

## Natural Area Suitability Analysis Criteria Summary

### Description

The Natural Area Suitability Analysis attempts to identify areas within the Town's Jurisdictional Limits that exhibit characteristics consistent with criteria defining natural habitat. The criteria are diverse and were separated into one of three sub-models: Natural Habitat, Hydrology and Land Use/Land Cover.

Within the criterion data the values have been reclassified to a 1-10 suitability scale. For example: In the hydrology model the proximity to a stream data is represented as a linear distance while hydric soils data are represented as a percentage of the delineated soil area. To incorporate these datasets into the model, the two dissimilar units: linear distance and area percentage; must be reclassified (binned) to a 1-10 scale where 1 is least suitable and 10 is most suitable as natural habitat. The reclassification process uses unique classes, equal width range or a continuous mathematical function to bin the values depending on the nature of the criterion data.

For each criterion dataset, the entire area of the Town Jurisdictional limits is divided into a continuous grid of 30m x 30m cells, which is approximately 1/5 of an acre per grid cell, and each grid cell is assigned a suitability value for dataset. A helpful visualization could be several pieces of Town-shaped graph paper where each sheet has a different grid cell fill-pattern based on habitat suitability values. After the original values in each criterion were individually reclassified to the 1-10 suitability scale, they were assigned an overall percentage weight of influence on their respective sub-model. The classified, weighted layers are then incorporated to produce a suitability grid where each criterion influences the overall suitability value of each grid cell based the suitability classifications within the cell and the overall weight of the criterion layer.

Once the sub-models are run, the result is a suitability grid for each of the model themes. The sub-model results are then weighted relative to each other and incorporated in the same manner as the individual layers to produce a composite suitability grid surface that incorporates all of the classified, weighted criteria.

### Classification Methods

**Continuous Function-** For continuous data such as proximity-based suitability scores. A continuous mathematical function (curve) that is fitted to the range of values in the data. This analysis used the Small function to indicate a strong preference for very small values, which are in this instance primarily locations within short distances (linear feet) of criteria features. This function takes input parameters for minimum, midpoint, and maximum distance from criteria features.

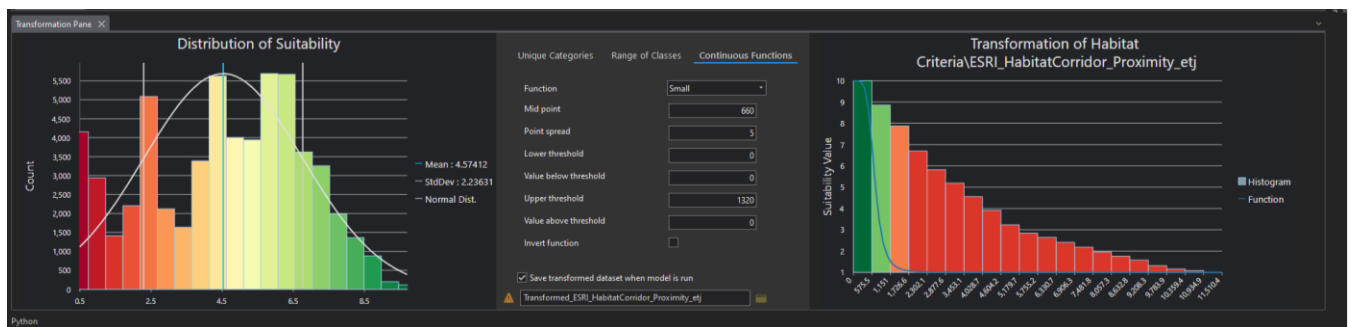


Figure 1- The Small continuous function curve is shown at right, with function parameters at center, and the resulting distribution of suitability values at left.

**Unique Classes-** For discrete data with unique classifications such as a land uses and their associated suitability preferences.

**Range-** For data with consistent class widths and preferences across the range of values

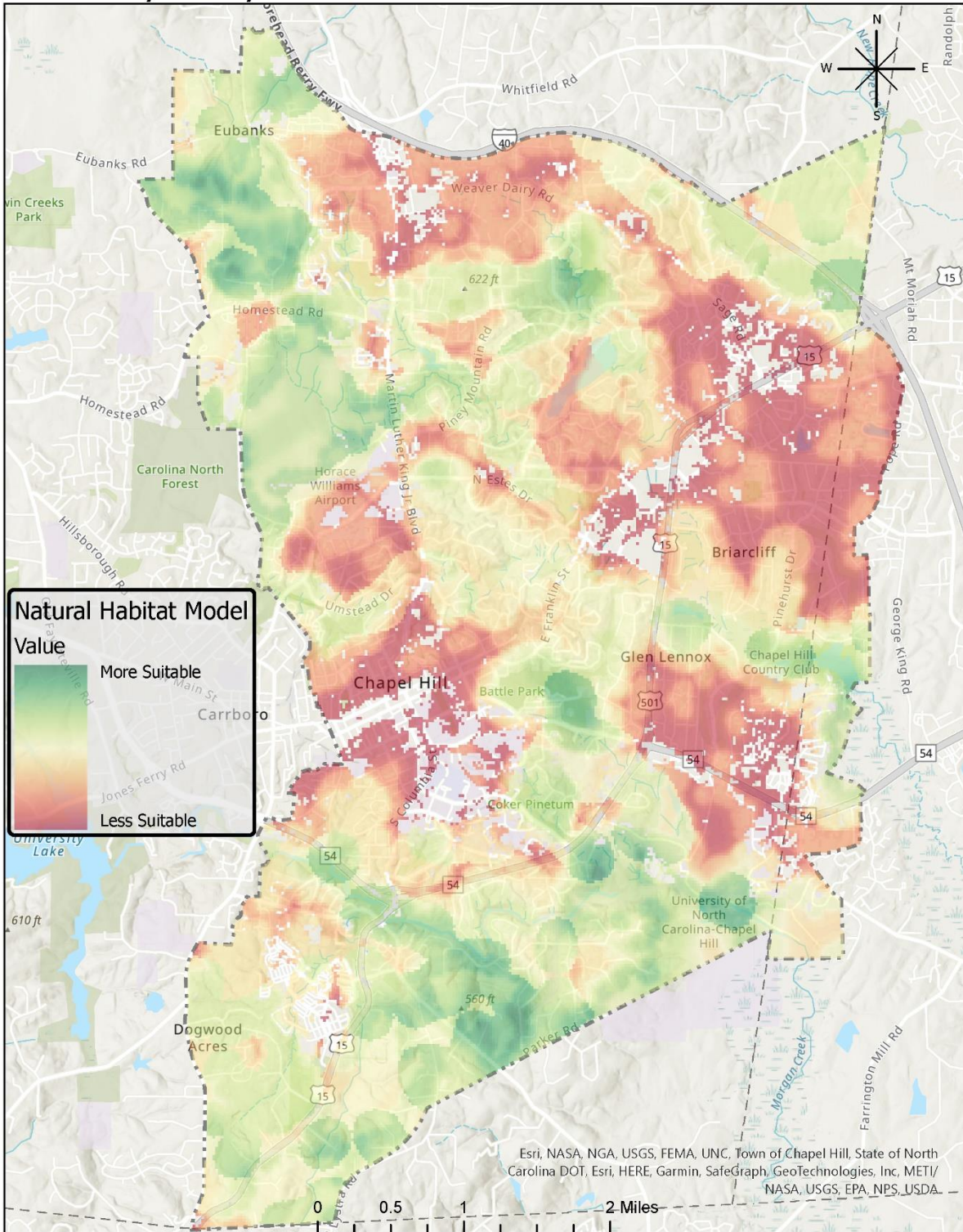
**Habitat Sub-model (50% Total Weight)**

The habitat model is reliant on existing habitat data derived from local, state and national habitat analyses from public and private sectors. The layers used in this sub-model, data classification methods, and sub-model weights are shown in Table I.

*Table I*

| Source  | Data                                    | Classification Method       | Class Intervals or Range          | Sub-model Weight |
|---|---|-----------------------------|-----------------------------------|------------------|
| Eno-New Hope Landscape Conservation Plan        | Habitat Corridors (proximity in feet)   | Continuous Function (Small) | Start: 0<br>Mid: 660<br>Max: 1320 | 18%              |
| Eno-New Hope Landscape Conservation Plan        | Habitat Patches (proximity in feet)     | Continuous Function (Small) | Start: 0<br>Mid: 350<br>Max: 700  | 18%              |
| NC Natural Heritage Program                     | Element Occurrences (proximity in feet) | Continuous Function (Small) | Start: 0<br>Mid: 660<br>Max: 1320 | 16%              |
| Environmental Systems Research Institute (ESRI) | Habitat Cores (proximity in feet)       | Continuous Function (Small) | Start: 0<br>Mid: 500<br>Max: 1000 | 12%              |
| Environmental Systems Research Institute (ESRI) | Habitat Fragments (proximity in feet)   | Continuous Function (Small) | Start: 0<br>Mid: 350<br>Max: 700  | 16%              |
| Environmental Systems Research Institute (ESRI) | Habitat Corridors (proximity in feet)   | Continuous Function (Small) | Start: 0<br>Mid: 660<br>Max: 1320 | 10%              |
| Environmental Systems Research Institute (ESRI) | Habitat Cost Surface                    | Range                       | 0-255 @ 25 pt intervals           | 10%              |

# Suitability Analysis- Draft Natural Habitat Model



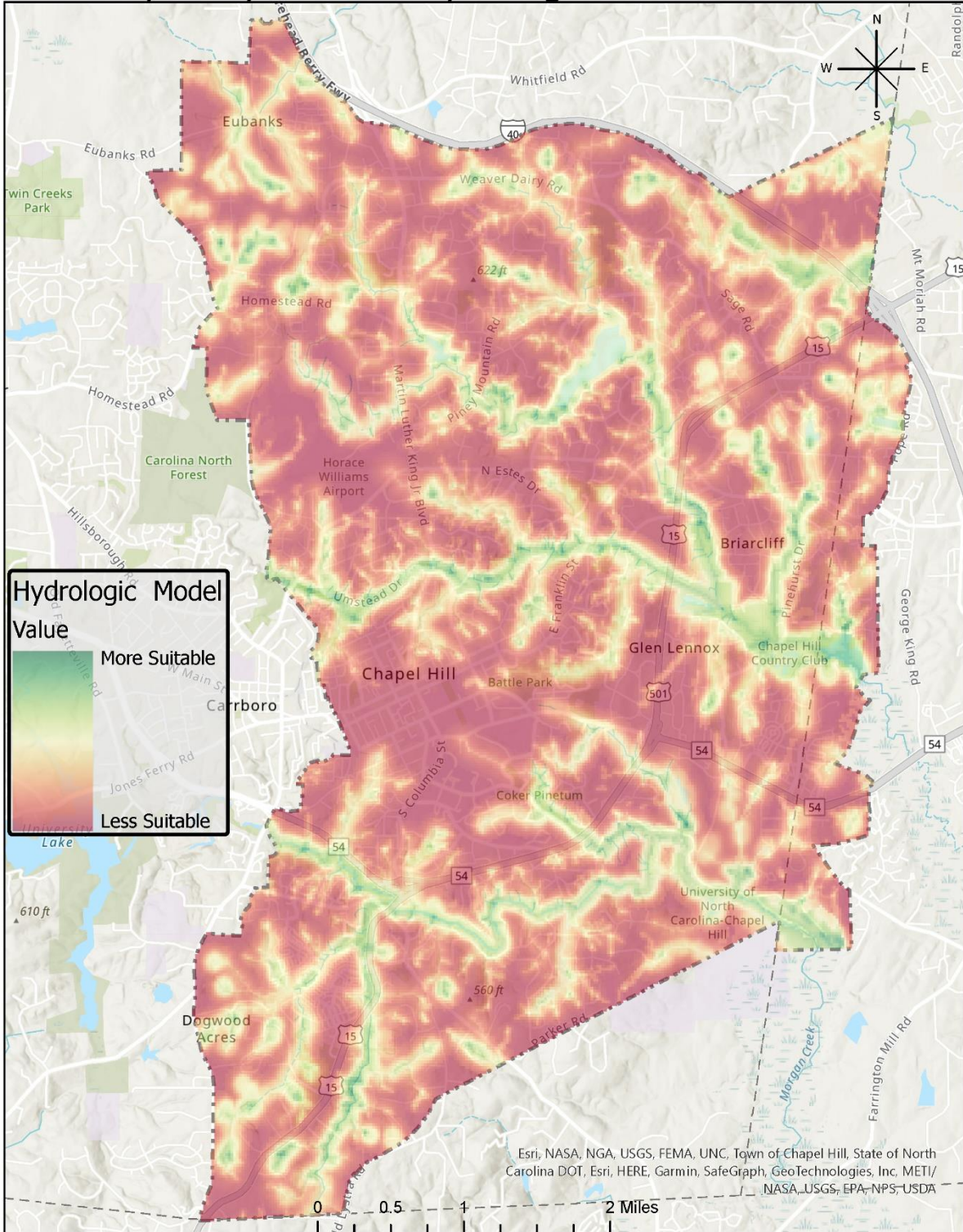
### Hydrology Sub-model (30% Total Weight)

The hydrology sub-model is comprised of local and federal datasets to represent riparian, wetland, and aquatic habitat. The layers used in this sub-model, data classification method, and overall weights are shown in Table II.

Table II

| Source                       | Data                                     | Classification Method       | Class Intervals or Range         | Sub-model Weight |
|------------------------------|--|-----------------------------|----------------------------------|------------------|
| US Fish and Wildlife Service | Wetlands (proximity in feet)             | Continuous Function (Small) | Start: 0<br>Mid: 350<br>Max: 700 | 20%              |
| Town of Chapel Hill          | Perennial Streams (proximity in feet)    | Continuous Function (Small) | Start: 0<br>Mid: 350<br>Max: 700 | 18%              |
| Town of Chapel Hill          | Intermittent Streams (proximity in feet) | Continuous Function (Small) | Start: 0<br>Mid: 100<br>Max: 350 | 16%              |
| Town of Chapel Hill          | Ephemeral Streams (proximity in feet)    | Continuous Function (Small) | Start: 0<br>Mid: 75<br>Max: 150  | 10%              |
| Town of Chapel Hill          | Waterbodies (proximity in feet)          | Continuous Function (Small) | Start: 0<br>Mid: 350<br>Max: 700 | 10%              |
| NRCS Soil Survey             | Hydric Soils (percent hydric)            | Unique Classes (observed)   | 90%, 40%, 5%, 3%, 1%.            | 16%              |

# Suitability Analysis- Draft Hydrologic Model



### Land Use/Land Cover Sub-model (20% Total Weight)

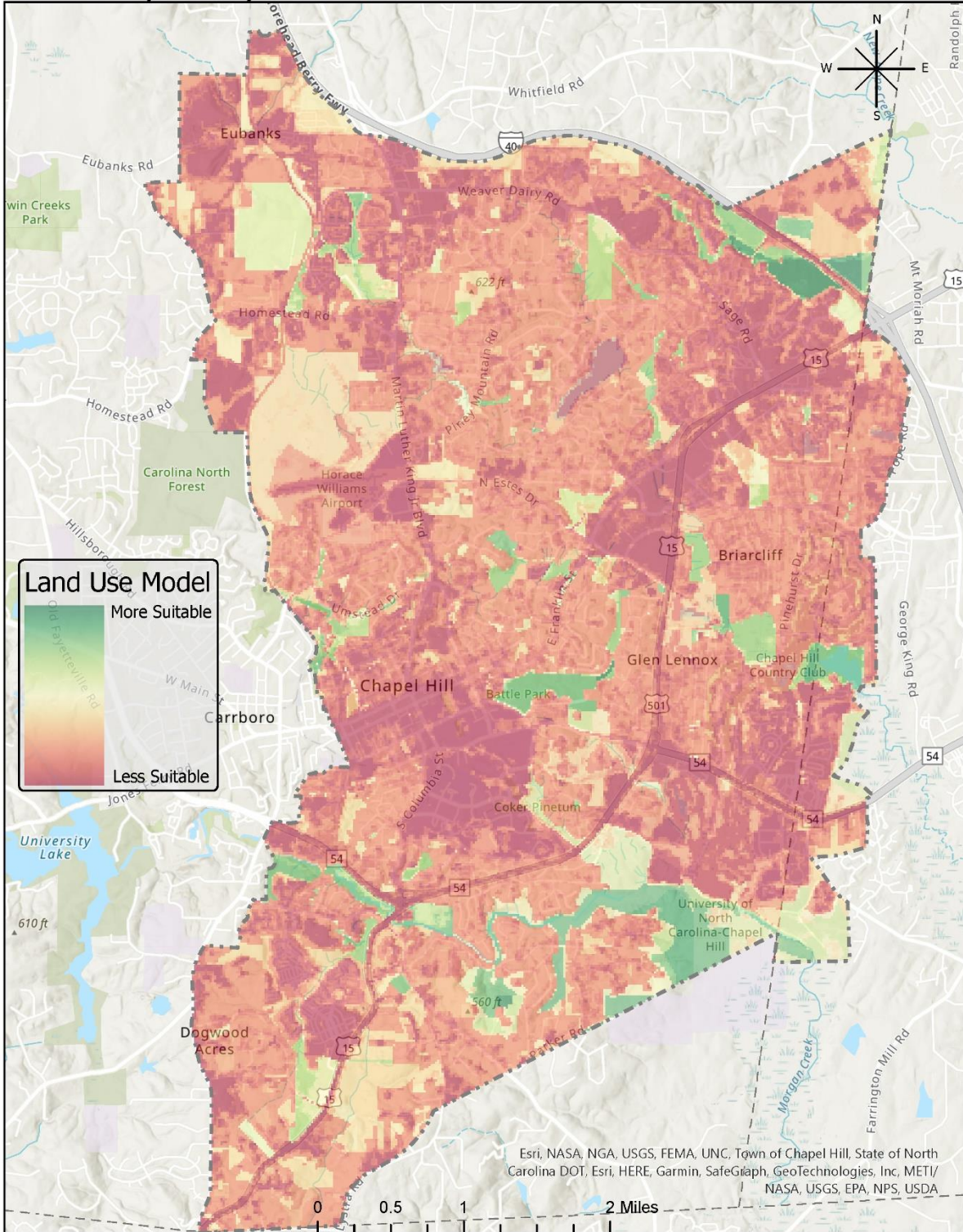
The land use/ land cover sub-model incorporates national, state, and local data to identify areas that are currently managed for biodiversity or have uses conducive to open space. The layers used in this sub-model, data classification method, and overall weights are shown in Table III.

Table III

| Source                           | Data  | Classification Method | Class Intervals or Range         | Sub-model Weight |
|----------------------------------|---|-----------------------|----------------------------------|------------------|
| NC Natural Heritage Program      | Managed Areas                               | Unique Classes        | GAP Scores 1,2,3 (10,9,8)        | 20%              |
| NC Natural Heritage Program      | Natural Areas                               | Unique Classes        | GAP Scores 1,2,3 (10,9,8)        | 20%              |
| MRLC National Land Cover Dataset | Tree Canopy (percent cover)                 | Unique Classes        | 0-100% with 10% intervals (1-10) | 16%              |
| Town of Chapel Hill              | Parks and Open Space                        | Unique Classes        | POS Use Score: 10,8,7,5,1        | 18%              |
| Town of Chapel Hill              | Non-Impervious* parcels                     | Unique Classes        | Presence/Absence Binary (5/1)    | 10%              |
| Town of Chapel Hill              | Existing Land Uses Supporting Natural Areas | Unique Classes        | Land Use Score: 10,8,7,5,1       | 16%              |

*\*Non-impervious parcels include parcels with no impervious surfaces as well as large parcels with minimal/nominal areas of impervious surfaces for accessibility.*

# Suitability Analysis- Draft Land Use Model



Draft Composite Surface (First Iteration)

# Suitability Analysis- Draft Natural Area Model

