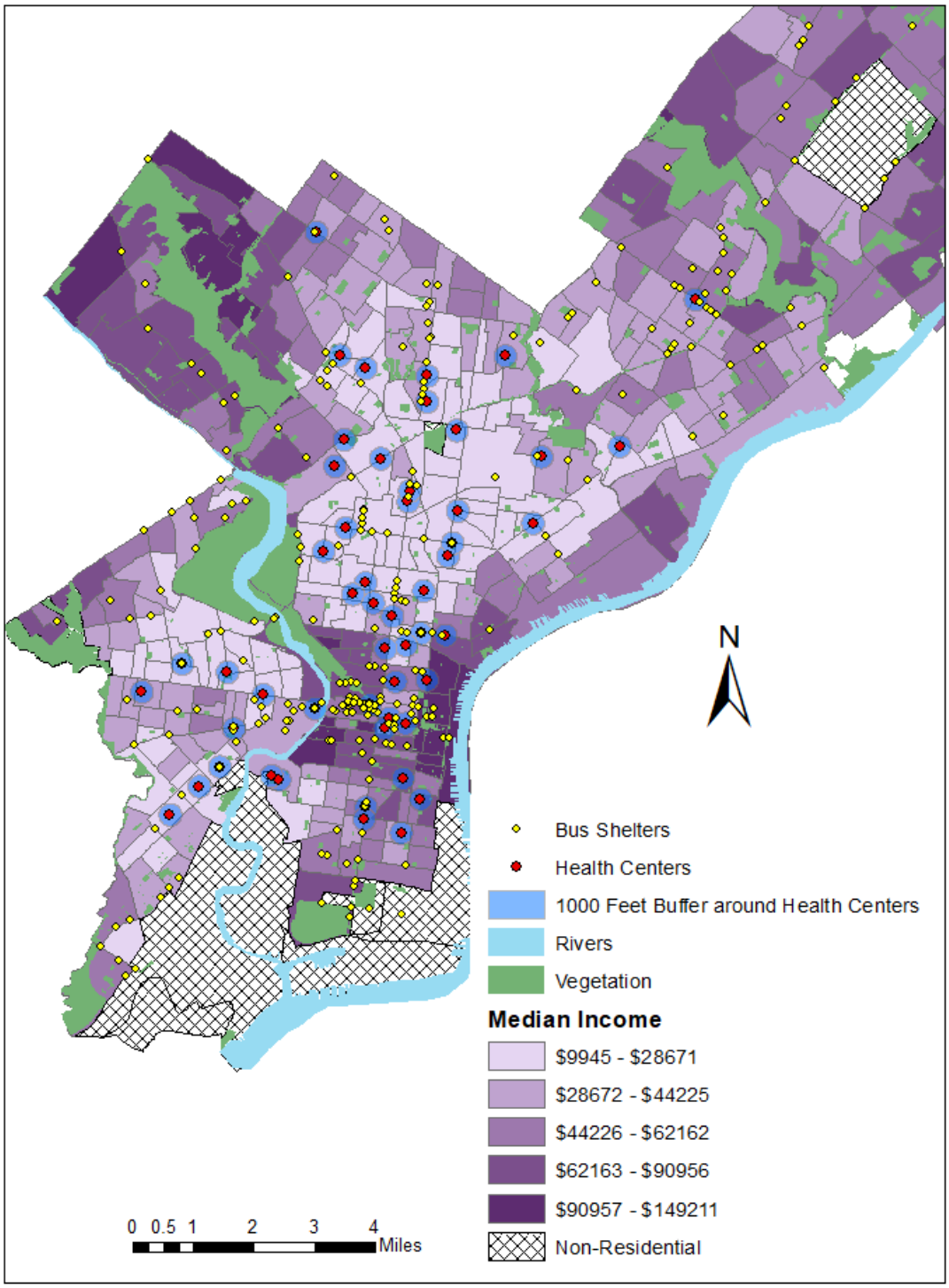
Euclidian and Network Distances Assignment

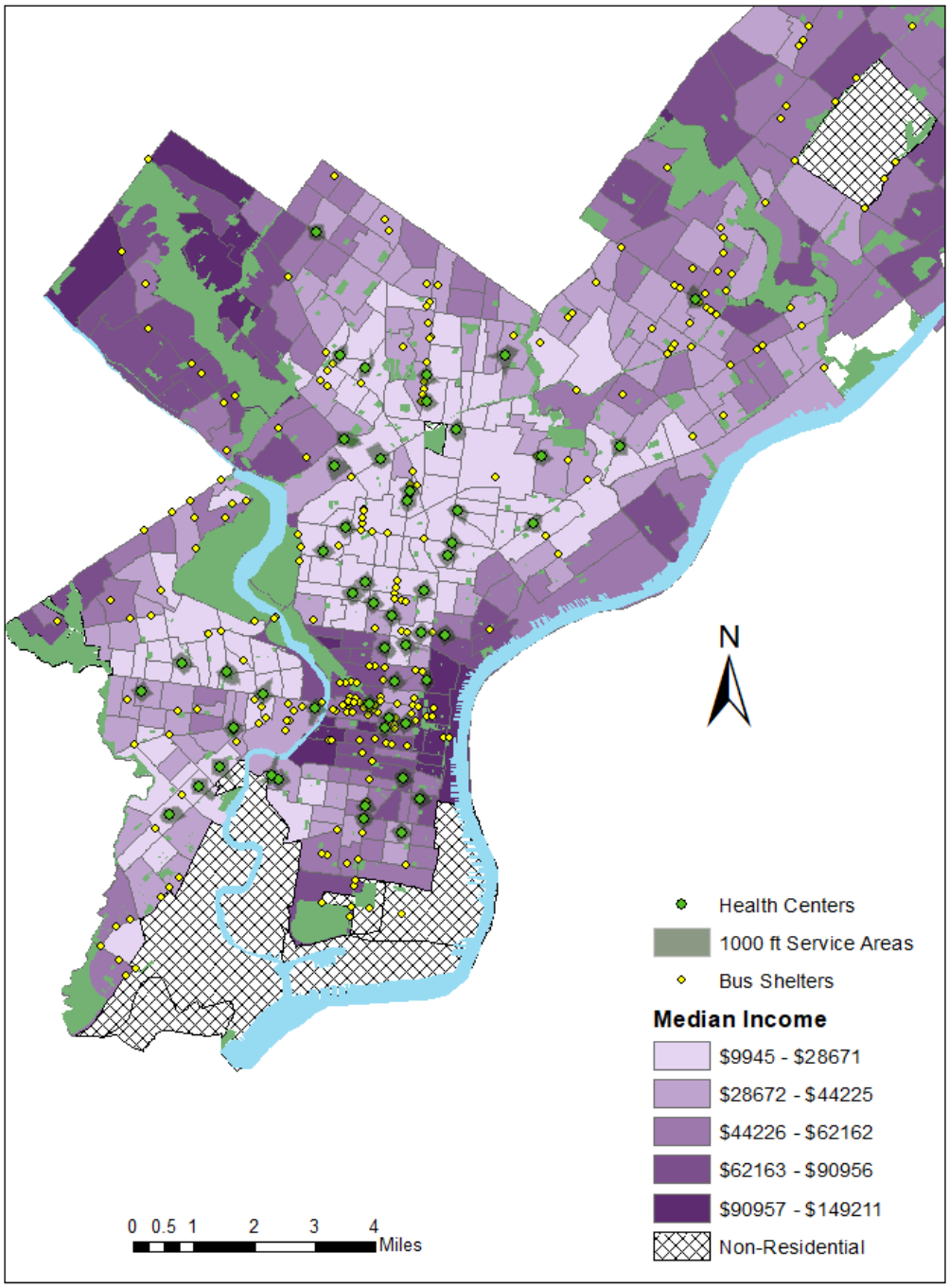
By Shweta Chopra



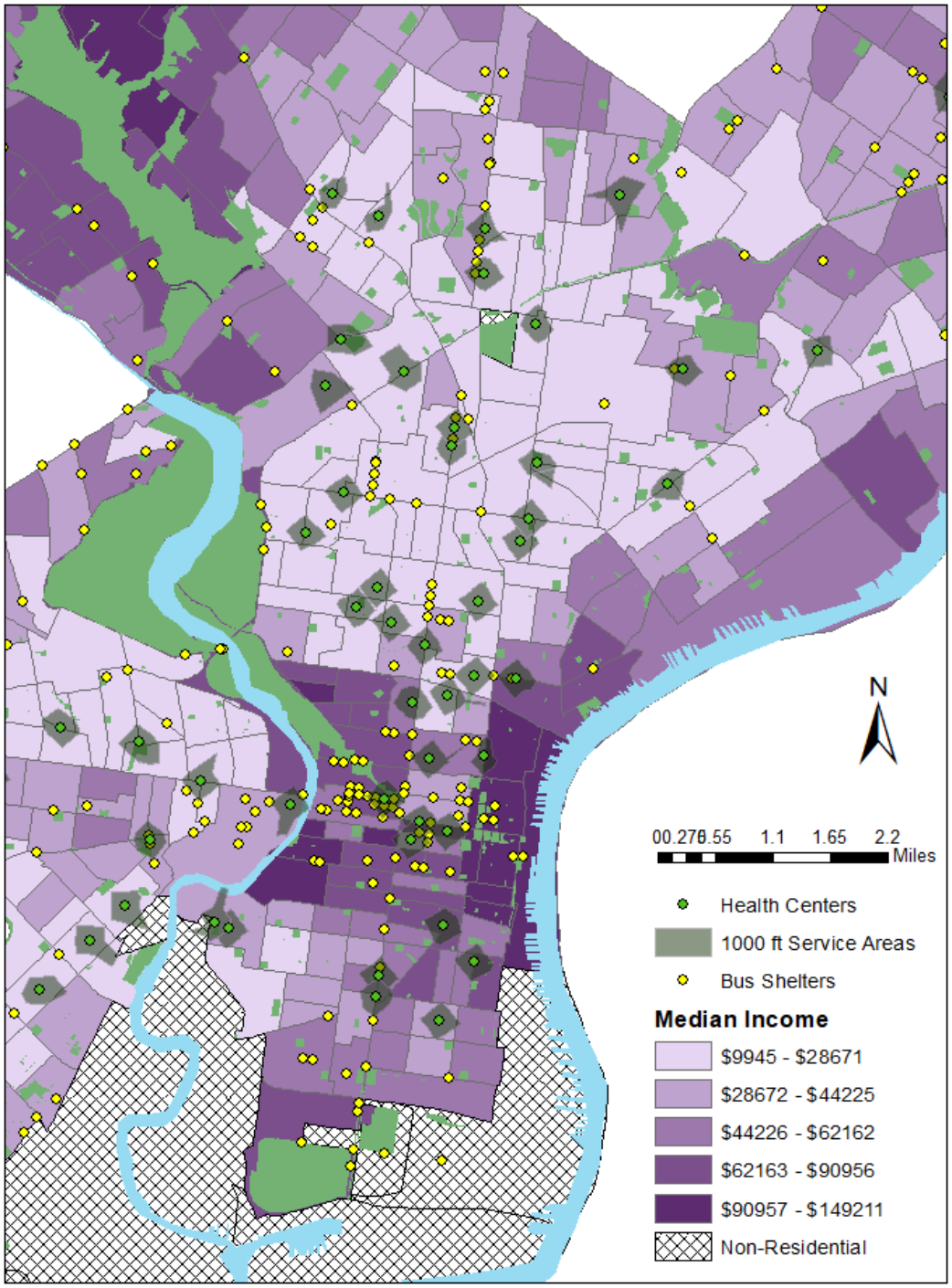
The City of Philadelphia has recently considered an initiative to establish more bus shelters in the city, and revamp existing ones, called the 'Philly Transit Shelter Project'. These shelters, created at Bus Stops, allow for seating area, a covered roof in case of rain, and at times even provide warmth in extreme cold. One important category of people for whom the presence of such shelters is a boon, are those that are sick or unwell, and are visiting Health Centers. In that state, the availability of a place to sit while waiting for a bus to arrive can provide great relief. Further, those with chronic illnesses, that visit health centers more frequently, would benefit the most from such shelter spots. As such, ensuring the availability of a bus shelter within 1000 feet (ideally even less), to a Health Center, should be taken up by the city.

Using data from Open Data Philly and SEPTA, we plot the locations of Health Centers and Bus Shelters in the city, respectively. At first glance itself it is evident that there is unequal density of bus shelters in different parts of the city. Then using Euclidean distance buffers of 1000 feet, we can view the number of health centers that do not have easy access to a bus shelter nearby.

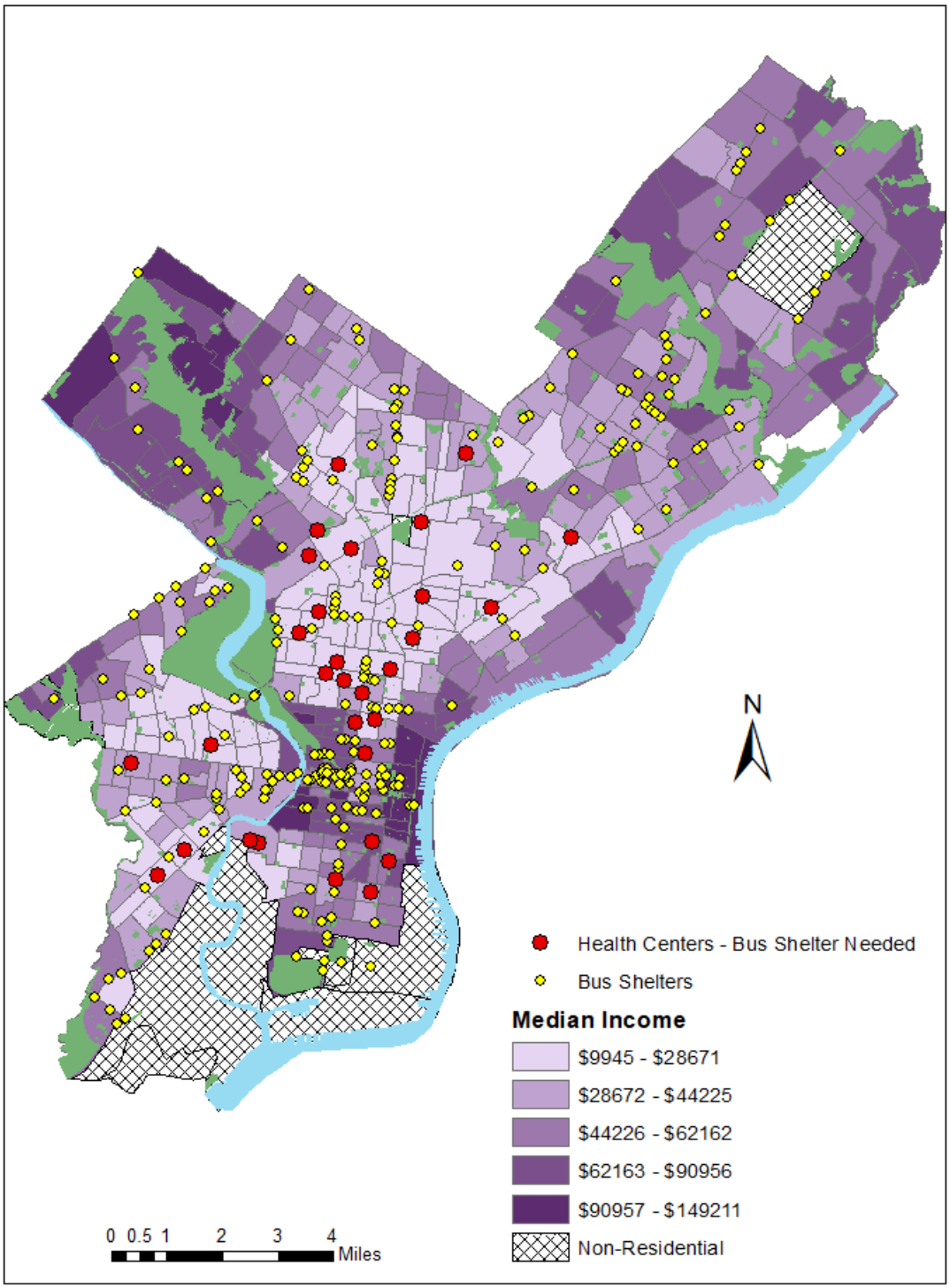
Instead of Euclidean distance, we can also use Network Distances to create a service area (similar to a buffer), around the health center, this time accounting for actual street access. We find this to be a more reliable measure of distance in our case, since the distance to actually be travelled by sick patients should be taken into account, rather than Euclidean distance. We find that these service area sizes are even smaller than our earlier buffers, meaning the access is even poorer as per this measure.



We can zoom in further to view these service areas, and we find that several health centers not have a bus shelter close by. These are also areas characterized by lower median income. Thus there is disproportionate inconvenience caused to lower income groups, while a higher income area like Center City has shelters in much greater density.

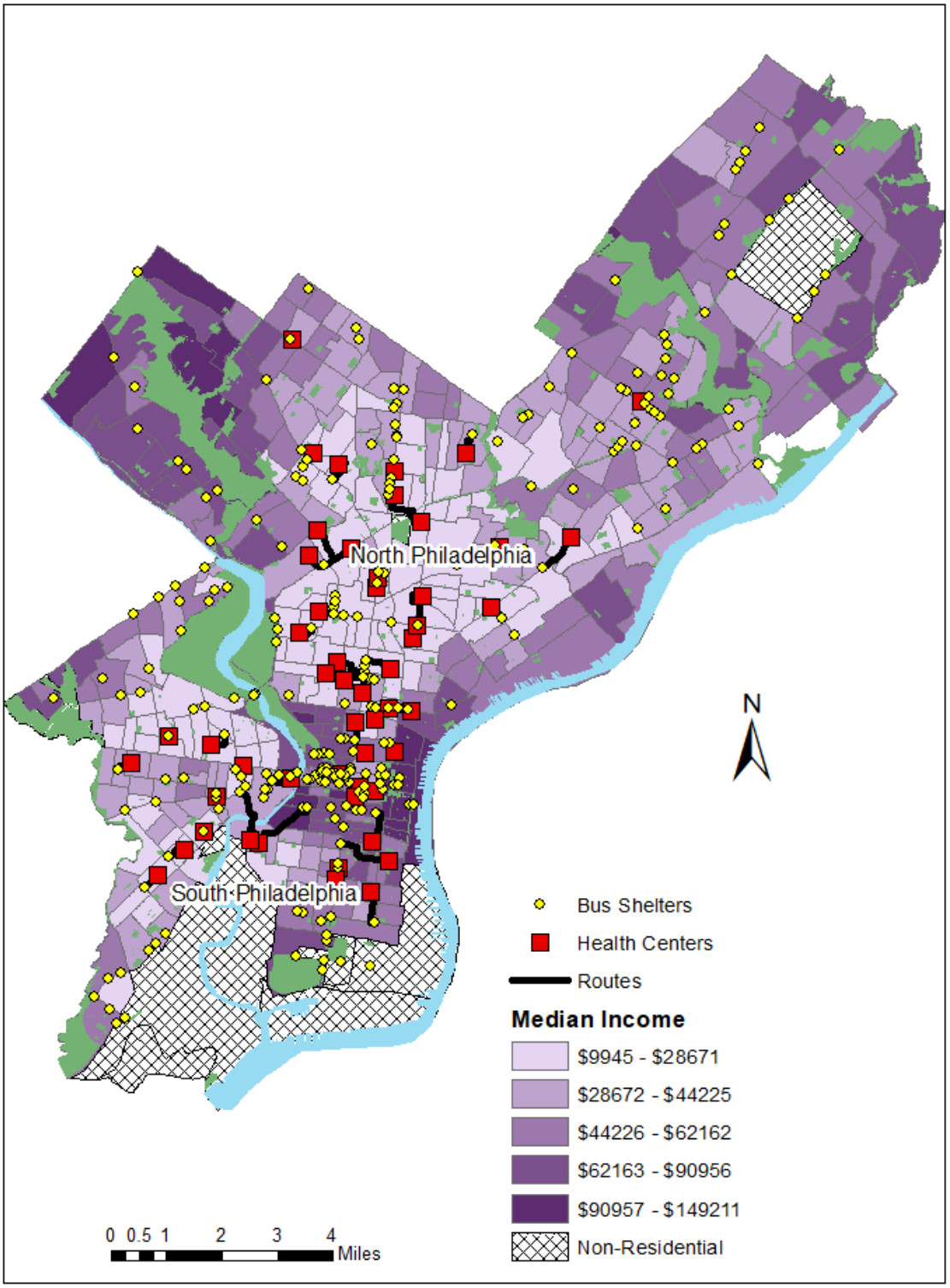


Using a location query we can extract those Health Centers where a bus shelter needs to be constructed close by (no shelter within 1000 feet) – these are represented in red. ArcMap can also provide a list with locations of these Health Centers, that the City of Philadelphia can then visit to take note and plan for shelter installation.

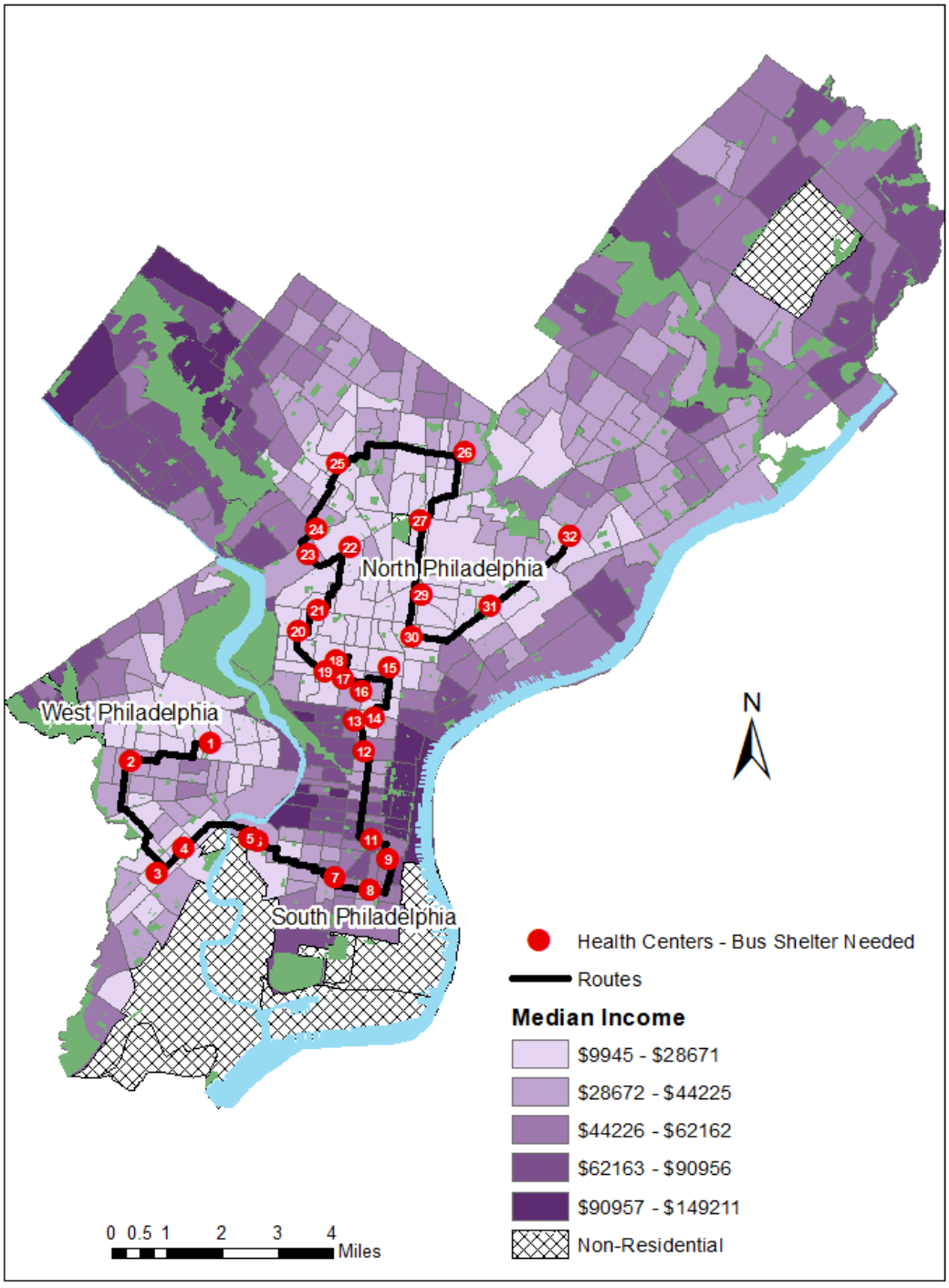


Using a spatial join we looked for Euclidean distances to the closest bus shelter from each Health Center. Again, Network Distances performed better here in finding the actual distance to be traveled by an individual to access it. It also allowed

for the route to be depicted, visually revealing those Health Centers that are very far from bus shelters. The length of these routes must be reduced by providing shelters closer to the Health Centers. North and South Philadelphia health centers seem to experience the worst access. Its not that individuals would travel these routes in reality, but the ones facing these routes would settle for standing and waiting for their bus as they have no other option.



Finally, in order to take forward the initiative to ensure every Health Center in Philly has access to bus shelters nearby, the city department would need to visit and investigate intervention centers – where bus shelters are still needed. In order to help them efficiently and optimally complete this visit, I have created an optimized route via Arcmap, that recommends the ideal start and stop locations, and route to be taken, to complete this task with least travel.



Data Sources: OpenDataPhilly, SEPTA, US Census Bureau