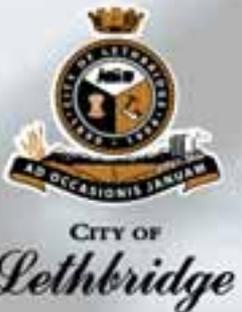


9-1-1 and GIS

Analyzing 9-1-1 Call Data from an Emergency Management Perspective

Chris Kearns, M.Sc. – City of Lethbridge / Jacksonville State University
Tanveer Islam, Ph.D. – Jacksonville State University



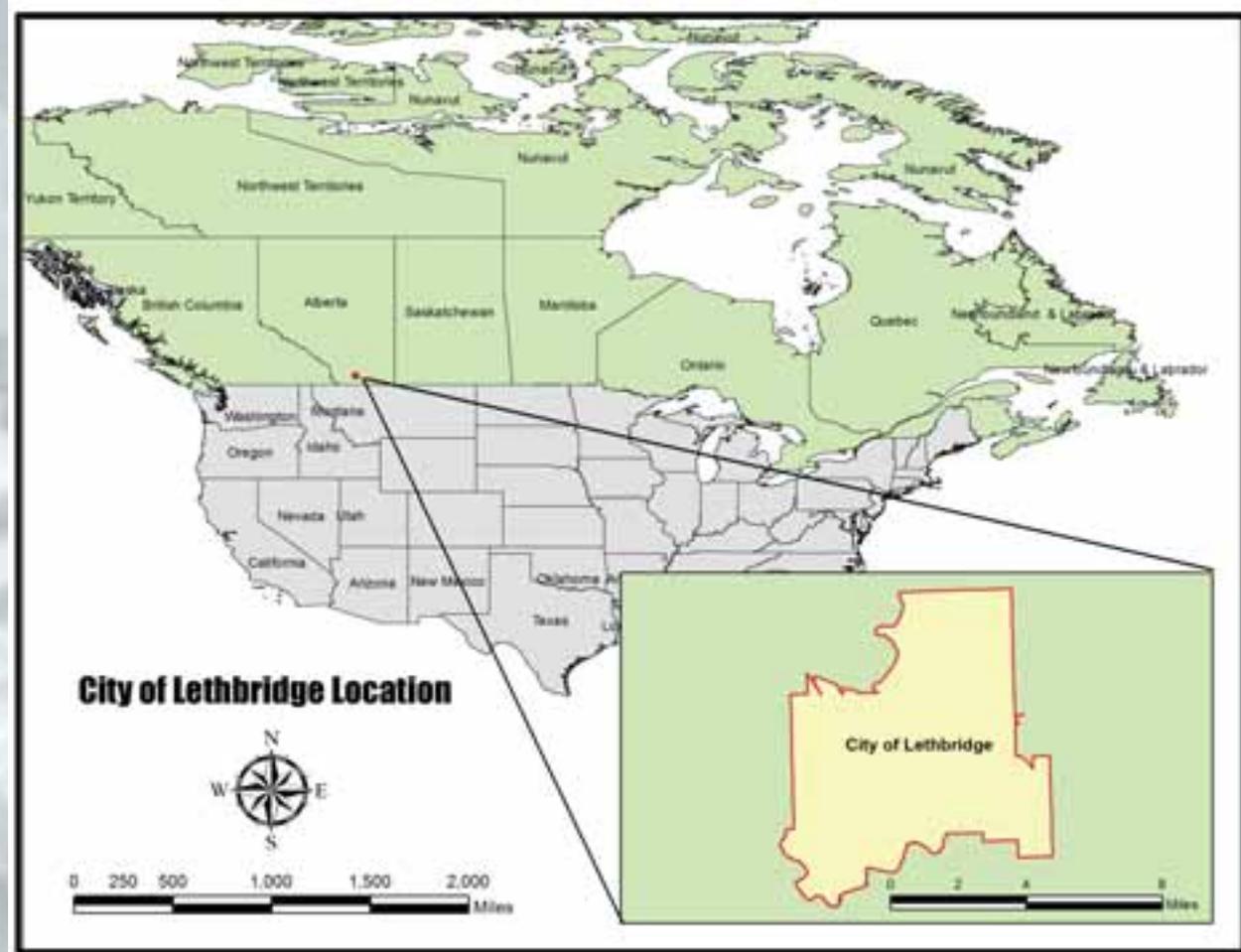
9-1-1 Research Project

- This is preliminary research
- We are plotting 9-1-1 calls on a map and looking for trends
- Analyzing 9-1-1 call data we are trying to understand the process and speed an area returns to "normal" (i.e., the pre-disaster patterns)
- We will make recommendations to improve the current emergency management capabilities



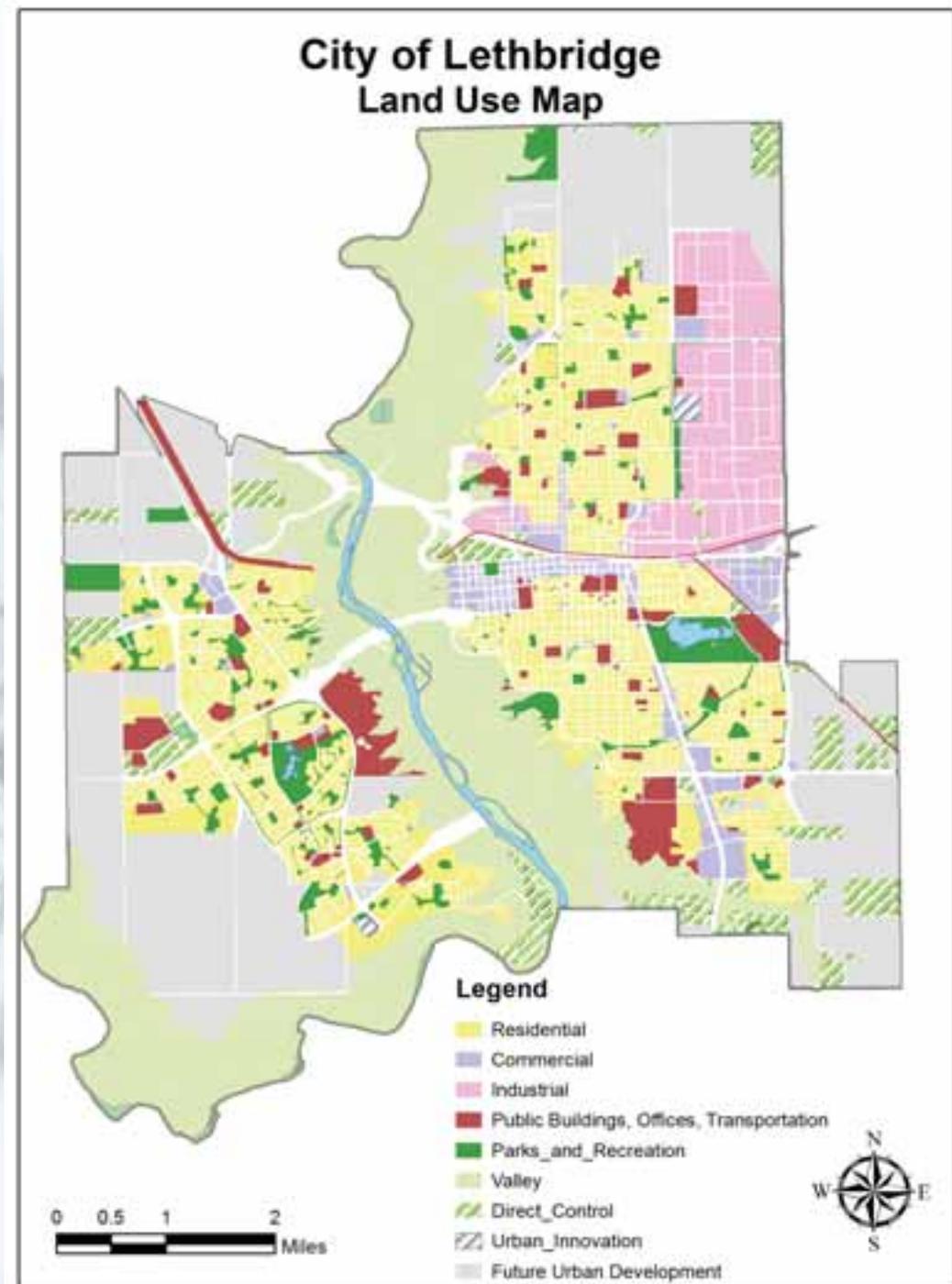
Study Area: City of Lethbridge

- Lethbridge, Alberta
Canada
- 131 miles South of
Calgary
- 1 hour North of
Montana
- Pop. 89,074 (2012
census)
- Greater regional
pop. 130,000



City of Lethbridge

- A lot of residential neighbourhoods
- Industrial, towards the East edge of the City
- Plenty of green space
- Downtown is to the East of the Old Man River

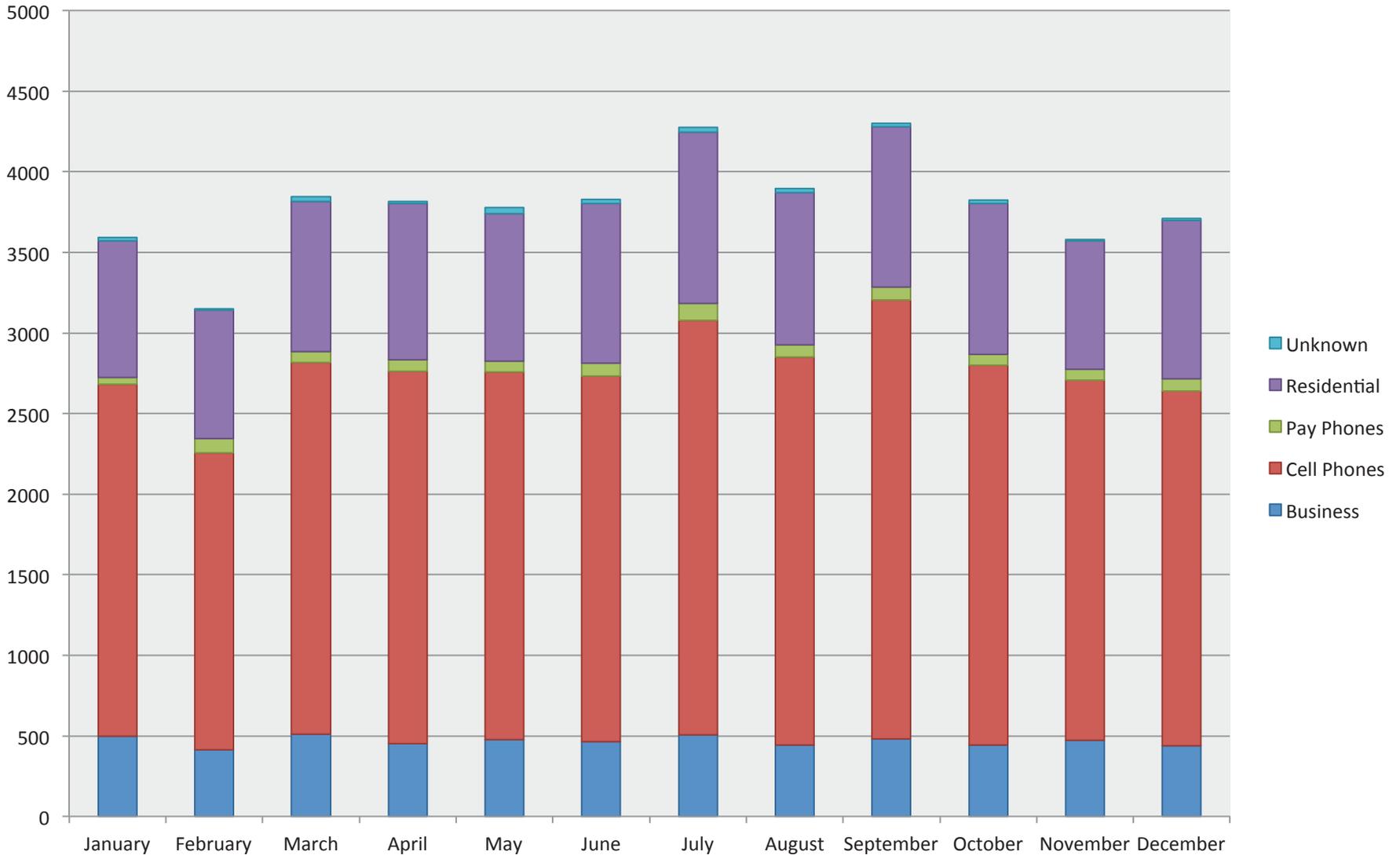


City of Lethbridge

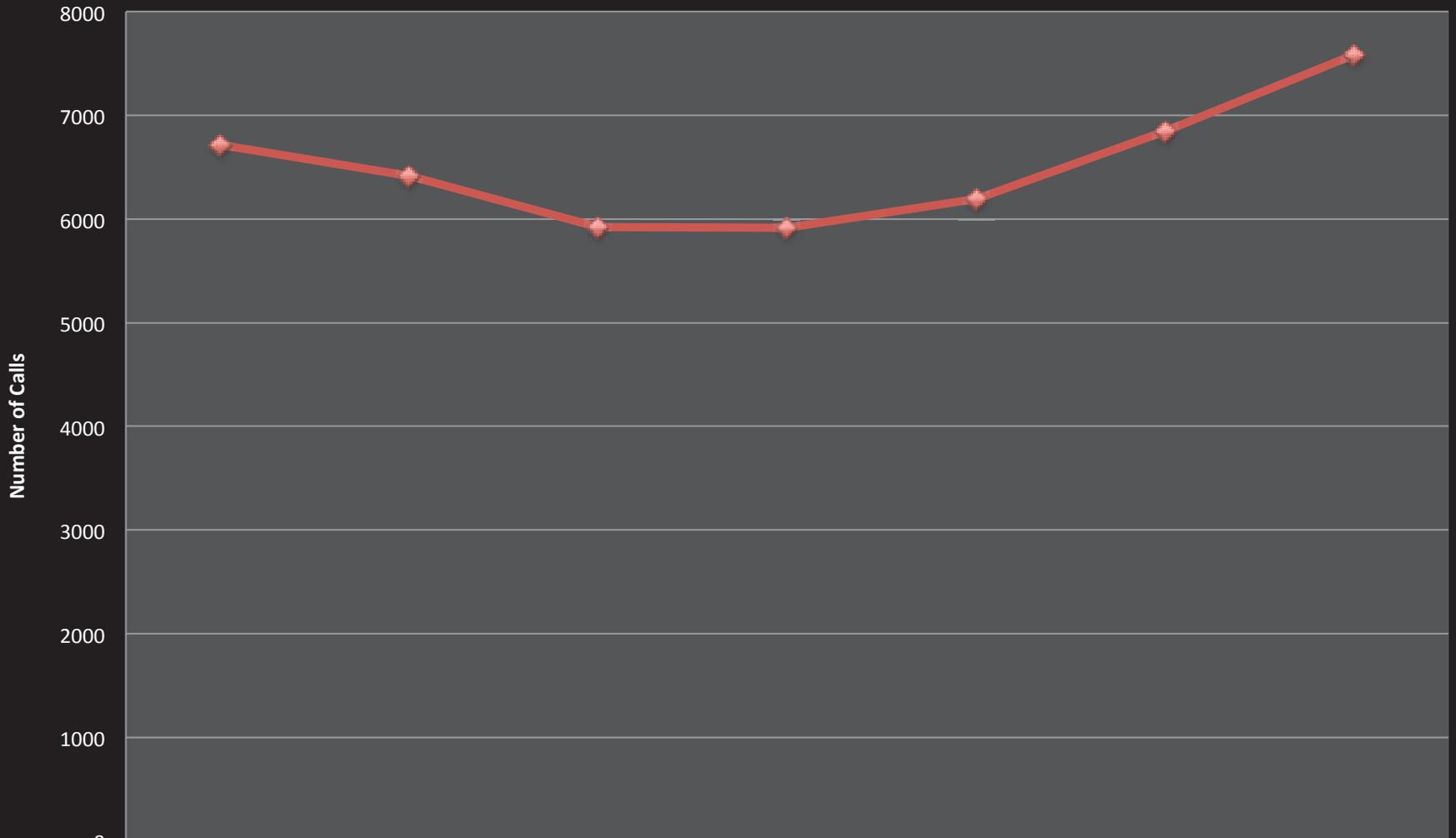
Public Safety Communications Centre (PSCC)

- Public Safety Answering Point (PSAP) for the region
- Dispatch Lethbridge Fire, Lethbridge Police and 25 rural fire and EMS agencies
- Handled 45,594 calls on 9-1-1 in 2012
- 65% of those calls were from the City of Lethbridge

2012 9-1-1 Calls by Month by Service Type

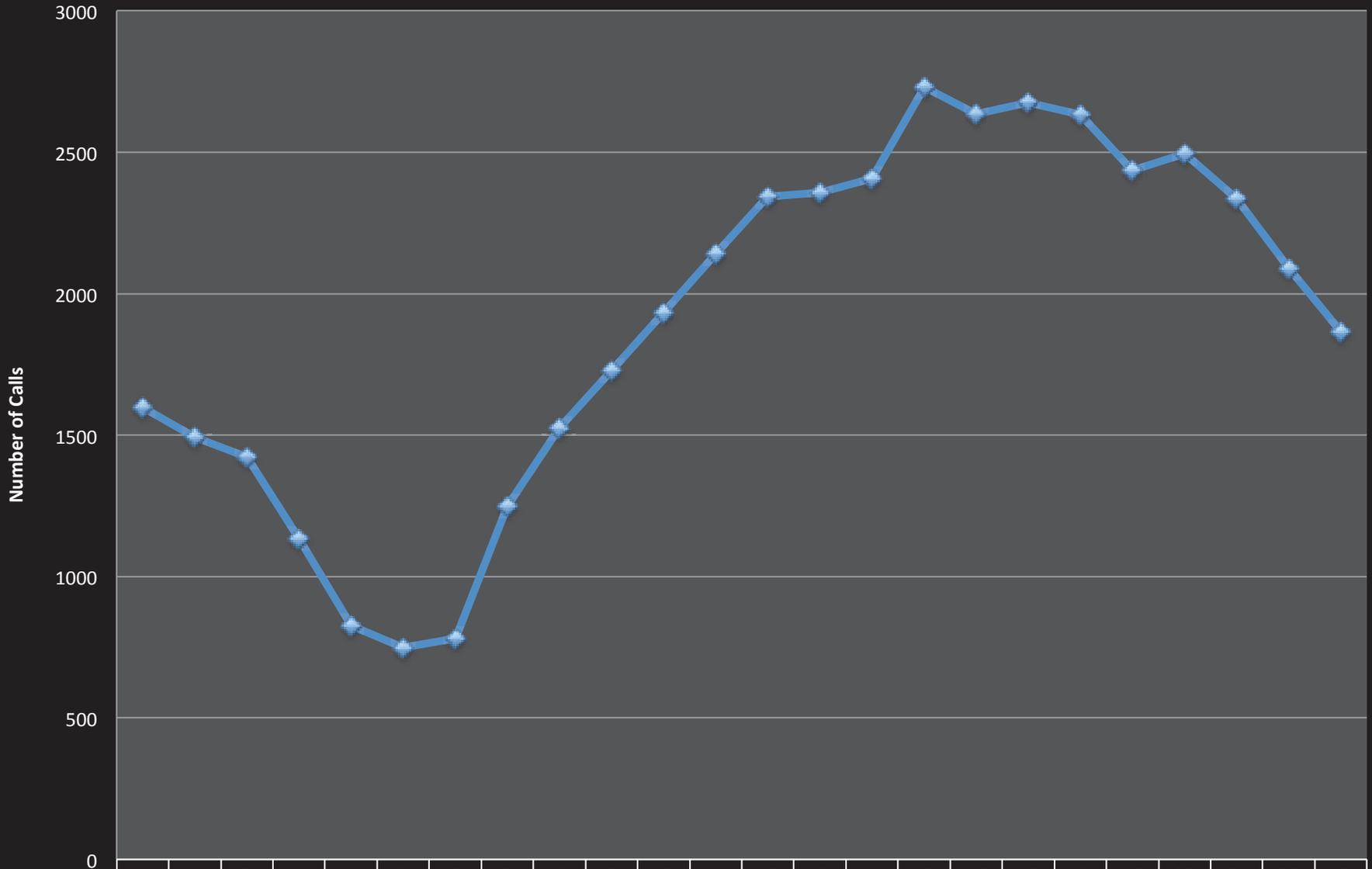


9-1-1 Calls by Day of Week

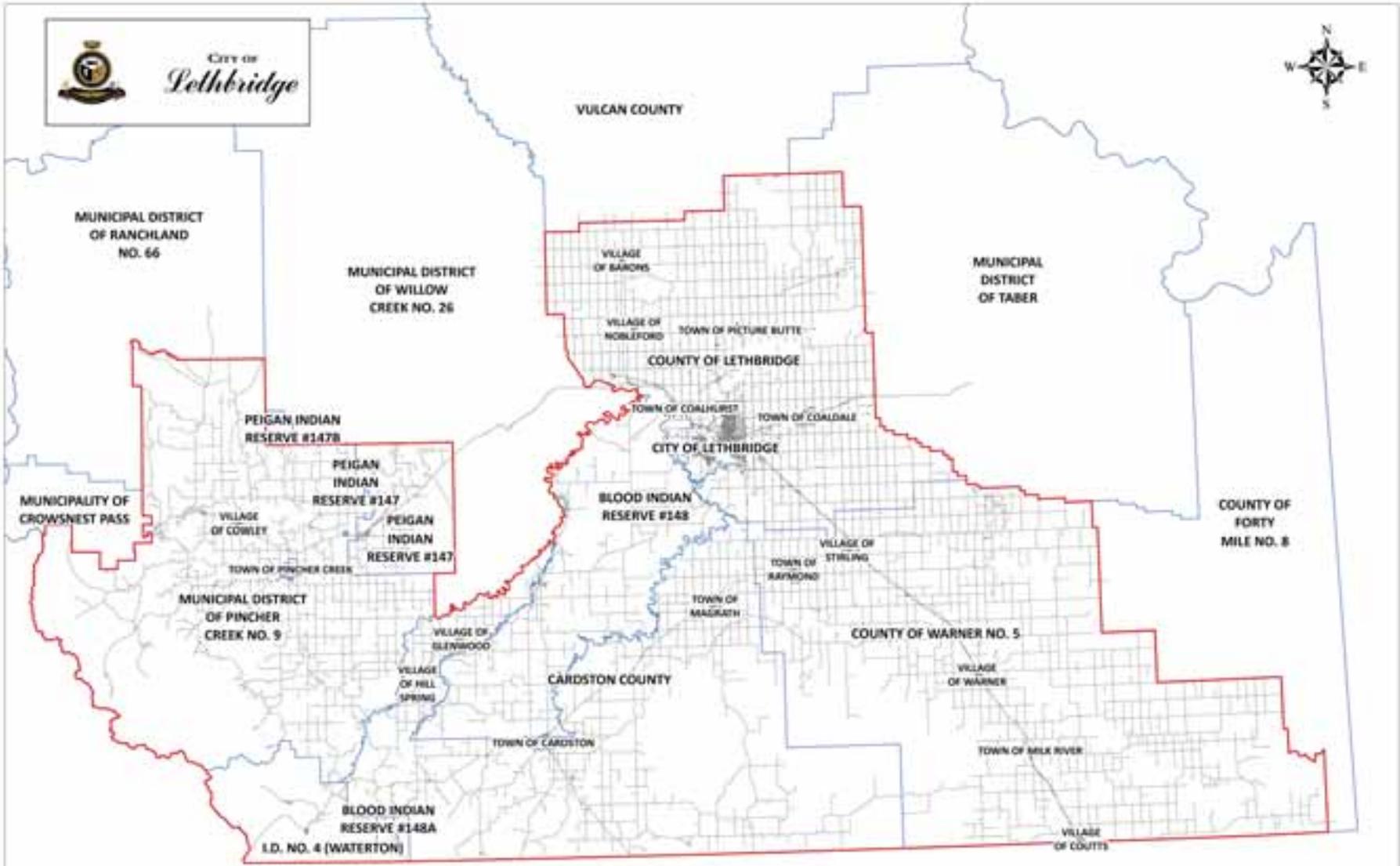


	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Total	6718	6417	5921	5916	6192	6845	7585

9-1-1 Calls by Hour of the Day



Total	1598	1494	1423	1136	826	749	782	1250	1524	1729	1932	2142	2344	2358	2408	2730	2636	2675	2634	2436	2496	2335	2090	1867
-------	------	------	------	------	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------



Legend

- Dispatch Area
- Municipal Boundaries
- Single Line Street Network

City of Lethbridge Public Safety Communications Centre 9-1-1 Call Answer Region

Notes

1. This map is intended to provide a general overview of the 9-1-1 call answer region. It is not intended to be used as a legal document. For more information, please contact the City of Lethbridge Public Safety Communications Centre at (403) 942-2222.

2. The City of Lethbridge Public Safety Communications Centre is responsible for the 9-1-1 call answer region. The City of Lethbridge is not responsible for the 9-1-1 call answer region in other municipalities.

3. The City of Lethbridge Public Safety Communications Centre is not responsible for the 9-1-1 call answer region in Indian reserves.

4. The City of Lethbridge Public Safety Communications Centre is not responsible for the 9-1-1 call answer region in unincorporated areas.

5. The City of Lethbridge Public Safety Communications Centre is not responsible for the 9-1-1 call answer region in areas where the 9-1-1 service is not available.

6. The City of Lethbridge Public Safety Communications Centre is not responsible for the 9-1-1 call answer region in areas where the 9-1-1 service is not available.

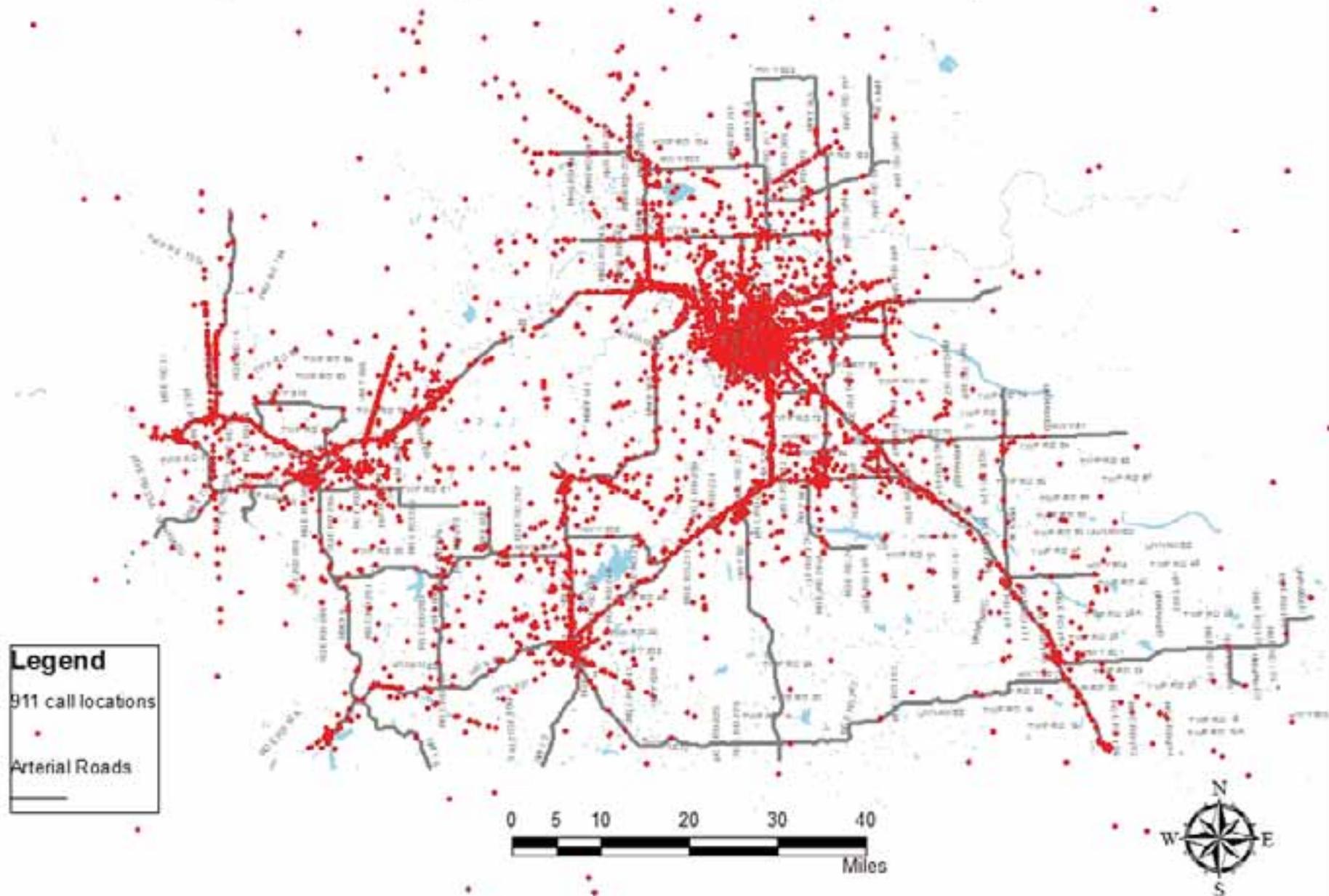
7. The City of Lethbridge Public Safety Communications Centre is not responsible for the 9-1-1 call answer region in areas where the 9-1-1 service is not available.

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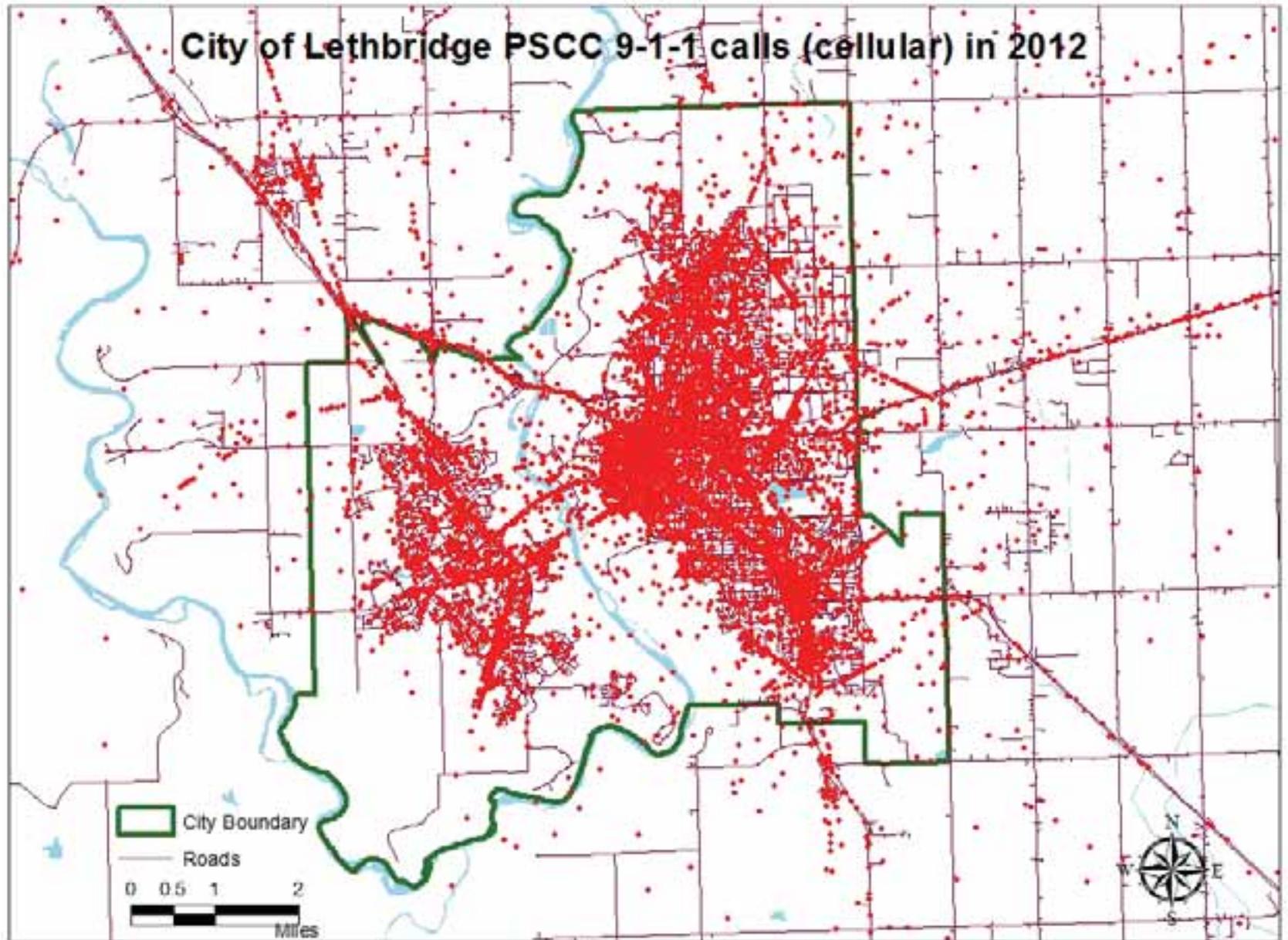
9. The City of Lethbridge Public Safety Communications Centre is not responsible for the 9-1-1 call answer region in areas where the 9-1-1 service is not available.

10. The City of Lethbridge Public Safety Communications Centre is not responsible for the 9-1-1 call answer region in areas where the 9-1-1 service is not available.

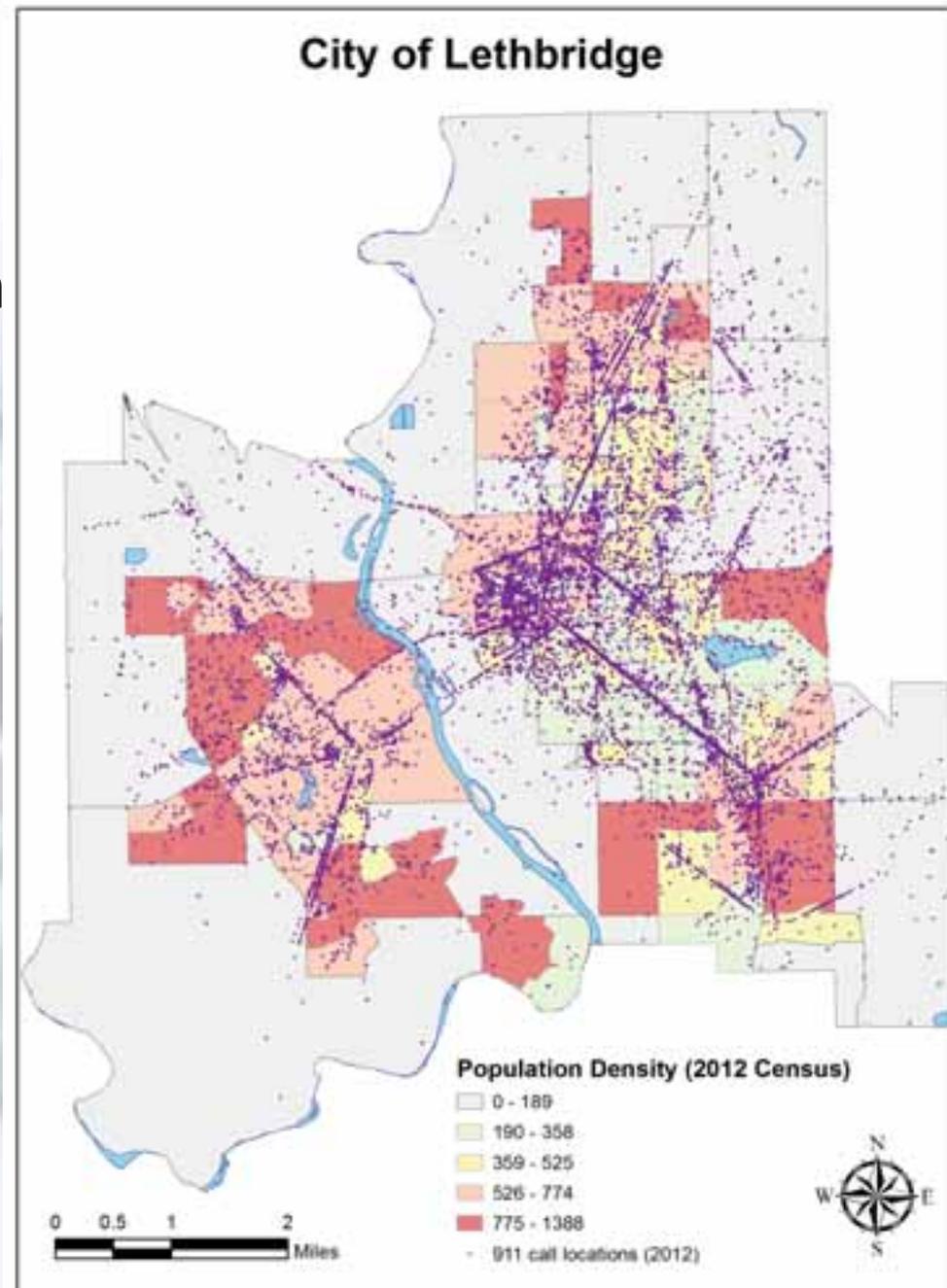
City of Lethbridge PSCC 9-1-1 calls (cellular) in 2012



City of Lethbridge PSCC 9-1-1 calls (cellular) in 2012

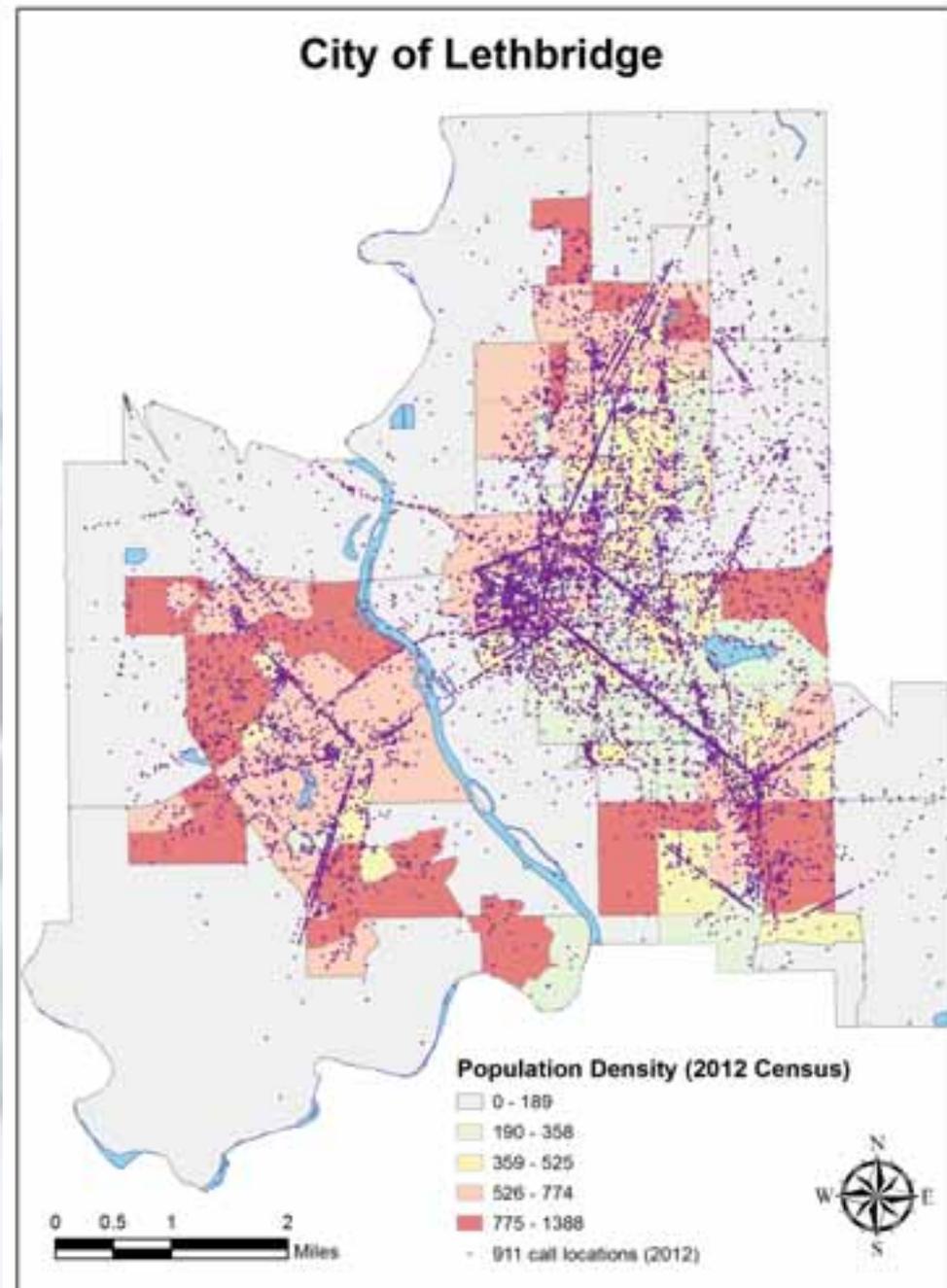


- **45,594** 9-1-1 calls 2012
- **29,657** (65%) were from the City of Lethbridge
- **27,687** (61%) of 9-1-1 calls were from cell phones
- **17,647** (39%) were cell phones within the City of Lethbridge (map to right)



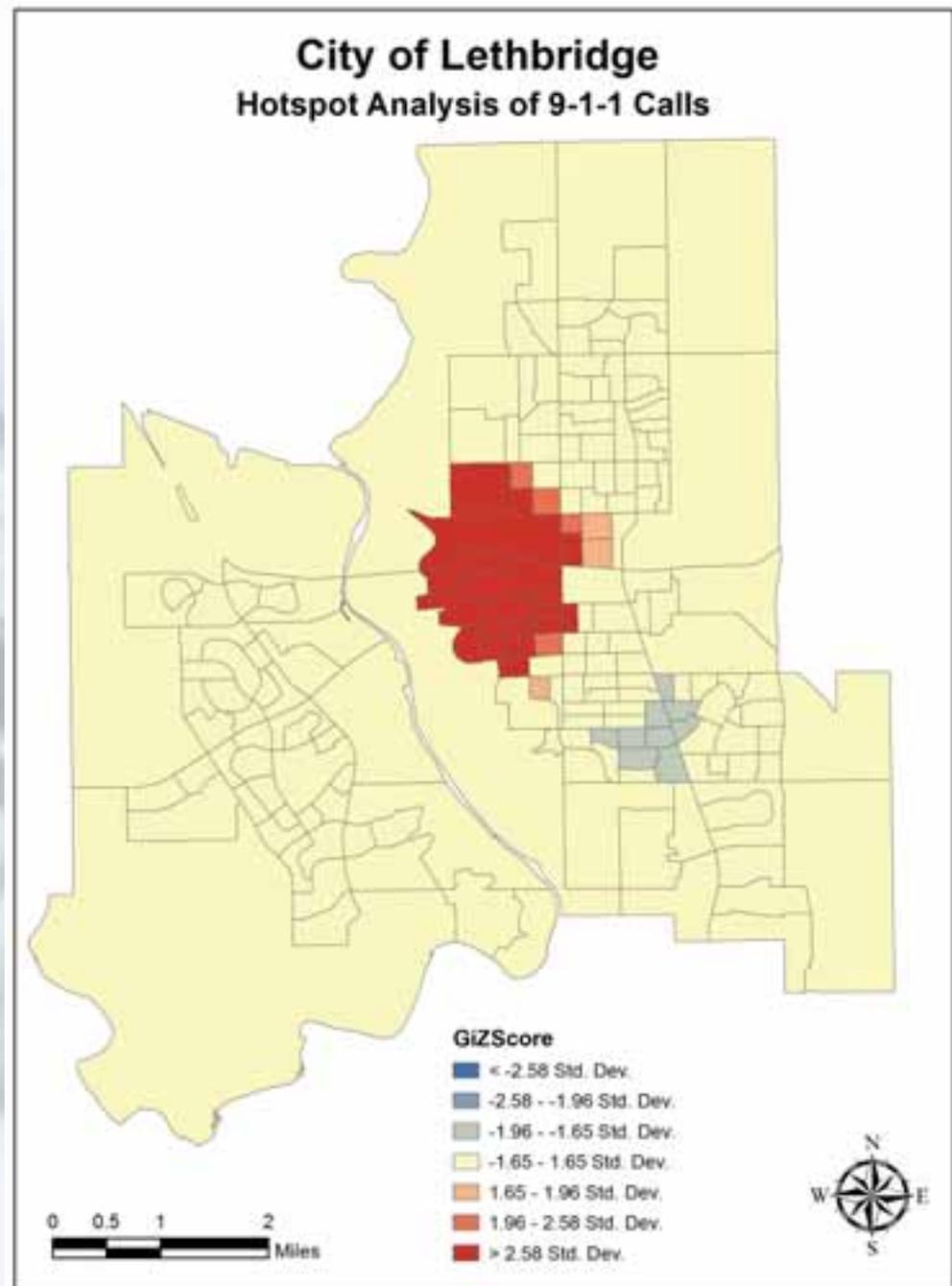
Population Density & Cellular 9-1-1 Calls

- 9-1-1 calls, from cellular telephones, appear to be in the *moderately* populated areas.

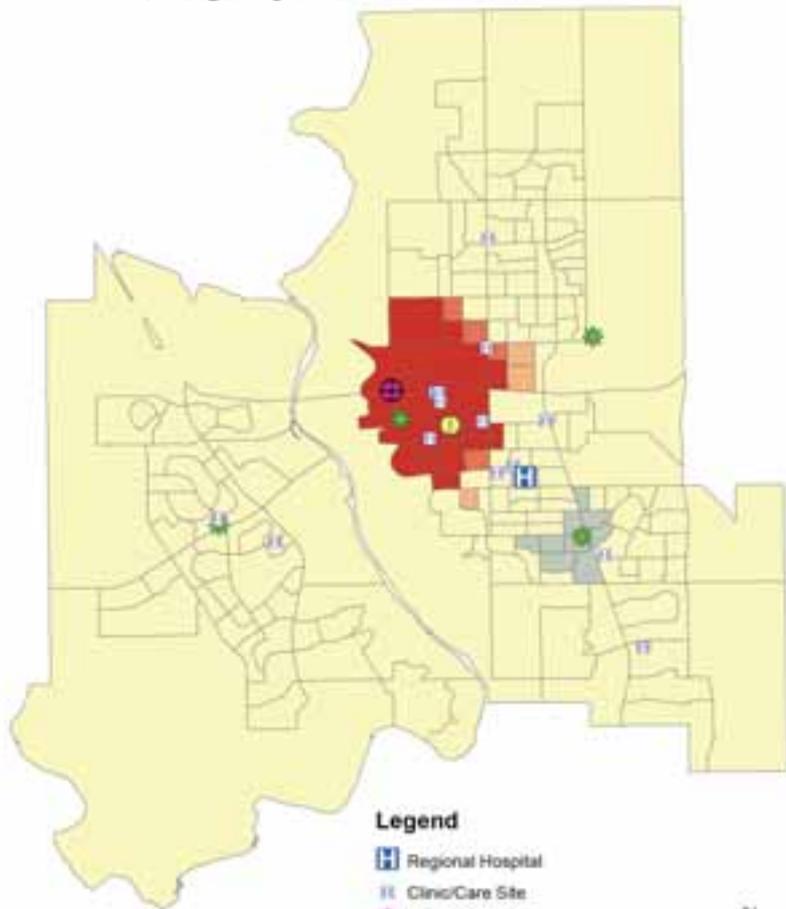


Hotspot Analysis

The hotspot analysis showing the cluster of census tracts comparing high and low number of 9-1-1 calls, thus, indicates the areas of concern in the City of Lethbridge. The larger the z-score is, the more intense the clustering of high values (hot spot) and the smaller the z-score is, the more intense the clustering of low values (cold spot).



City of Lethbridge Emergency and Health Care Facilities

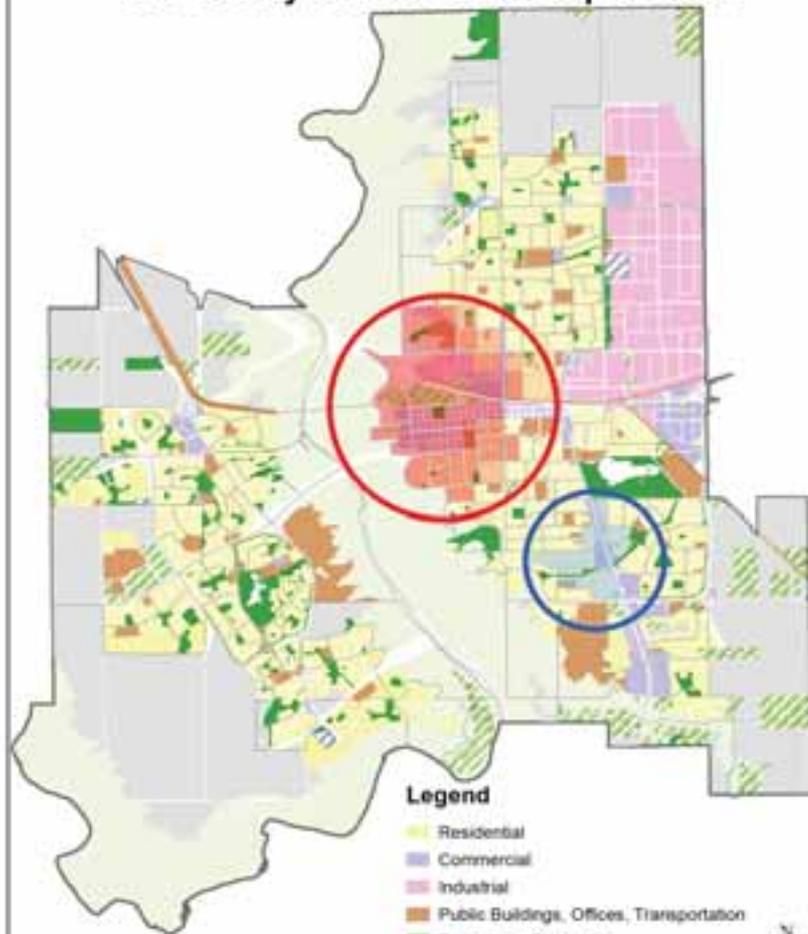


Legend

- Regional Hospital
- Clinic/Care Site
- Lethbridge Regional Police Service
- RCMP
- Fire Station



City of Lethbridge GIS Overlay of Land Use/Hotspot Zones



Legend

- Residential
- Commercial
- Industrial
- Public Buildings, Offices, Transportation
- Parks and Recreation
- Valley
- Direct Control
- Urban Innovation
- Future Urban Development



September 10, 2012

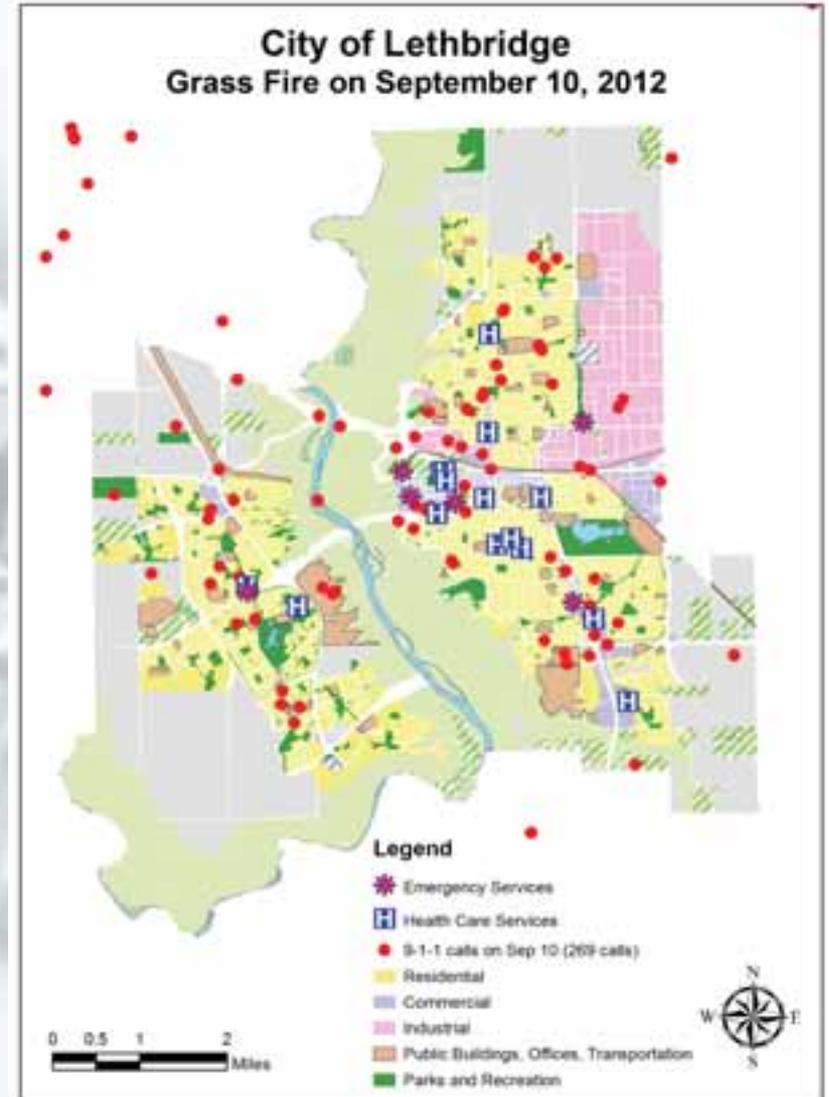
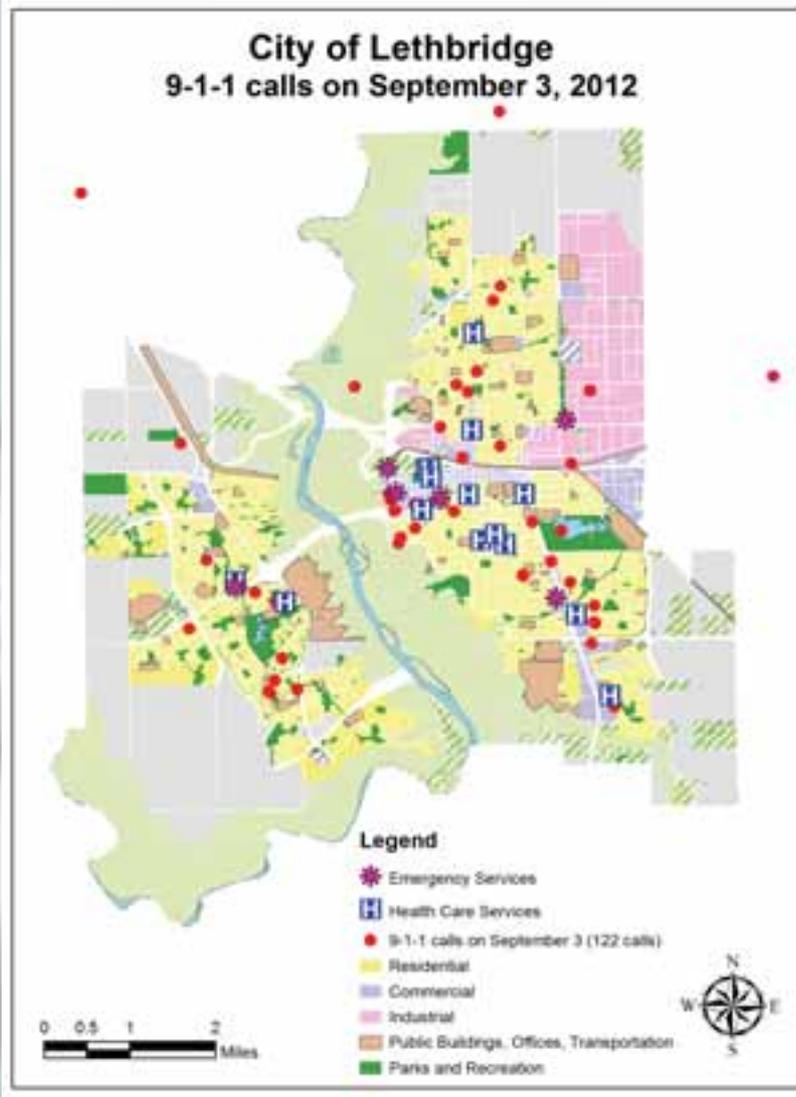
A large wildfire threatened rural communities and the City of Lethbridge



- Almost 5,000 hectares were destroyed
- 2,000+ residents were evacuated
- Local State of Emergency Declared in three communities.

- 9-1-1 was very busy that day

9-1-1 Regular Day vs. Wildfire Day



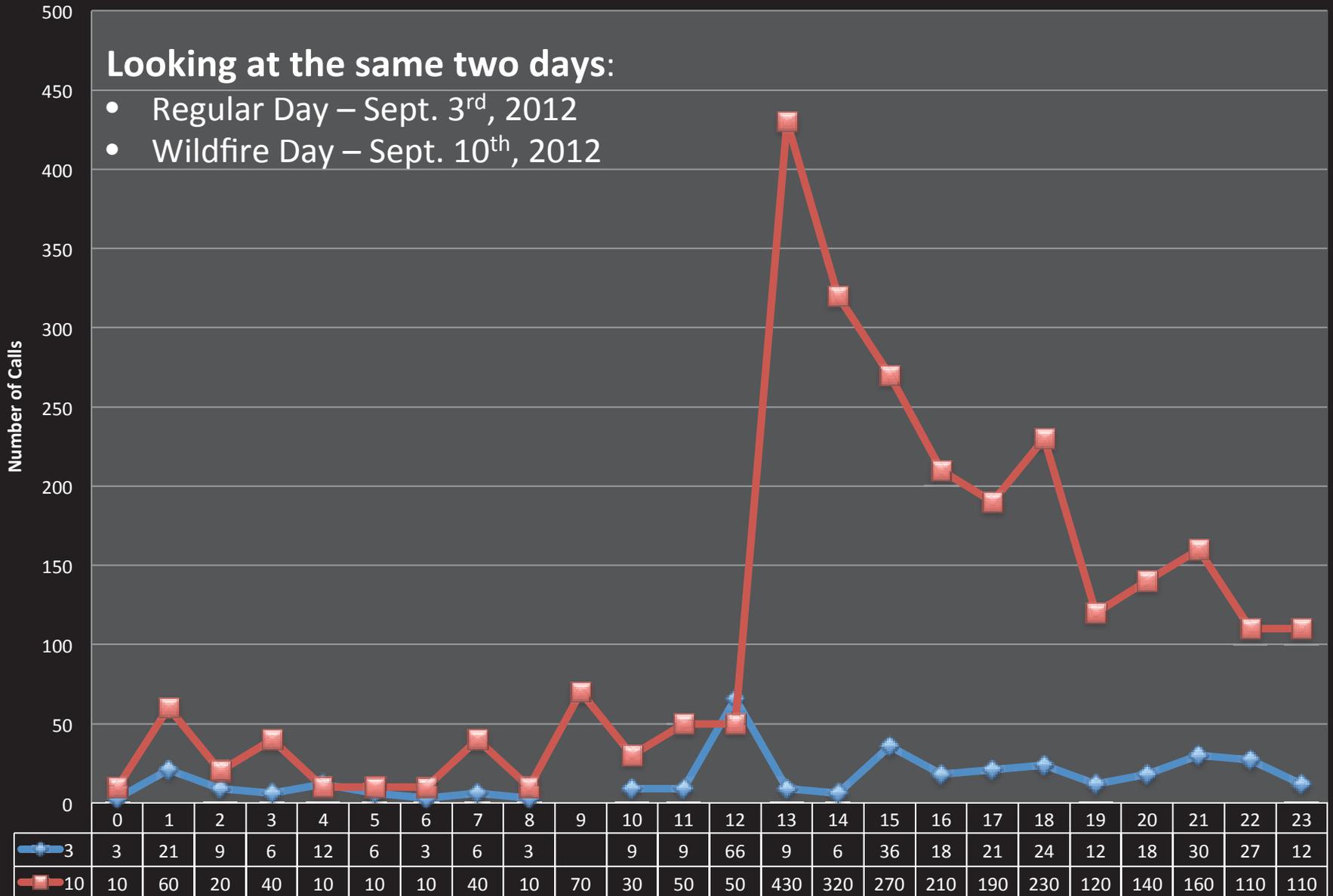
Cellular 9-1-1 Calls – Regular Day

Cellular 9-1-1 Calls – Wildfire Day

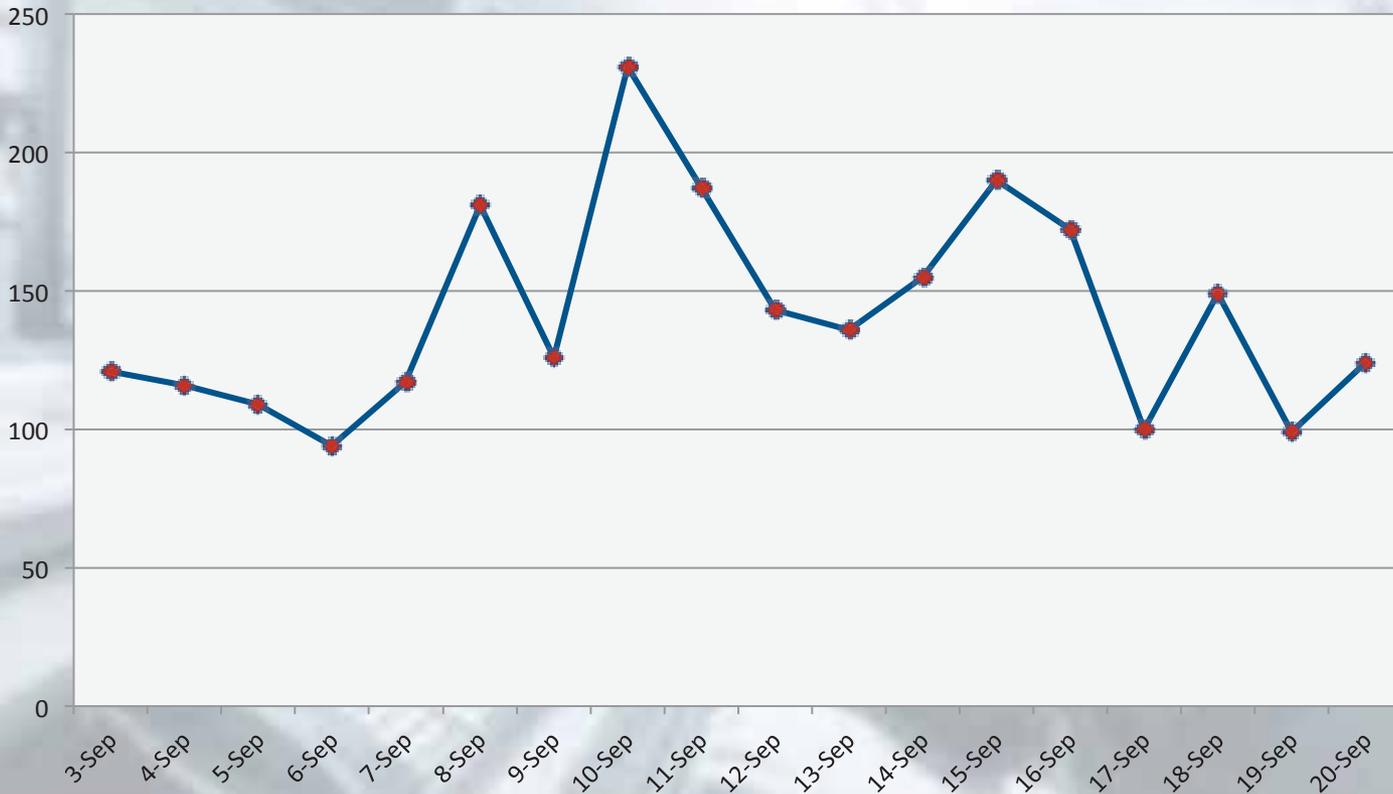
9-1-1 Calls by Hour of the Day

Looking at the same two days:

- Regular Day – Sept. 3rd, 2012
- Wildfire Day – Sept. 10th, 2012



Pre-and post-wildfire call pattern (Sep 3-20, 2012)



Call volumes would be high for several days until it becomes 'normal'

What have we learned so far:

- The majority of 9-1-1 calls, in Lethbridge, from cellular phones, appears to be centered on the downtown commercial and business district.
- The least number of cellular 9-1-1 calls appears to be centered on an almost exclusively residential area.
- The area of highest call volumes has the majority of emergency services and health care facilities.

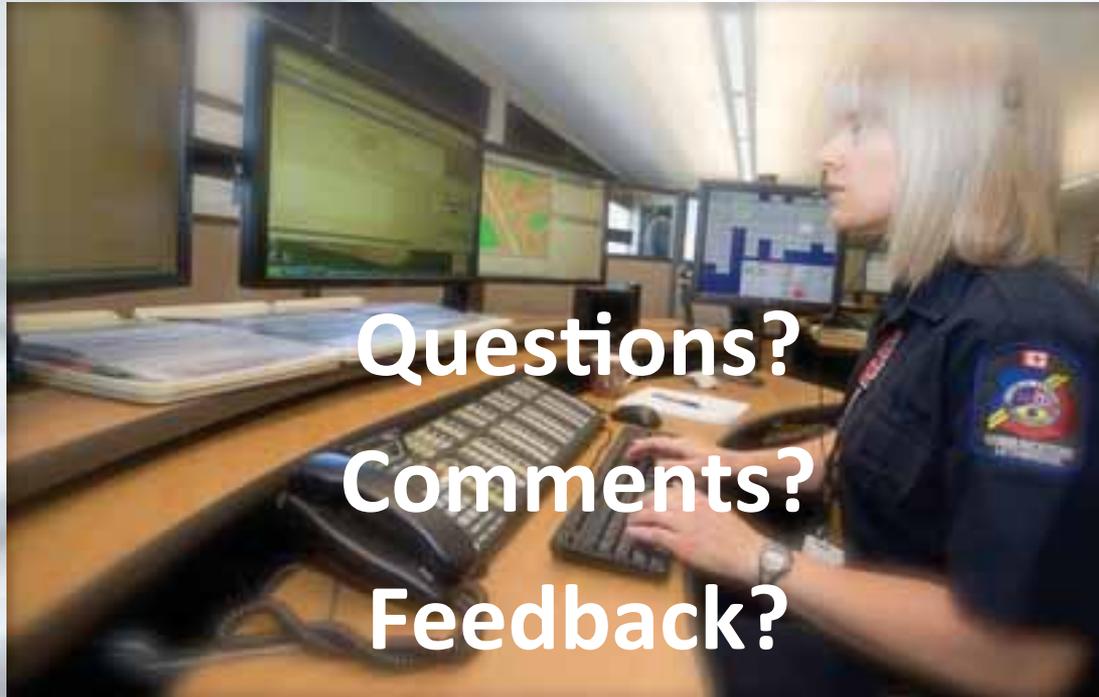
Recommendations so far...

- When disaster strikes, it is going to get busy. Be prepared.
- Time of day analysis indicates that highest call volumes are in the mid-afternoon. This is perhaps when an increased emergency services presence may be required – particularly in the downtown core.
- This same analysis could influence the staffing model of the 9-1-1 centre to staff more efficiently during the peak periods.

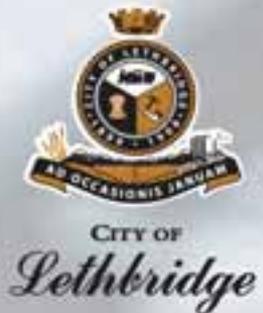
Recommendations so far...

- Hotspot analysis indicates that the downtown commercial/business and low-income residential areas generate highest call volumes. Emergency management capabilities need to be increased in these areas.
- More research needs to be done comparing the type of calls (crime, medical, fire, etc.) to land use so that relevant emergency services could be distributed evenly.
- More research needs to be done, particularly comparing cellular use to land line use.

Thank you!



Questions?
Comments?
Feedback?



Special Thanks to:
The City of Lethbridge
Alberta Health Services
Telus Communications Company
Jacksonville State University

