

# Analyzing User Demographics on the Swamp Rabbit Trail

## Spatial Analysis of Available Public Parking based on Survey Results

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### Abstract

Over the last two years the Earth and Environmental Science department has teamed up with the Health Sciences Department to research usage of the Swamp Rabbit Trail. Using the data that has been collected under collaboration between Dr. Julian Reed (HES) and Dr. Suresh Muthukrishnan (EES), I analyzed usage patterns of the trail from over 1000 Greenville County residents. The trail has 19 designated access points where there is a limited amount of parking available, and some offer bike rental services. Using the data and previously constructed maps, I analyzed where trail users traveled from, and if there were any areas that appeared to be under-utilizing the trail due to lack of convenient access. There had already been statistical research done that looked into peoples' reasons for not using the trail, but I used spatial analysis to find an ideal location for additional local parking availability for the trail.

### I. Introduction

The Greenville Hospital System Swamp Rabbit Trail is a 17.5 mile long greenway that plays an intricate role in the sustainability of Greenville. A greenway is "a linear open space established along a natural corridor converted to recreational use... linking parks, nature reserves, cultural features, or historic sites with each other and with populated areas" [4]. The Swamp Rabbit Trail matches this definition perfectly, as it is built along the old rail road corridor, connecting the people of Greenville County to many local land marks and urban areas. This upcoming summer I will be working closely with Dr. Muthukrishnan to continue research using a new data set on the demographics of trail users to develop my own thesis. However, for this class project the only data available at the time is last years set. With this data, from last year's research, I am exploring the possibility of building a new public parking lot near the trail and seeing how it may increase trail use from people in the proximate neighborhoods. There is an access point but no public parking where the trail's path crosses Sulphur Springs Road, near the vicinity where many of the people who expressed that access to the trail was too far from their homes live. Brooks Bailey, currently a senior EES major, did research on SRT user patterns last year that has been very useful in constructing my project. Using GIS and spatial analysis techniques in ArcMap, with influence from Brooks' maps, I constructed maps that show my proposed location for additional parking where the trail crosses paths with Sulphur Springs Road.

### II. Literature Review

The paper by Dr. Muthukrishnan, Dr. Reed, and Dr. Anna E. Price [7] outlines the general ideas behind this greater research endeavor, as well as provides many of the particulars on the details of the survey results from the Swamp Rabbit. The survey was of mostly white (93.1%) adults (84.2%), with slightly more than half (59.1%) being males. Also, that the vast majority (91%) of people using the trail cited exercise as their main purpose. The journal article by Lluís Mundet and Germa Coenders [6] also provided me with a good direction to take this class project. In this article there's a portion where the authors discuss how the neighborhoods surrounding the greenways played an integral role in the greenway as a community. This included people who did not live in these proximal neighborhoods and needed transportation just to get to the trail. In Europe (where this study was based), there is more widely available public transportation. But here in Greenville, public access involves building parking lots. There was a map [1] made by Brooks Bailey that I found useful in deriving a concept for this project. His map showed the reasons given in the survey for people who didn't use the trail, and where these people live. Some of this data can be seen on the map to the far right. Lastly, I referenced the virtual maps online [5] that the county provides as a public resource. All of these references were useful in compiling the data into maps I could use for this project.

### III. Methodology

Sustainability is a field of growing importance and prominence in everyday life, both in Greenville and around the world. Which is why for my project I wanted to take some of what had already been done with the Swamp Rabbit Trail and expand on it in a way that can be practically applied to the sustainability of the Upstate. There were 1,148 people who were interviewed as part of the survey conducted by the HES department. A subset of those are a group of people who had never used the Swamp Rabbit, for a variety of reasons. More than 50 of this subset claimed that the trail was "too far away". In Figure 2, I mapped the location of those people's homes (red dots) in relation to the location I propose for a new public parking lot at the Sulphur Spring Road crossing. The reasons I propose the Sulphur Springs Road location is because it's a main road that crosses the trail, and is located centrally between the two nearest public parking locations at Duncan Chapel and Cedar Lane Road. Also, the map shows that 16 survey participants who say that the trail is "too far" from their homes live within five miles of the location of this potential parking lot, and there are many more who live just slightly farther away than that. Many of the other people who responded to the survey chose the "Other Reasons" category. Although we cannot know for sure what their reasons are, a more convenient parking location would hopefully be an attractive feature to at least some of these people. Using ArcMap, I was able to find the distance that the people in the survey live from the nearest public parking access point. I then included the potential lot at Sulphur Springs Road in this calculation in order to see who would be most affected by the addition. The graph in Figure 3 represents my findings. There were 28 people in the survey who live closer to Sulphur Springs Road than any of the existing lots. If that lot were built, those people would be on average 28.9% closer to a public parking lot than they currently are.

### IV. Results and Discussion

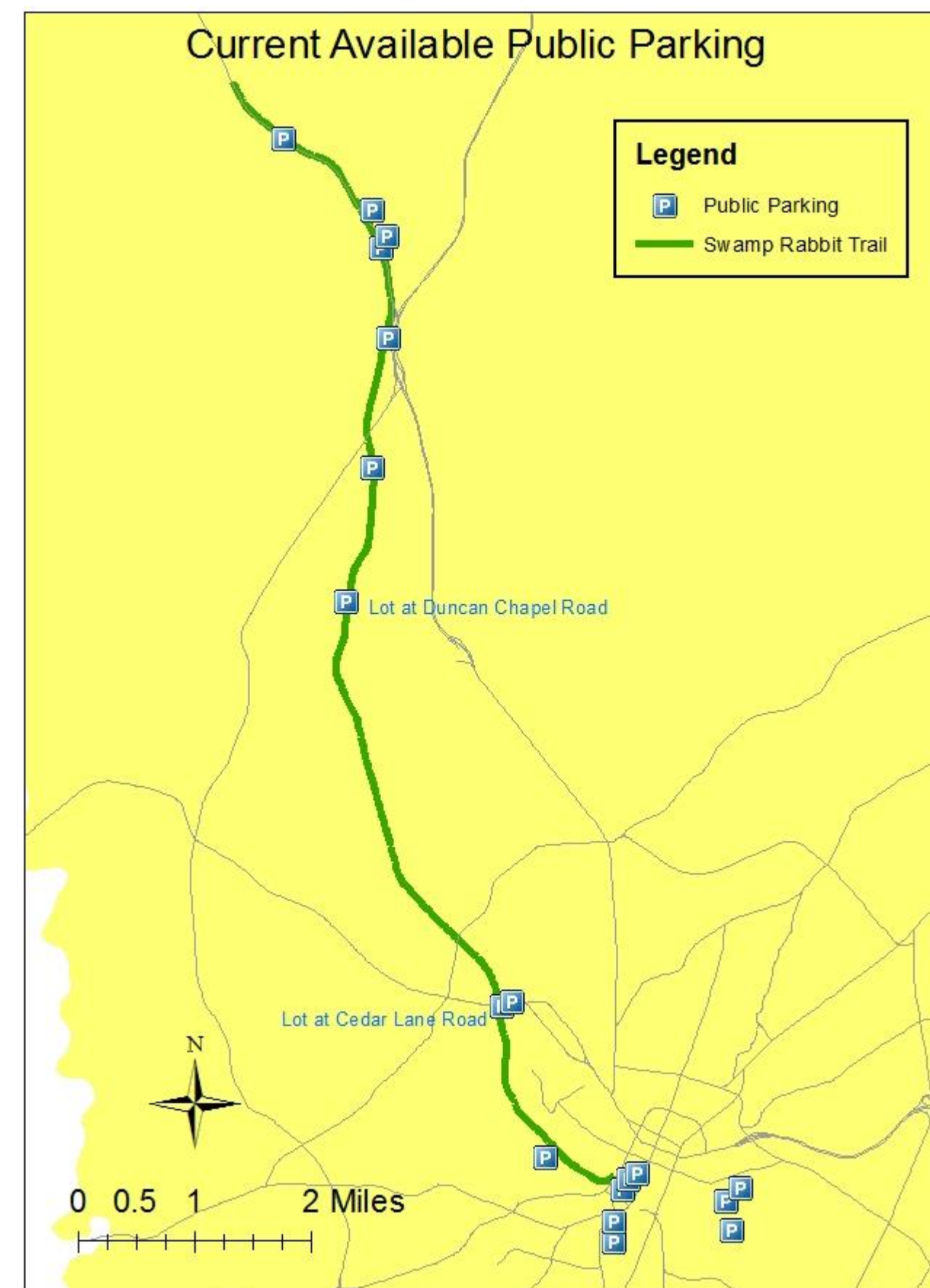


Figure 1. Map of the Swamp Rabbit Trail and the 19 current available adjacent public parking lots. The lots at Duncan Chapel Road and Cedar Lane Road are 4.2 miles apart with no available free public parking in between.

### Travel Distance Changes (Percent) Based on New Lot Location

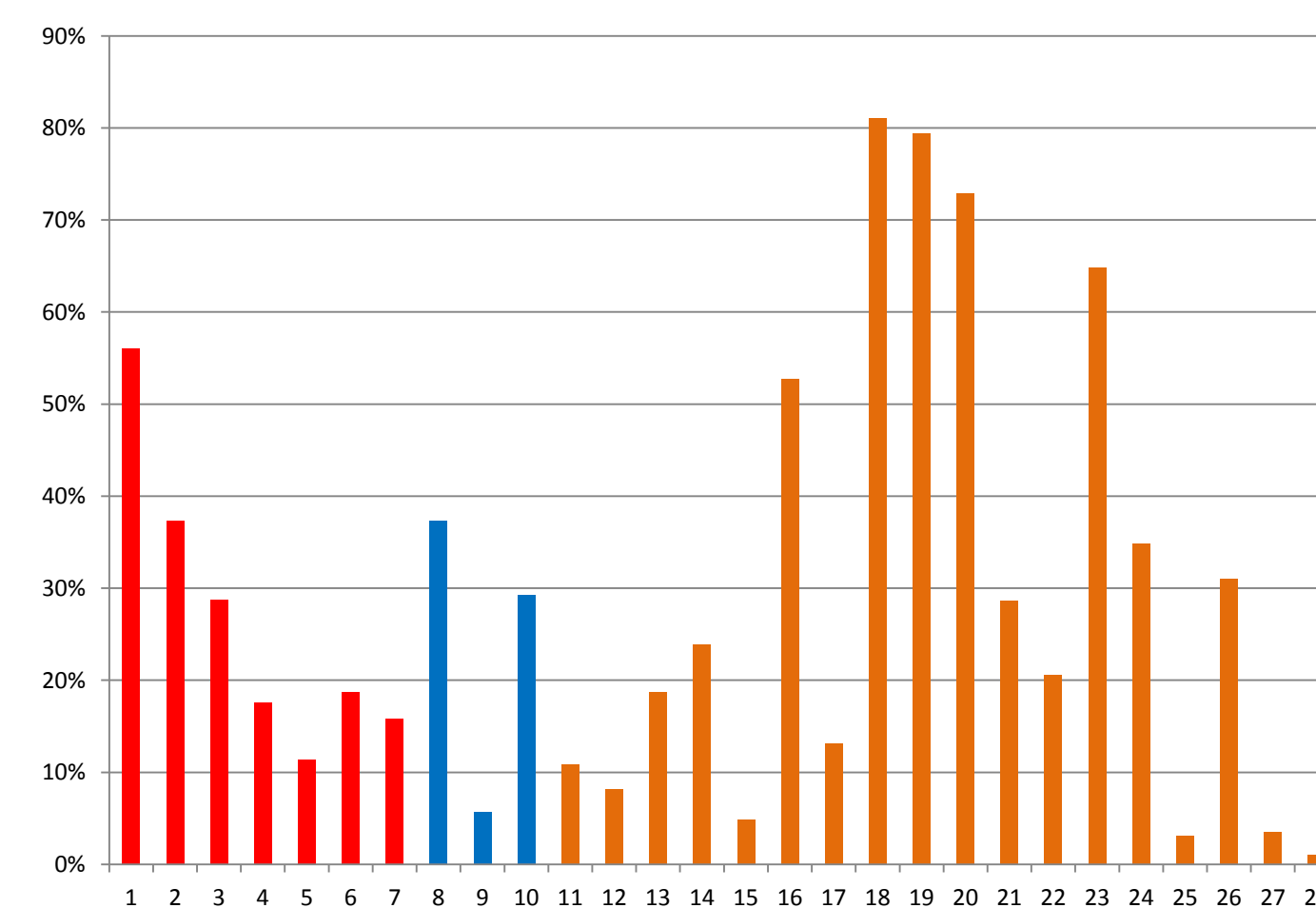


Figure 3. This graph shows how much closer the people who live nearest the proposed location at Sulphur Springs Road would be to trail access with public parking than where they currently live, as a percentage of how much closer they live to Sulphur Springs than to the current nearest parking lot. Colors coordinate with legend on Figure 2.

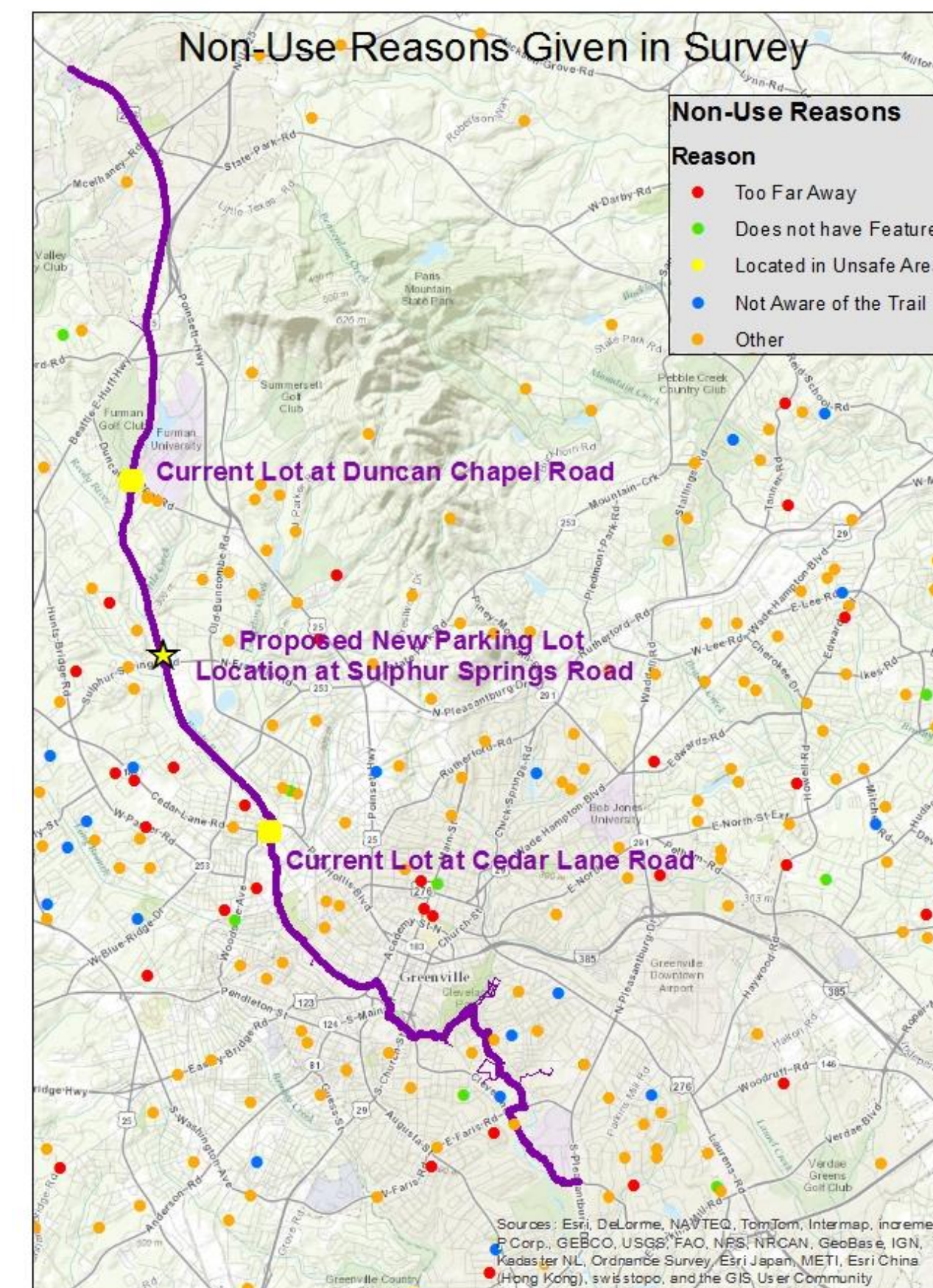


Figure 2. Map of responses to Non-user survey administered by HSC department shows reasons people identified as why they have never used the Swamp Rabbit Trail. This map also shows the location of the proposed lot at Sulphur Springs Road.

### VI. Future Research

For ten weeks this upcoming summer (2013) and throughout the fall and spring next school year I will be continuing spatial analysis of the Swamp Rabbit Trail using a new data set that has been collected over the past year by the Health Science department. I will use that data to develop my own thesis separate from the work that has already been done by other students and faculty members. I will also used my continued involvement with the project as an opportunity to hopefully propose this location for actual consideration for a new public parking lot. There are currently existing plans to build the "Swamp Rabbit Station" in Berea near Sulphur Springs Road, which will perhaps include the construction of a new public parking lot for trail-goers.

### VIII. Acknowledgements

I would like to thank the EES and HES departments for giving me access to their data and for allowing me to take part in their research this upcoming summer. In particular thank you to Dr. Muthukrishnan and Dr. Reed as well as Brooks Bailey for his assistance. Also thanks to my professor, Mike Winiski, for his help during class.

### V. Conclusion

My main goal for this project was to utilize GIS in a way that it could be applied to improve Greenville's sustainability in a practical manner. After looking at the data and available maps, it didn't take long to determine potential sites for building new public parking lots. Sulphur Springs Road is the best choice because it is situated centrally between the nearest lots at Duncan Chapel Road and Cedar Lane road, in a populated area, with space to build. The Duncan Chapel and Cedar Lane lots are 4.2 miles apart, with Sulphur Springs Road in the middle, just slightly closer to Duncan Chapel Road. Also, it is in the proximity of many people who's survey responses included that the trail was "too far away". Once I had established this as my potential proposed location, I took a drive out to Sulphur Springs Road to look at the location, and there is certainly enough space to construct a new parking lot without disturbing the trail or the local businesses and houses in the area. The results of my spatial analysis showed that the location at Sulphur Springs Road is definitely a suitable place for a new parking lot. Although this survey only sampled a very small portion of the population, my results suggest that this new parking lot could increase trail usage by a significant margin. My analysis shows that on average the people in the survey who live near Sulphur Springs road are 28.94% closer to that access point than to the currently existing ones. According to census data there are over 14,000 people living in Berea [2], where the Sulphur Springs Road access point is, that would now have a local parking location to enjoy one of Greenville's finest public resources. Overall, my findings show that building a new public parking lot in this vicinity would expose a new sector of the population to the trail, which would hopefully increase usage, and in the end improve the sustainability of Greenville, and quality of life for everyone.

### VII. References

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