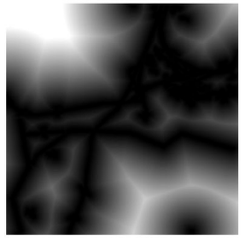
Locating Sites for Community Garden within the South Lynnfield Area

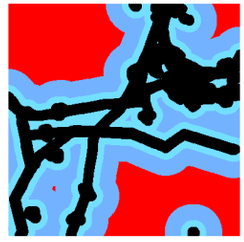
by Chengcheng Qiu

(1) Rating the proximity to environmental negatively impactful or restricted areas:
ısportation routes, waste disposal and powerline.

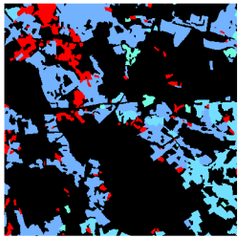
Euclidean distance



Recalssify



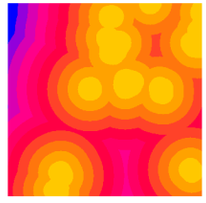
(2) Rating the proximity to residential areas.



Euclidean distance

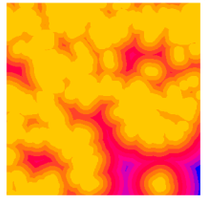
to different housing units

multi-family housing

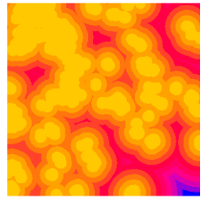


high-density housing

medium-density housing

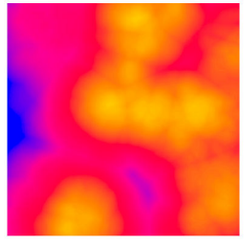


low-density housing

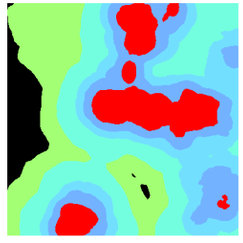


0.1 * "FarFromLowDens"+0.2 * "FarFromMedDens"
+0.3 * "FarFromHighDens" +0.4 * "FarFromMultiFam"

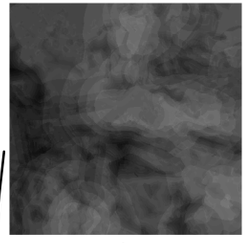
Raster Calculator



Recalssify



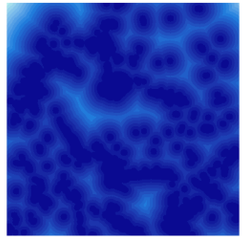
0.1 * "HydroPreferFactor"+
0.2 * "RoadAndOpenFactor"+
0.3 * "HazardFarFactor" +
0.4 * "ResidentialFarFactor"



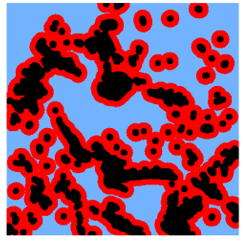
Recalssify

(3) Rating the proximity to water

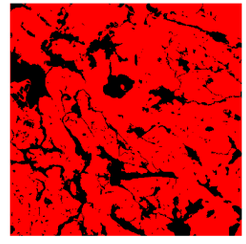
Euclidean distance



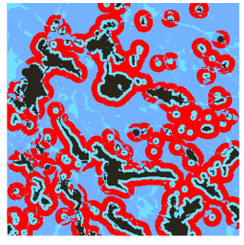
Recalssify



Land Type: Dry Land

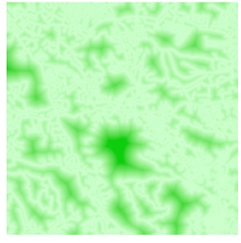


Cell Statistics

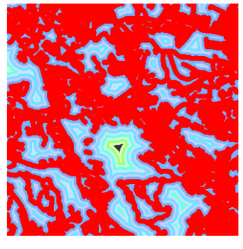


(4) Rating the proximity to non-major raods

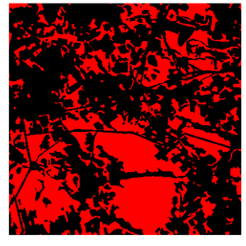
Euclidean distance



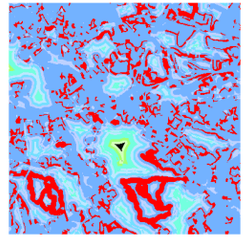
Recalssify

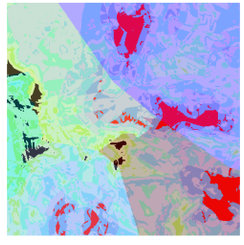


Land Type: Open Land/Space



Cell Statistics





1 Towns
2 NAME
3 084 = Lynnfield
4 087 = Peabody
5 101 = Wakefield
6 111 = Lynn
7 113 = Saugus
8
9
10

Introduction

I scored the suitability for having a community garden in the South Lynnfield based on **5** considerations:

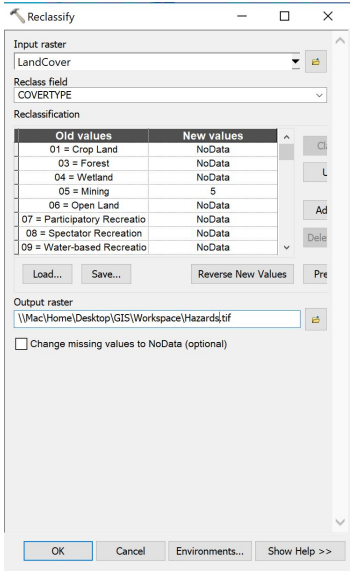
(1) be distant from sources of environmental hazards and danger.

(2) close to residential areas, so that more people could participate and do gardening.

(3) In an ideal distance from water, so that it would not be flooded during summer season, but at the same time allow people to enjoy the view of lake/pond.

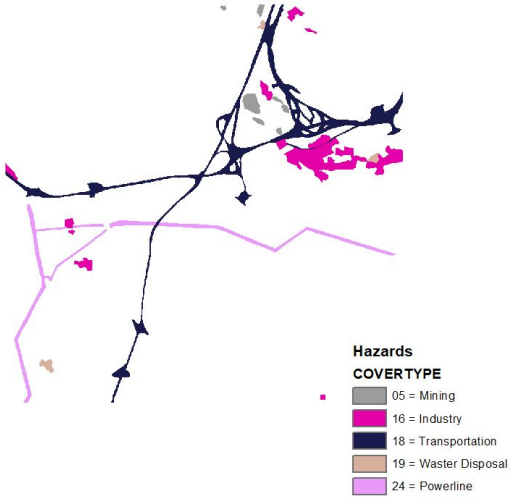
(4) Be close to local roads, located in open public areas.

I reclassified the land cover map to include only the selected areas for subsequent analysis.

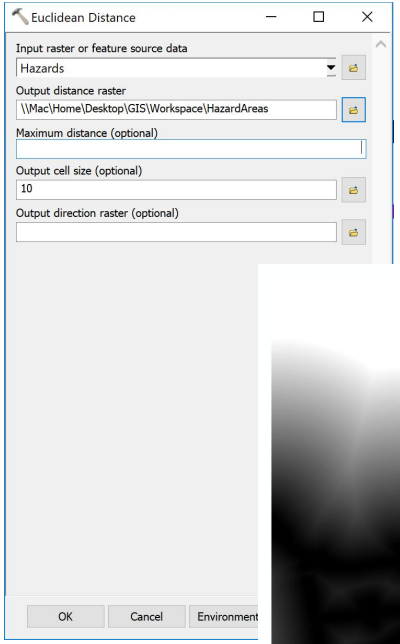


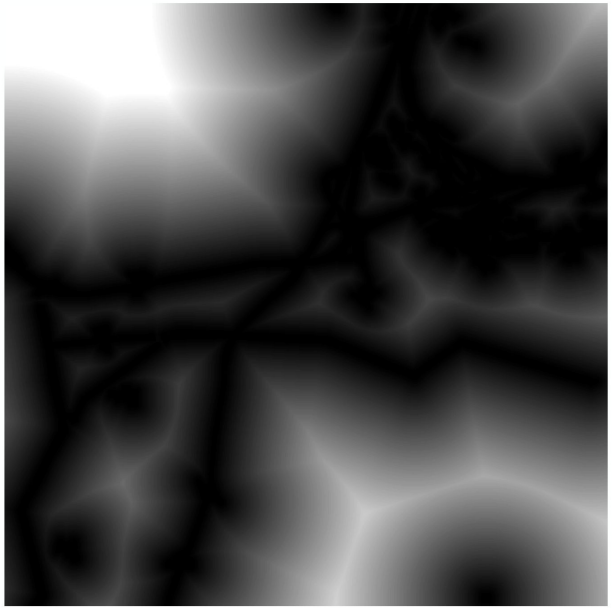
Step 1. be distant from sources of environmental hazards and danger

I identified mining, industry, transportation, waste disposal and powerline as sources of environmental hazards and danger, because these places often involve relative high level of air pollution and pose threats to human health.

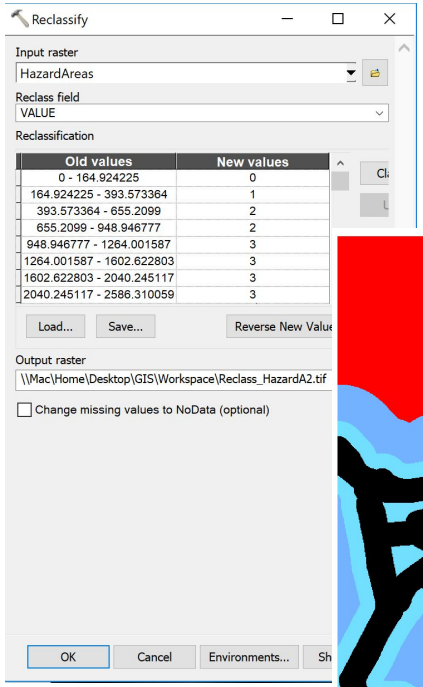


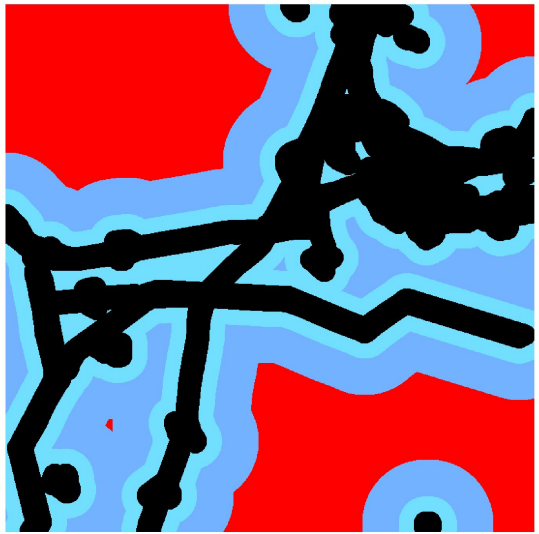
I then used the euclidean distance tool to calculate every grid's distance to the hazardous places.





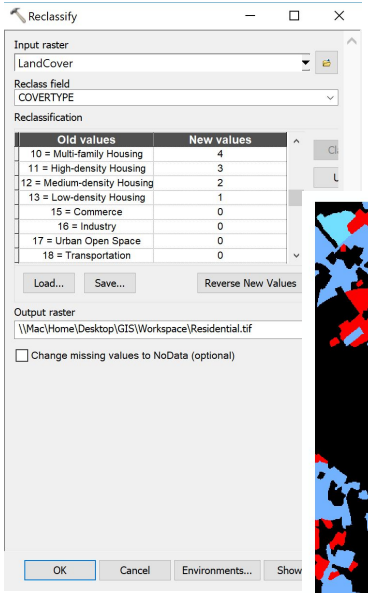
Lastly, I reclassified the scoring of distance to the hazardous places. Grids that are within or immediately near (0-165m) scored 0, those that are 165-394m away scored 1, those that are 394-949m away scored 2, and those that are more than 949m away from the hazard sources scored 3.

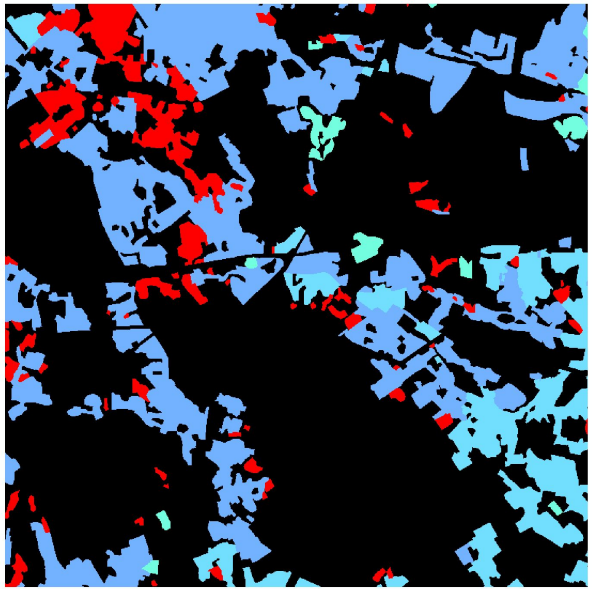




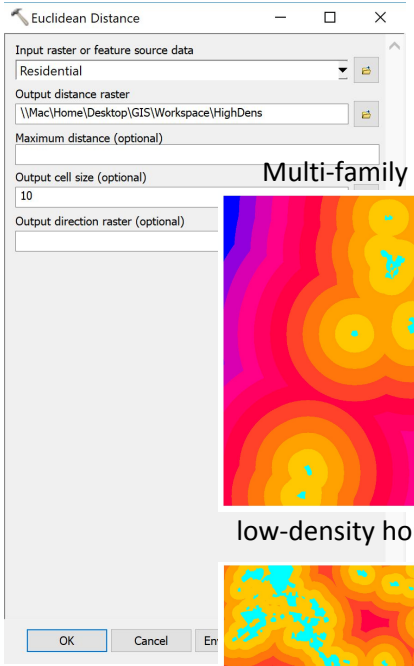
Step 2. be close to residential areas, so that more people could participate and do gardening

Firstly, I reclassified the land cover map and included only residential areas, by setting the others as 0 or NoData.



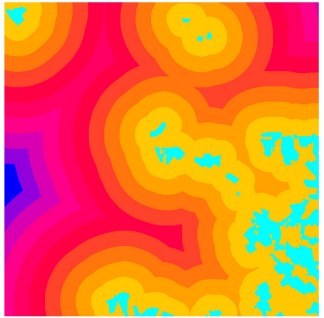


I then calculated the distance to each type of housing: multi-family housing, high-density housing, medium-density housing and low-density housing using euclidean distance tool.

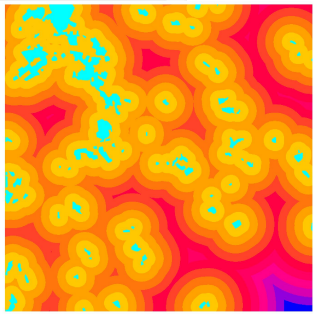


Multi-family housing

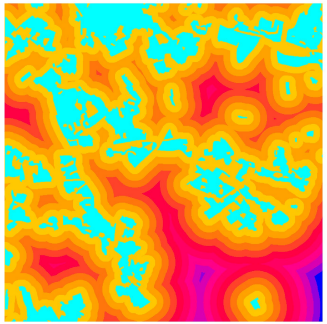
high-density housing



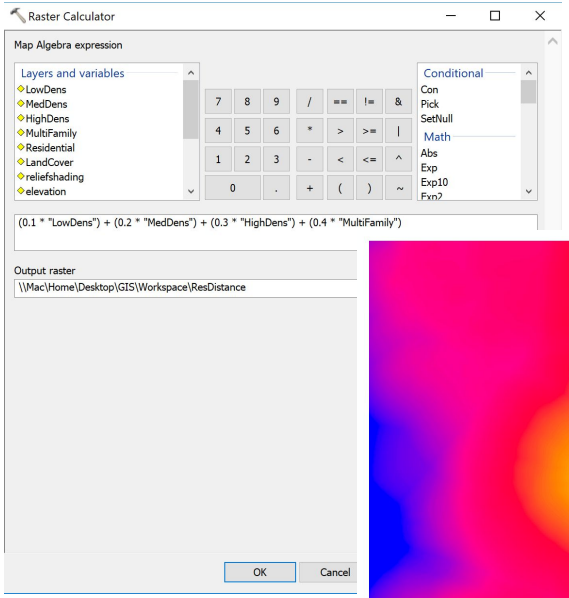
low-density housing

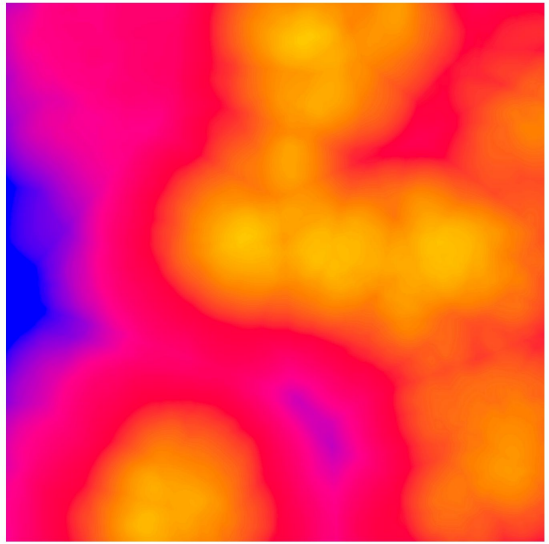


med-density housing

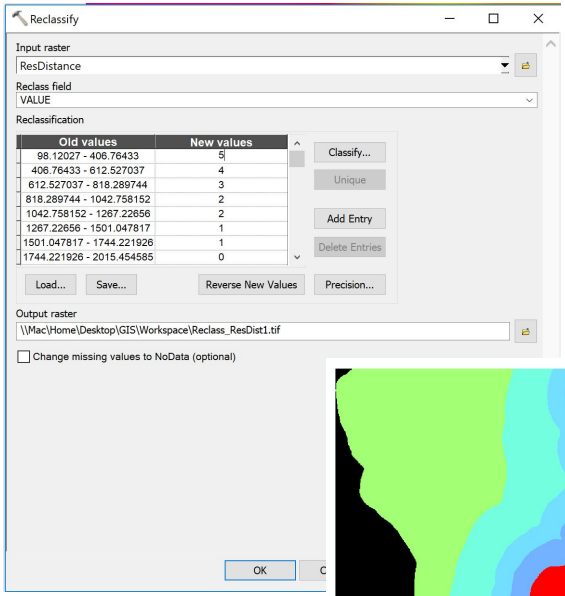


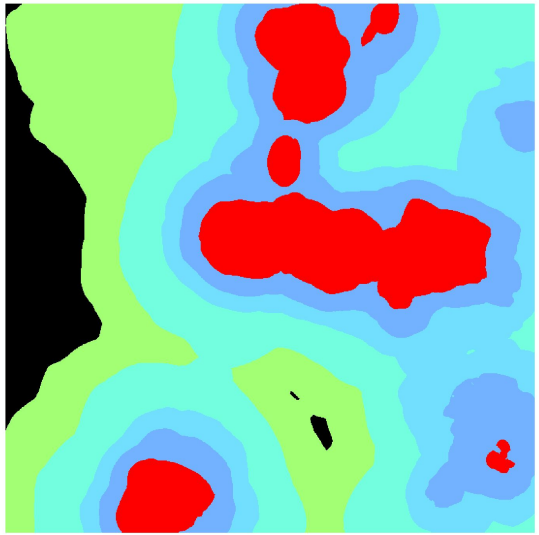
Then, I used raster calculator, giving different weights to the distance from different types of housing, to calculate the weighted average of distance to all types of residential areas. The formula is: **(0.1*"LowDens")+(0.2*"MedDens")+0.3*"HighDens")+0.4*"MultiFamily")**





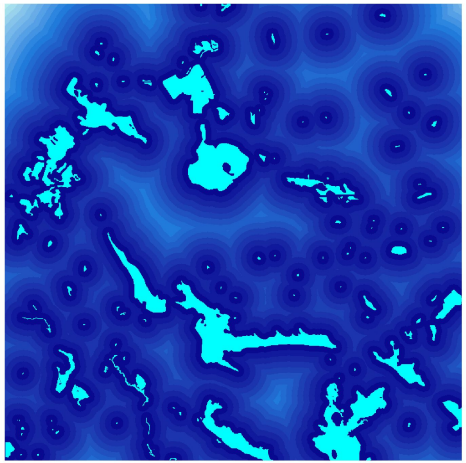
I then reclassified the weighted average distance, and assigned different scores, with highest to the shortest distance.



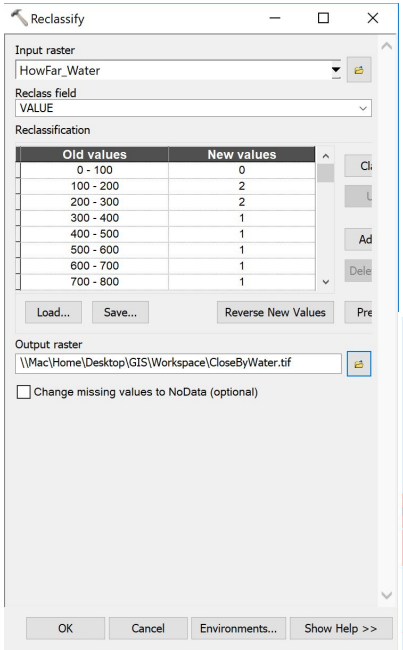


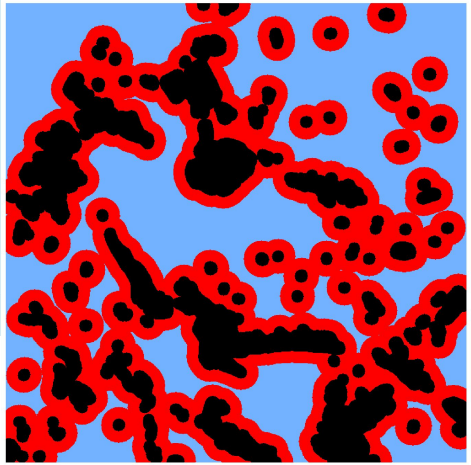
Step 3. **In an ideal distance from water, so that it would not be flooded during summer season, but at the same time allow people to enjoy the view of lake/pond.**

Firstly, I reclassified the land cover map and included only lake/pond, and then calculated the distance from each grid to the nearest lake/pond.

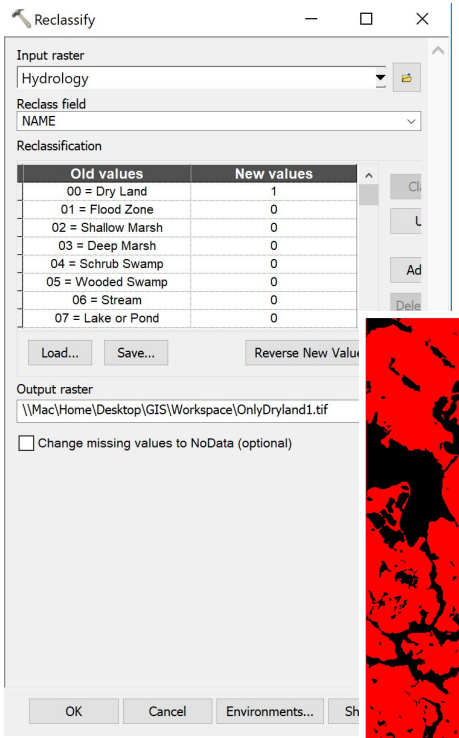


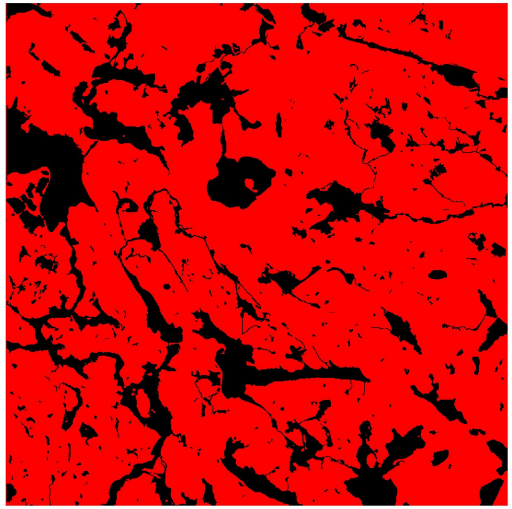
I then reclassified the distance to water, favoring most the areas that are within 100-300m distance from the lake/pond, giving intermediate score to areas that are more than 300m away from the water, and giving the lowest score to places that are immediately nearby water.



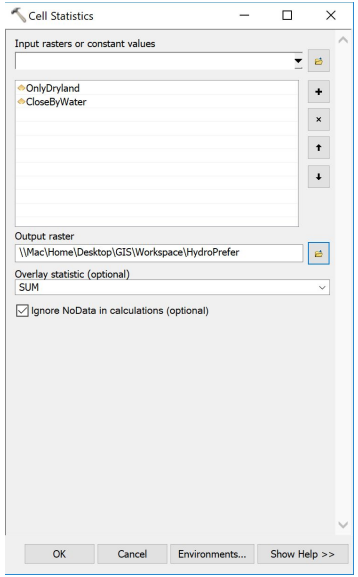


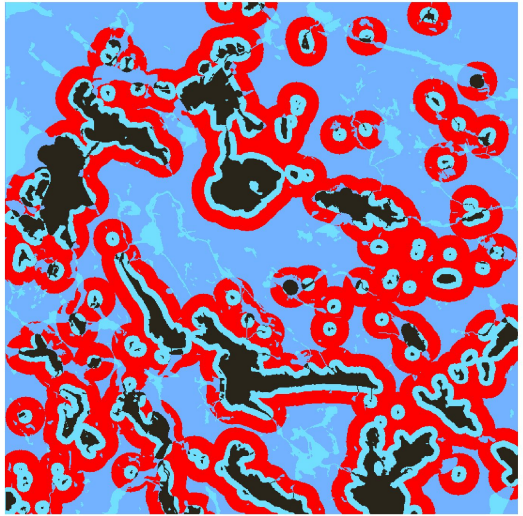
Then, I reclassified the hydrology map, scoring dry land 1 and the other land types as 0.





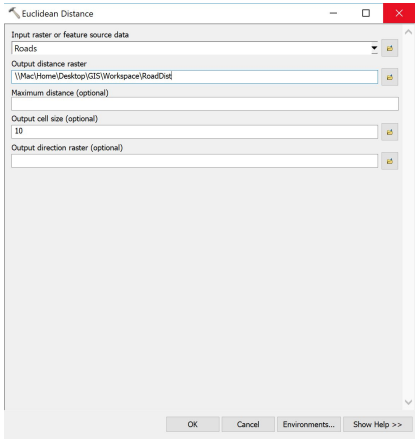
I then used cell statistics to sum the scores of distance to water factor and land type factor.

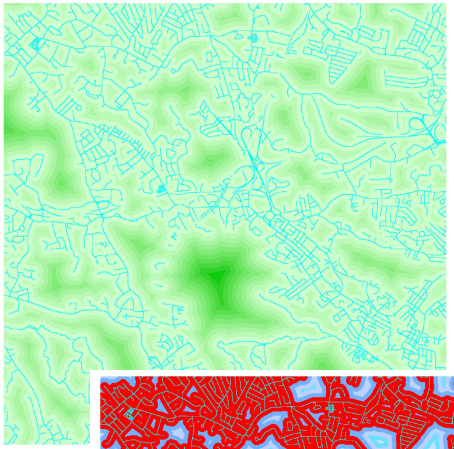


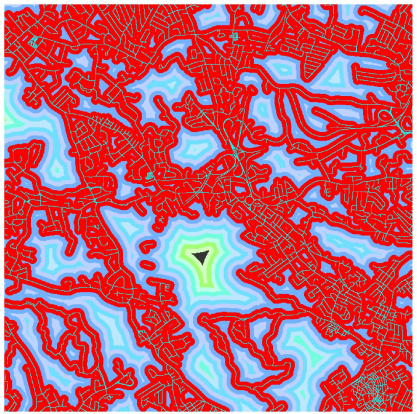


Step 4. Be close to local roads, and located in open public areas.

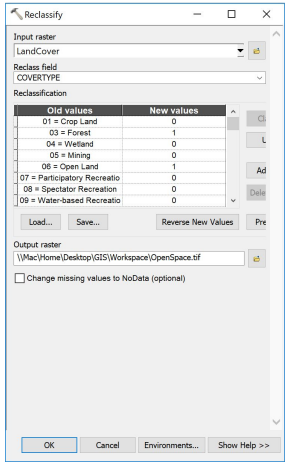
Select only local roads from the attribute table, calculate the distance from each grid to the local roads, and reclassify the distance to road.

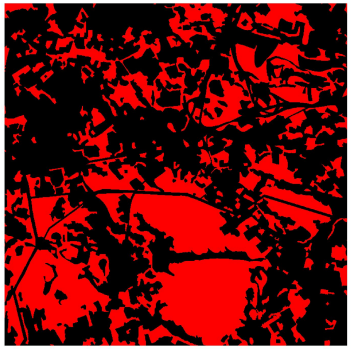


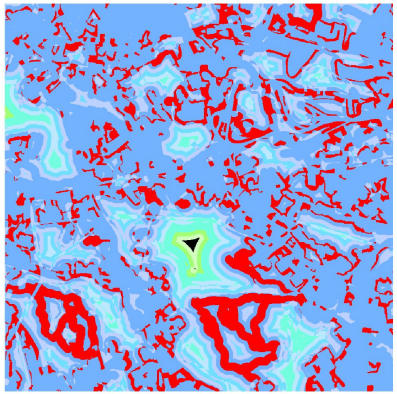




I then reclassified the land cover map, giving higher score to open/public space, and then summed the scores from the distance to local roads and land in open/public space using cell statistics.

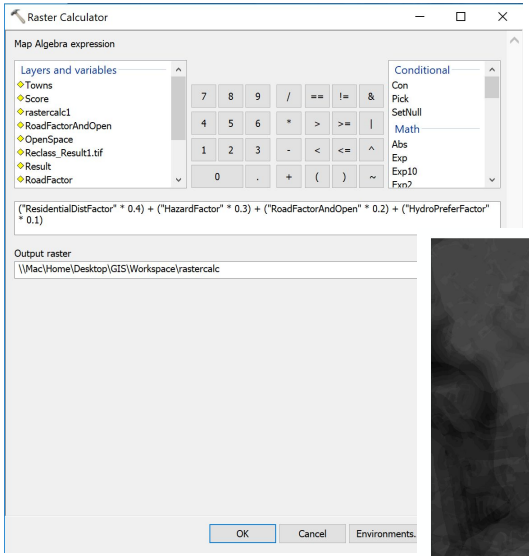


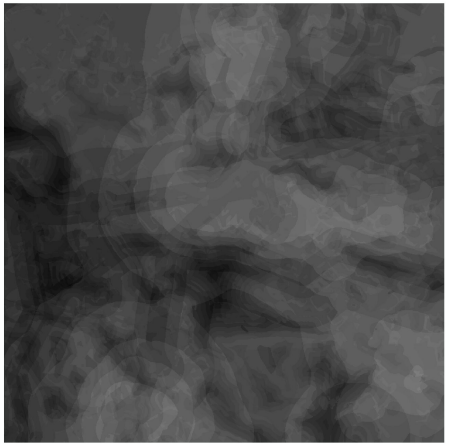




Result

I calculated the total score using raster calculator, giving different weights to the four factors, using the formula: 0.1 * "HydroPreferFactor"+0.2 * "RoadAndOpenFactor"+0.3 * "HazardFarFactor" +0.4 * "ResidentialFarFactor". Weighting most the distance to residential areas because it is the most important factor that will keep the community garden lively.





I then stretched the range of scores to 1-10, and reclassified them in 10 classes, with scores ranging from 1-10. Lastly, I overlapped the score map with towns' map to locate appropriate sites in South Lynnfield area. The ideal places are circled in yellow in the map.