analyses. The map shows a network of roads and water features, with a central area highlighted in green and blue.

Selected Attributes of Hydrology

FID	Shape	FEATURE	NAME	SHAPE_len
208	Polyline	RIVER	GUADALUPE RIVER	11433.643961
341	Polyline	HYDRO	WEST OUTFALL	12931.238527
342	Polyline	CREEK	WHISPERING CREEK	11778.630715
559	Polyline	CREEK	SPRING CREEK	5972.134689
560	Polyline	CREEK	SPRING CREEK	914.052405
581	Polyline	CREEK	SPRING CREEK	801.825802
582	Polyline	CREEK	SPRING CREEK	776.548428
580	Polyline	CREEK	WHISPERING CREEK	405.429992
602	Polyline	HYDRO	GRAVEL PITS	1301.451737
604	Polyline	HYDRO	GRAVEL PITS	1997.551106
605	Polyline	HYDRO	GRAVEL PITS	3049.310889
606	Polyline	HYDRO	GRAVEL PITS	4139.510365
608	Polyline	CREEK	SPRING CREEK	729.044381

Selected Attributes of CritInfr

FID	Shape	Status	Score	Match_type	Side	Match_addr
15	Point	M	52	M	R	4008 NIMITZ ST 4008
26	Point	M	100	PP		202 V
29	Point	M	100	A	R	5500 COUNTRY CLUB DR 5500
42	Point	M	100	A	R	2902 BLUFF ST 2902
45	Point	M	100	A	L	100 E MOCKINGBIRD LN 100 E

Selected Attributes of PopConc

FID	Shape	NAME	ADDRESS
1	Point	HOWELL MIDDLE SCHOOL	2502 FANNIN DR
5	Point	SHIELDS ELEMENTARY SCHOOL	3400 BLUEBONNET DR
21	Point	VICTORIA CHRISTIAN SCHOOL	801 E AIRLINE RD
22	Point	OUR LADY OF VICTORY SCHOOL	1311 MESQUITE LN
23	Point	NORTHSIDE BAPTIST SCHOOL	4100 N LAURENT ST
24	Point	FAITH ACADEMY	2002 E MOCKINGBIRD LN
40	Point	BUSY B'S DAYCARE	105 BANBURY TX
45	Point	CROSSROADS PULMONARY & KING KD'S DAY CARE	2806 N NAVARRO STE C
47	Point	LADY BUG DAY CARE CENTER	103 COZZI CIR
56	Point	Main St Personal Care	3305 N Main

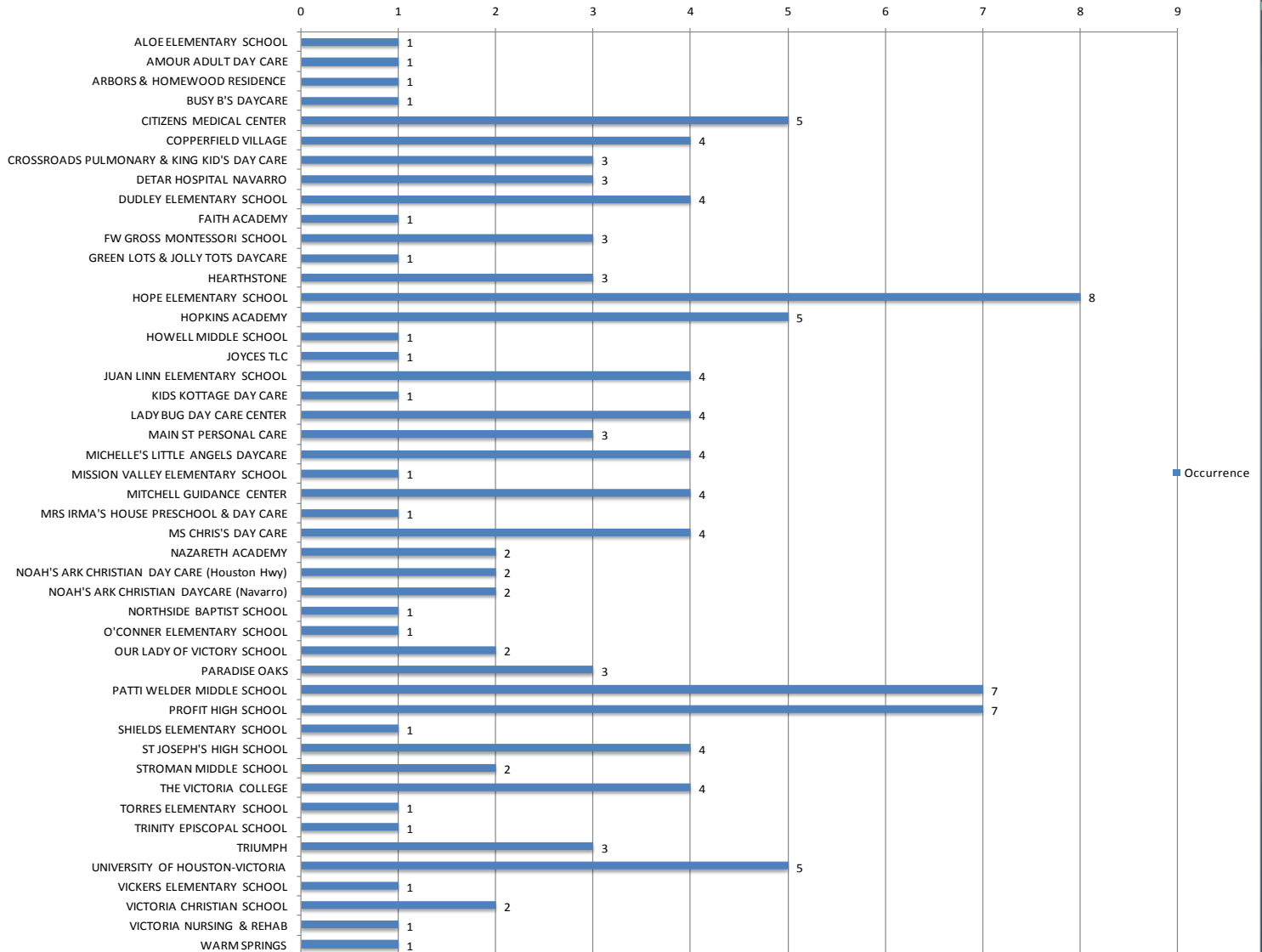
Results

Features At Risk By Hazard Sites

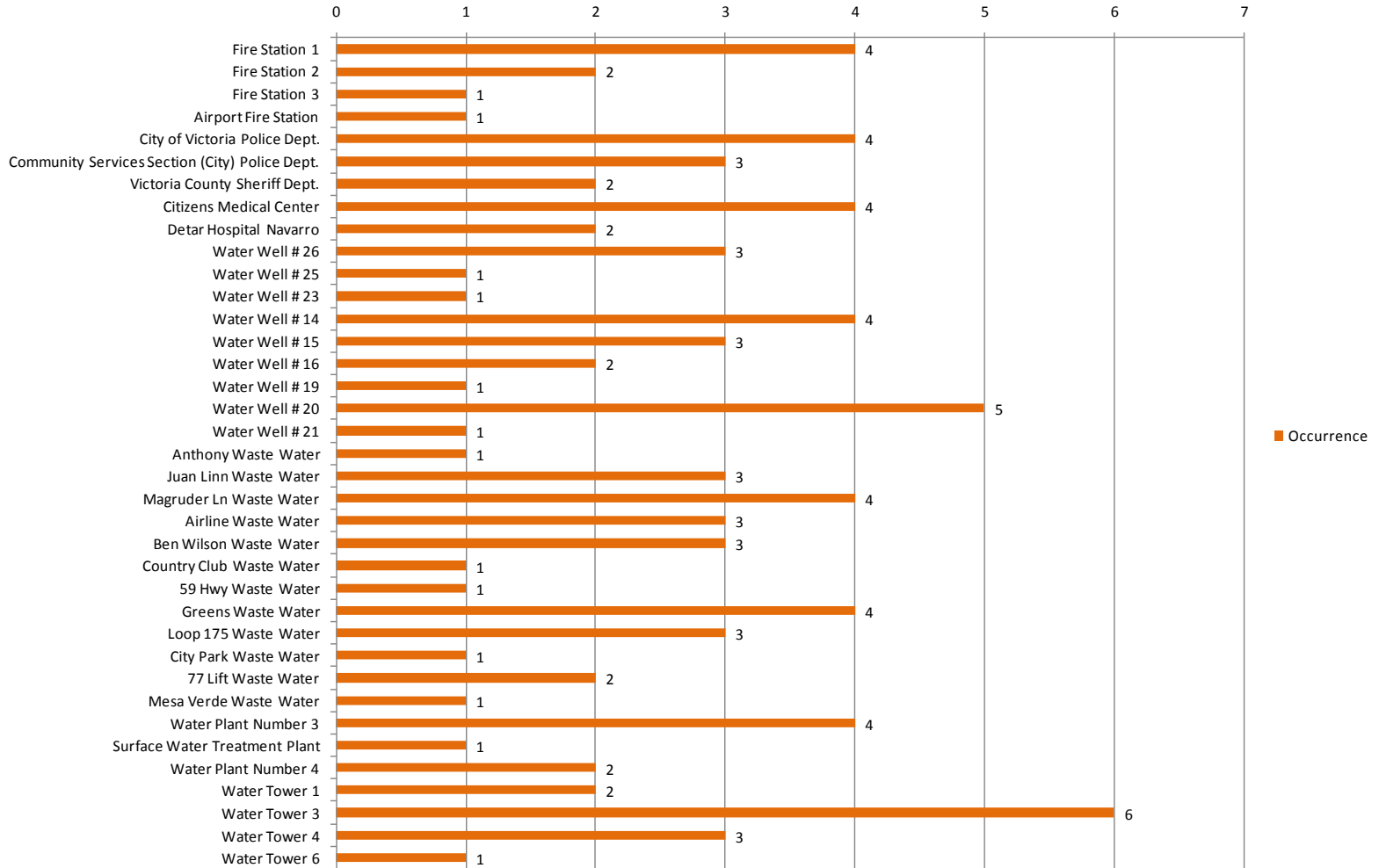


Hazard Site	Pop. Concentration Risk	Critical Infrastructure	Hydrology
AAA Butane	Mission Valley Elementary School	-	Rocky Creek
Acetylene Oxygen Company	Hope Elementary School Patti Welder Middle School Stroman Middle School Hopkins Academy Dudley Elementary School	Juan Linn Waste Water Ben Wilson Waste Water	
AEP Texas Central Co - TCC-Chocolate Bayou Substation	-	-	Chocolate Bayou
AEP Texas Central Co - TCC-Magrunder Substation	-	Magrunder Lane Waste Waster Water Tower #3	Whispering Creek Spring Creek
AEP Texas Central Co - TCC-North Victoria Substation	Hope Elementary School Profit High School	-	-
AEP Texas Central Co - TCC-Victoria Service Center	Lady Bug Day Care Center Main St. Personal Care	Water Tower #3	
AEP Texas Central Co -TCC-DuPont Switch (Victoria) Substation	-	-	-
AEP Texas Central Co -TCC-Victoria Substation	FW Gross Montessori School	Greens Waste Water	Guadalupe River
Air Liquide Large Industries U.S. LP	-	-	-
Airgas Southwest, Inc.- Victoria #1	Hope Elementary School Patti Welder Middle School Stroman Middle School Hopkins Academy Dudley Elementary School Profit High School	Juan Linn Waste Water Ben Wilson Waste Water	-
Alamo Concrete Products, LTD	Profit High School Citizens Medical Center Ms. Chris's Day Care	Citizens Medical Center Water Well #20	Souther Pacific Ditch
Alamo Concrete Products, LTD. - VICTORIA / H H # 51	Vickers Elementary School Copperfield Village Nursing Home Hearthstone Nursing Home	Water Tower #4	
Alta Mesa Services, LP. - Beck B #1	-	-	Willow Creek

Population Concentration Risk Occurrence by Hazard Site



Critical Infrastructure Risk Occurrence by Hazard Site

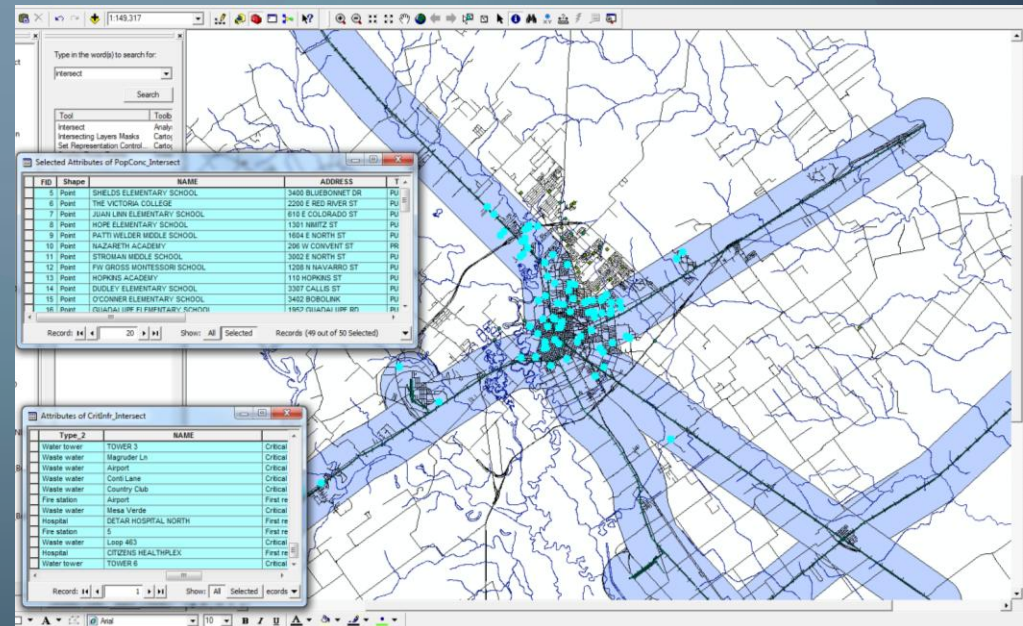


Discussion

Limitations

- Database maintenance
- Shelter Distances
- Shelter repeats
- Hydrology data
- Railroads

FID	Shape *	FEATURE	NAME	SHAPE_len
0	Polyline	HYDRO		4758.478141
1	Polyline	CREEK	CHICOLETE CREEK	6615.305399
2	Polyline	HYDRO		1030.80408
3	Polyline	HYDRO		7184.39185
4	Polyline	HYDRO		7601.042374
5	Polyline	CREEK	HAINES FLAT CREEK	9884.519571
6	Polyline	HYDRO		19.43857
7	Polyline	HYDRO		25.976353
8	Polyline	HYDRO		13511.427053
9	Polyline	HYDRO		14.692726
10	Polyline	CREEK	BROWN CREEK	8857.317377
11	Polyline	CREEK	HAINES FLAT CREEK	5746.601865
12	Polyline	HYDRO		2497.595252



Implications



- Aid for Emergency Planning and Procedures
 - Supplemental Tables & Graphs
- Organized Evacuations to save time and lives
- Guide for protection of Population Concentrations and Critical Infrastructures that are at more risk than others

Conclusion

- STEP was able to collect all necessary data for a thorough and complete analysis.
- STEP created a database of any missing information that was not available from data contributors.
- STEP was able to provide detailed interpretations of all analysis done, as well as provided visual reports to aid in the decision making process in the case of a chemically hazardous disaster.

Final Deliverables



- Detailed final report with maps
- Website of completed project
 - <http://geo-311306.evans.txstate.edu/>
- (2) CDs that contain:
 - All data
 - Metadata
 - Reports
 - Poster
 - Presentation
 - Readme file (how to use CD)



Questions ?

