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Evaluating the Visual Impact of New Development on Mount Vernon's Viewshed

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CONSERVATION INNOVATION CENTER
CHESAPEAKE CONSERVANCY

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Saving the Chesapeake's Great Rivers and Special Places

George Washington's Mount Vernon Development Visibility Analysis

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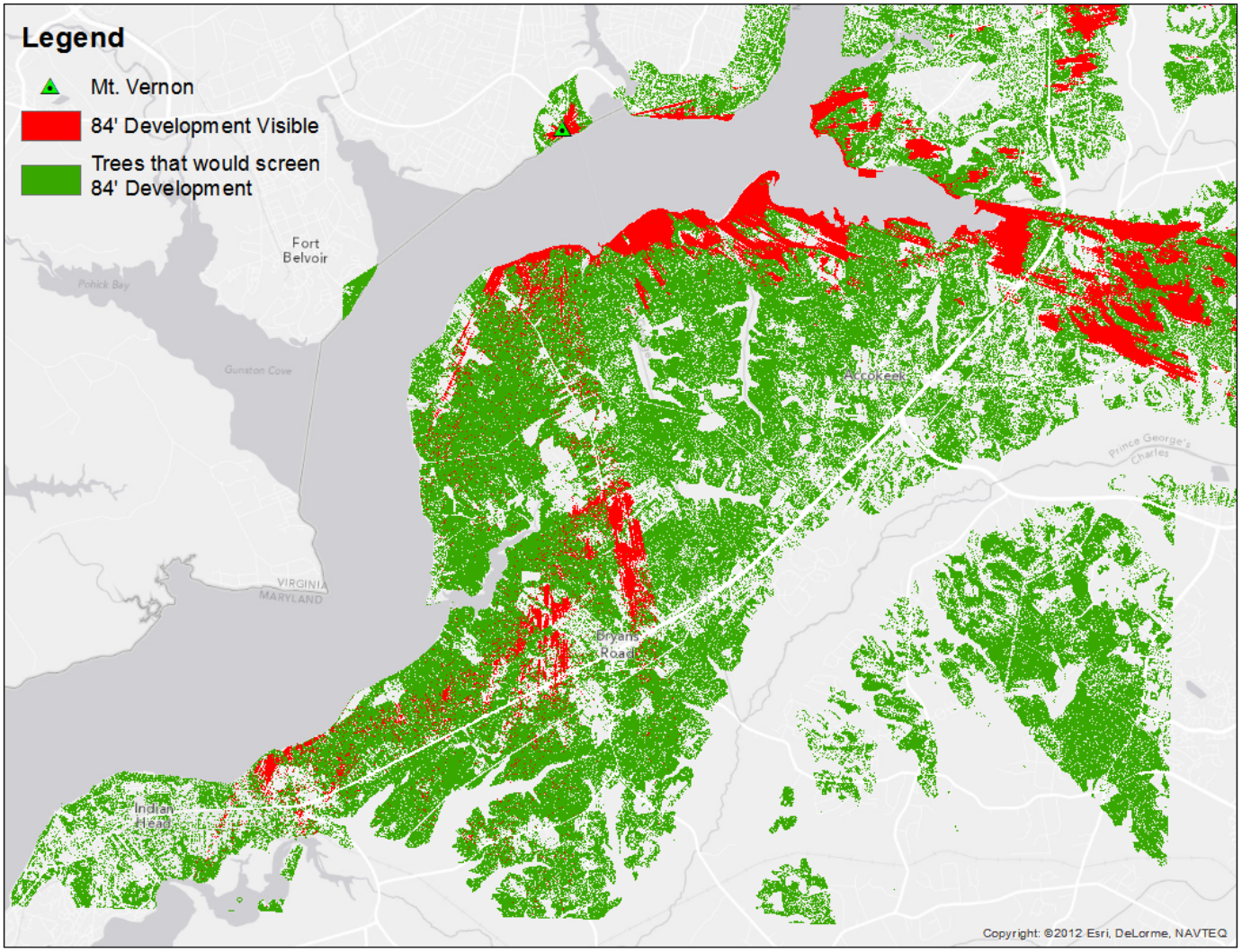
- **Chesapeake Conservancy extended M-NCPPC analysis to Charles County and created a consistent dataset that spans political boundaries**



Creating Base Elevation Datasets

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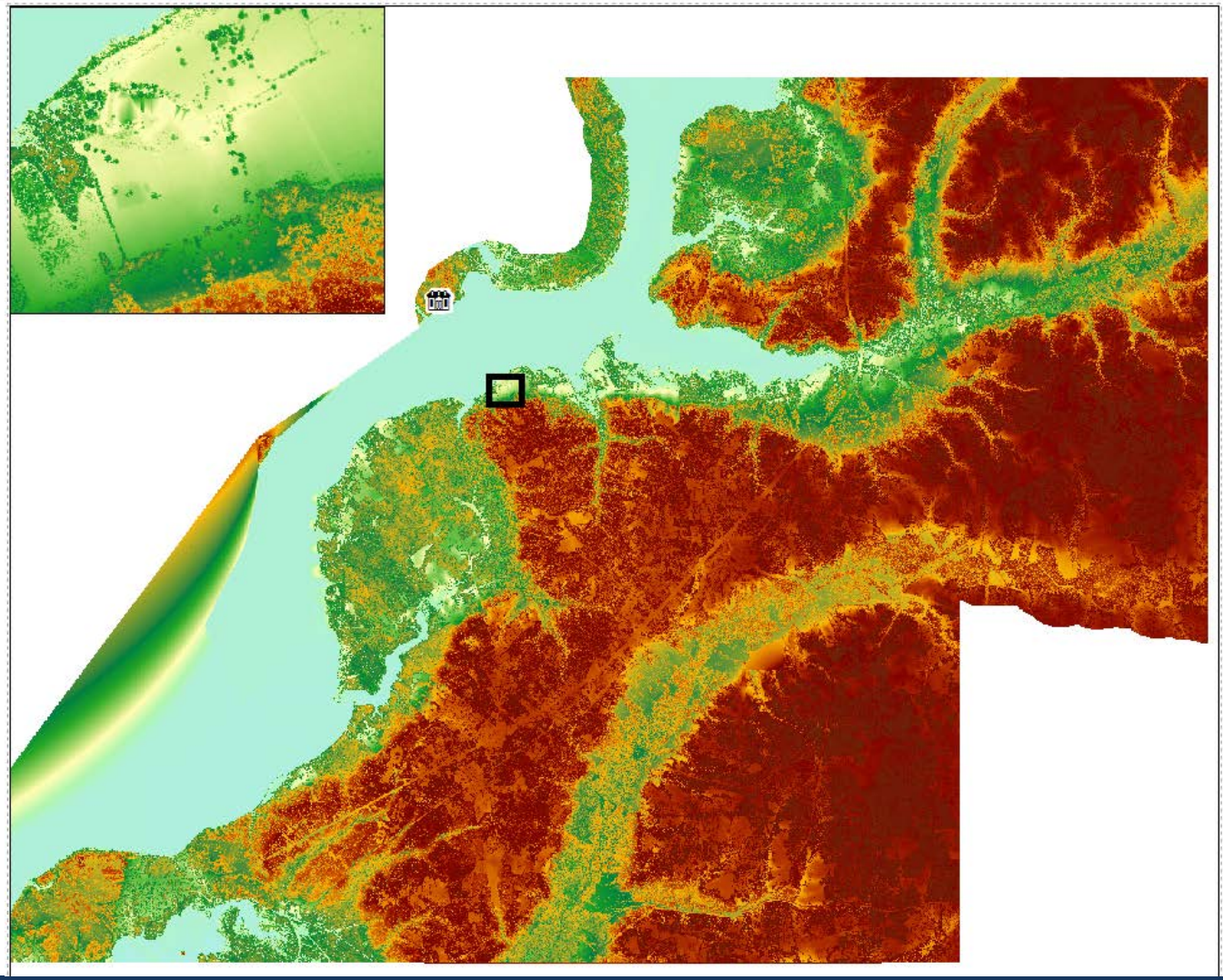
Created a 4ft resolution Digital Elevation Model (DEM) and Digital Surface Model (DSM)



Viewshed Basics

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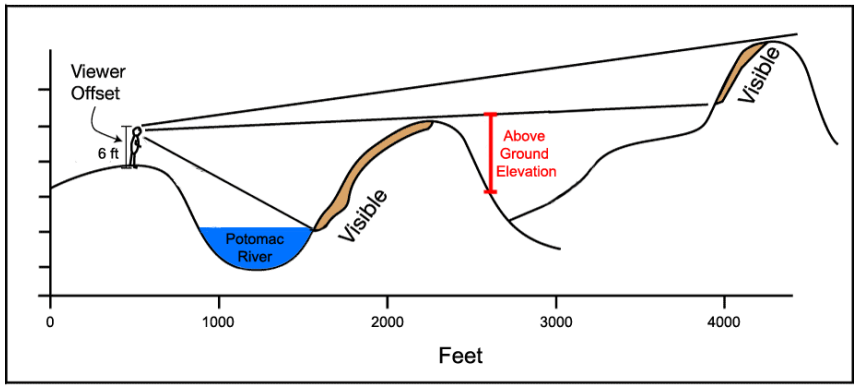
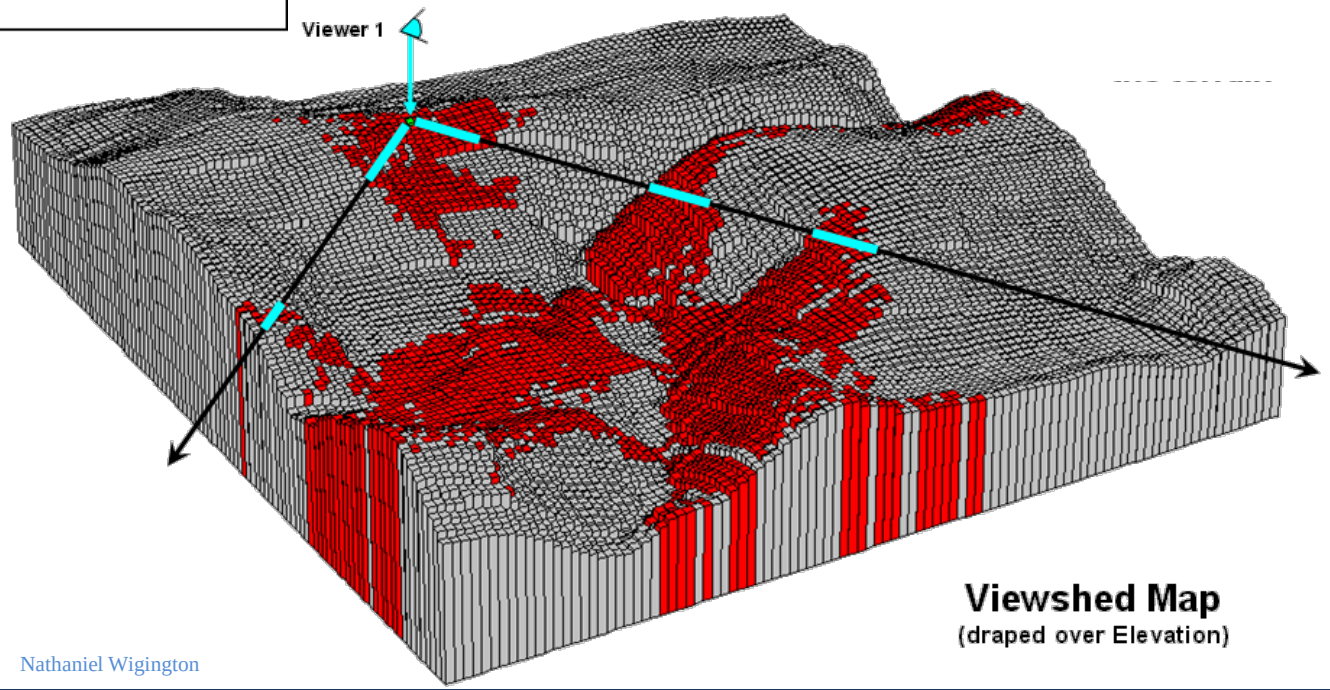


During analysis, we created an Above Ground Elevation (AGE) dataset showing how high a surface would need to be to be visible

Initial visibility analysis was performed on the DSM using a 6ft viewer offset



Nathaniel Wigington

Viewshed Basics

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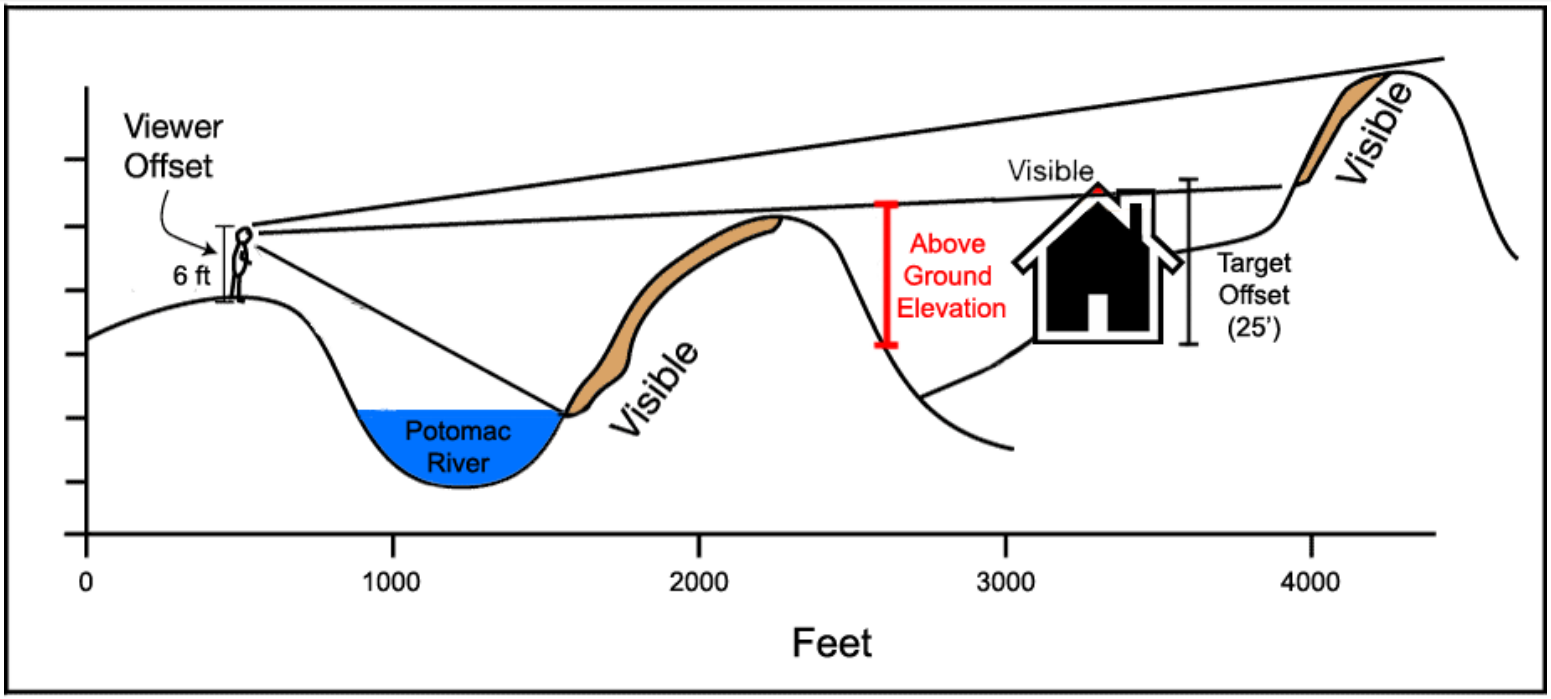

To identify areas where development would be visible, we used a conditional statement to select landscapes where the AGE was less than the target offset (25', 36', 84')

Creating an Interactive Analysis Tool

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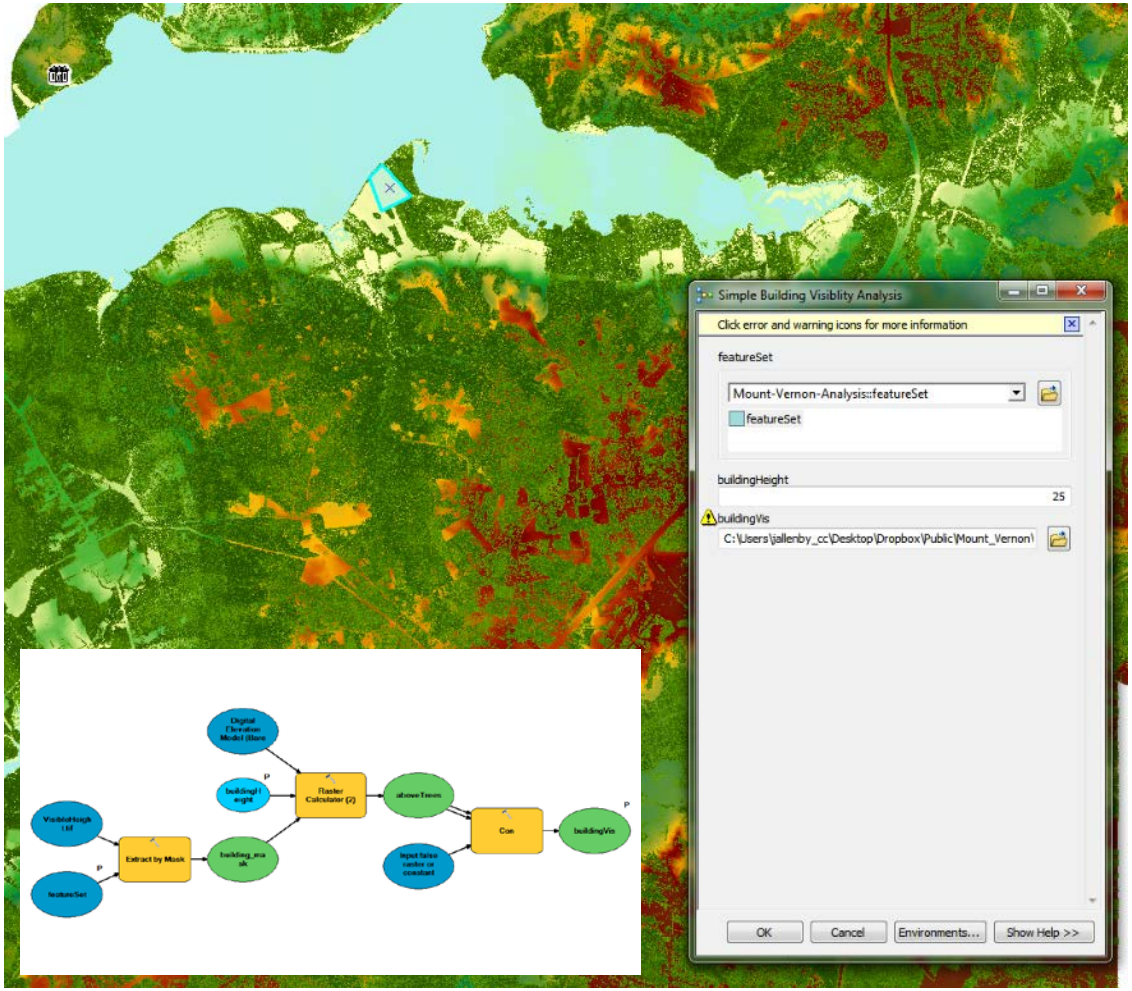
- **Created a tool in Model Builder that would allow users to view the portions of a potential project that would be visible and determine how much of it would be visible above the tree-line**



Creating an Interactive Web-Viewer

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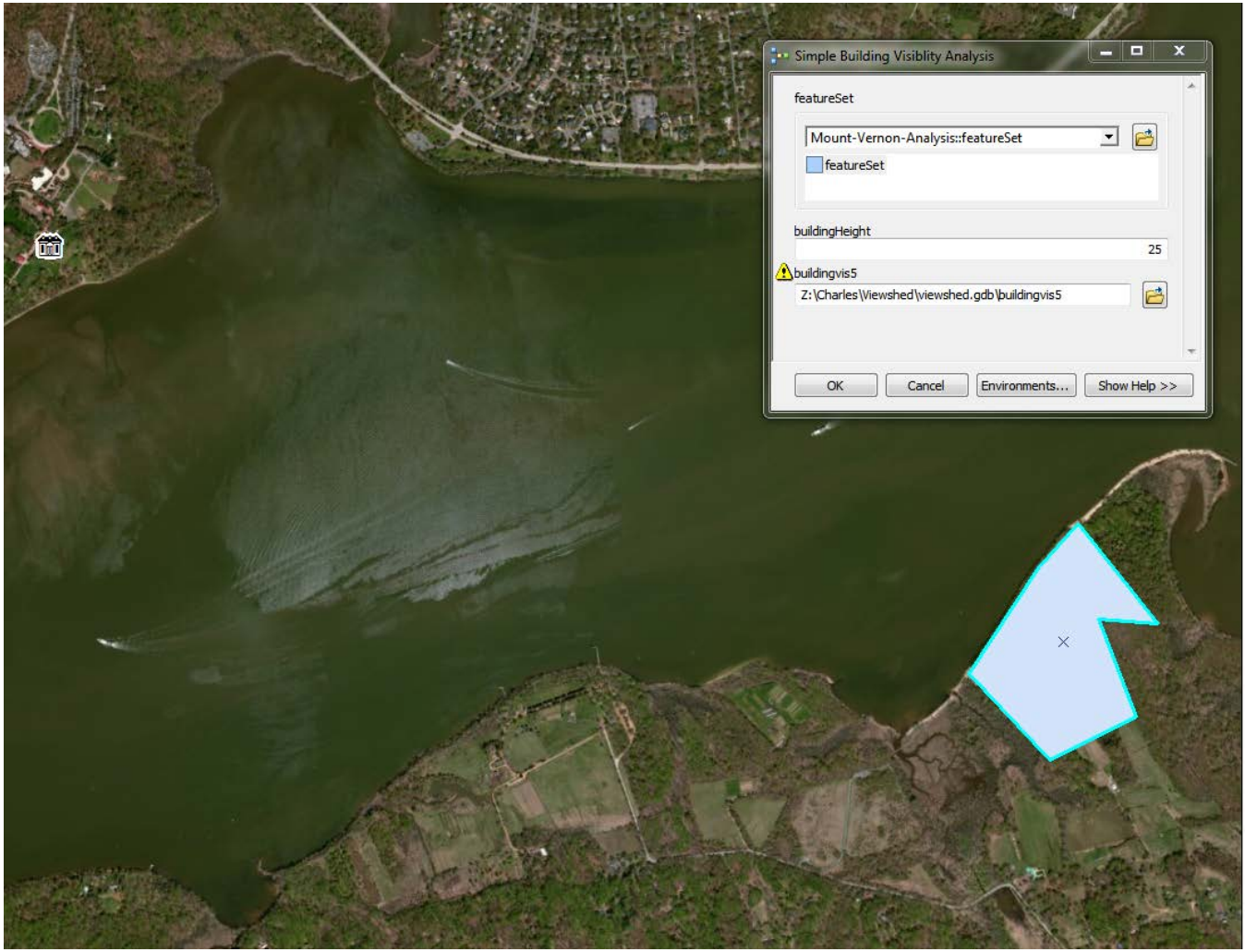
- **Two inputs needed are:**
  - **Building footprint/parcel boundary**
  - **Proposed Building Height**
- **Published the model as a geo-processing service**



Creating an Interactive Web-Viewer

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- **Model adds the proposed height to the DEM layer and compares it to the DSM AGE layer to identify where the offset is greater than the AGE.**
- **Classifies output layer to show height above tree line**

Extending the initial analysis to help identify critical trees

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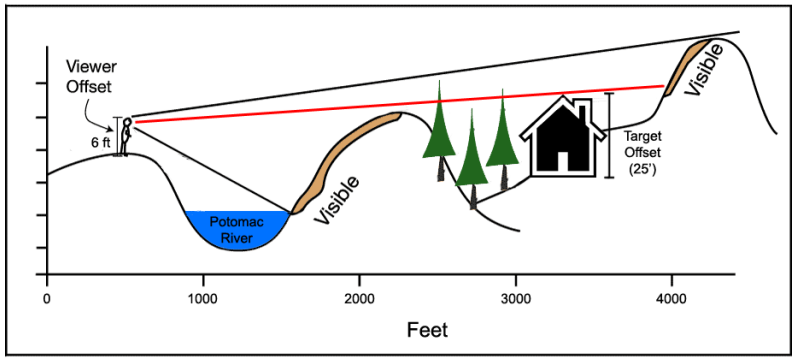
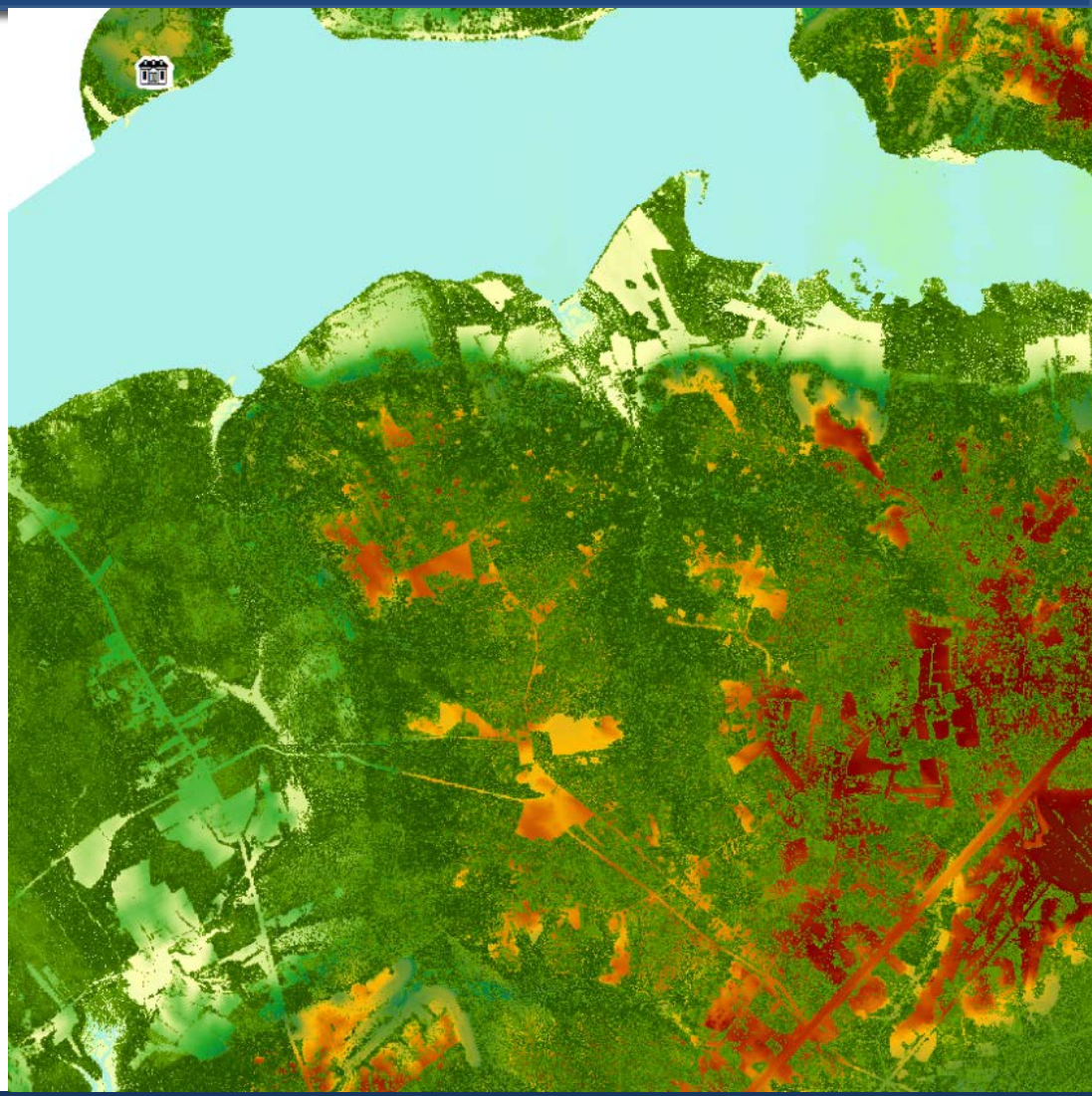
After initial tool development, Mount Vernon indicated that it would also be useful to have an output layer that showed which trees are responsible for screening the potential development





Extending the initial analysis to help identify critical trees

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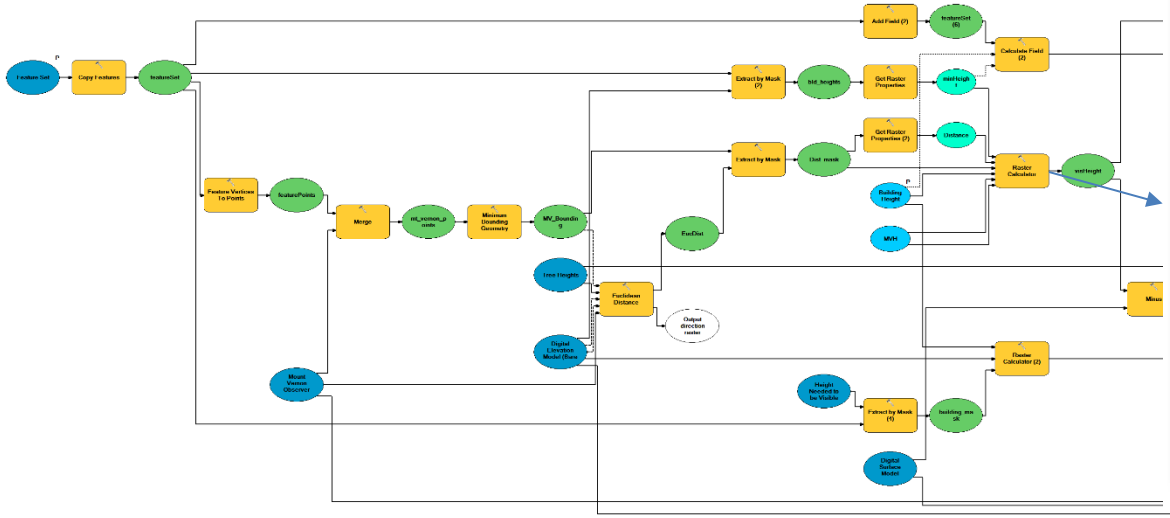
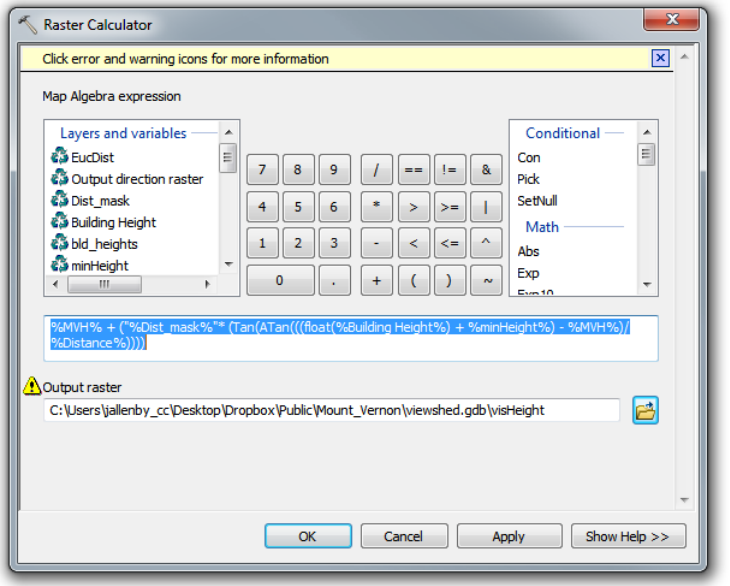
The model would incorporate an additional analysis that would calculate a "plane of visibility" (POV) from the observer at Mount Vernon to the top of the proposed building and compare it to the elevation of the DSM layer





Extending the initial analysis to help identify critical trees

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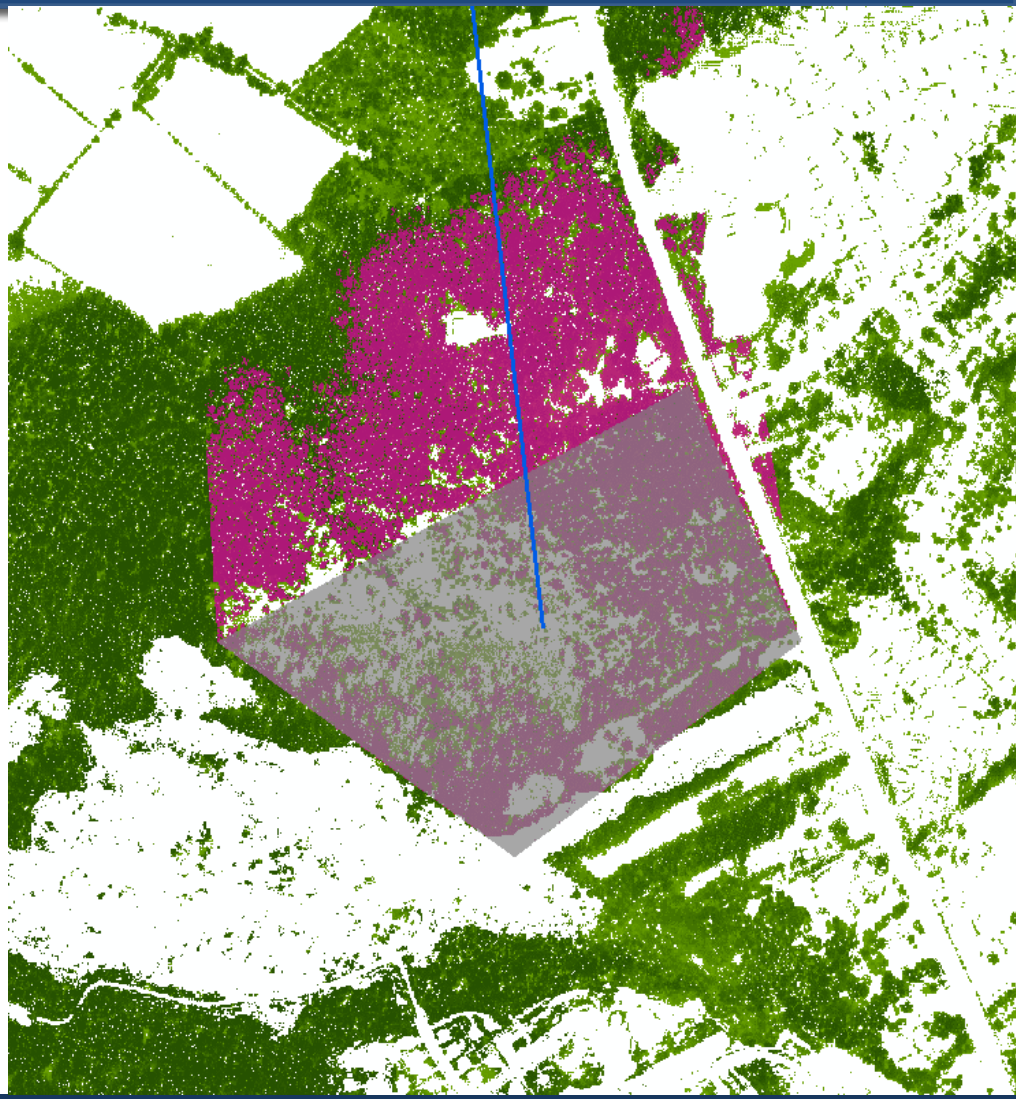
Portions of the DSM that are above the POV are filtered out then compared to a tree canopy layer that has:

- **A difference between the DSM and DEM elevations of more than 5ft but less than 300ft**
- **A positive NDVI value to screen out buildings and other non-tree features**



Extending the initial analysis to help identify critical trees

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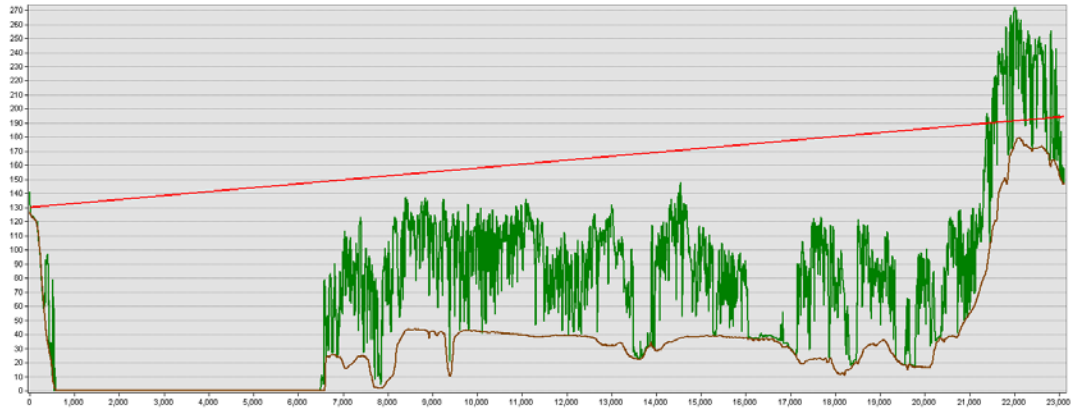
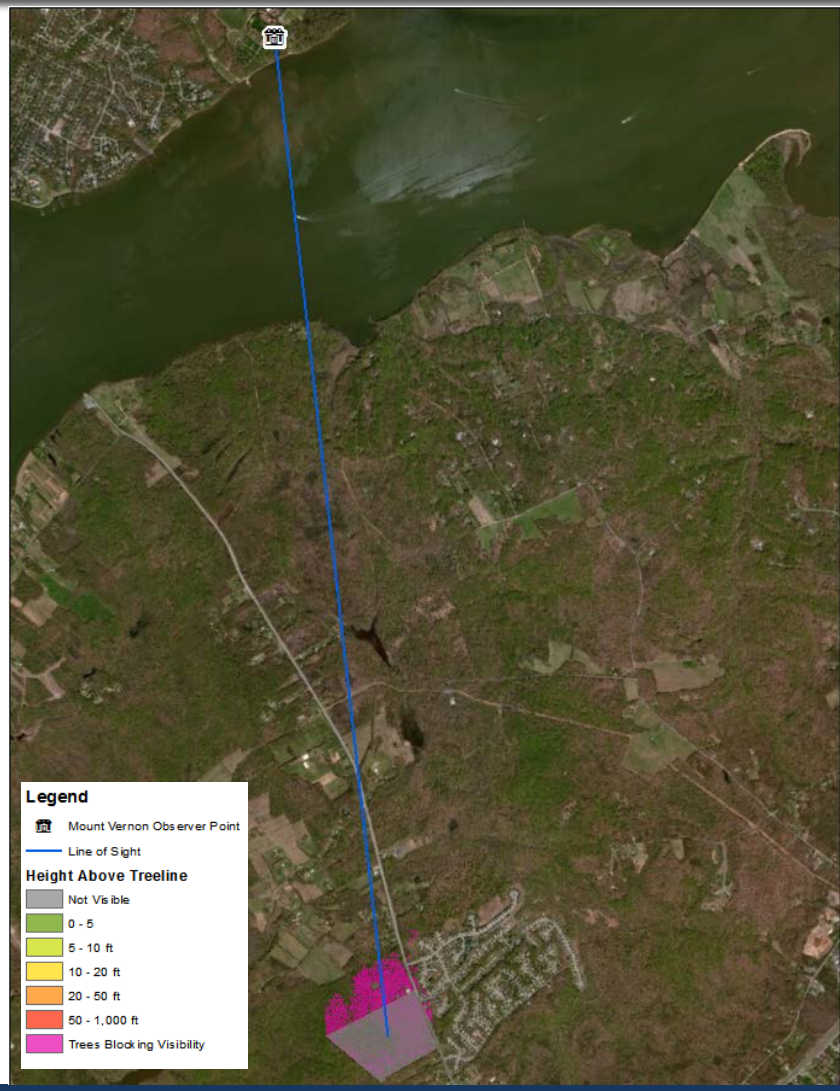
The resulting analysis creates three outputs:

- **A raster layer showing the visibility of the feature**
- **A raster layer of trees that are above the "plane of visibility" and screen the proposed project from Mount Vernon**
- **A profile graph showing the DEM, DSM, and Elevation of Visibility along a sight line from Mount Vernon to the centroid of the target feature**





Updating the Web-tool

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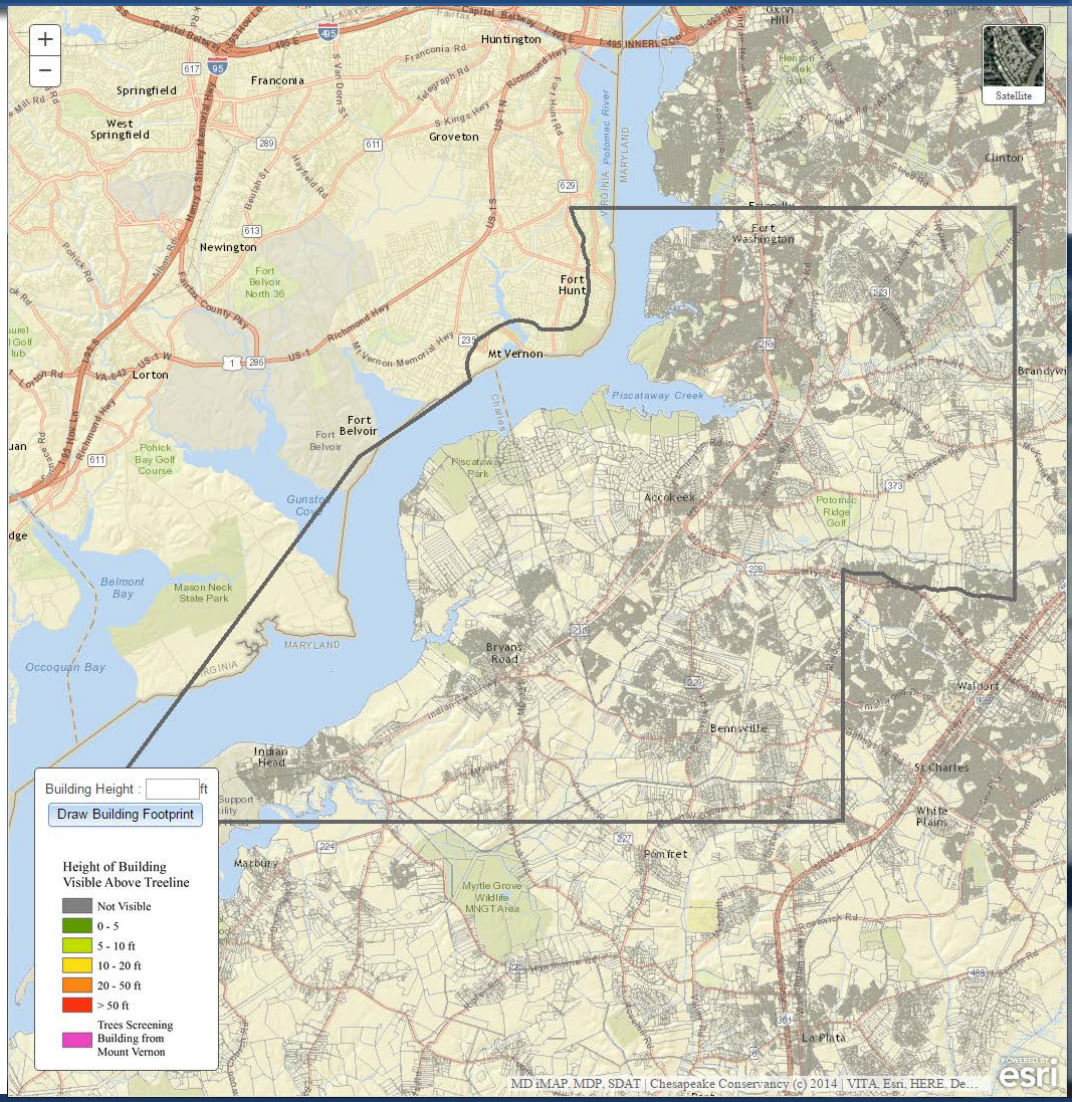
The final model was modified slightly to run on ArcGIS Server and was published as a geo-processing service with the same two inputs:

- **Parcel boundary/ building footprint**
- **Building Height**



Updating the Web-tool

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- When zoomed in, parcel boundaries hosted by the State of Maryland appear as a scale dependent layer
- Users have the choice of a street map or aerial imagery base map

Updating the Web-tool

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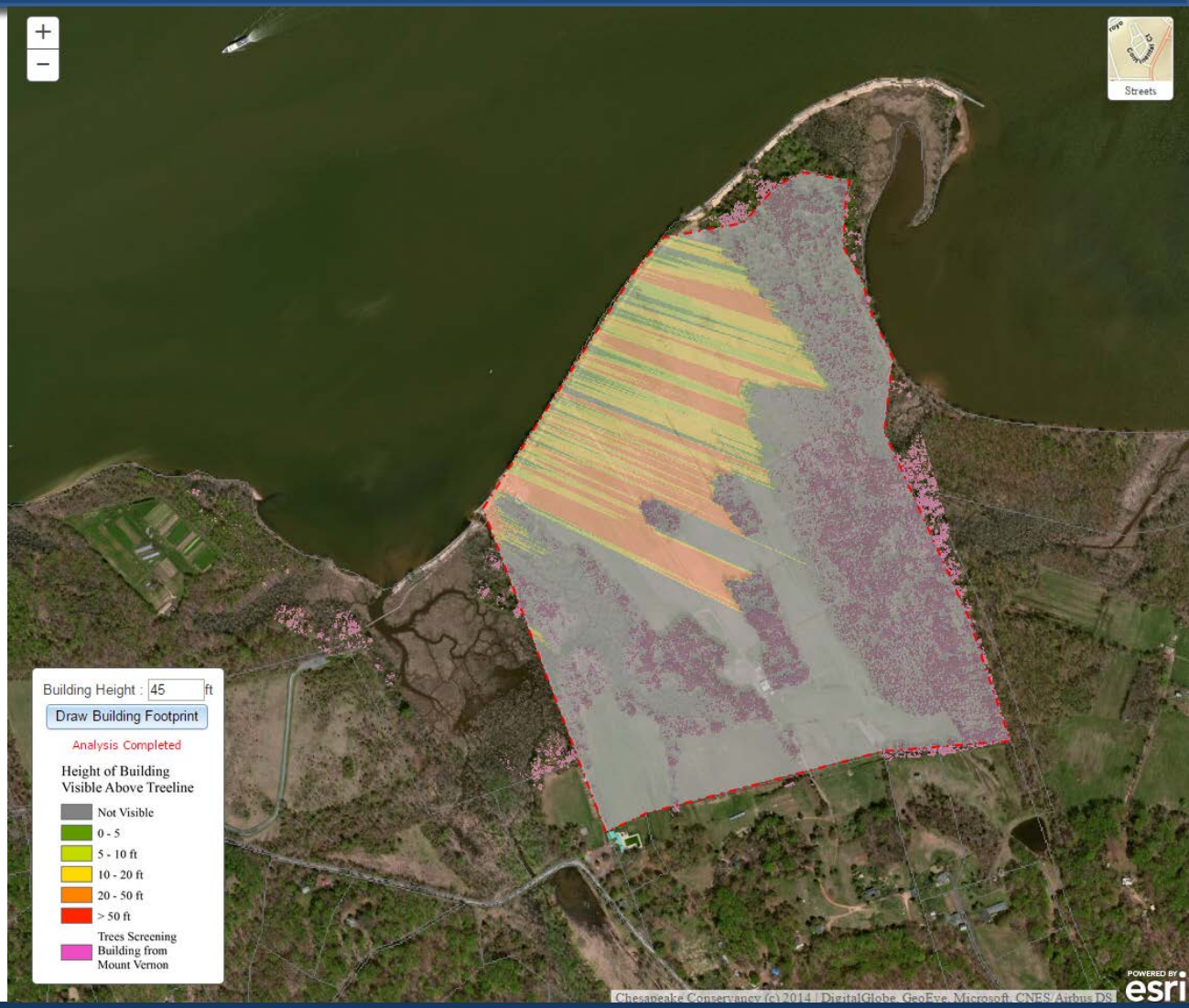
- **Analysis time is dependent on the size of the feature drawn and the distance from Mount Vernon but usually takes between 5-15 seconds**

- **Resulting datasets are automatically added to the map**



Next Steps

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- **Sharing the data and toolboxes with Prince George's and Charles County Planning Departments**
  - **Planning departments do not always have the extensions needed to run the toolboxes (Spatial Analyst and 3D Analyst) making the web-tools crucial**
- **Identifying how the analysis can be incorporated into county planning processes**
  - **Comprehensive plan updates**
  - **Subdivision review**
- **Determining if and how the information/web-tools should be shared with developers to incorporate into planning process as early as possible**

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Try it yourselves

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http://chesapeakeconservancy.org/mount-vernon

Questions?

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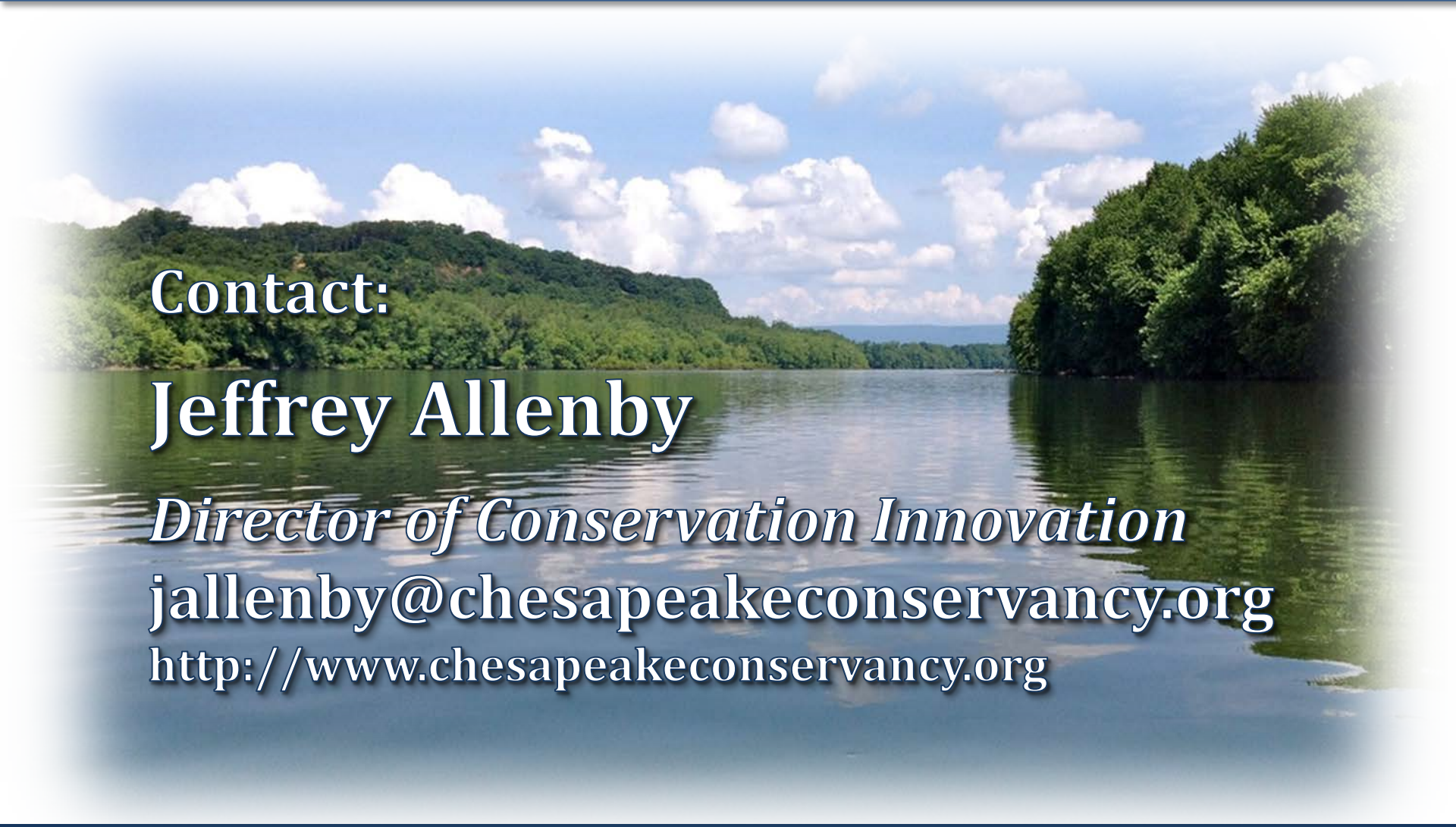

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http://www.chesapeakeconservancy.org