Using Open Data and GIS to Rank Potential Commuter Rail Infill Station Sites

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Background

Rail transit in the Chicago metropolitan area is currently split between two agencies:

1) The **Chicago Transit Authority (CTA)**, which operates high-frequency electrified (3rd rail) trains either along elevated viaducts or in subways almost entirely within Chicago's city limits;

2) **Metra**, which has both locomotive and electrified (overhead wire) trains which are generally suburban commuter rail lines.
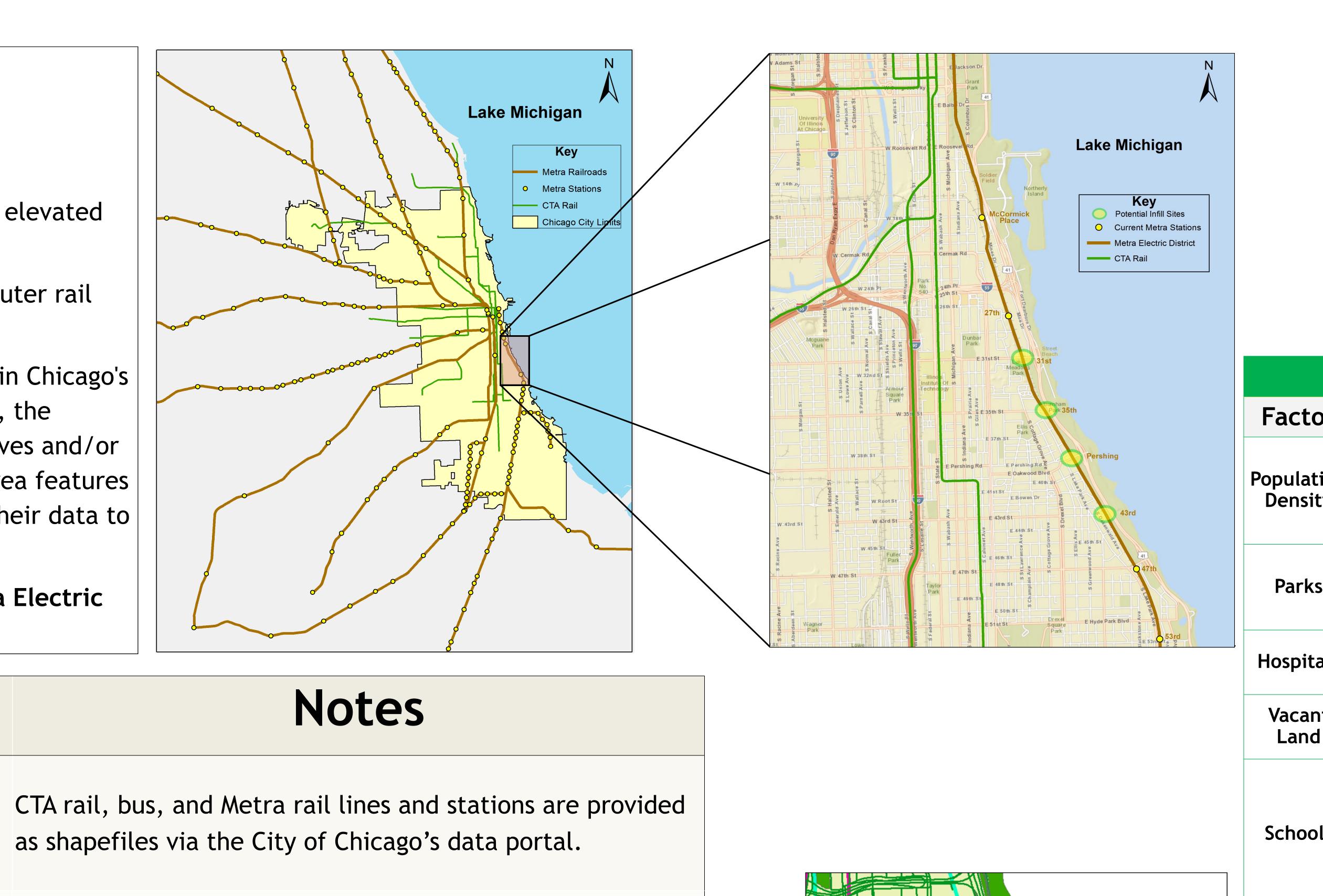
One outlier to this dichotomy is the **Metra Electric District (MED) South Shore Line**, which operates entirely within Chicago's borders, but operates on a commuter rail schedule. Since stations along most of the line are about 1/2 mile apart, the service area has sufficient coverage to economically provide high frequency service to the large population that lives and/or works near the line. However, there is currently **a 2.5 mile gap** between the 27th and 47th street stations. This area features land ripe for growth and transit oriented development, and as the City of Chicago and other local agencies open their data to the public, opportunities multiply for engaged citizens to support specific capital expenditures in this area.
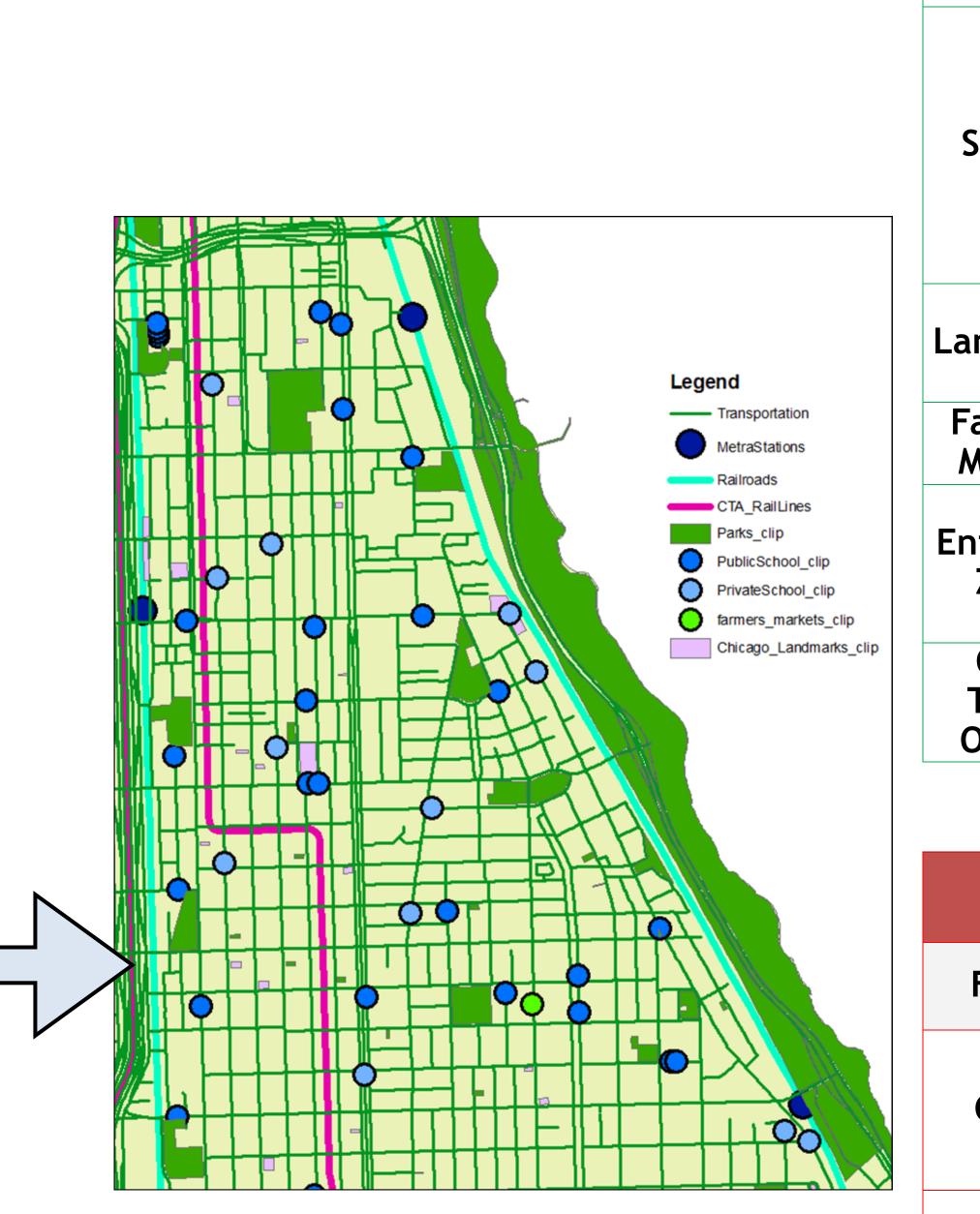
This project aims to rank, among 4 alternatives, the locations most suitable for infill rail stations on the Metra Electric District South Shore Line.

Why provide this data?

. Encourage public participation

. Minimal cost compared to potential return (e.g. citizen-provided maps, applications, analysis)

. Improved standards for data quality

. Improves inter-agency cooperation

An example output from the CPD's ClearMap online viewer. The associated data can be exported as a text file for use with GIS software.

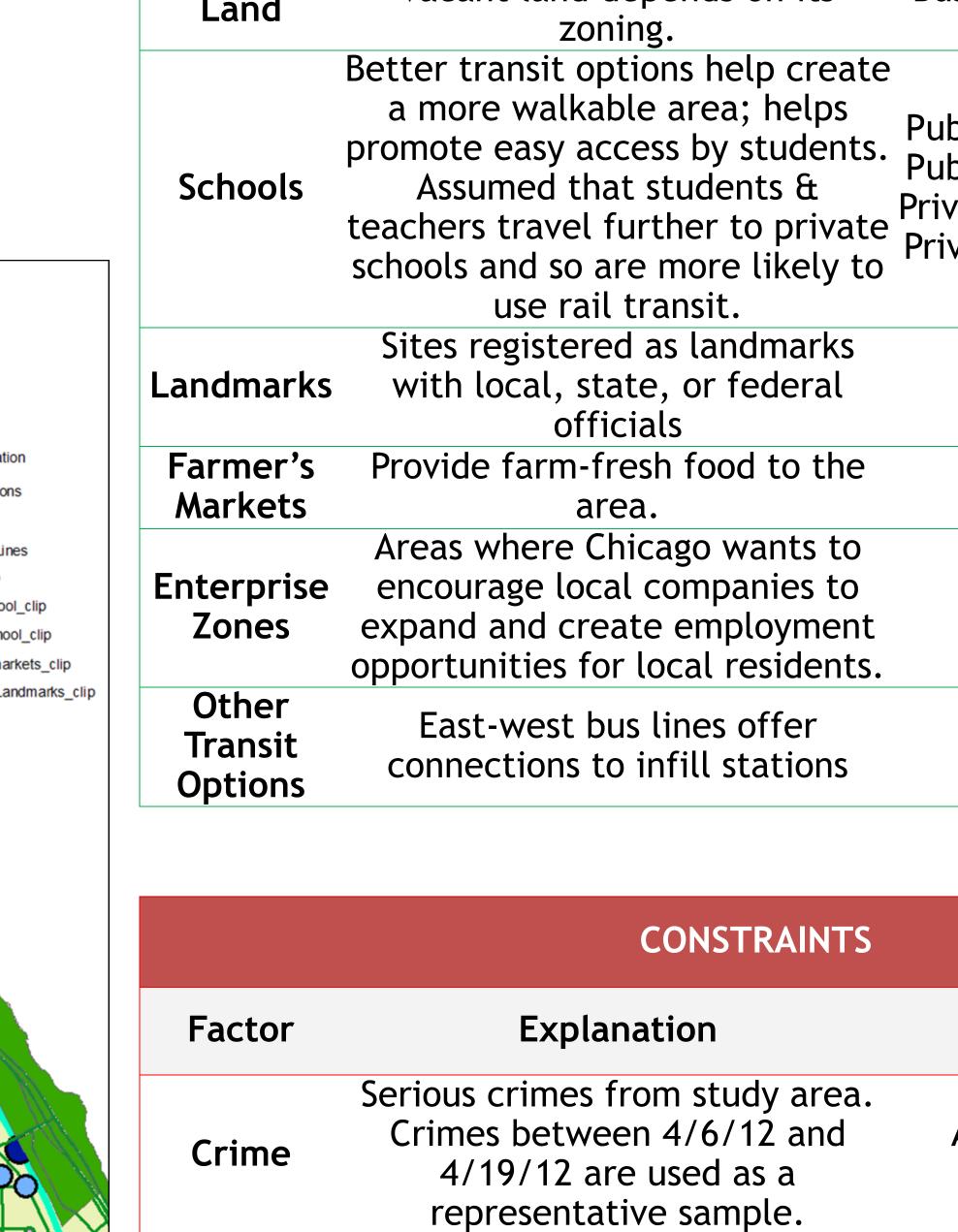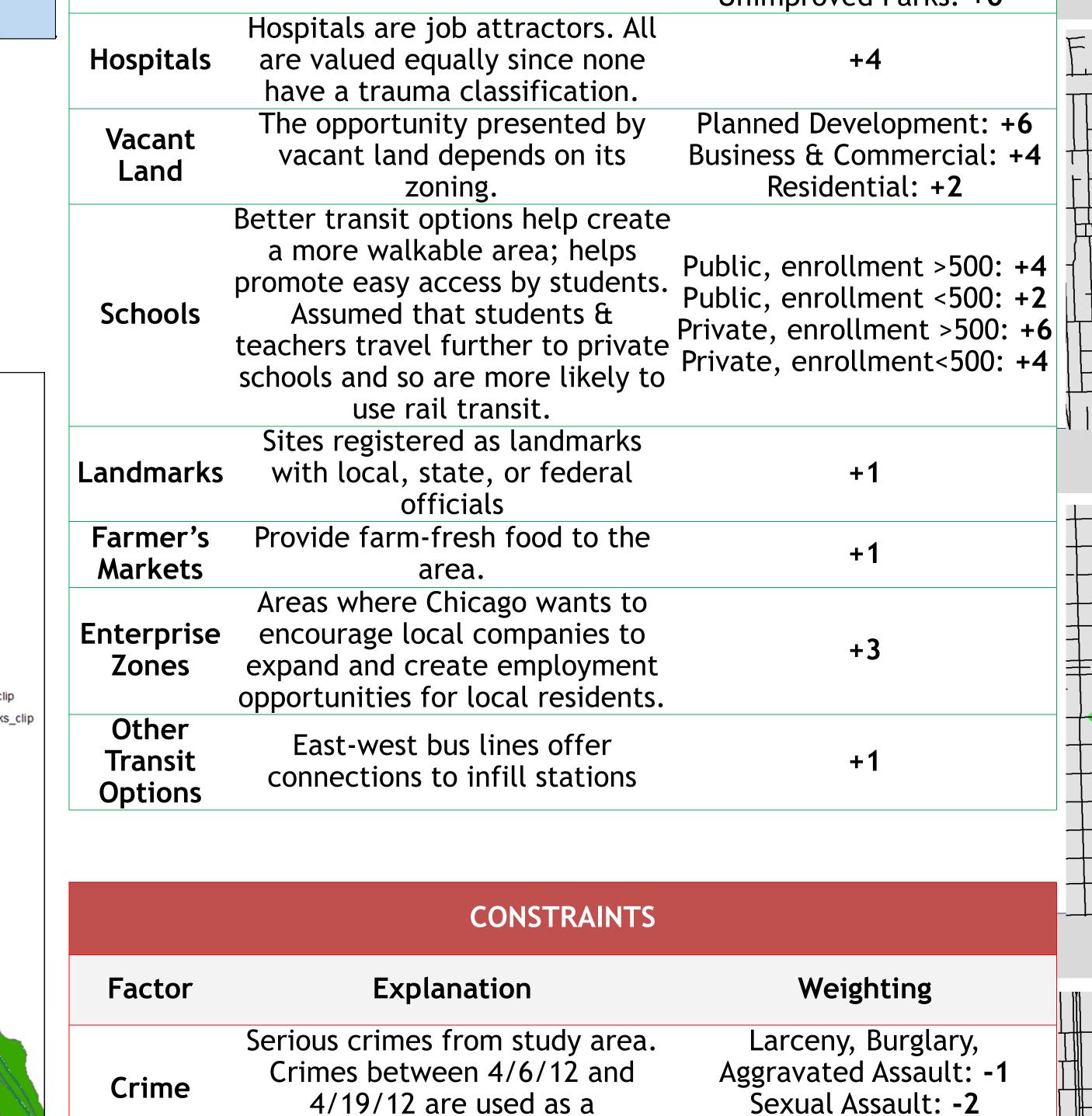| Data	Source	Format	Notes
Nearby Transit	City of Chicago	Shapefiles	CTA rail, bus, and Metra rail lines and stations are provided as shapefiles via the City of Chicago's data portal.
Street Grid	City of Chicago	Shapefile	The city of Chicago's provides shapefiles for all level of roads in Chicago. Since this analysis relied on walking distance to/from each of the potential stops, links in the grid such as highways and associated exit/entrance ramps were removed.
Population Density	ESRI	Shapefile	Based on US Census data, TIGER files provide census block group-level population density data.
Land Uses	Chicago Metropolitan Agency for Planning (CMAP), City of Chicago	Shapefiles	In general, land uses in this study are based on CMAP's 2005 land use inventory*. Specific uses such as hospitals, farmer's markets, parks, landmarks, and schools are culled from the City of Chicago's GIS data portal.
Zoning	City of Chicago	Online Viewer, no files	This analysis uses zoning sparingly. Enterprise Zones in the study area were used as a proxy for places where the city would encourage growth. Currently vacant lots (based on the CMAP land use inventory) were categorized by zoning to measure potential growth. Both Enterprise and vacant lot zones were hand-coded based on the Chicago Zoning Map viewer, because until August 2012, the city did not allow the underlying data to be accessed.
Crime	Chicago Police Department	Viewable online, data output is a Tab-delimited list	The Chicago Police Department only makes crime data available online in 2-week increments from the past 90 days. This study used the 2 week period beginning 4/6/12 as a representative sample. Since the release of more comprehensive reports are subject to CPD approval, this data is not truly "open."

An overlay of Enterprise Zones over the city's official zoning code in the study area. As more detailed data is opened to the public, more fine-grained analysis becomes possible.

OPPORUTNITIES

Factor	Explanation	Weighting
Population Density	High-density areas provide a customer base, while fostering growth will be easier in low-density areas, where there are fewer people to resist.	Highest quintile: +1 Lowest quintile: +1
Parks	Large parks near stops can attract visitors. Parks are sorted by their class.	City, Magnet, Regional: +4 Neighborhood, Community, Mini-parks: +2 Unimproved Parks: +0
Hospitals	Hospitals are job attractors. All are valued equally since none have a trauma classification.	+4
Vacant Land	The opportunity presented by vacant land depends on its zoning.	Planned Development: +6 Business & Commercial: +4 Residential: +2
Schools	Better transit options help create a more walkable area; helps promote easy access by students. Assumed that students & teachers travel further to private schools and so are more likely to use rail transit.	Public, enrollment >500: +4 Public, enrollment <500: +2 Private, enrollment >500: +6 Private, enrollment<500: +4
Landmarks	Sites registered as landmarks with local, state, or federal officials	+1
Farmer's Markets	Provide farm-fresh food to the area.	+1
Enterprise Zones	Areas where Chicago wants to encourage local companies to expand and create employment opportunities for local residents.	+3
Other Transit Options	East-west bus lines offer connections to infill stations	+1

CONSTRAINTS

Factor	Explanation	Weighting
Crime	Serious crimes from study area. Crimes between 4/6/12 and 4/19/12 are used as a representative sample.	Larceny, Burglary, Aggravated Assault: -1 Sexual Assault: -2 Homicide: -3
Industrial	Vacant land zoned for Industrial/ manufacturing uses.	-2
Other Transit Options	Nearby north-south bus lines and rail transit stations are substitutes for MED trains	-3

Opportunities	Constraints	Suitability

*All opportunity/constraint/suitability maps at 1:24,000 scale

31st Street

35th Street

Pershing Avenue

43rd Street

31st Street & 43rd Street largely score below 5, and the zone of sub-zero scores near the station at 43rd make it the least optimal infill station. Similarly, both 35th & Pershing largely score above zero, but the sub-zero area adjacent to the Pershing station makes it worse than 35th, our top choice for an infill station.

Infill Station Ranks

1. 35th St
2. Pershing Avenue
3. 31st Street
4. 43rd Street