Locating a new Indian Restaurant in the southern part of Los Angeles County

By Nandan Nayak

Introduction:

The LA County is known to be the most populous and ethnically diverse county of California and in the US as well. Due to the mountains and the deserts that occupy the most part of the county, the LA county population is mostly concentrated in the southern and south western part. According to the U.S. Census Bureau, there are about 100 thousand Indians living in Los Angeles. Well known universities in the county like the USC, UCLA etc. offer admits to students from all over the globe. Of the total international students that enroll each year, the Indians constitute the third most-represented foreign nationals. Even though there are a lot of Indians in this county, there are hardly any well known Indian restaurants. Indian food is considered to be rich in spices and hence aromatic. As part of the site suitability analysis, this analysis can reveal the possible alternatives to open up an Indian restaurant to cater the dietary needs of the Indian community living in the LA County and also give an opportunity to the natives to try something new, adding richness to its already diverse cuisines.

| Criterion	Measurement	Data Source	Type	Importance	Processing
Land has to be 1 acre (or more) to cover the facility, with parking lot	Acre	Parcel Land	M	High	Obtain parcels of 1 Acre and above using Raster Calculator
The demographics around the location must maintain an annual income of 25K per annum	$	Median Income Layer from Census Blocks	M	High	Obtain regions having Median Income more than $25K and above using Raster Calculator
There must be sizable number of people from the Indian(or Asian) community in the neighborhood	Population in number	Population Density Layer from Census Block	M	High	Obtain regions having population density of 500 people or above using Raster Calculator

Distance from the downtown should be less than 5 miles	Miles	Downtown Layer	P	Medium	Obtains buffers around downtown areas using Euclidian distance and use Raster Calculator to get 5 Miles buffer
Distance from the nearest highway must be less than 5 miles	Miles	Highway layer	P	Medium	Obtains buffers around highway areas using Euclidian distance and use Raster Calculator to get 5 Miles buffer

Table2. Criteria and Data Sources

The above table lists the criteria and the data sources with type as M for Mandatory and P for Preferred and is listed in the order of importance.

Study Area:

The Los Angeles County, also known as L.A. County, is a county in the U.S. state of California which has a population of 9,818,605, making it the most populous county in the United States according to 2010 U.S. Census report. Los Angeles County alone is more populous than 43 individual U.S. states. Most of the population of Los Angeles County is located in the south and southwest and with more than one quarter of total California residents, this is one of the most ethnically diverse counties in the state and country. According to the U.S. Census Bureau, the county has a total area of 4,751 square miles (12,310 km2), of which 4,058 square miles (10,510 km2) is land and 693 square miles (1,790 km2) (15%) is water.
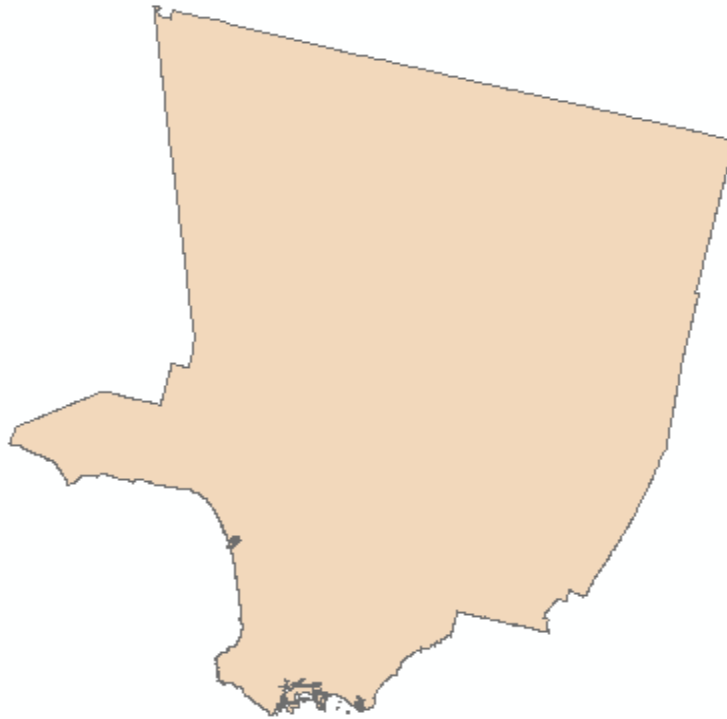
Fig.1. Study Area – Los Angeles County

Data:

The los Angeles County Boundary, Downtown layer and highways layer were taken from the LA County GIS Data Portal. The format of all data layers were provided in the geodatabase format. The Parcel Land was taken from the ArcGIS Repository and the Median Income Layer and the Population Density Layer were taken from ArcGIS Online. The Spatial Reference used was NAD_1983_StatePlane_California_V_FIPS_0405. Additional details about all the layers is provided in the below table – Table2.

#	Data Contents	Source	Type	Date of Compilation	Format	Feature Type
1	Los Angeles County Boundary	http://egis3.lacounty.gov/dataportal/wp-content/uploads/ShapefilePackages/DPW_COUNTY_BOUNDARY.zip Author - Thierno Diallo	M	2013	GIS Shape file	Simple Polygon
2	Parcel Land	ArcGIS repository, H:\ReadOnlyData\	M	2009	GIS Shape file	Simple Polygon
3	Median Income Layer	ArcGIS online – http://services1.arcgis.com/xFy0NvdBBPjHy9cp/arcgis/rest/services/Air_polution_site_and_median_income_in_Los_Angeles_County/FeatureServer Author – Nick Adam	M	2014	GIS Shape file	Simple Polygon
4	Population Density	ArcGIS online – http://services1.arcgis.com/xFy0NvdBBPjHy9cp/arcgis/rest/services/Air_polution_site_and_median_income_in_Los_Angeles_County/FeatureServer Author – Nick Adam	M	2014	GIS Shape file	Simple Polygon
5	Downtown Layer	http://egis3.lacounty.gov/dataportal/?s=downtown Author - Mark Greninger	P	2012	GIS Shape file	Simple Polygon
6	Highways Layer	http://egis3.lacounty.gov/dataportal/?s=highway Author – Thomas Brothers	P	2009	GIS Shape file	Simple Polygon

**Table2. Sources and attributes of Shape files**
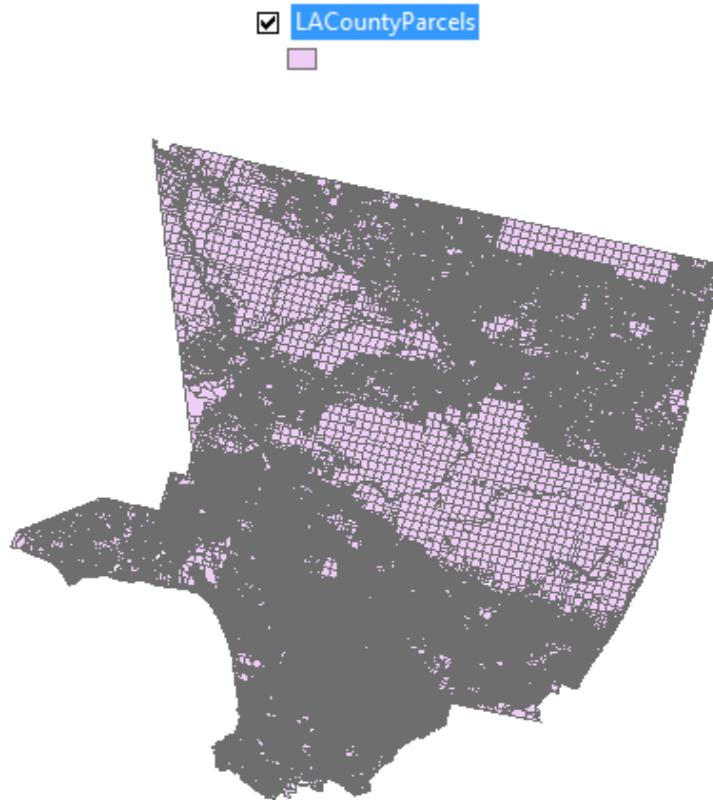
Fig.2. Parcels in LA County

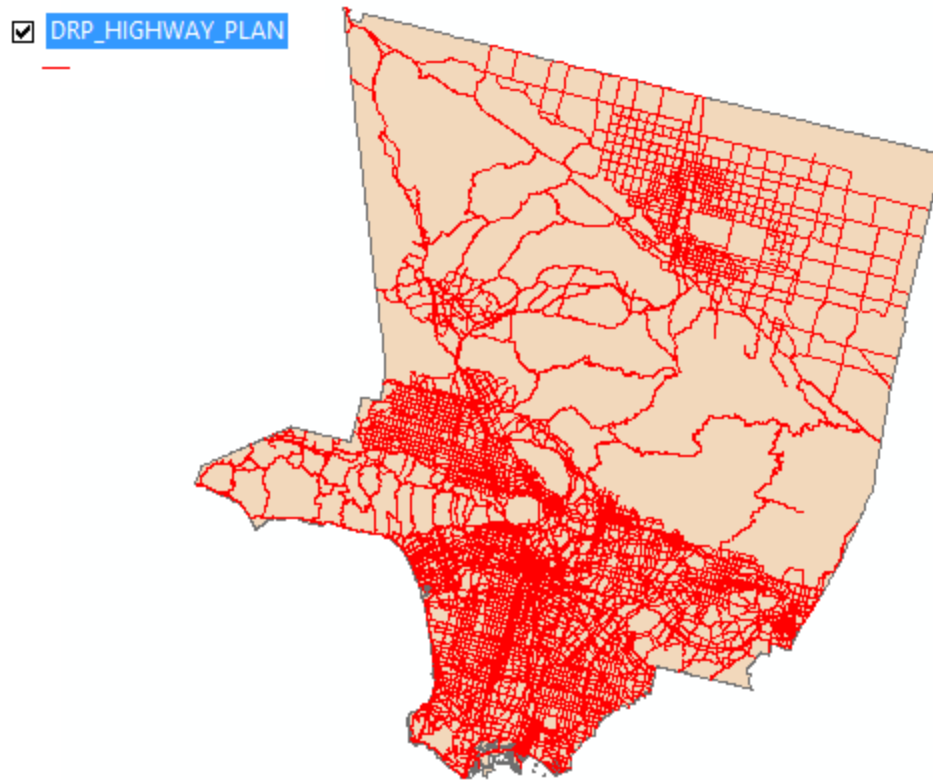The above map shows the parcels in the LA County of all sizes.
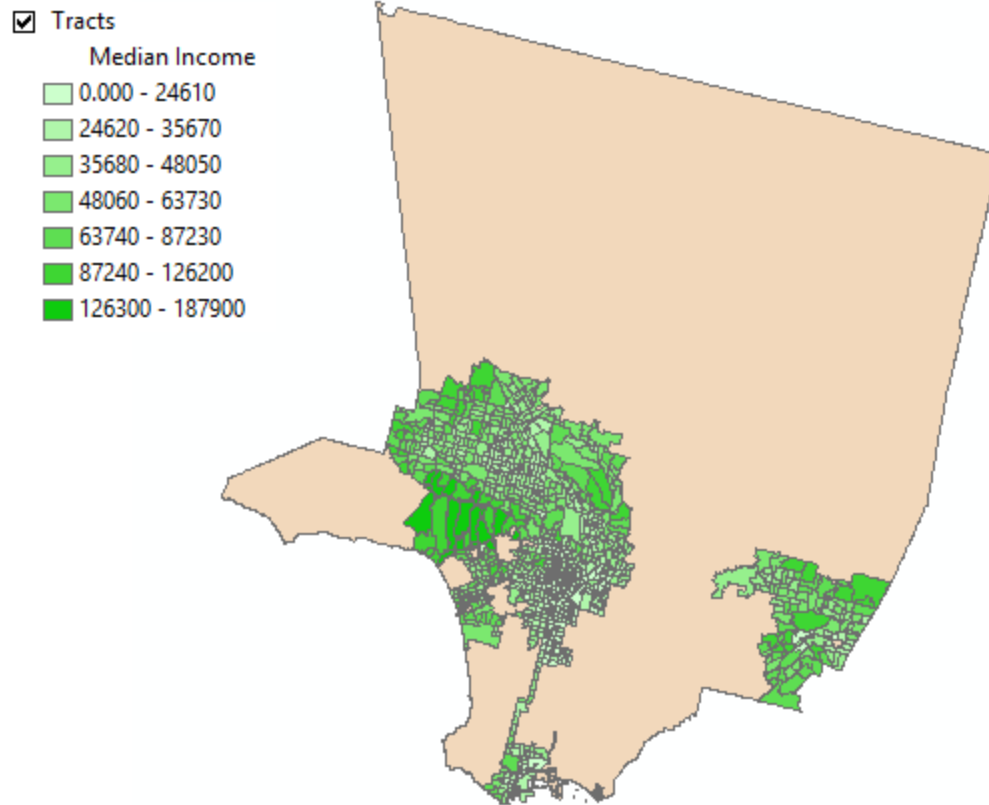
Fig.3. Median Income

The above map is obtained by using the Jenks classification in the Symbology and is represented using Graduated colors. The region was classified into 7 classes as it clearly shows the regions where people have median income greater than approximately 25K
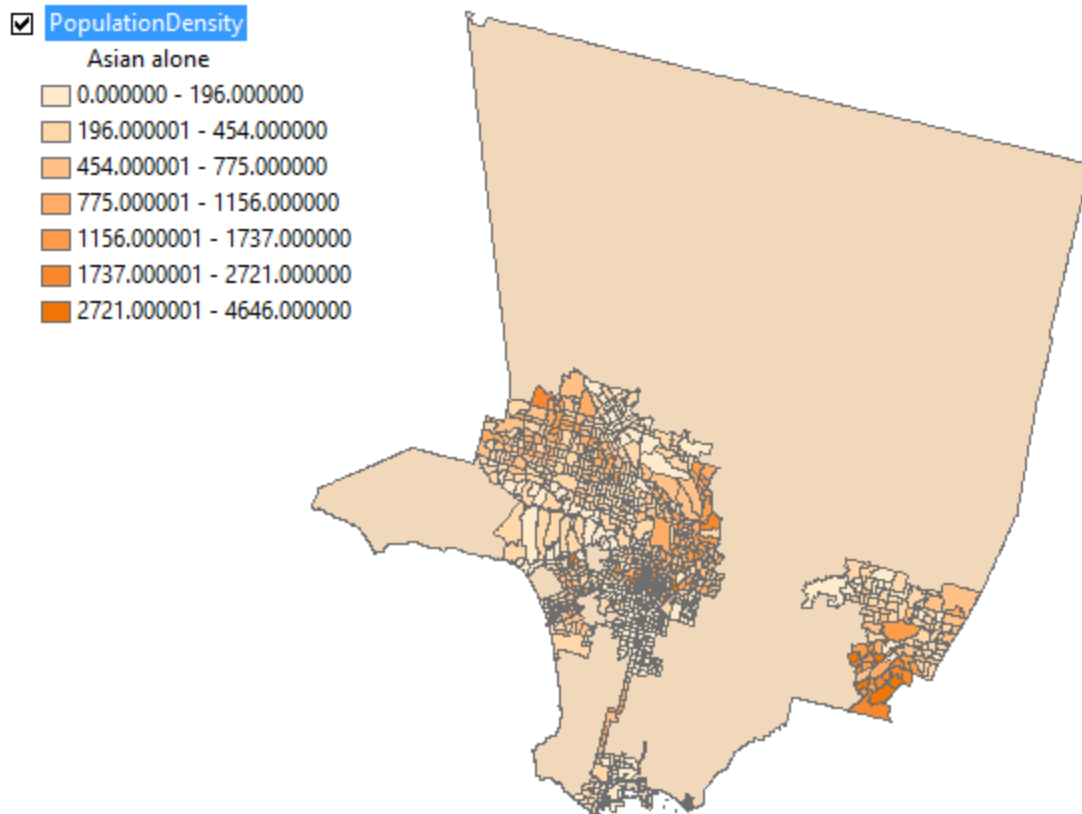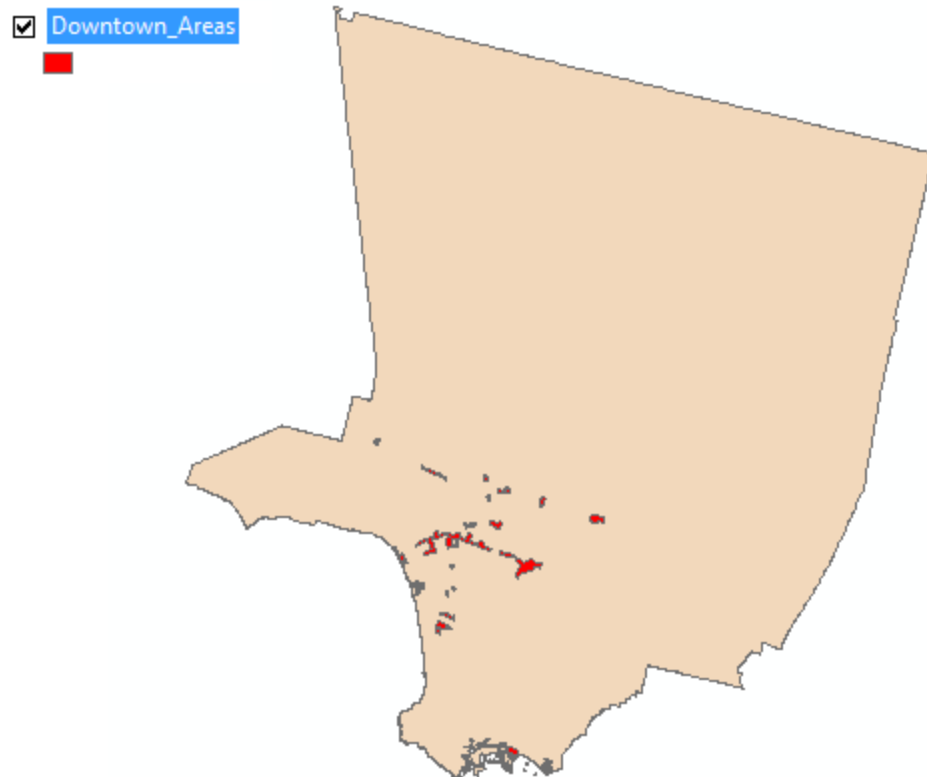
Fig.4. Population Density

The above map is obtained by using the Jenks classification in the Symbology and is represented using Graduated colors.

☑ DRP_HIGHWAY_PLAN

Fig.5. Highways Layer

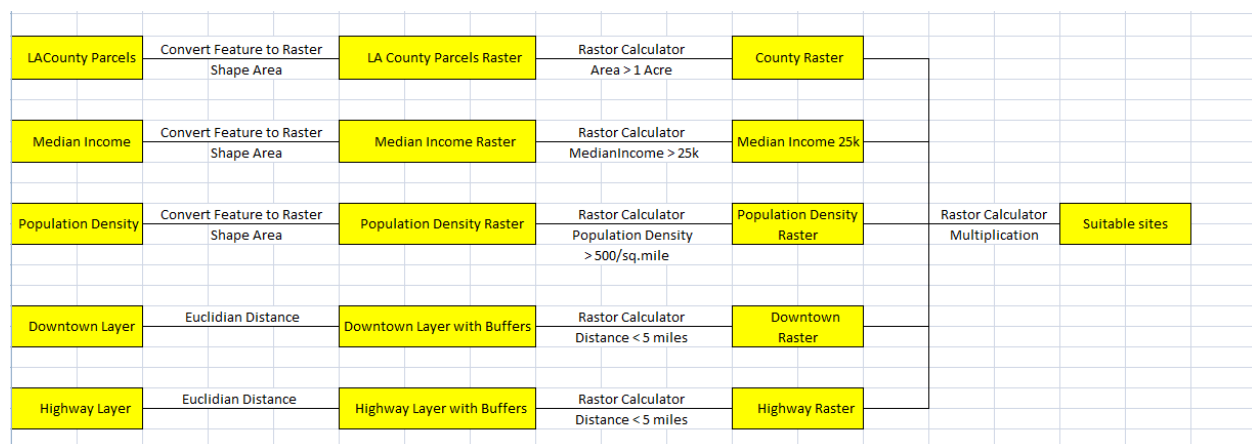The above map shows the highways of the Los Angeles County.

Fig.6. Downtown Layer

The above map shows the downtown areas in the southern part of Los Angeles County.

Methodology:

Fig.7. Flow Chart for locating a site for Indian Cuisine restaurant

Consider the LA County Parcels layer. Convert this feature layer into Raster by using the Feature to Raster tool. Input the Parcels raster into the Raster Calculator to get the parcels that are more than 1 acre of area.

Consider the Median Income layer and convert the feature layer into raster by using the Feature to Raster tool. Input the Median Income Raster into the Raster calculator to get the areas where people earn more than 25k annually.

Consider the population Density layer and convert the feature layer into Population Density Raster. Input the Population Density Raster into Raster calculator to get the areas where the Asian population Density is more than 500/sq. mile.

Consider the Downtown layer and input into Euclidian Distance tool to get a buffered Raster. Input this buffered raster into Raster Calculator and get a buffered raster of 5 miles around the Downtown Layer.

Consider the Highway layer and input it into Euclidian Distance tool to get a buffered Raster. Input this buffered raster into Raster Calculator and get a buffered raster of 5 miles around the Highway Layer.

Multiply the LA Parcels Raster of 1 acre, Median Income raster of 25K, Population Density of 500/sq. mile, Buffered Downtown Layer of 5 miles and Buffered Highway raster of 5 miles to get the suitable sites for the restaurant.
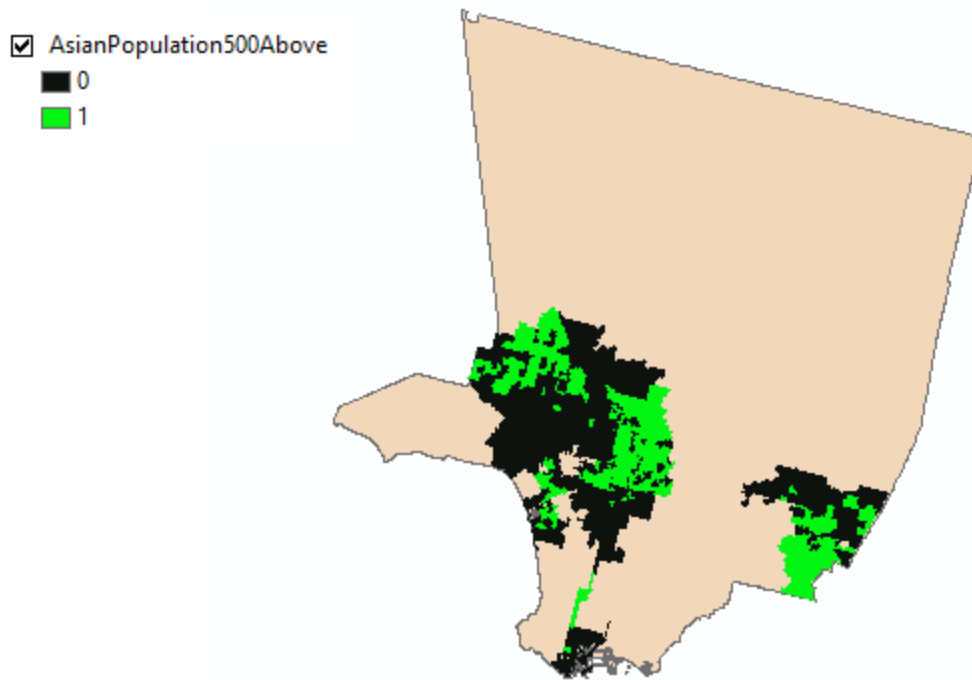
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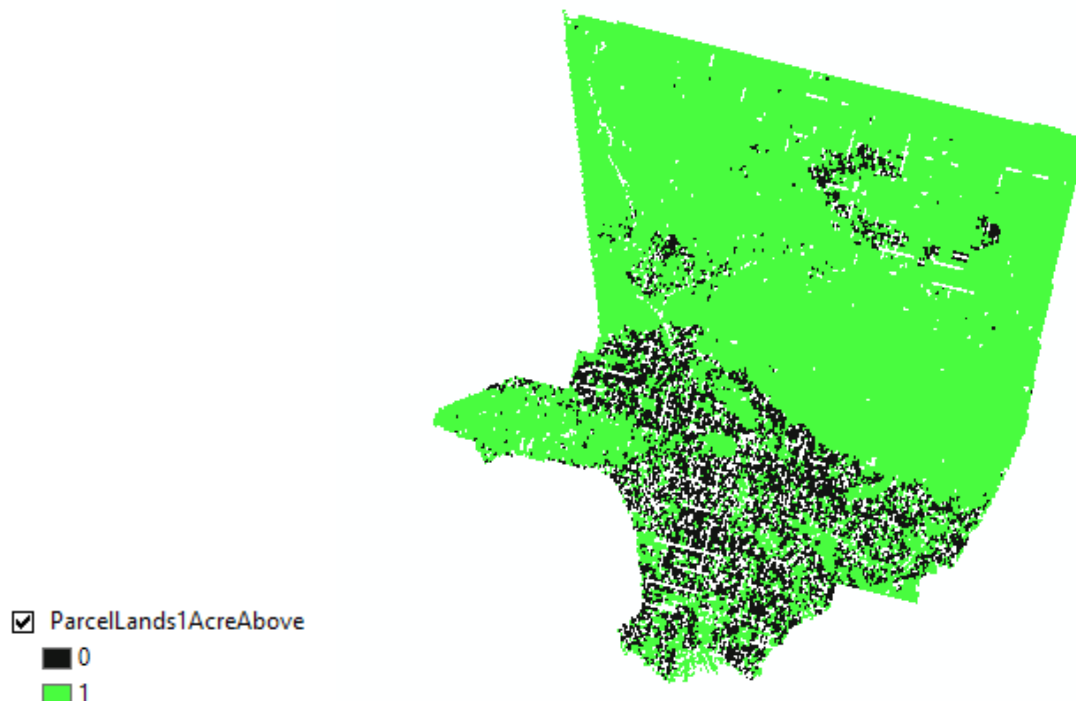
Fig.8. Parcels that are more than 1 Acre

The above raster was obtained by using the Raster Calculator of the Spatial Analyst tools to get the parcels above 1 acre of size.
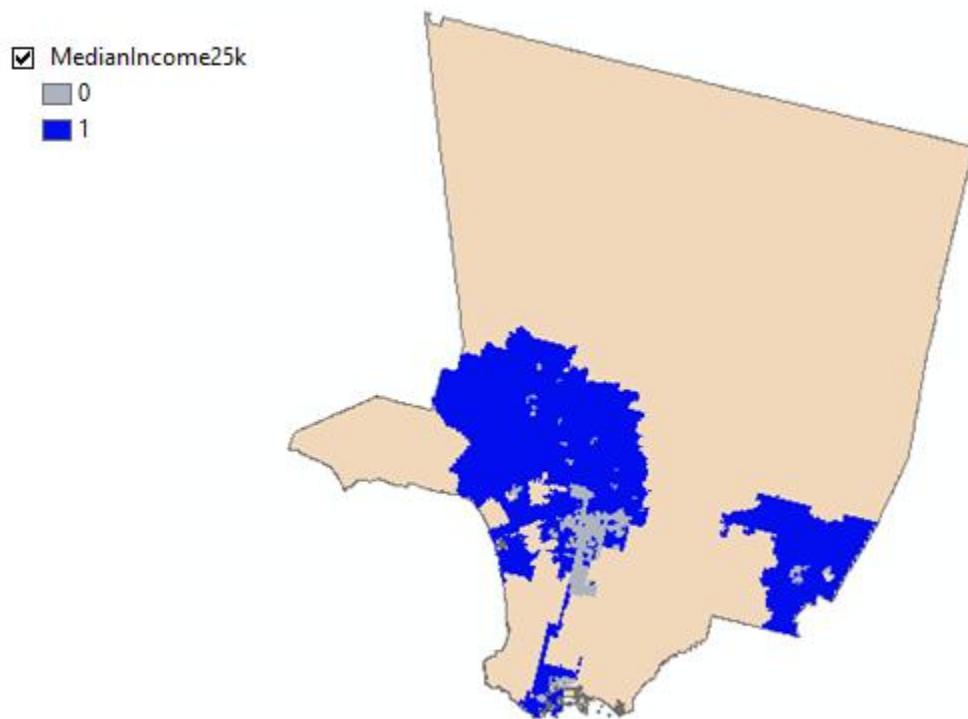

Fig.9. Raster showing Median Income more than $25k annually

The above raster was obtained by using the Raster Calculator of the Spatial Analyst tools to get the regions where people have income more than $25k annually.

Fig.10. Asian Population Density with more than 500 people per square mile

The above raster was obtained by using the Raster Calculator of the Spatial Analyst tools to get the regions having population density of more than 500 people /sq. mile.
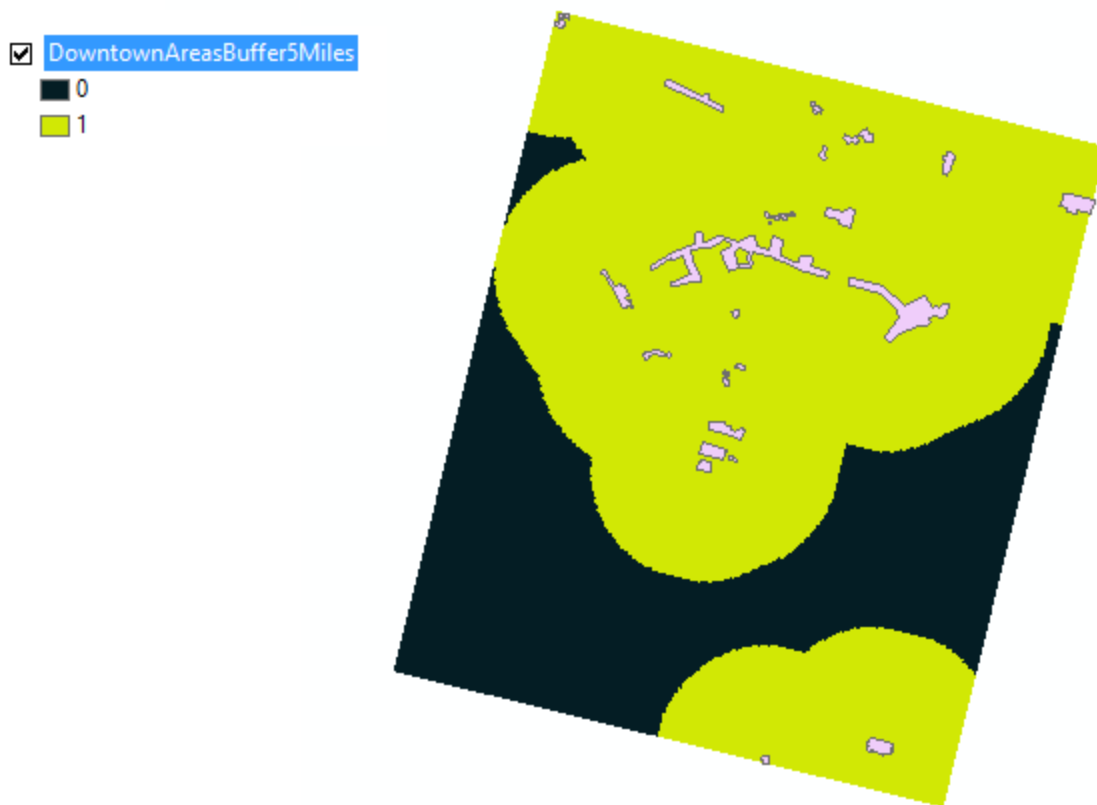
Fig.11. Downtown Layer with 5 miles of buffer region

The above raster was obtained by using the Euclidian Distance of the Spatial Analyst tools to get the buffers of 5 miles around the Downtown areas.
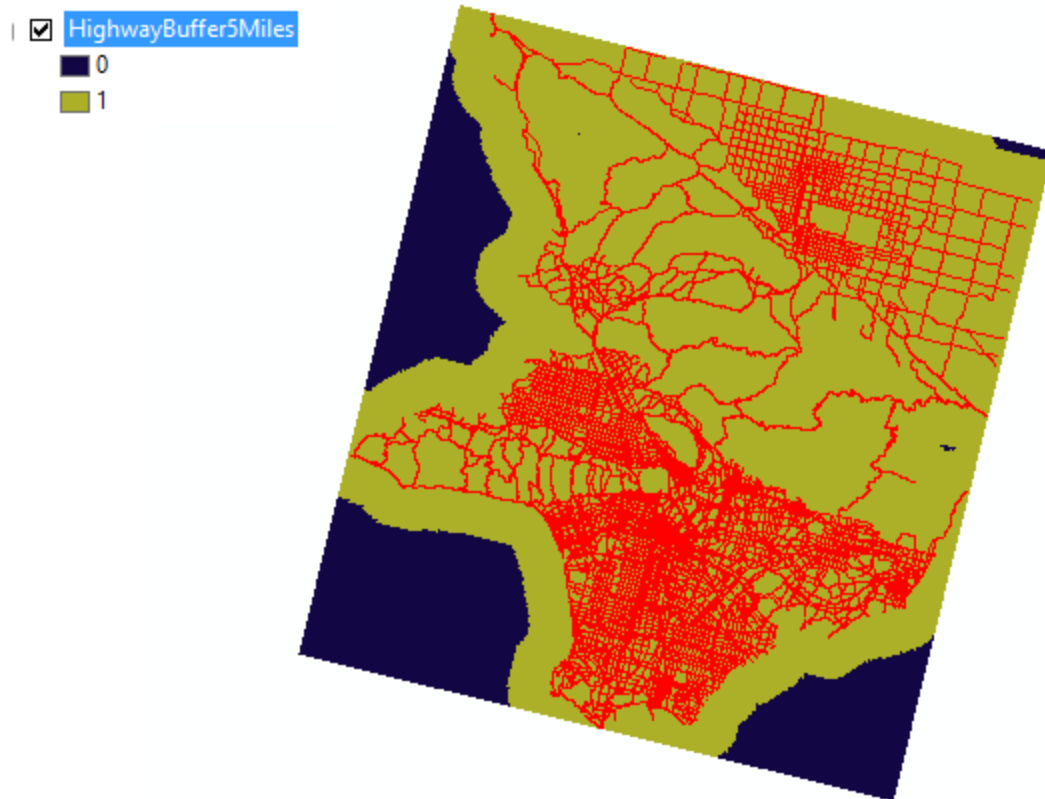
Fig.12. Highways Layer with 5 miles of buffer

The above raster was obtained by using the Euclidian Distance of the Spatial Analyst tools to get the buffers of 5 miles around the Highway areas.
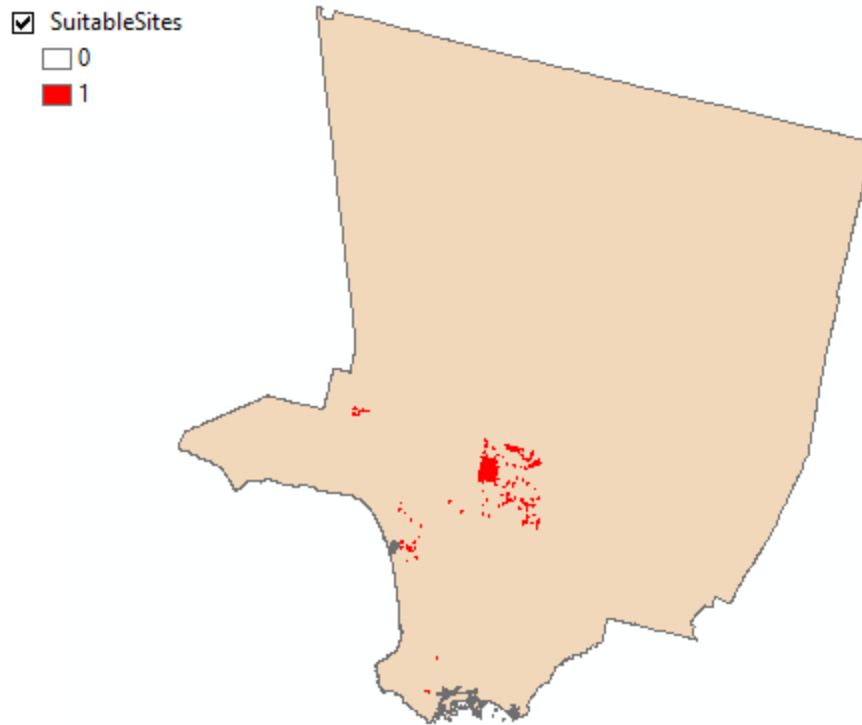
Fig.13. Suitable site to open the Indian restaurant

The above raster was obtained by multiplying all the candidate rasters (Fig.8 – Fig.12) using the Raster calculator of the Spatial Analyst tools to get the Suitable sites to open the Indian Restaurant.
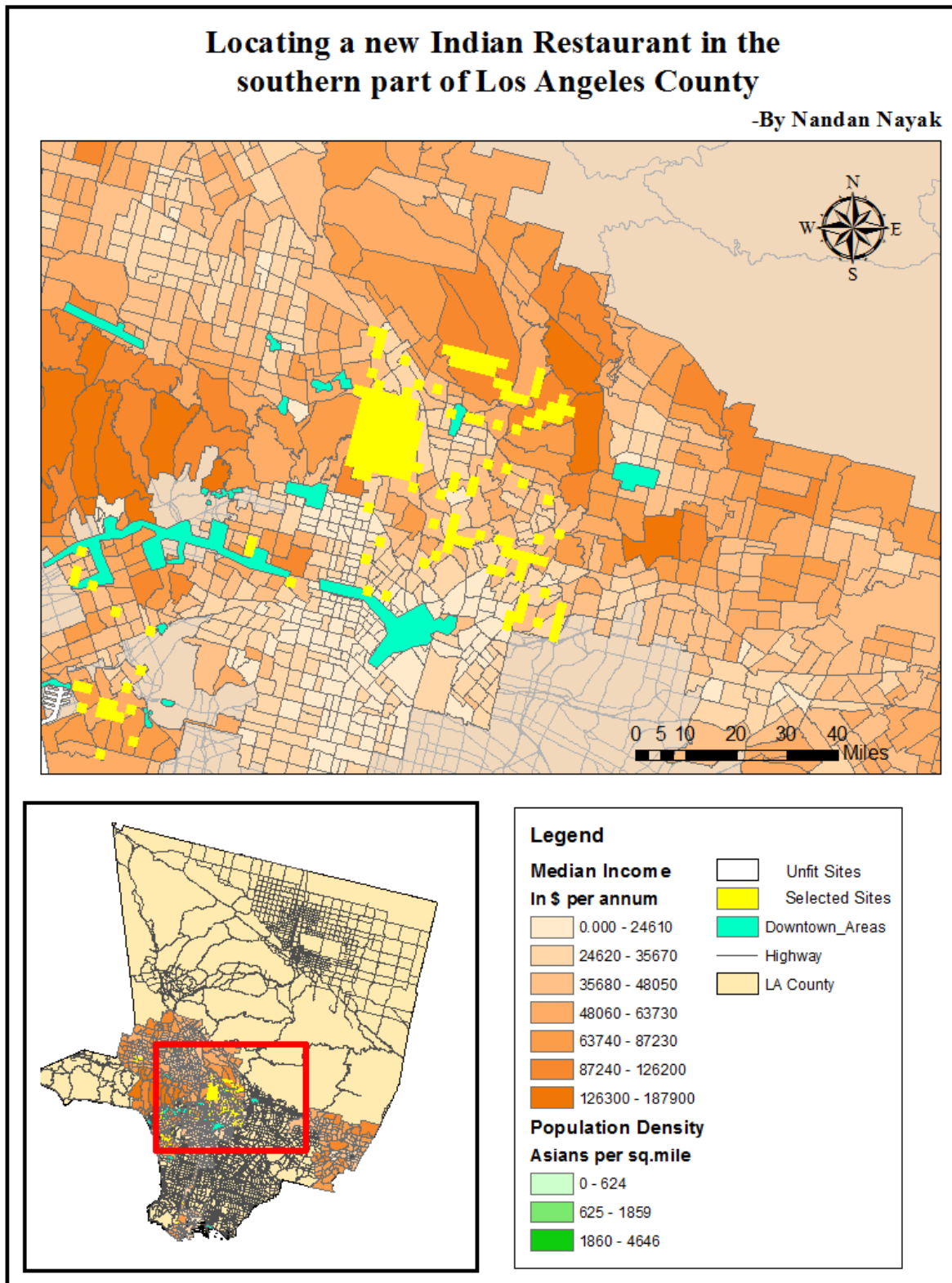
Fig.14. Site Chosen for the Indian Restaurant

Conclusion:

To solve the problem of site selection for an Indian cuisine restaurant, the shape files required for Downtown, Highway, Parcels, and median income were obtained from Los Angeles County Enterprise Portal. However, in this analysis the population density of Asians is considered as the population density of the Indians due to lack of availability of data set.

References:

1. Diallo, Thierno, *Los Angeles County Boundary*, http://egis3.lacounty.gov/dataportal/wp-content/uploads/ShapefilePackages/DPW_COUNTY_BOUNDARY.zip
2. Spatial Science Institute Repository, *Parcel Land*, H:\ReadOnlyData\
3. Adam, Nick, *Median Income Layer*, Arc GIS online, http://services1.arcgis.com/xFy0NvdBBPjHy9cp/arcgis/rest/services/Air_polution_site_and_median_income_in_Los_Angeles_County/FeatureServer
4. Adam, Nick, *Population Density*, ArcGIS Online, http://services1.arcgis.com/xFy0NvdBBPjHy9cp/arcgis/rest/services/Air_polution_site_and_median_income_in_Los_Angeles_County/FeatureServer
5. Greninger, Mark, *Downtown Layer*, http://egis3.lacounty.gov/dataportal/?s=downtown
6. Brothers, Thomas, *Highways Layer*, http://egis3.lacounty.gov/dataportal/?s=highway
7. Wikipedia, *Los Angeles County California*, https://en.wikipedia.org/wiki/Los_Angeles_County,_California