

# Analyzing Access to Transit in the Nation's Capital

## Introduction

One of the most important developments in the field of urban planning has been the advent of zones of transit-oriented development (TOD). TOD zones are defined as areas where neighborhoods can develop around nodes of public transportation. However, most studies also show that transit infrastructure is not the only factor that contributes to TOD. Amenities like zoning, and access to shopping, schools, and parks, also contribute to the development of transit-oriented communities. In this study, I ran two analyses of census block groups in Washington, D.C. First, I ran an analysis to see which census block groups were best suited for TOD in terms of land use and amenities (ignoring transit). In the second section of my analysis, I analyzed each census block group to see which had the best access to Metrorail. By running this two-part analysis, I hope to show how well D.C. serves the neighborhoods that are best suited to TOD with public transportation.



Figure 1, Inset Map of Washington, D.C.

## Methods

My process for this project can be divided into two parts, a suitability analysis, and a network analysis.

### Suitability Analysis

I used data from the city's data catalog to construct a model for TOD suitability. This suitability analysis can be further divided into two parts. First, I created a model of factors commonly attributed to transit-oriented neighborhoods. I focused on five factors: population density, and access to retail, grocery stores, schools, and parks. I then combined these analyses by reclassifying each on a 1-5 scale and then using a raster calculator to add them together. For the second part of my analysis, I created a score of land uses for each census block group. I reclassified the land use categories on a 1-5 scale. I then assigned each block group a land-use score, with a higher scores representing land uses most suitable to TOD. Finally, I combined my factor analysis and my land use analysis together using a weighted addition, with land use weighted to 40% and other factors weighted to 60%. Finally, I produced a suitability map on a 1-4 scale.



Factor	Weight
Population Density	50%
Retail	20%
Grocery	10%
Parks	10%
Schools	10%

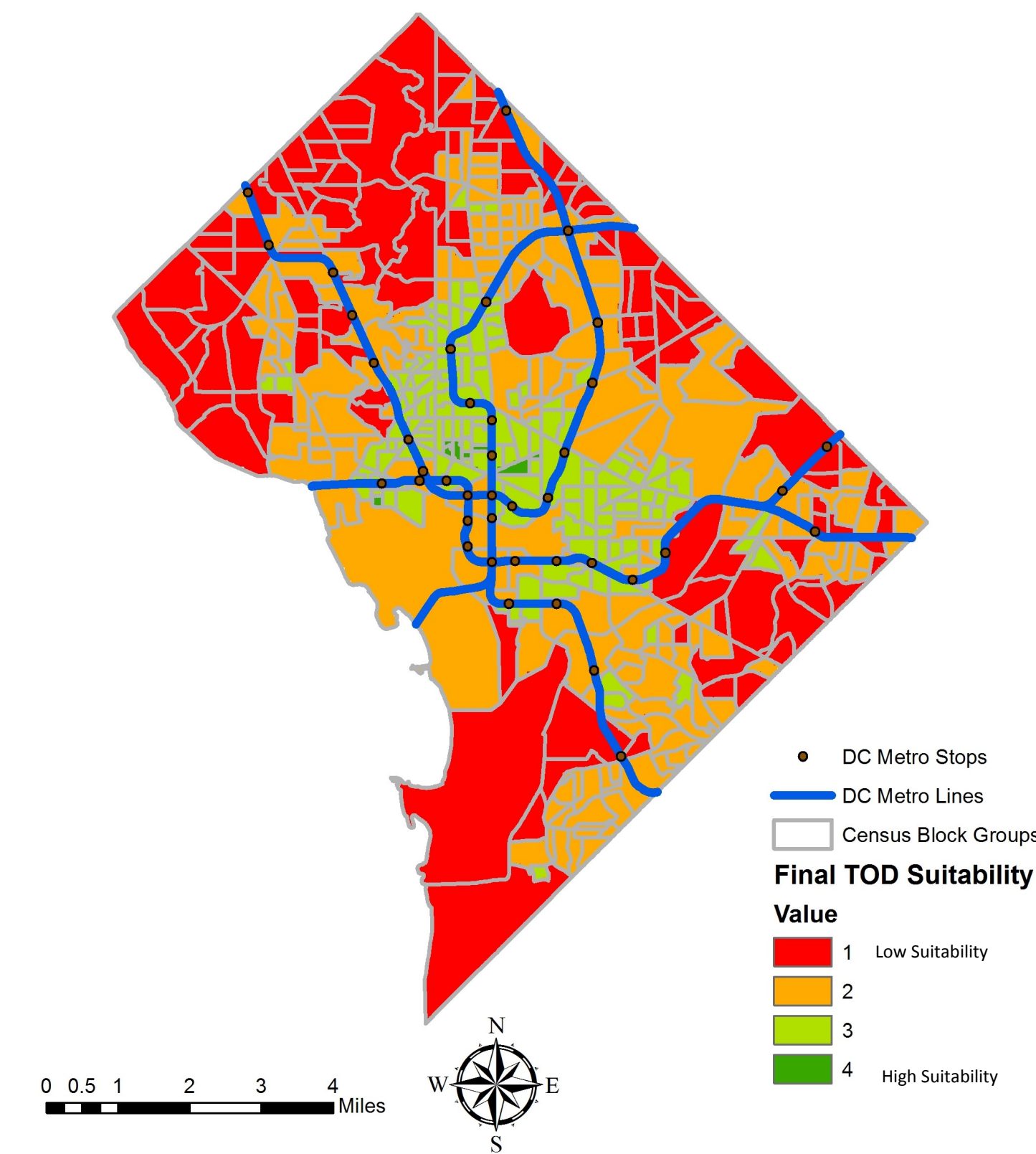
  

Land Use	Score
Mixed Use, Commercial High Density	5
Federal Government, Residential High Density, Commercial Medium/Moderate Density, Professional/Technical	4
Residential Medium/Moderate Density, Local Public Institutions	3
Commercial Low Density, Parks and Open Space	2
Residential Low Density, Water	1

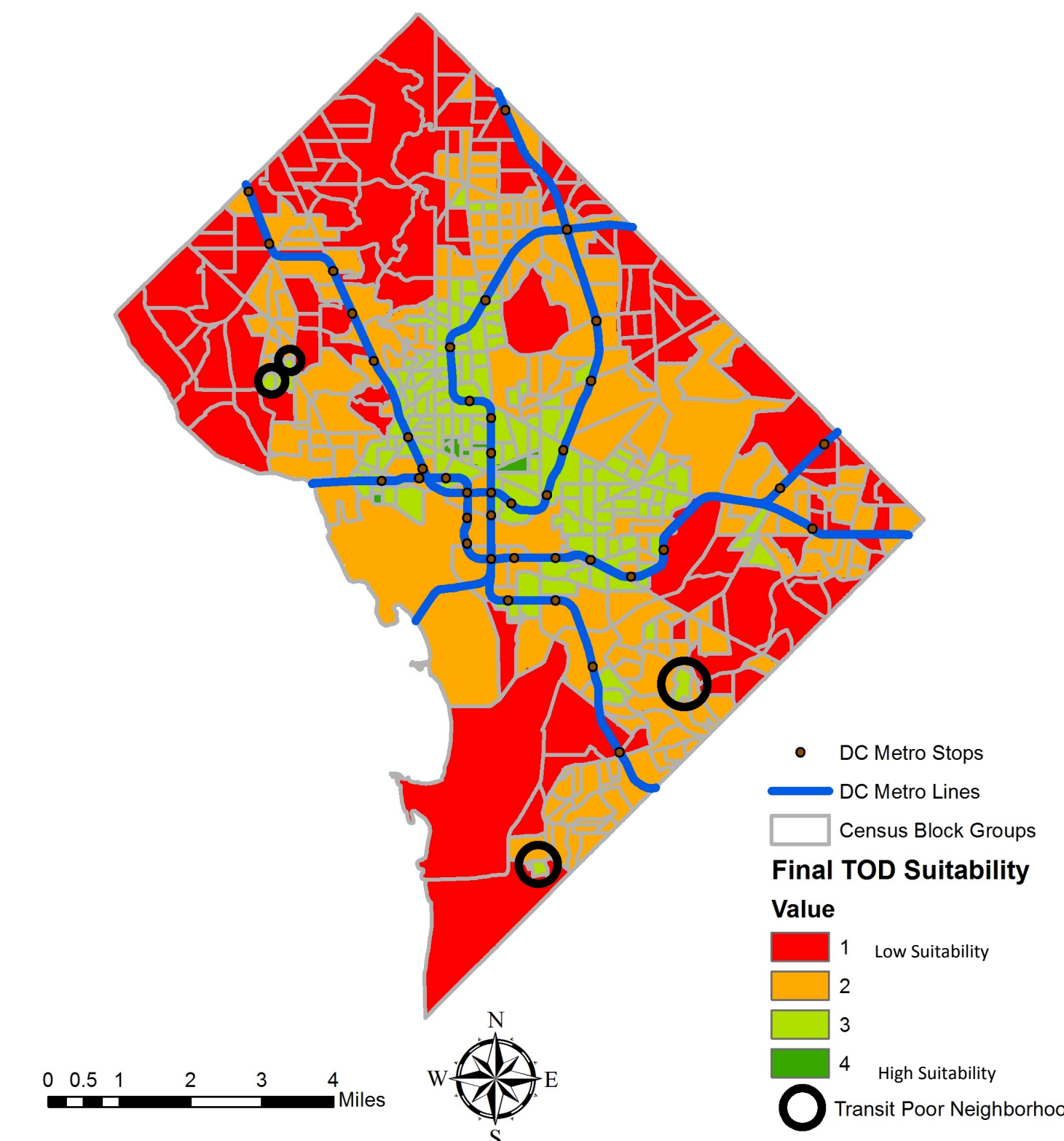
### Network Analysis

For the next part of my project, I attempted to analyze how accessible each individual block group is to Metro stations. To accomplish this, I conducted a network analysis using roads data from DC Department of Transportation (DDOT). Using DC's roads as a network, I calculated the distance from the center point of each block group to the nearest metro station.

## Final TOD Suitability



## Transit Poor Neighborhoods



Cartographer: Michael Marks

Date: May 1, 2014

Class: Intro to GIS, Spring 2014

Sources: District of Columbia Data Catalog, D.C. Department of Transportation

Projection: NAD\_1983\_StatePlane\_Maryland\_FIPS\_1900

Scale: 1:88,000

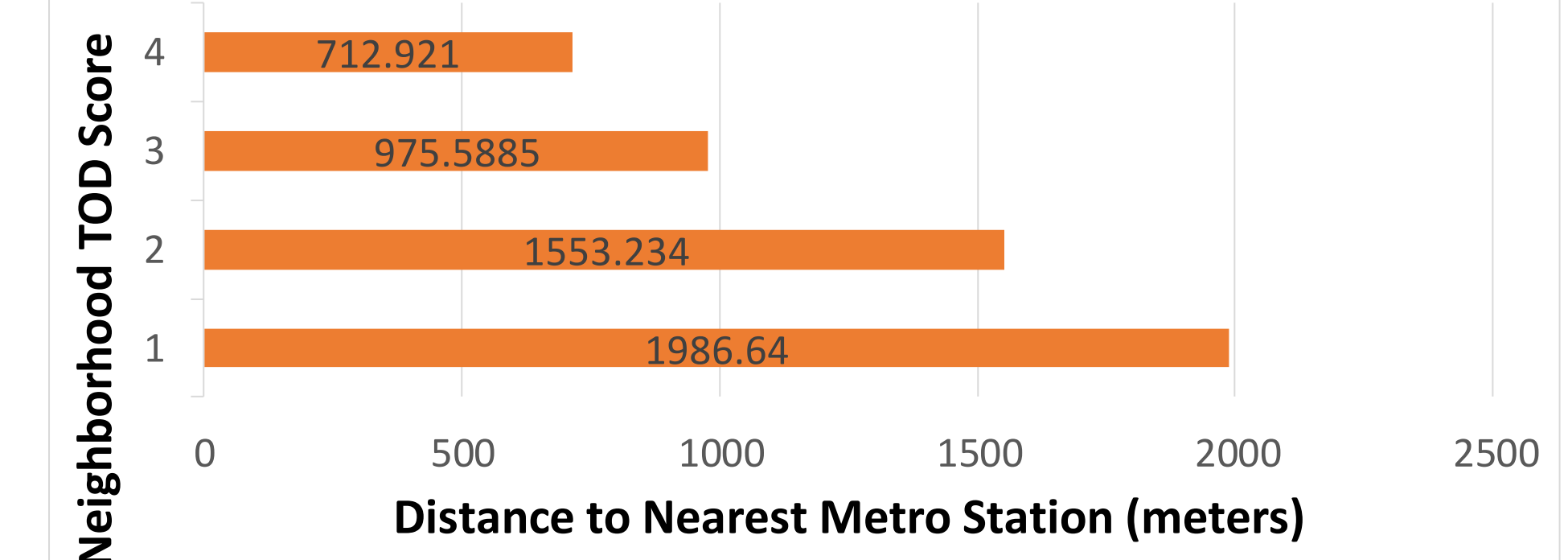


## Results and Conclusions

The results of my analysis show that there is indeed some correlation between high-quality access to transit and neighborhoods that are rich in non-transit factors that are considered to contribute to the development of transit-based neighborhood. The graph below shows that as the transit score of neighborhood increases, the mean distance to the nearest Metro stop decreases. This demonstrates that, in general, the Washington Metropolitan Area Transit Authority (WMATA) is providing quality service to the neighborhoods that are most suited for it.

However, my results also show that there are some neighborhoods that might be well-suited to transit-oriented development based on their non-transit factors, that are currently underserved by Metro. There are four neighborhoods in my survey that are scored a '3' that are located more than two standard deviations further away from a Metro stop than the mean distance for neighborhoods rated a '3'. This suggests that WMATA should find a way to improve access to Metrorail in these neighborhoods.

### Distance to Nearest Metro Station by Neighborhood TOD Score



## Transit-Oriented Development (TOD) Factors

