The Eugene P. Odum Conservation Tract in Madison County – A Conservation Easement Viewshed Assessment

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Professor Odum

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Eugene Odum, father of modern ecology, created a conservation easement on his property in Madison County, GA in 1977. Since then, Dr. Odum has passed away, and the land has come into the possession of the University of Georgia. This tract in Madison County, Georgia is interesting for the following facts:

- a. It contains at least one spring and stream which are tributaries of the Broad River, classified as a Federal Wild and Scenic River in 1982.
- b. It falls within the area designated as the Broad River Environmental Corridor created by the Georgia Department of Natural Resources (DNR) in 1976.
- c. It lies within the parameters of several contiguous Georgia counties that planned in 1995 to create the Broad River Heritage Trail.
- d. At least one native fresh-water snail of family Hydrobiidae lives there. (See appendix D.)
- a. These snails are an ecological tell species, meaning they indicate water purity due to their sensitivity to water clarity and pesticides.
- e. Because of the nearly pristine quality of the watershed and its proximity to the Broad River, Dr. Odum placed a conservation easement on the property that only allows building within a narrow band atop a particular ridge on the property, with buildings not to exceed 40 feet in height, and roads not to exceed 30 feet in width.
- f. There is another larger DNR conserved property directly across the Broad River from which there is a good view of the Odum tract and perhaps the ridge in question.
- g. The easement implies that native fauna not be disturbed.

Wild and Scenic Rivers are a great place to canoe. The local canoeing industry is concerned about the placement of a 40 foot tall building on the ridge, and

whether it will mar the viewshed from the Broad River. It would also be nice to get an idea of what would be visible from the other conserved land across the Broad. In this assessment, it is my plan to model what a forty foot tall building might look like from the river and from across the river. From there we should be able to garner whether the conservation easement is sufficient to preserve the viewshed or if further easement restrictions may be necessary prior to sale of the property by the University to a third party.

Materials:

- a. I got a copy of the plat from Dr. Liz Kramer and scanned it.
- b. Jason Lee rectified the plat scan for me.
- c. Liz Kramer also supplied me with 1m ortho photos for the area.
- d. I got a copy of the easement from Bud Freeman, who lives close by the Odum Tract in Madison County and consequently has more than a passing interest what happens with the land.
- e. I learned a little about the indigenous snails from Ron Carroll.
- f. From the Georgia On-line GIS Clearinghouse, I downloaded GIS these files for Madison County:
 - i. National elevation data 30 m.
 - ii. Georgia conservation land parcels
 - iii. Roads
 - iv. streams
 - v. water bodies
 - vi. county boundaries
- g. Sketchup used to create fly-throughs to model the viewshed.

Methods:

First I brought the Clearinghouse data into ArcMap. I trimmed the data down from the entire county to just the immediate vicinity of the Odum tract and the DNR tract directly across the Broad. I tried to rectify the scanned map on my own with awful first results because the scan had no . Jason helped get it closer. From there I was able to modify the rectification to fit more closely using the control point method in ArcMap. One challenge was the fact that either the Conservation Lands data from the Clearinghouse was shifted grossly, or perhaps included only a part of the meets and bounds discussed in the easement.

For this exercise, the best we can do is approximate where the ridge is. The ridge and the road are the only viable landmarks on the plat, so I used these to approximate our base. I matched the curve of the road closely to that found in the aerial photo and road shapefile. Then I used control points to match up the ridge from the national elevation data raster image with the interior meets and bounds of from the plat. Once these were close, I created a new polygon shape file with the adjusted "pseudo-rectified" meets and bounds. Since we're mainly interested in building on the ridge, this approximation should be close enough for our needs. I exported the file to a pdf called "Scope of Viewshed Assessment." This document is included as appendix a to this document. It includes an explanation of the site in plan format.

I tried bringing the data into ArcScene with some mixed results. For some reason, the Georgia Conservation Lands Data would render while still attached to the .ee0 file. (I added an extension that allows direct import from .ee0 files to the ArcGIS suite.) However, when I tried to separate out the one DNR parcel across the broad into a separate shapefile, the parcel would disappear when the baseheight was set to the TIN data. All data are using the same projection and work well together in ArcMap. The adjusted parcel data had no trouble using the TIN base height, so I cannot guess why the conservation lands data wouldn't render in ArcScene. It might have been easy to leave all the Conservation Lands in the data set. but I didn't want to see the old and incorrect Odum tract lying shifted and under my adjusted buildable and non-buildable polygons.

So I added the 'Export to Sketchup' feature to ArcGIS and exported the TIN to a Sketchup file. Then, I added shapefile import capability to Sketchup and imported the data I'd collected in ArcMap. I smoothed the contiguous triangles of the TIN, draped my shape files on the model, colored it and added trees and

buildings. The shape files drape better in Sketchup than they do in ArcScene, without the triangular artifacts of the TIN file showing through various parts of a draped shapefile, evincing instead a smooth and continuous drape upon the landform.

Although the orthophotos show that the land is relatively uniformly populated with trees along the slopes of concern, I would not be able to render the data very well with the same number of trees, due to the constraints of one small computer. Instead, I elected to use a few trees 30 feet tall placed strategically to examine whether a canopy could easily hide most of a 40 foot tall construct during the warmer months.

In Sketchup, I set up a fly-through mimicking the route of a canoe traveling down the Broad River. The entire time, the camera is set to face the view of the most prominent building site. In the first fly-through, the buildings would likely be visible from some portions of a canoe trip. In the second fly through, I've set the buildings a little further south in an effort to guage whether it would be possible to lessen the impact on the view shed by allowing a 40 foot tall building closer to the road at the south end of the property.

I set up three vantage points without fly-throughs on the DNR parcel north of the Broad just to see whether there might be a visibility concern from there as well.

Material Results:

- a. Two fly-throughs, one with more prominently placed buildings, one with less-prominently placed buildings. (Included on CD with this document in the fly-through folder. Note that fly-throughs will flow better if they are first transferred to your computer's C drive.)
- b. Two sets of images A through L as shown on the Scope of Assessment from Appendix A that likewise show prominent and less-prominent building placement from views along the Broad River.
- c. Powerpoint presentation including of this entire project.
- d. A copy of the easement, with plat in PDF format.

Thoughts:

- a. The easement does not conclusively define which 40 feet in height is appropriate. Because the area is generally hilly, a building that is forty feet tall at the top of the slope can present walls at the bottom of the slope that are actually significantly taller than 40 feet from finished floor elevation. So even if the building is no taller than 40 feet from a legal point of view, it can be perceived as taller than forty feet from the viewshed. (See image to the right.)
- b. The national elevation data is thirty meter data lending considerable room for error, as shown in the image to the right. Rivers cannot flow on the side of a mountain, but must seek the bottom of the valley. For our purposes, we are assuming that the skew in error is relatively uniform.

Conclusions:

Buildings placed on the ridge will be visible from the river and the northern DNR conserved land from a large portion of the view shed throughout the winter. Tree canopy will cover a portion of what is there during canoeing months, but there will still be some visible structure along some portion of a canoe trip no matter where you place the structure. The impact would be lessened if the buildings were located further south, rather than on the northern-most part of the ridge. It may be prudent to add a clause that makes it so the forty feet in height does not exceed the height from the lowest finished floor elevation of the structure. (See image to the right.)







Conservation Easement Viewshed Assessment



Legend

- Buildable Area
- Non-buildable Area
 - Other Conserved Land
 - Various Views
 - Streams
- ----- Roads
 - Broad River

Scope of the Assessment

This map depicts the buildable versus non-buildable area of the Odum tract in relation to the Broad River and the DNR conserved land across the river.

- Various views are depicted. A through I are examples of what you might see canoeing the Broad.
- J through L show various views from the DNR conserved land.









Conservation Easement Building Placement



Legend

- Buildable Area
 - Other Conserved Land
- ----- Streams
- ----- Roads
 - Broad River
 - Northen Placement
 - Southern Placement

Building Placement

This map shows placement of the buildings, both for the more prominent placement on the north end of the ridge where the buildings will be more likely visible from the river and the south end of the ridge in an effort to place the buildings more sensitively in the land, away from the Broad River viewshed.

Structures in the buildable area are depicted in the fly-throughs in Appendix B.



Hydrobiidae:

I couldn't find any examples of the very small native hydrobiid snails on the web, so I got this one from a website about cave dwelling animals in Illinois. The Bureau of Land Management put out a handy document about these snails - 128 pages - available for download here:

http://www.or.blm.gov/surveyandmanage/Field_ Guide/Aquatic_Mollusk/Aquatic_Guide.pdf

It includes information about species in Georgia. I do not know the genus and species of ours.

There are aggressive varieties of non-native hydrobiids invading the US that are actually native to New Zealand or Australia. They look very similar to ours. There are also apparently many species native and abroad which have yet to be identified.

Contrasting ArcScene and Sketchup...



In ArcScene, this orthophoto has a baseheight based on the TIN. (Same is true with NED format.) The shapefiles draped on top do not follow the TIN very precisely. The Sketchup view of similar data is below using a smoothed TIN and the same shape files.



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Thank you!



An extra aerial view of the area from Sketchup.