

Site Suitability Analysis: Mid-density low-income housing for SE Portland

Maps and Analysis by Indigo Way and Shawna Miller

Methods

The process can be understood in three sections data exploration, the binary suitability analysis, and the weighted suitability analysis.

Data exploration:

There was little information about acreage needed for a medium density development in the city. The information from the Affordable Housing dataset from RLIS was used to find out the average size of lots of multi-residence affordable housing built within the last 15 years. The average was found to be .77 acres, which is the minimum area used for the binary analysis.

Binary Suitability Analysis:

A slope surface, vacant lots and zoning codes was used for a binary suitability analysis. A large portion of the work was done in vector, using querying and intersections to find sites that met all criteria. A 6% slope value was determined to be appropriate based on a previous studies by Mohamed A. AL-SHALABI, Shattri Bin Mansor, Nordin Bin Ahmed, Rashid Shirriff, 2006 and The Equal Rights Center & Steven Winter Associates Inc., 2012. Vacant lots had to be at least .77 acres. The criteria was zoning codes Multi-use residential 4-7 and Multi-family residential 5-7, which limited limited the density to 31-65 units per acre. High density housing did not seem appropriate and high density zoning is not readily available in the study area.

Weighted Suitability Analysis:

Euclidean distance surfaces were created for schools, libraries, parks, grocery stores, childcare, hospitals and light rails stops. The bus lines dataset was divided into frequent and non-frequent lines and Euclidean distance surface were created. For model 1, all datasets were reclassified with the values shown in the table to the right. For models 2 and 3, libraries, schools, parks, grocery stores, childcare and hospitals were reclassified on a 1-10 equal interval scale. Frequent, non-frequent and light rail stops did not function with a regular reclass, thus a fuzzy membership tool was run on these layers. These fuzzy membership surfaces were then sliced into 10 equal interval classes. The reclassified surfaces and sliced surfaces were then used in a weighted overlay. The weighting schemes are notated under their respective maps.

Data Sets & References:
Streets, Highways, Arterials, Buslines, MAX stops, Taxlots, Zoning, Libraries, Vacant Lots, and Affordable housing - RLIS Data
DEM - Portland State University Geography department I-Drive Oregon 10m DEM
Parks - Civic Apps
Grocery Stores - METRO Planning & Sustainability
Childcare - Coalition for a Livable Future (Processed into GIS data by Kaitlin Berger & Justin Sherrill)

Anderson, N. (2011). Site Selection for Affordable Housing Development: An Analysis of Housing Element Suitable Sites Inventories from Orange County, California. Retrieved from [http://ppl.sococo.ucf.edu/sites/ppl.sococo.ucf.edu/files/users/jsumcad/2011%20Anderson%20PR%20\(Affordable%20housing%20in%20OC\)%20Bes%20PR%20con-win.pdf](http://ppl.sococo.ucf.edu/sites/ppl.sococo.ucf.edu/files/users/jsumcad/2011%20Anderson%20PR%20(Affordable%20housing%20in%20OC)%20Bes%20PR%20con-win.pdf)

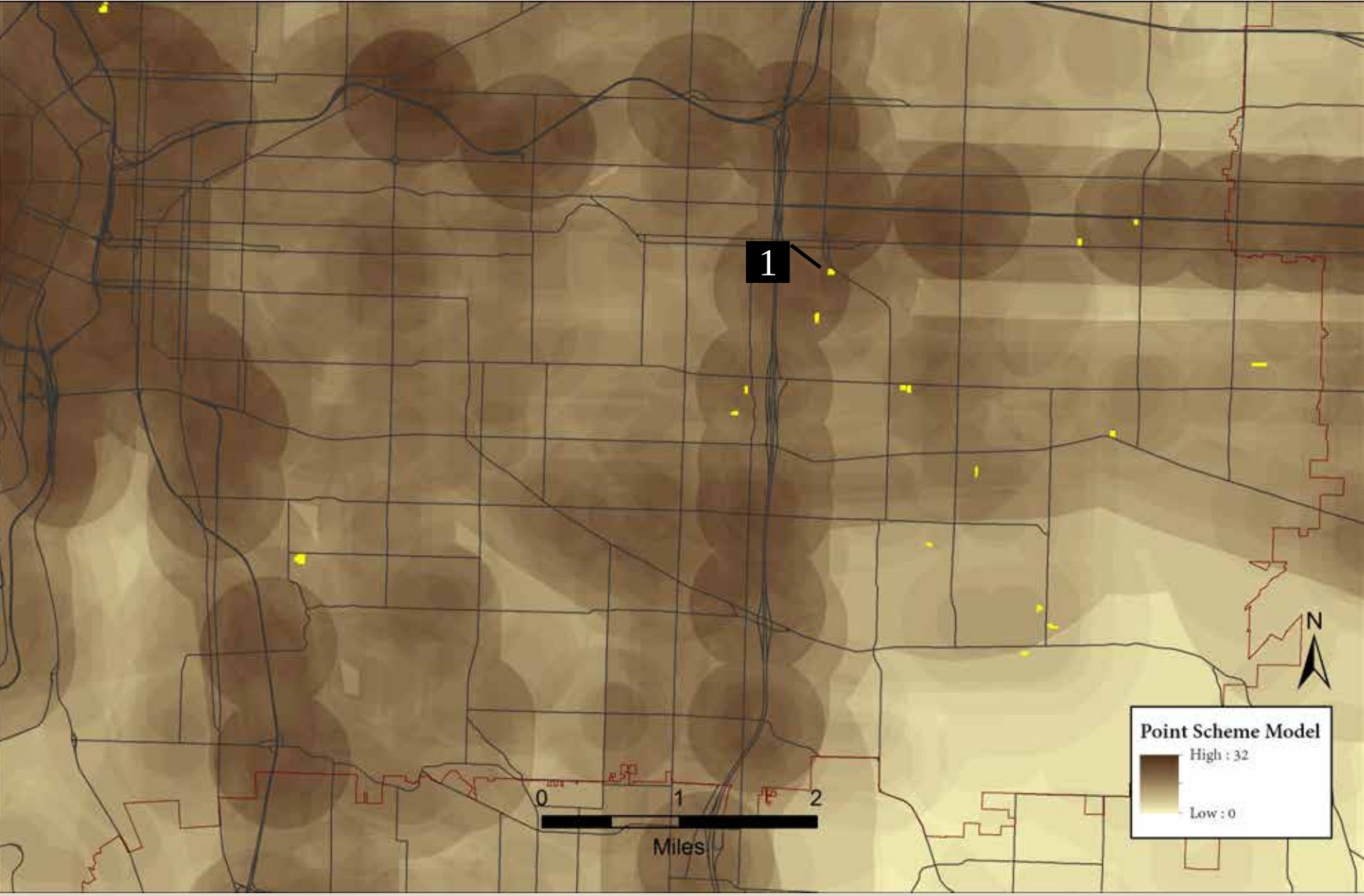
Background Image - <https://buildingportland.wordpress.com/category/real-estate-trends/>

Mohamed A. AL-SHALABI, Shattri Bin Mansor, Nordin Bin Ahmed, Rashid Shirriff (October, 2006). Gis Based Multicriteria Approaches to Housing Site Suitability Assessment. *GIS-Applications - Planning Issues* TS72. Retrieved from https://www.fg.net/resources/proceedings/fig_proceedings/fig2006/papers/ts72/ts72_05_alshalabi_etal%20_0702.pdf

Templeton, A. (2015 April, 26). Portland's Poorest Households Find Few Options For Affordable Housing, *Oregon Public Broadcasting (OPB)*. <http://www.opb.org/news/article/portlands-poorest-households-find-few-options-for-affordable-housing/>

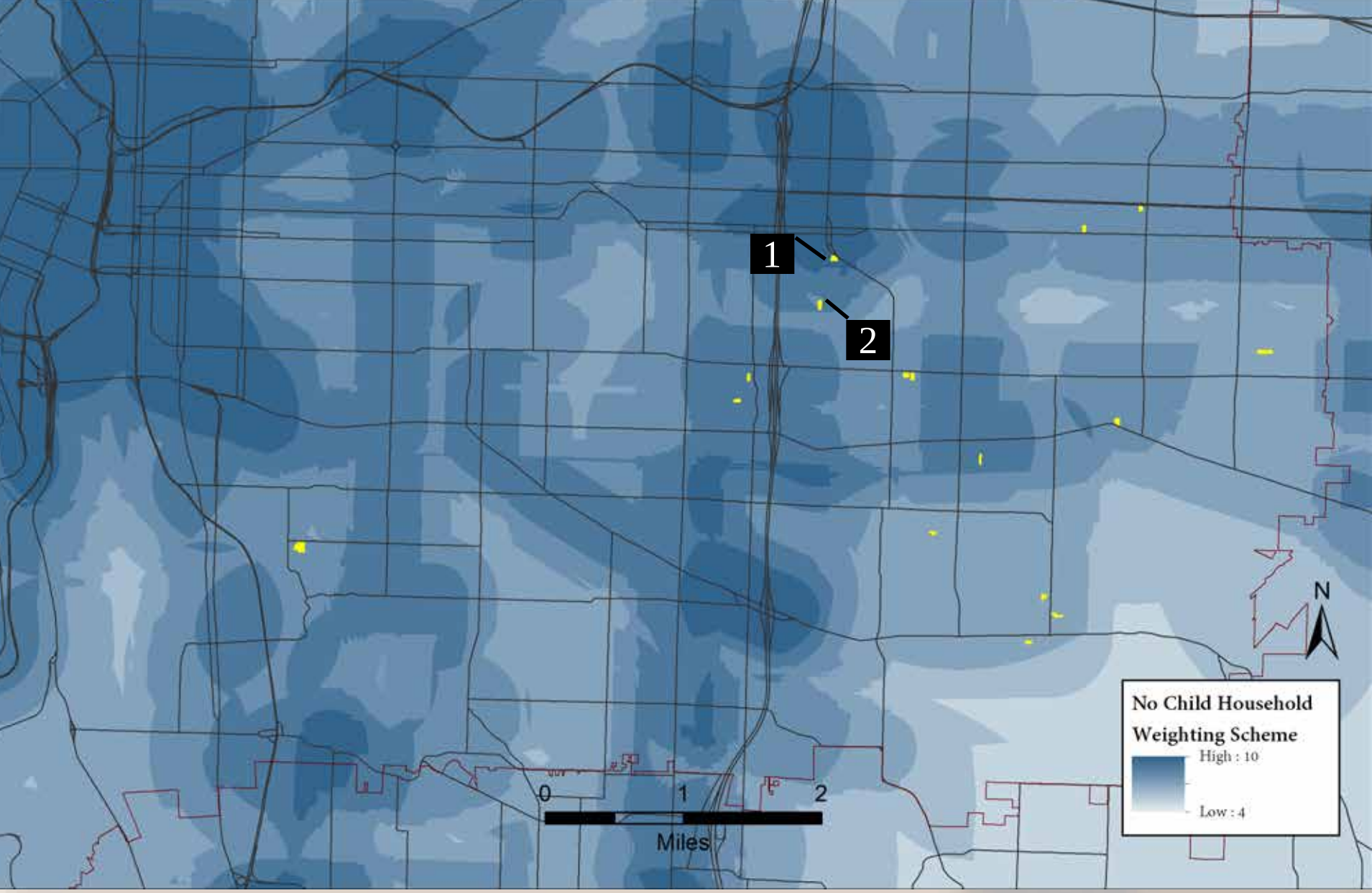
The Equal Rights Center & Steven Winter Associates Inc. (2012) *Fair Housing Act Best Practices Handbook: A guide to accessible design and construction compliance*. Retrieved from http://www.equalrightscenter.org/site/DocServer/FHA_Best_Practices_Handbook_web_6_BedIn.pdf?docID=681

Model 1 – Based on a site selection analysis in Orange County California (Anderson, 2011). This model used pre-determined values for all amenities.
Model 2 – Not based on previous studies and was created for families with no children. This model emphasized transit and grocery stores.
Model 3 – Not based on previous studies and was created for families with children. This model emphasized childcare, schools, transit, and grocery stores.

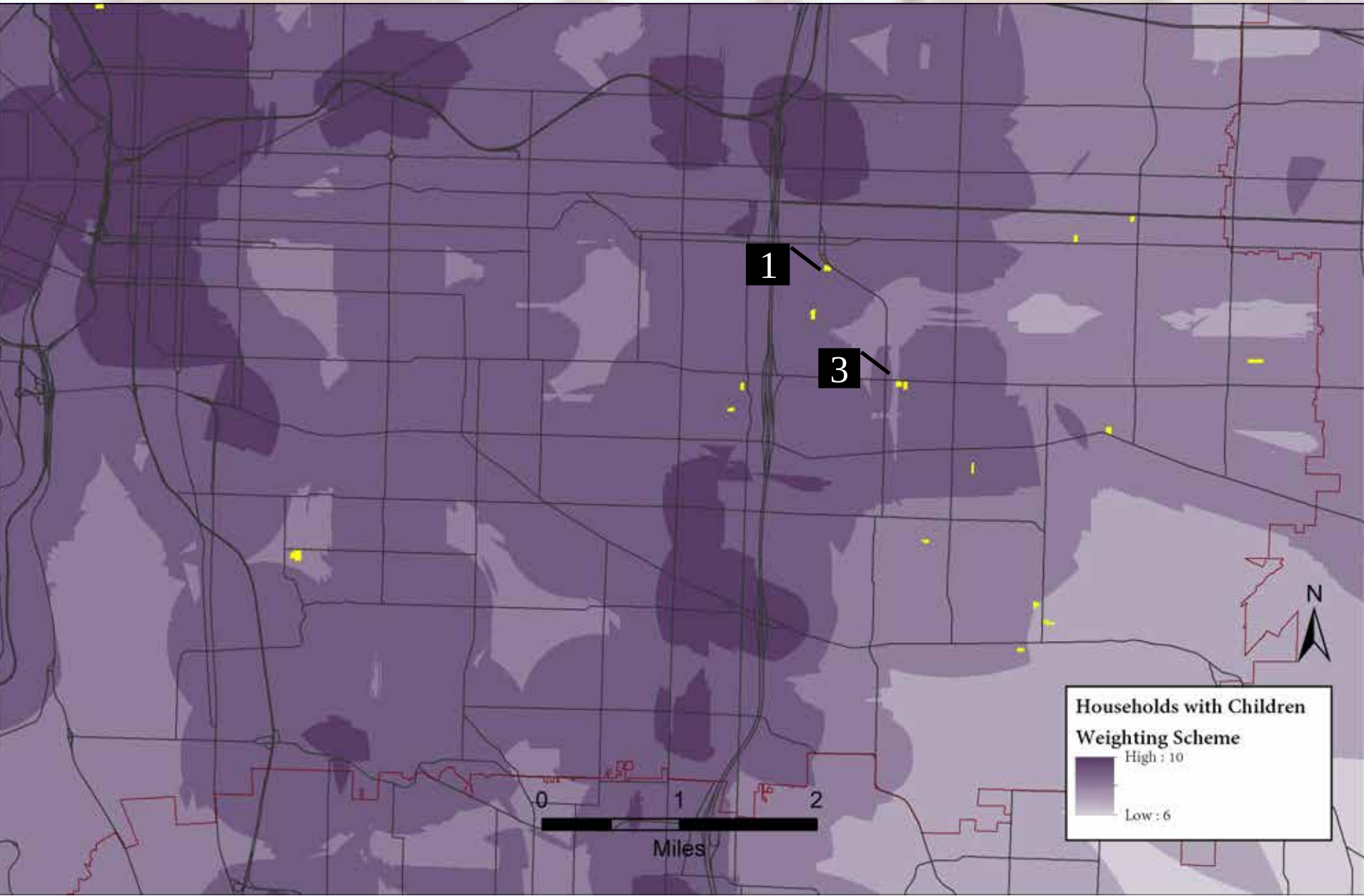


Model 1 is based on the point system from Anderson 2011, but is modified to suit Portland's extensive transit system. This modified point system is detailed in table below.

Distance	Non-frequent Bus lines			Frequent Bus lines			Light Rail stops			Head Start Daycare			Schools			Libraries			Grocery stores			Hospitals			Parks				
	.25 mi	.33 mi	.5 mi	.25 mi	.33 mi	.5 mi	.25 mi	.33 mi	.5 mi	.25 mi	.5 mi	1 mi	.25 mi	.5 mi	1 mi	.25 mi	.5 mi	1 mi	.25 mi	.5 mi	1.5 mi	.5 mi	1 mi	2 mi	.25 mi	.5 mi	1 mi		
Points	3	3	2	1	6	5	4	4	6	5	4	3	2	1	3	2	1	3	2	1	5	4	3	3	2	1	3	2	1



Model 2 focused amenities relevant to adults, weighting public transit 29%, grocery stores, 25%, and libraries, parks and hospitals equally weighted at 12% each.



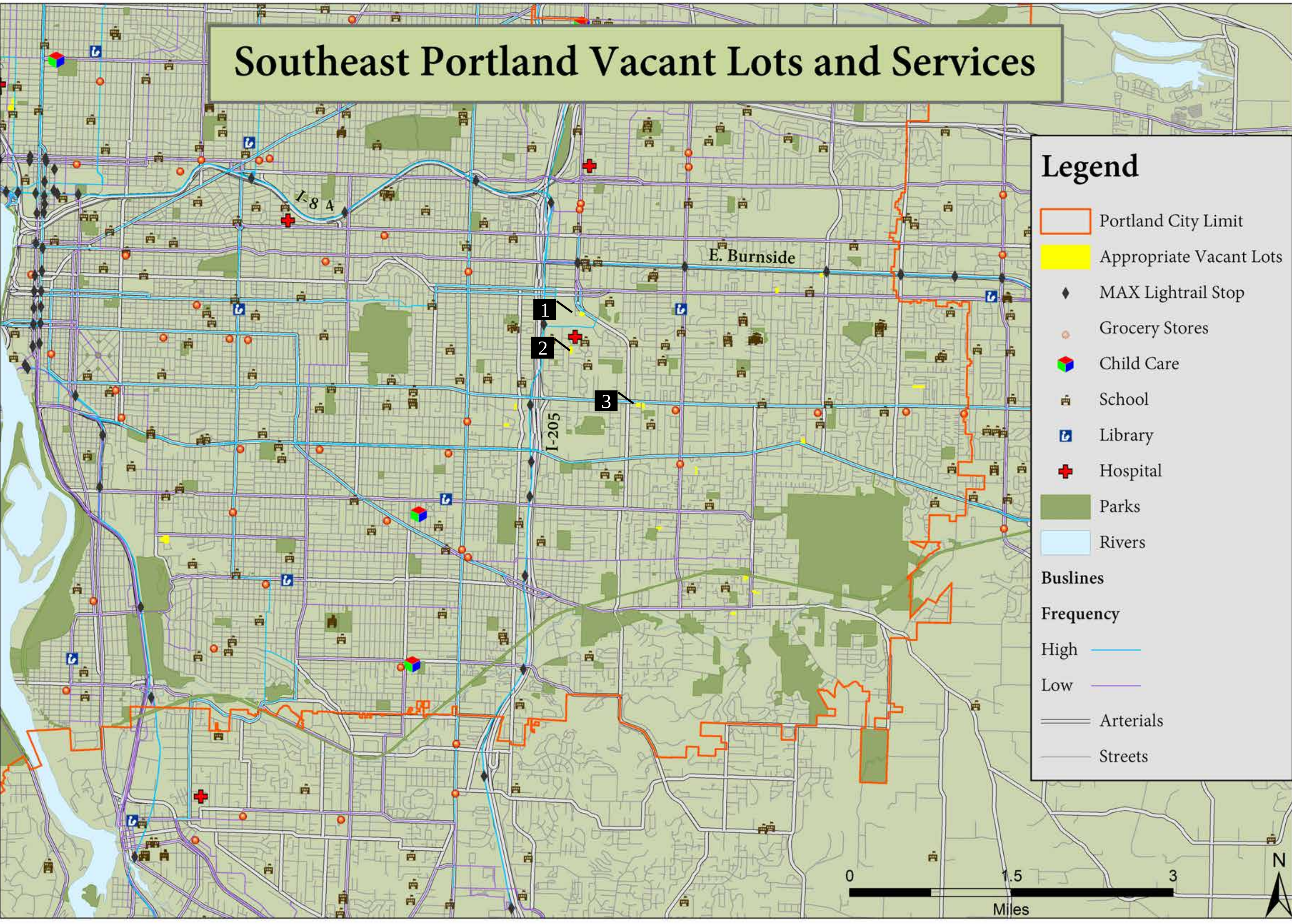
Model 3 focused on amenities relevant to families with children, weighting childcare, schools, public transit, and grocery stores equally at 20% each, hospitals at 10% and parks and libraries equally at 5% each.

Introduction

There is an estimated shortage of 20,000 affordable housing units in the Portland Metro area (Templeton, 2015). This project centers on finding sites for medium-density affordable housing in southeast Portland. Southeast Portland was chosen because there were greater numbers of vacant lots, medium-density zoning, and transportation infrastructure in place.

Our research question is: Where are suitable sites for medium-density low-income housing to alleviate the current housing crisis shortage?

The types of information used to answer this question include slope, vacant properties, and zoning to determine site feasibility. Information about amenities and services utilized by low-income populations is used for the analysis. Distances to these amenities was the primary criteria for the analysis. The amenities and services included public transit, grocery stores, child care, schools, libraries, hospitals, and parks.



Results & Conclusion

This project found three ideal sites for affordable multifamily housing buildings in the Southeast Portland area. The three best sites were chosen due to their highest weighted values and having the largest sizes of the 16 total sites in the SE Portland area. The three sites combined would result in approximately 205 units. This is a little more than .01% of the needed 20,000 units (Templeton, 2015) in the metro area. Site 1 was found to be the most ideal by all the models. The data was readily available from RLIS. However, during the process of the analysis there were several issues regarding both the accuracy of the data and availability of research on the amenities needed for low-income families and individuals. Issues regarding the accuracy of the zoning and vacancy data sets were brought into question during the process of the analysis. The vacant lots dataset from RLIS was problematic because it disregarded tax lot boundaries and ownership. There was a lack available research found providing weighting schemes this analysis could be based on. This resulted in the creation of best-guess weighting schemes based on opinion and personal experience. This analysis was limited in scope and would need more components to be useful to site real low income housing in Portland. A further examination of this data is needed due to many factors such as zoning limitations, building reclamation possibilities, cost prohibitive sites (some exceeding \$1.4 million dollars), available employment, socioeconomic factors, and current census data to locate areas of most need.

Despite the limitations of this study, only a few appropriate sites were found, which would only alleviate .01% of the need for affordable housing in Portland. There are opportunities for affordable housing in Portland, though they are few, they exist and should be utilized.