In this question, we used Analytic Hierarchy Process (AHP) to compute a score of the desirability of the parcels. In AHP the problem is broken into a hierarchy of easy-to-comprehend sub-problems. In this model we used the following metrics:

1. Actual Area: Total area of the house including the area of the floors
2. Pool Count: Number of pools in the house
3. Latitude & Longitude: Coordinates of the house
4. Unit Count: Number of units in the house
5. Lot Size: Area of the land
6. Bedroom and Bathroom count: Number of bathrooms and bedrooms
7. Hot Tub or Spa Present: If a hot tub or spa is present or not
8. Fireplace present: If a fireplace is present
9. Tax Value: The total tax value of the parcel
10. Building Type
11. Garage count: Number of cars that can fit in the garage
12. Age: Age of the parcel
13. Tax Amount: Total property tax assessed for that year
14. Air Conditioning Type: If the parcel is air conditioned or not
15. Region Id County: County of the parcel

In AHP, we give a relative importance to each of the above mentioned parameters as compared to the other parameters. Once the hierarchy is built, we evaluate its elements by comparing them to each other two elements at a time. For example, consider the example of Actual Area vs Pool Count. We think that Actual Area is 7 times more important than the pool count i.e. according to us having a bigger actual area of the property is more important than having a pool in the property.

The full list of comparisons is available in the distance\_metric.csv file committed to the repository. After this table is ready with policy scores and attribute weights, we can apply Simple Additive Weighting (SAW) and Weighted Product Model (WPM) to get to a decision.

**Simple Additive Weighting (SAW)**

In general, suppose that a given MCDA problem is defined on *m* alternatives and *n* decision criteria. Furthermore, let us assume that all the criteria are benefit criteria, that is, the higher the values are, the better it is. Next suppose that *wj* denotes the relative weight of importance of the criterion *Cj* and *aij* is the performance value of alternative *Ai* when it is evaluated in terms of criterion *Cj*. Then, the total (i.e., when all the criteria are considered simultaneously) importance of alternative *Ai*, denoted as *Ai*WSM-score, is defined as follows:

SAW decision values:

P1 = 6.019

P2 = 5.3

P3 = 5.78

**Final Decision**: Using SAW, we found P1 to be the best Policy to be opted

When we applied this method to find the best and the worst parcel, we found the results to be in conformance with our expectation. For example, we consider the actual area to be one of the most important factor. In the results also we found that the area of the best house is 5 times more than the worst house.Similarly, we expected that the more tax amount would decrease the desirability of the house and this is exactly what we observed in our results. The tax amount of the most desirable house was almost half of that of the least desirable house.