

# Suitability Analysis for a New Hospital Location in Guelph, ON

## Context

The purpose of this analysis is to find a suitable location for a new hospital in the City of Guelph, which is essential to meet the increasing demand for health care services in a city with a growing population and aging demographic. The Guelph General Hospital is a 165-bed facility with roughly 1200 staff. The building needs substantial upgrades as it was first established in 1875 with only small additions added since then. This analysis is based off the assumption that federal funding will allow for a completely new rebuild in a larger more accessible location.

## Study Site

Guelph is located in the Southwestern Ontario, about 1-hour drive from Toronto. The availability of a Go Train and bus services to and from Toronto has made the City of Guelph a very suitable location to live for those commuting back and forth on a daily basis. Due to the easy accessibility to Toronto the population has grown rapidly in recent years putting increased strain on the health care system. The city's borders are expanding in all directions with rapid development happening around the downtown core. This makes it a critical time for municipal and federal planners to assess a location for a new hospital while there is still undeveloped real estate available.

## Methodology

The overall methodology of this analysis was done in several progressive steps. First, the data was collected from two main sources which were the City of Guelph and Ontario Base Map data, both of which are open source. Next data was prepared and managed by projecting to NAD 1983 UTM Zone 17N and clipped to the study extent of a portion of Wellington County which encompassed the City of Guelph. After this, 7 criteria surfaces were developed which can be seen below in the following images. Using AHP derived weights for each criterion a weighted overlay was developed to output a weighted suitability surface. Finally, 5 suitable regions for a new hospital location were derived by using the locate regions tool to obtain the final map output for this analysis.

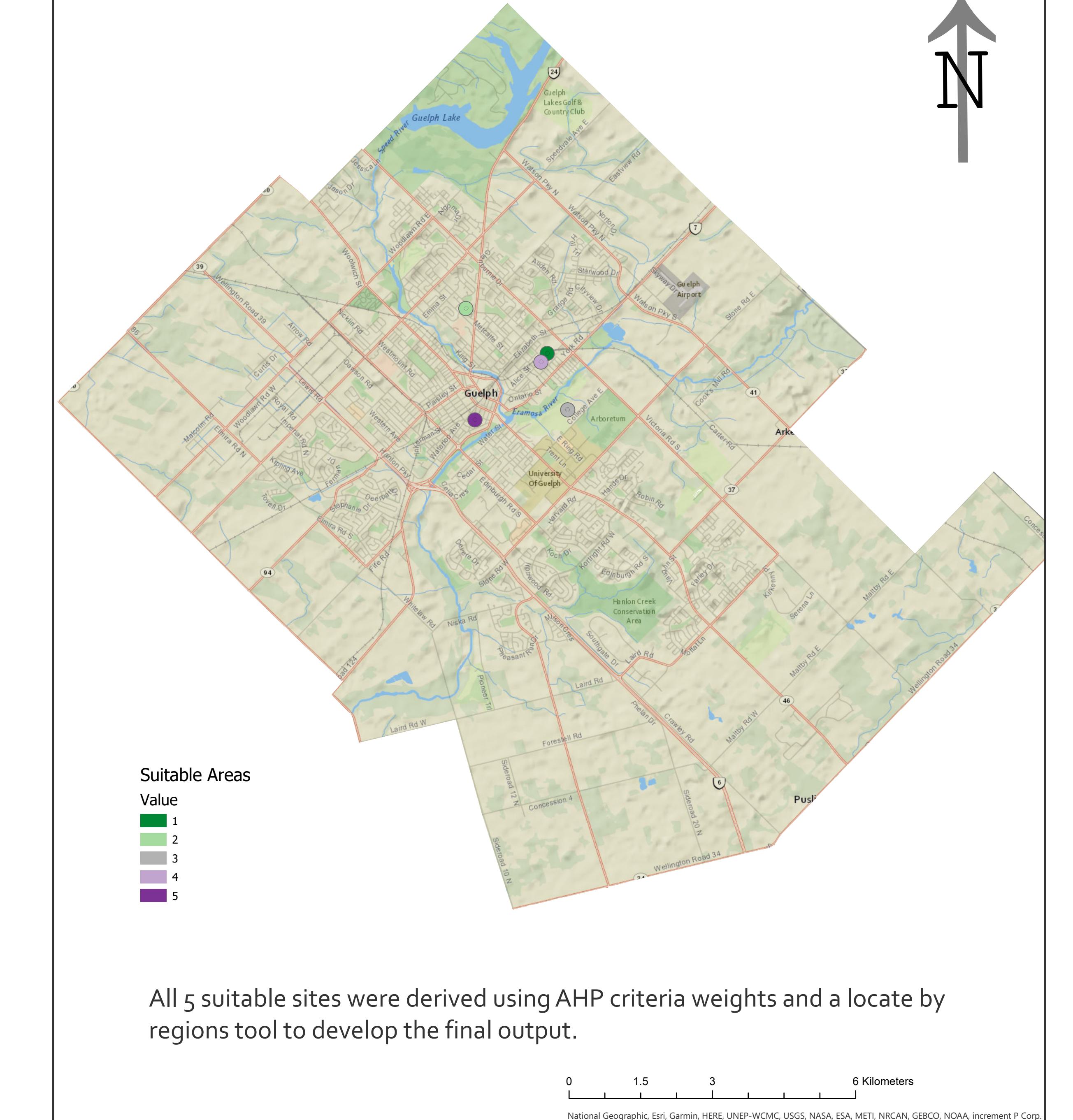
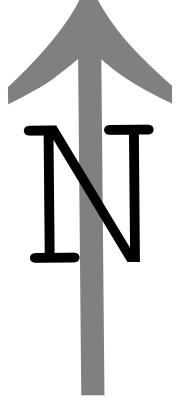
## Conclusion

The results of this analysis show that the final weighted suitability surface and ultimately the 5 suitable locations successfully met the goals of this analysis. The spatial distribution of the 5 suitable locations give municipal and federal planners options when considering the best site. There is also room for improvement in this analysis. By altering the AHP weights and suitability scores to reflect different levels of importance varying results can be achieved. The current scores were based off preliminary literature reviews and not professional experience, so this could make a big difference when conducting similar research in the future.

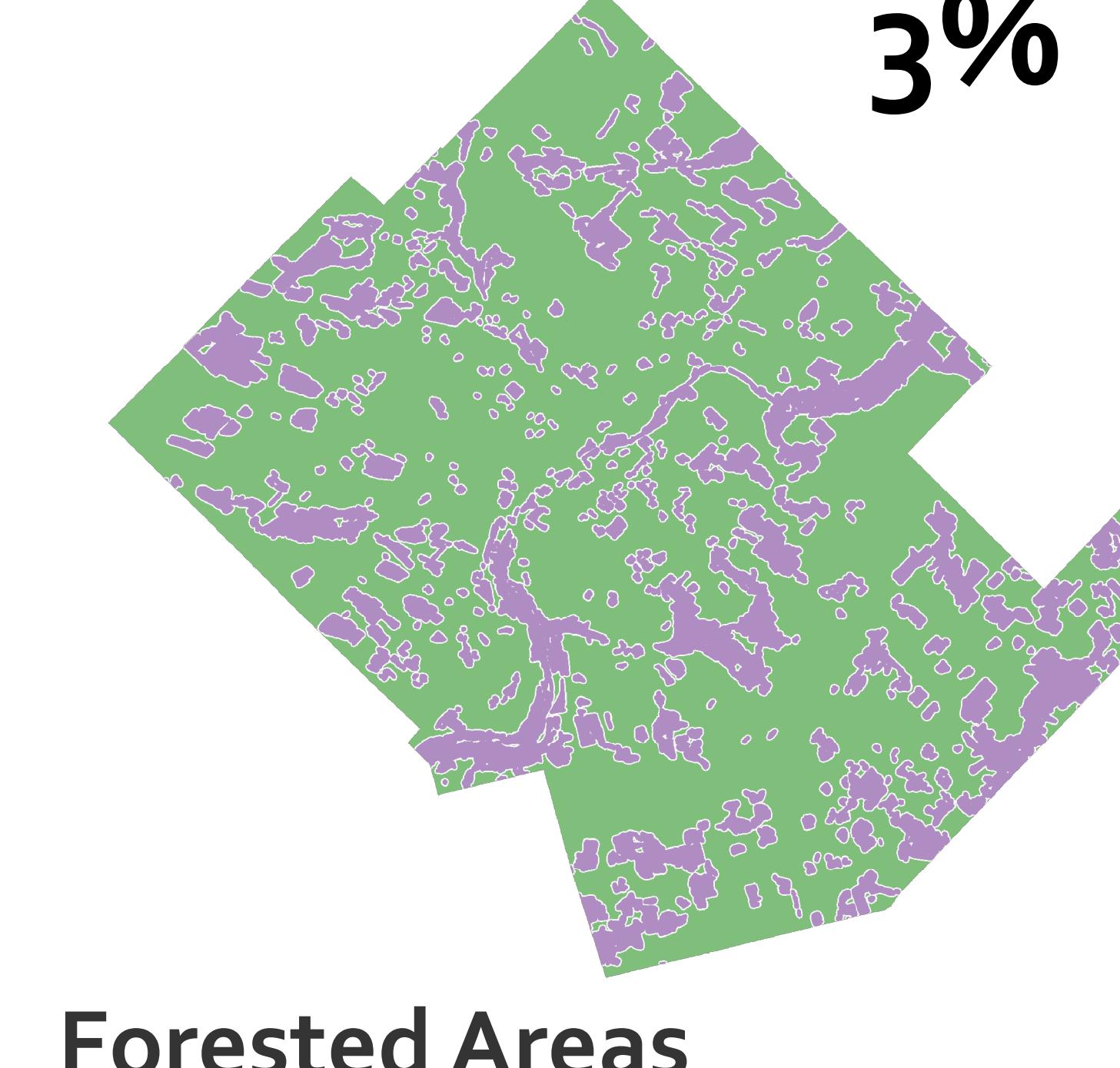
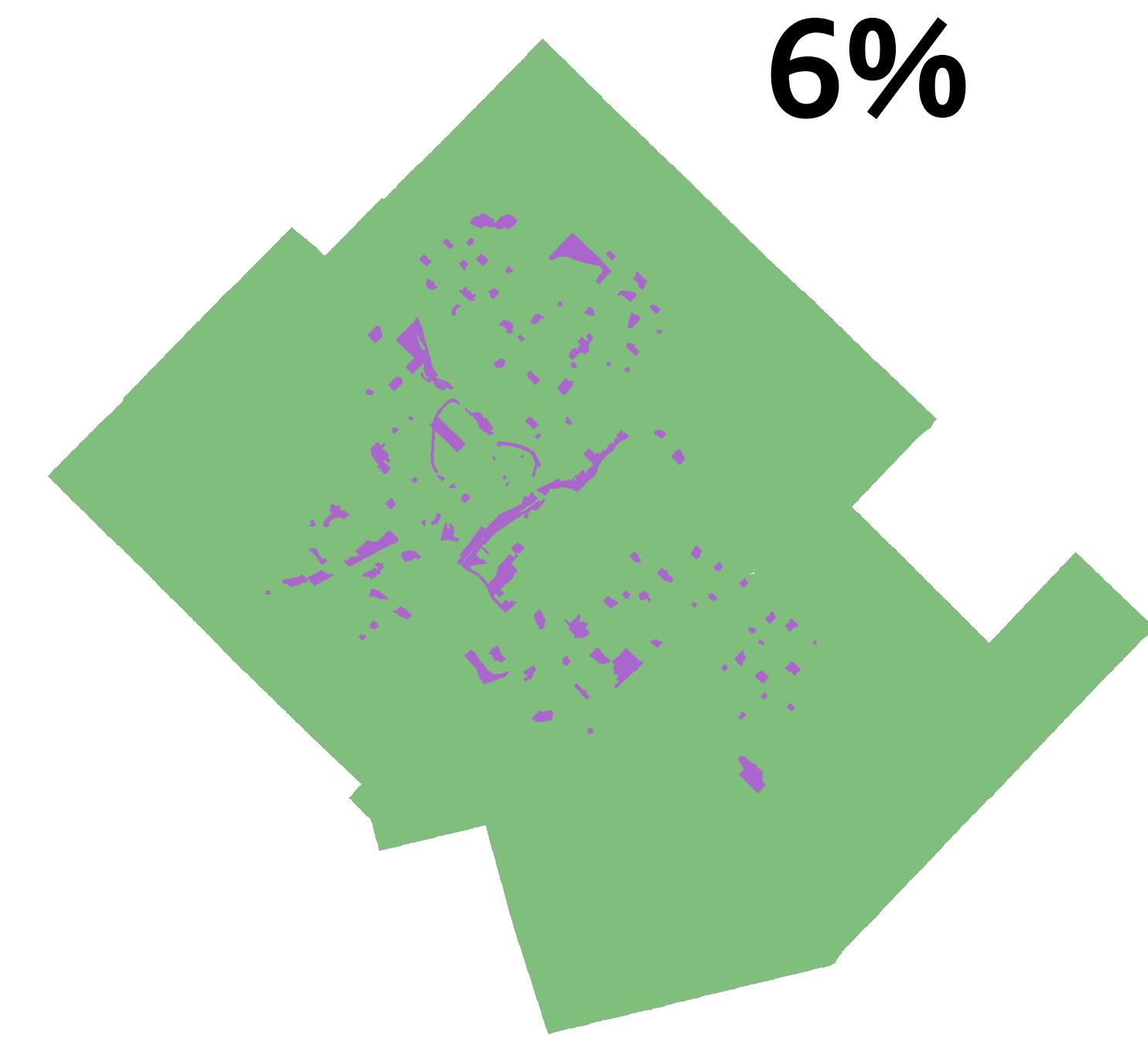
## AHP Rating Criteria

Criteria	Description	AHP Rating (1-9)
Distance to Major Arterial	Within 100 - 400 Meters of a Major Road	9
	Less than 100m Meters from Road	5
	Greater than 400 Meters from Road	1
Topography (Slope)	Less than 5 degrees	9
	Between 5 and 10 degrees	5
	Between 10 and 25 degrees	3
	Greater than 25 degrees	1
Distance to Water Source	Less than 50 Meters from Water or Greater than 800m	1
	Between 50 and 100 Meters from Water	5
	Between 100 and 200m Meters from Water	9
Near City Centre	Less than 2km from city centre	9
	Between 2 and 4km	5
	Greater than 4km from city centre	1
Municipal Parks	Not a Municipal Park	9
Municipal Park	Within 25m	1
Forested Area	Within 25m to 50m	5
	Greater than 50m	9
Protected Wetlands	Non-Wetland Area	9
	WetLand Area	1

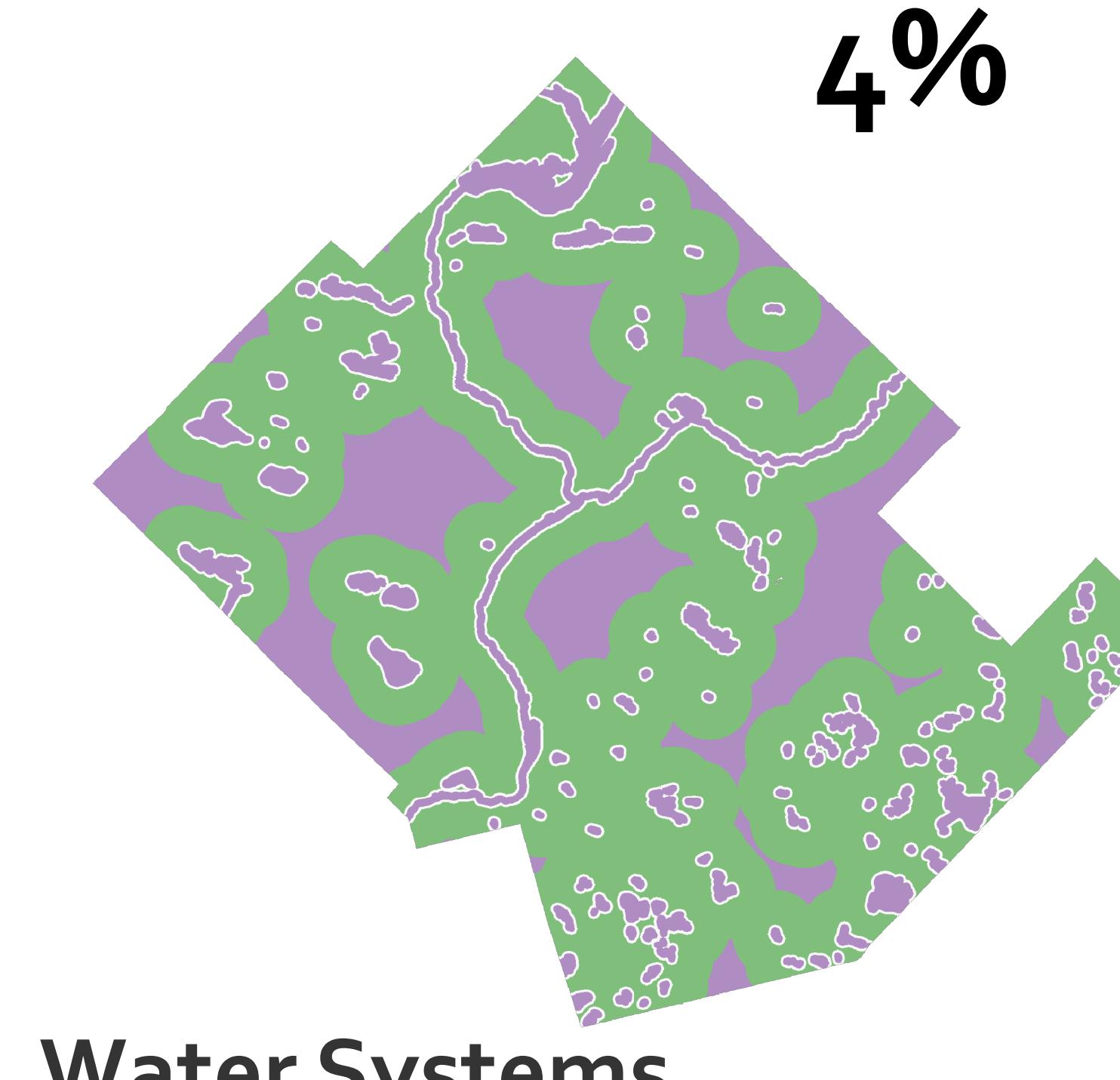
## The 5 most Suitable Locations



6%

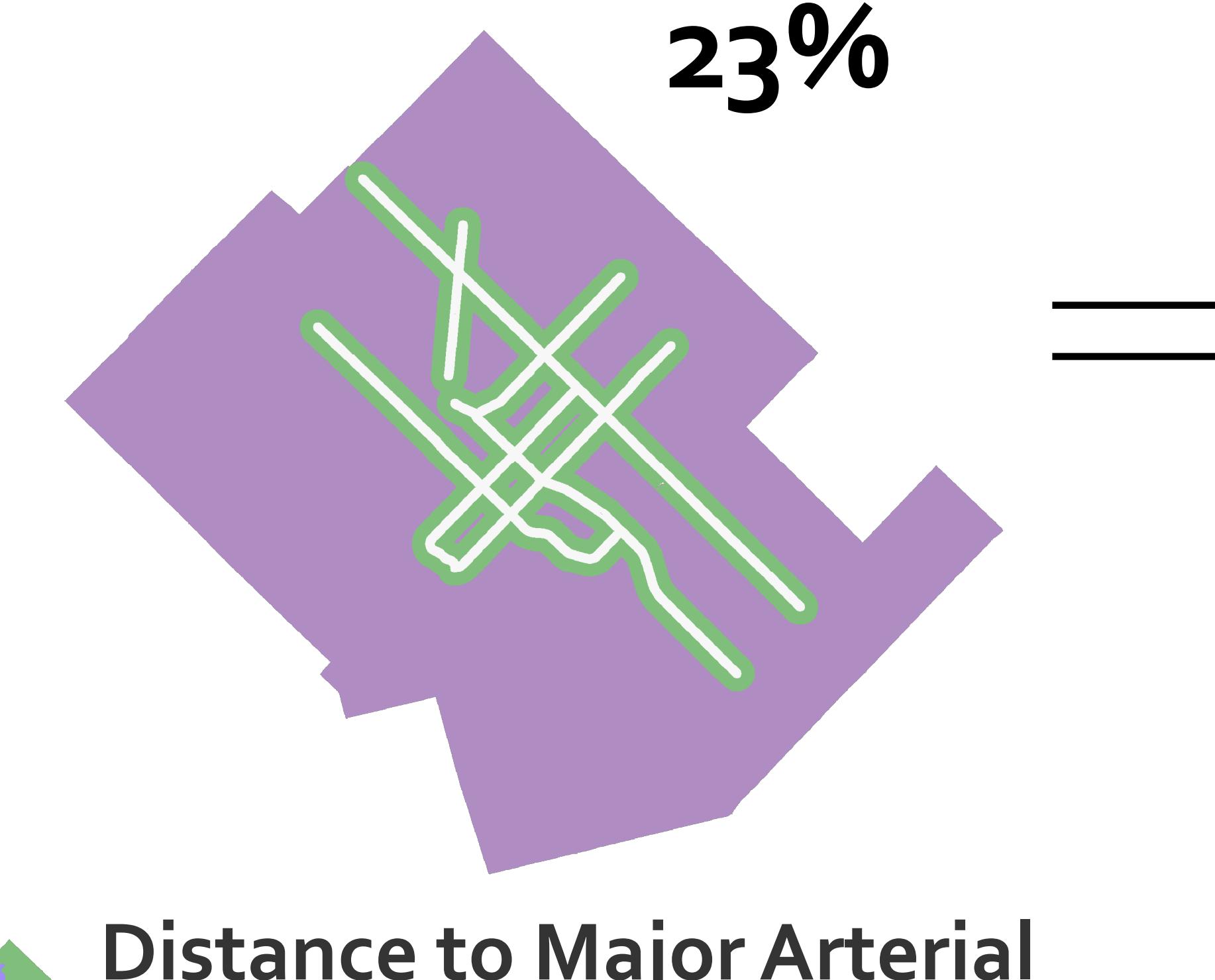


4%



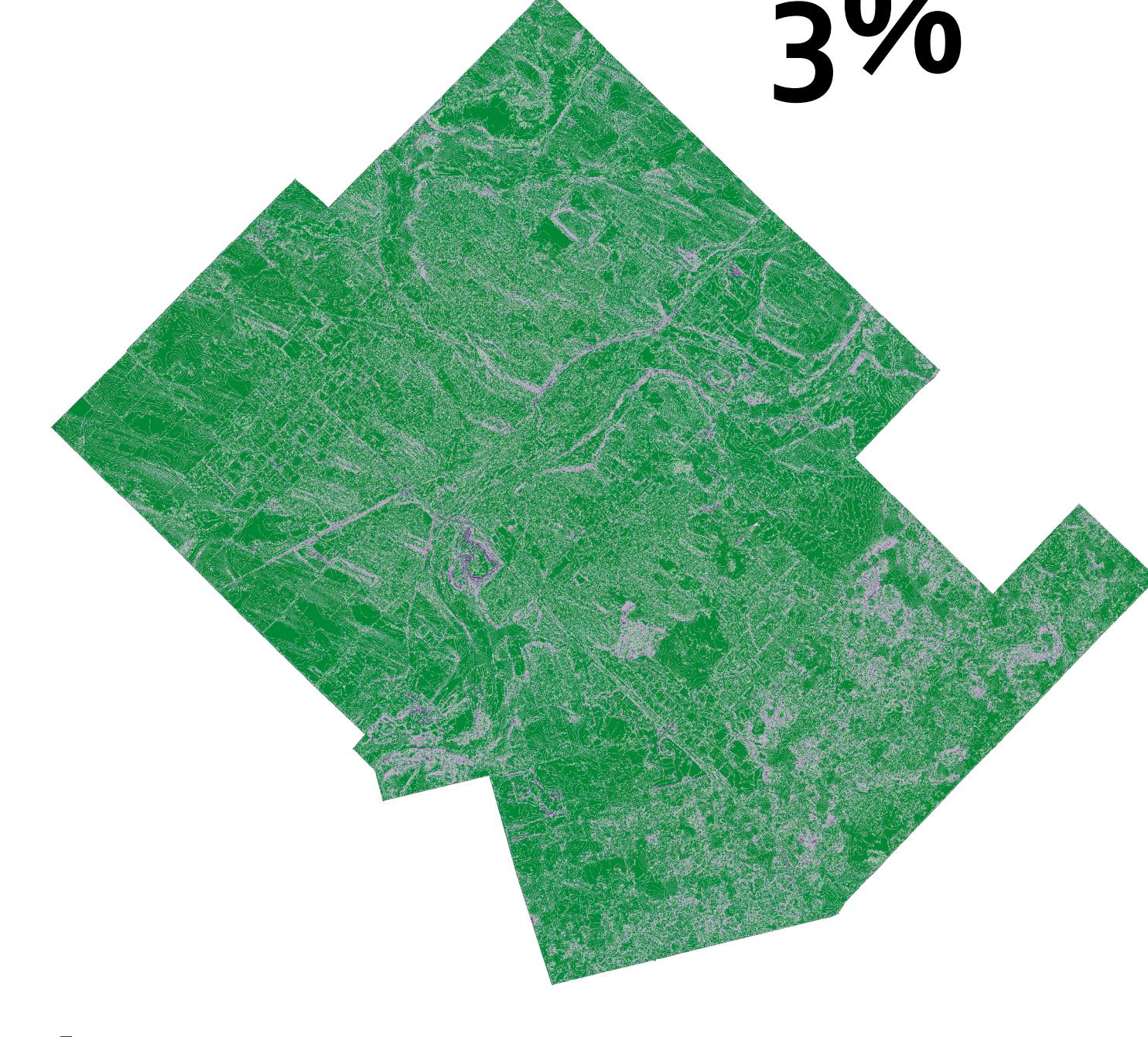
Forested Areas

23%

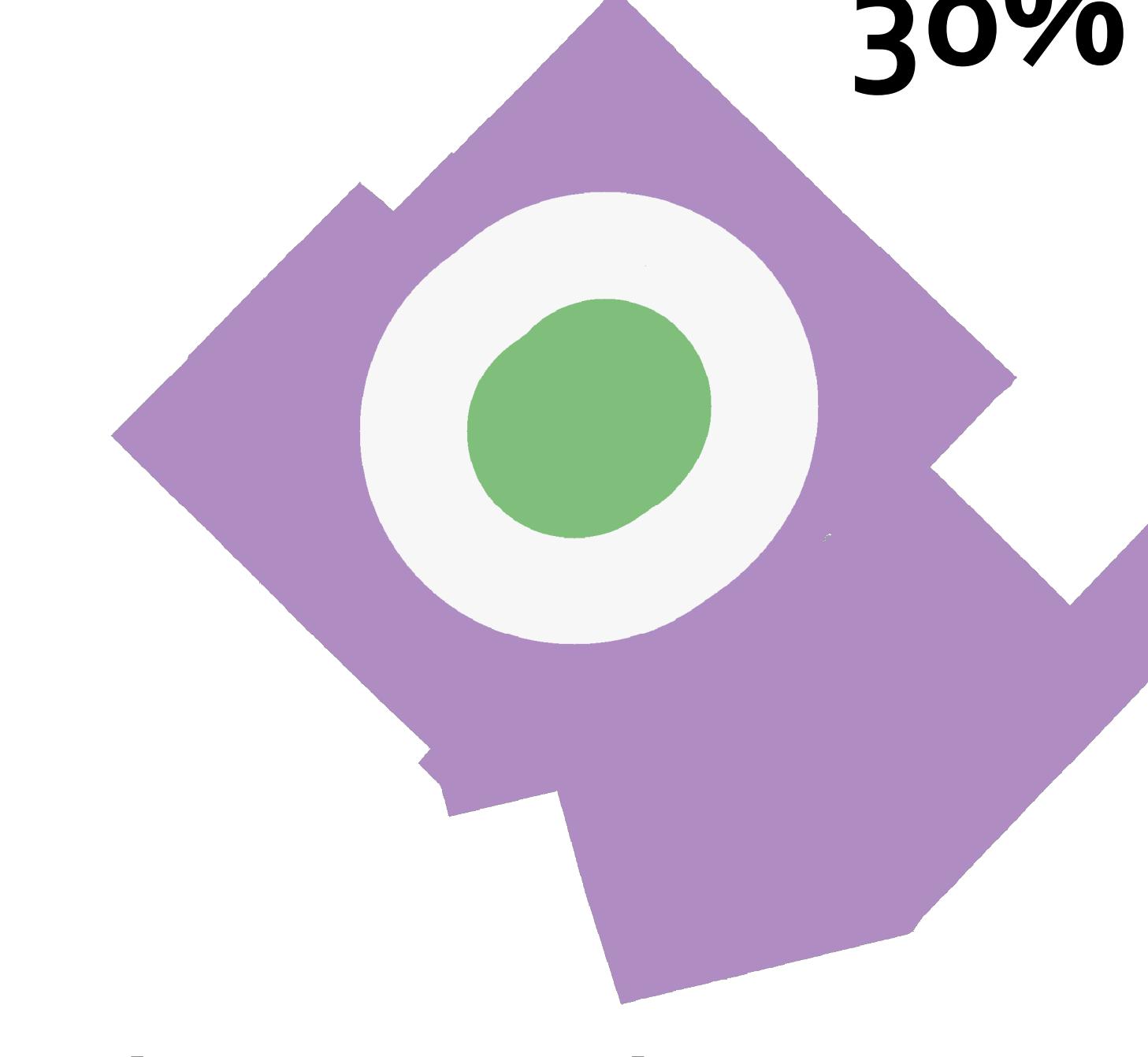


Distance to Major Arterial

3%

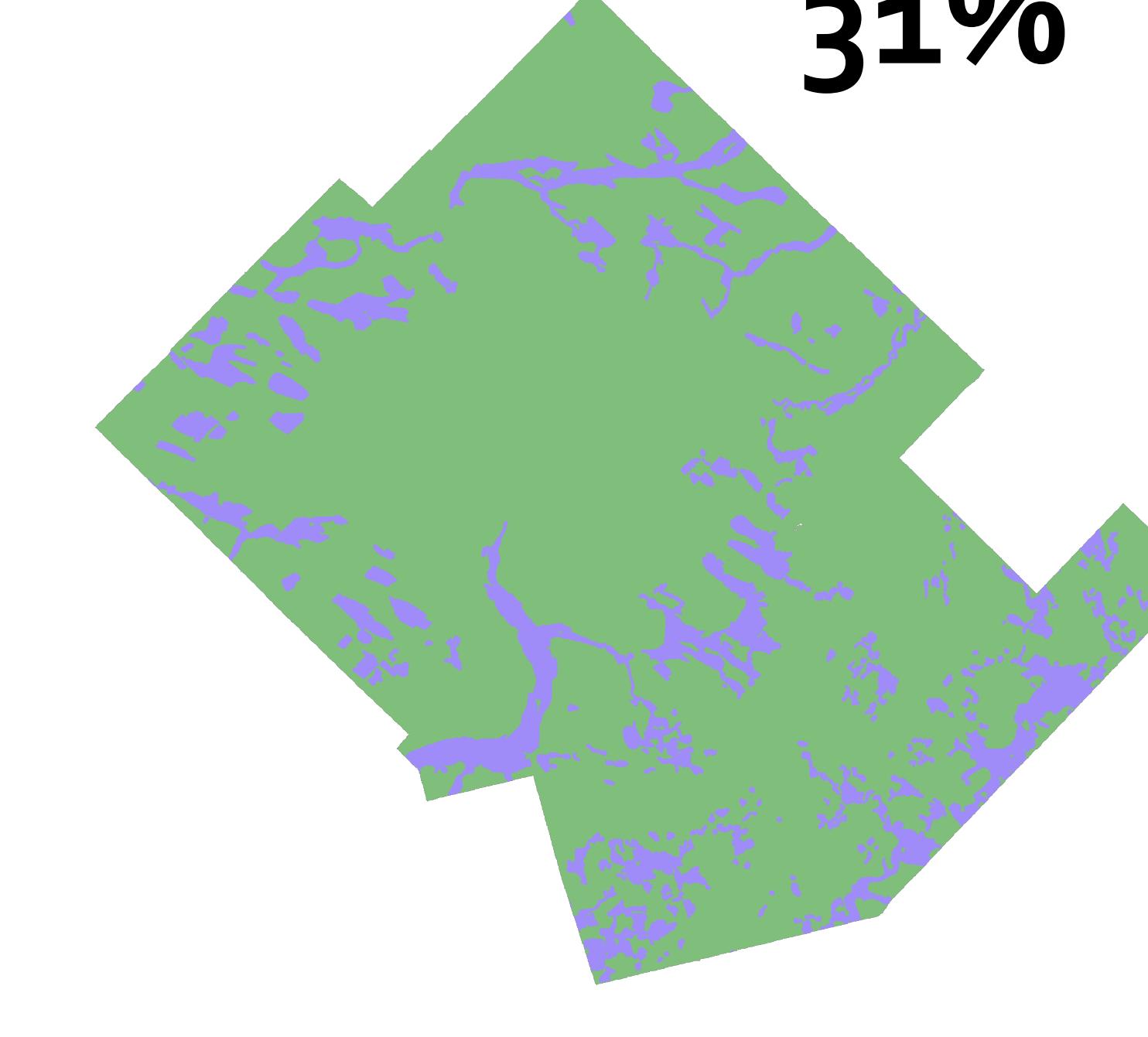


30%

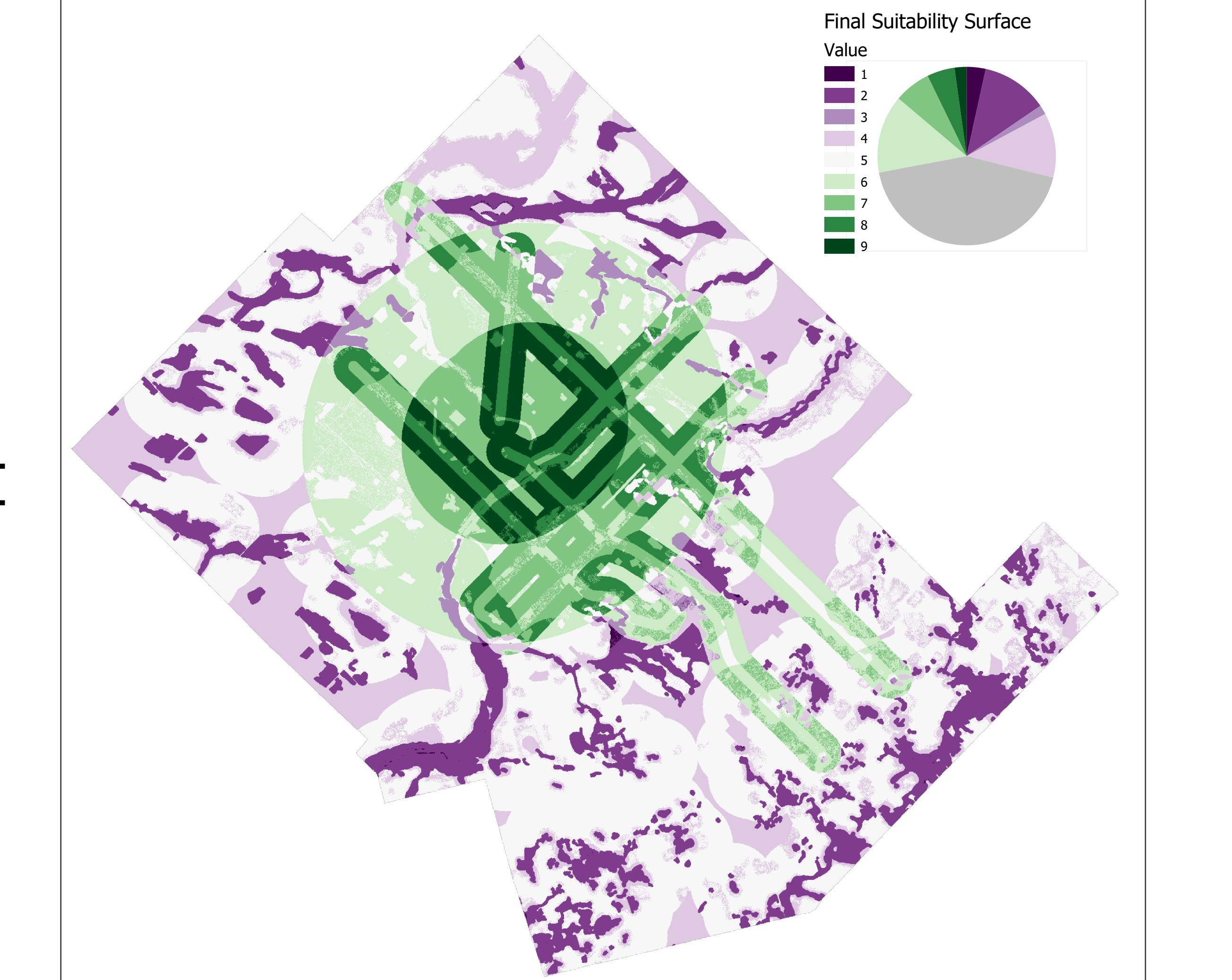
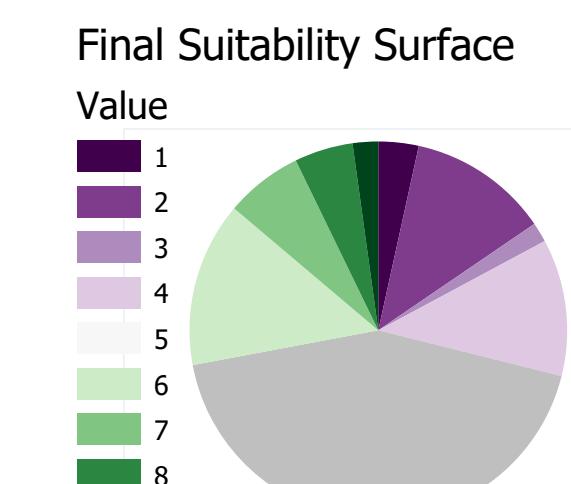


Wetlands

31%



## Weighted Suitability Surface



This weighted suitability surface combines the previous criteria to form a region that is most acceptable for a new hospital location. This pie chart is a representation of the total amount of suitable surface area. Regions that are highly suitable make up only 2.19% of the entire study site.