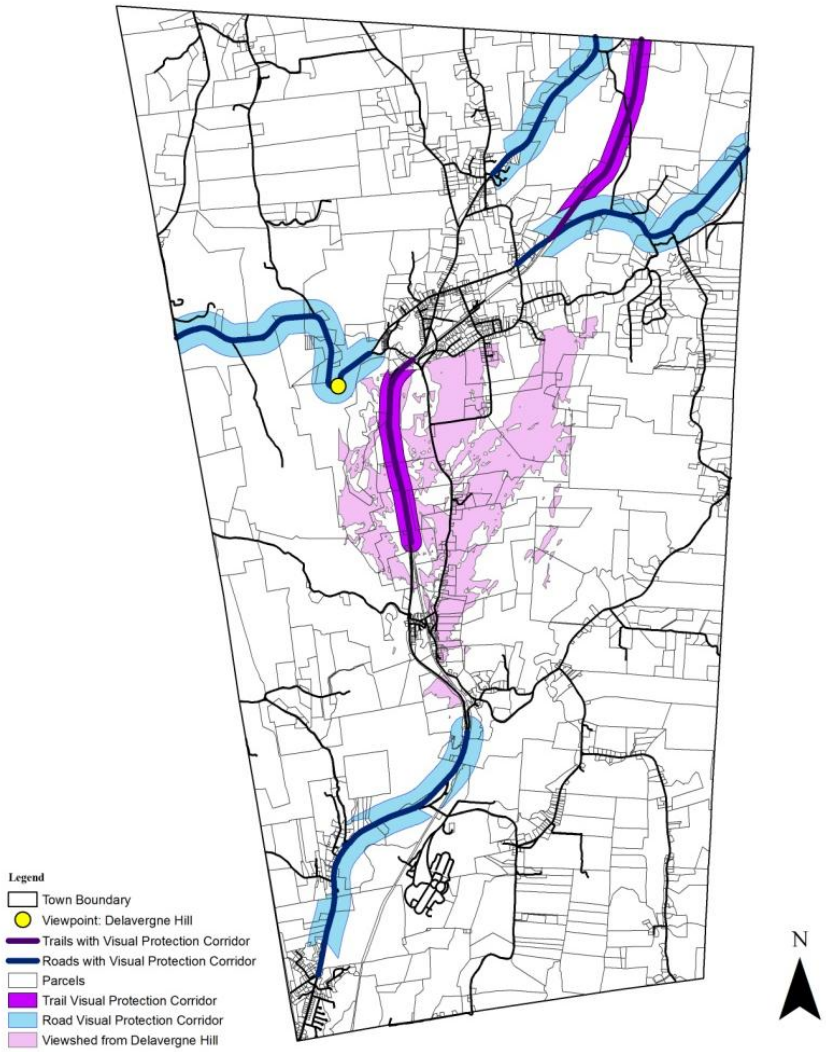
Overview

The Creation of the recommended Scenic Protection Overlay (SPO) for the Town of Amenia was derived from a combination of multiple data sources, procedures and algorithms. This document details how it was developed and the data sources and procedures used.

In summary, the recommended SPO is the result of a viewshed analysis from one selected viewpoint, a visibility analysis, and an agricultural land use analysis.

Viewshed from Delavergne Hill

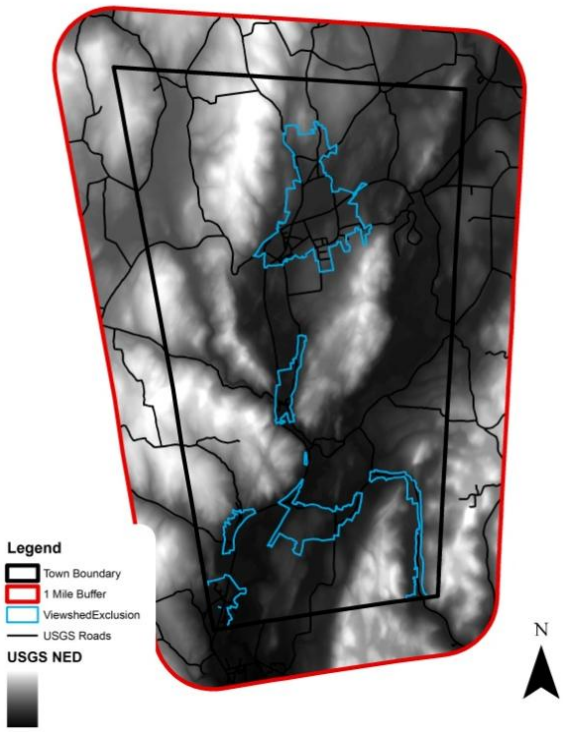
The first component of the SPO is a viewshed map created for the view from Delavergne Hill, specifically looking south and east from the auto pull-off from the hairpin turn. The viewshed starts just south of the County's DPW facility to the north and extends to the south 105 degrees to encompass the entirety of the view south of the Hamlet of Amenia. The viewshed was then clipped to a maximum of 4 miles.



Visibility Analysis

Overview

The Visibility Analysis begins with a USGS National Elevation Dataset (NED) 1/3 Arc Second raster data, which has a cell size of roughly 29.5' x 29.5'. The method scores each cell of the Town of Amenia according to its visibility from public roads[1]. The score is simply a count of the number of road points from which a particular cell has visibility, divided by the cell with the highest count. This results in every cell in Amenia being given a score between 0 and 1, where 1 is the cell with the most visibility from public roads and 0 is a cell that has no visibility from public roads.



Details

For this Analysis, the following layer files were used:

- Town of Amenia boundary file (polygon - from County)
- Viewshed Exclusion (polygon - from County)
- USGS NED (1/3 arc second) (raster - from USGS)[2]
- Town of Amenia roads (line - from USGS)

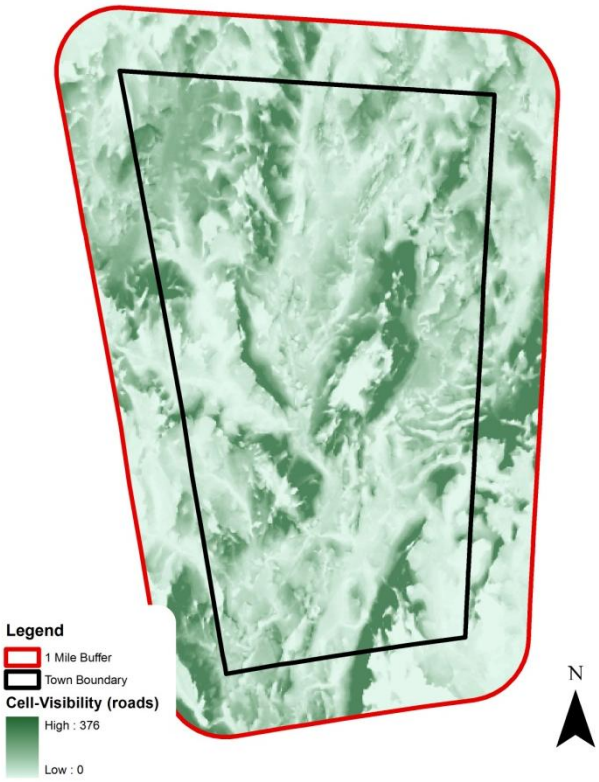
To begin, the USGS NED was clipped to a boundary that was created by adding a 1-mile buffer to the boundary of the Town. A 1-mile buffer was added to this early stage of the analysis in order to offset a bias that would occur in the visibility analysis against the cells on the outer edges of the Town. In short, visibility doesn't stop at the Town boundary.

The USGS roads layer is also added and clipped to the same 1-mile buffer boundary. It is this road layer that will eventually be turned into viewpoints.

The Viewshed Exclusion layer was defined during the creation of the previous SPO for the Town. Use of the Exclusion layer was ultimately rejected by the working group.

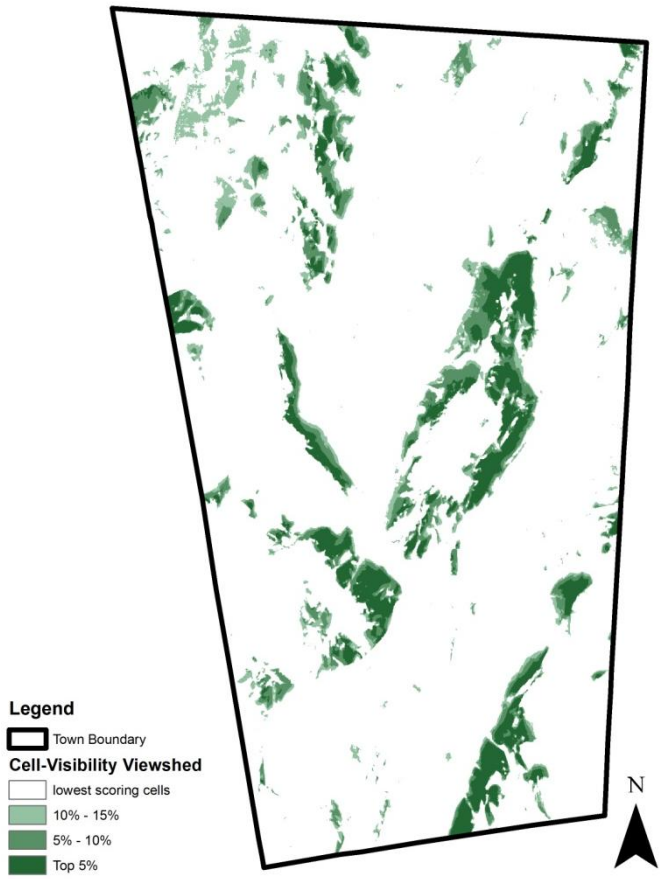
[1] A cell to cell visibility analysis for every cell in the town was done first, but was rejected for the road visibility analysis because the SPO should be concerned about publically accessible views. The results between the two methods, however, were very similar.

[2] We purposely used the USGS data instead of the County's vector elevation data because the vector elevation data and the USGS data were very highly correlated, and the USGS data is native raster data. To do the viewshed analysis using the County data, the vector data would have had to be converted to a TIN and then rasterized, which could have introduced unnecessary anomalies.



The Roads data were then converted from a line shapefile to a point shapefile consisting of roughly 1400 points.

A viewshed analysis is then run on the USGS NED, using the resultant roughly 1400 road points as viewpoints. The result is shown to the left, indicating how many road cells a particular cell is visible from. The range in Amenia is from 0 to 376, the darker the color, the more visible a cell is from roads. For use in the algorithm, the data are normalized by dividing the count by the highest number (376) to produce a visibility score for each cell between 0 and 1.



This viewshed is then clippped to the boundary of the Town. Next, the cells which fall within the Visual Protection Corridors (which are unchanged from the existing SPO) and the viewshed from Delavergne Hill are deleted from the analysis.
Finally, for ease of viewing, the resulting analysis is clustered into top 5% of visible cells, cells between 5-10% and cells between 10-15% of most visible cells in the Town.

Ultimately, this viewshed becomes a part of the other algorithms and is referred to as the **Cell-Visibility Analysis.**

Landuse Ag Algorithm

The last component of the analysis is referred to as the Landuse Ag, which is short for **Land-use Agriculture Algorithm**. The following files were used to complete this analysis:

- Agricultural Exemption from 2010 (polygon - from County)
- Amenia Parcels (polygon - from County)
- Forest Cover (fixed to take out easement) (polygon - from County)
- Wetlands NWI (polygon - from County)
- Cell-Visibility Analysis (raster - from previous analysis)

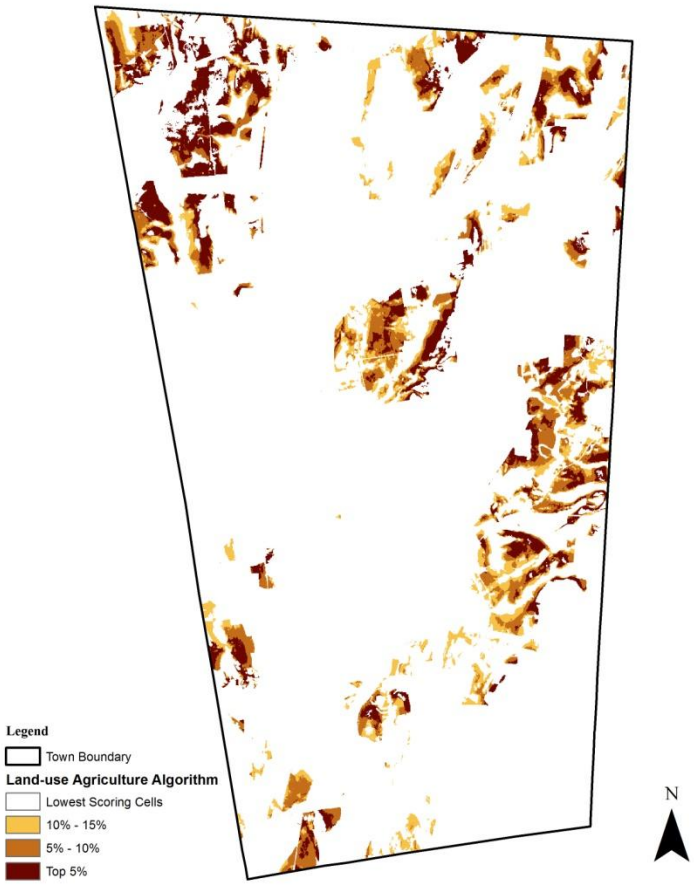
To begin, a layer was created joining all parcels that either take the agricultural exemption, or are classified by the County as agricultural land use (referred to as "parcels-ag"). Then, we developed an algorithm designed to assign every cell a score based on its cell-visibility rating, and whether it was in a forested, wetland or agricultural parcel:

Landuse = (Cell Visibility) + Abs(Landuse Ag - (Forest Cover And/Or Wetlands))

Where Abs = Absolute Value
Landuse Ag = 0 or 1, depending if the cell is in an agricultural parcel or not.
Forest Cover and/or Wetlands = 0 or 0.5 depending if the cell appears as forested or wetland.

The logic behind the algorithm is that forested and wetland areas are not typically in active agriculture, and the scenic character of the Town is, in part, defined by active agriculture. Agricultural parcels are identified, but most agricultural parcels are only partially agricultural. The algorithm scores the forested and wetland part of agricultural parcels lower than the balance, which could include field crops, pastures, buildings, orchards or grasslands. We take the absolute value so that the net effect of the algorithm on forested and wetlands is that all of these lands are treated exactly the same regardless if they are on agricultural land or not.

Once again, land in the visual protection corridors and Delavergne viewshed are deleted from this end result, which is clustered into top 5%, 5% - 10% and 10% - 15% categories.



Combining

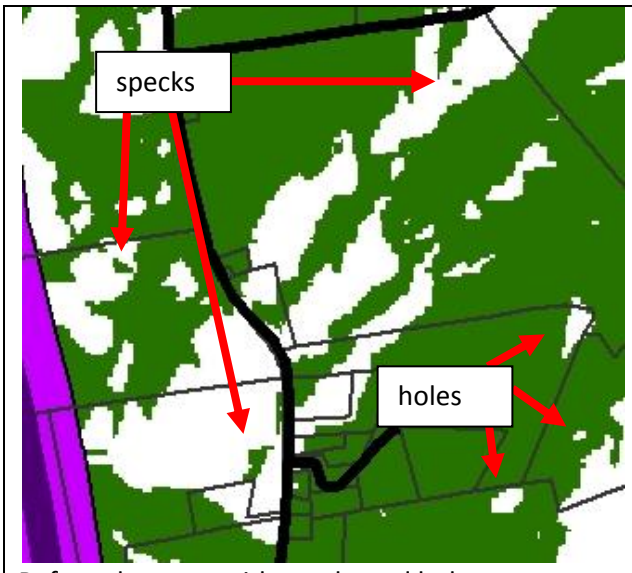
The result is that every cell in the Town has three ways it can be classified: a binary score based on the viewshed from Delavergne Hill (Visible / Not Visible) a score based on raw visibility (Cell-Visibility); and a score based on visible with agricultural use (Landuse Ag); These three classification systems are then combined to create a single SPO in the following manner:

Percentage of Town = (Cell Visibility% - (Viewshed%/2)) + (Landuse Ag% - (Viewshed%/2)) + Viewshed %

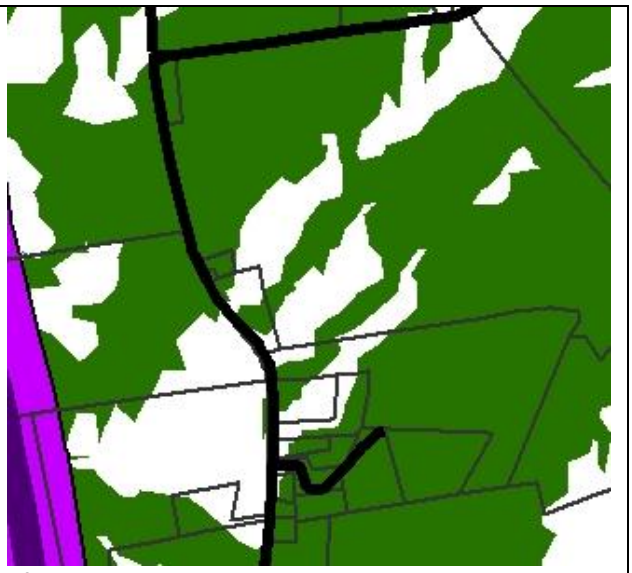
Since the Delavergne viewshed takes up 6% of the town, we would subtract the lowest scoring 3% from both the Cell Visibility and Landuse Ag components.

Smoothing (Cleaning Up)

This algorithm so far leaves us with either holes inside of features, or specks scattered across the Town. Additionally, all of the data so far is in raster format. To clean up and smooth out our data, the speckled and holed raster data is turned into a vector format, at the same time as deleting the specks that are less than 2 Acres, and filling in holes of less than 2 acres.



Before clean-up, with specks and holes.


After clean-up, without specks and holes.

The application of the smoothing algorithm will marginally change the amount of the Town in the SPO depending on the ratio of land added to land taken away, usually by less than 0.5%

Net Effect

On June 23rd the following was presented as the recommended SPO to a joint meeting of the Town and Planning Boards. It is created with the view from Delavergne, 20% Cell visibility weighting and 10% for Landuse ag. If eventually approved by the Town Board, shape files will be provided to Dutchess County Planning and Development and posted on-line.