APPENDIX C: Cecil County Natural Resource Identification

1. Boundary and source data
   1.1. The assessment boundary was all of Cecil County, plus out to the extent of USGS SPARROW watersheds (based on NHD) draining into the county, or the nearest road outside the county, whichever was further.
   1.2. All raster calculations were done in ESRI Grid format, with a cell size = 3 m. It took too long to run computations at 1 m, and possibly some computations would not run at all.
   1.3. We merged 1 m land cover classified by the Chesapeake Conservancy for Cecil county and the neighboring counties in PA and DE, out to the assessment boundary. The neighboring MD counties were separated by rivers.

2. Forest

   2.1. Forest patches with at least 1 ac of interior
      2.1.1. Rationale:
         2.1.1.1. Forest edges contain significant gradients of solar radiation, temperature, wind speed, and moisture between the forest patch interior and the adjacent land, especially if the adjacent land is developed. Increased solar radiation at the edge increases temperatures and decreases soil moisture and, with increased wind flow, decreases relative humidity, which can desiccate plants. Increased wind speed at a newly created edge commonly knocks down trees that are no longer buffered by adjacent canopy and not structurally prepared. This poses a problem especially for wetland trees, which have shallow roots and less stable soil. Wind can also carry dust or other small particles, which can adhere to vegetation. Noise from developed land disrupts natural activity in adjacent forest or marsh, by drowning wildlife cues for territorial boundary establishment, courtship and mating behavior, detection of separated young, prey location, predator detection, and homing. Sudden loud noises can also cause stress to animals. Changes in insolation and other physical parameters at created edges change plant and animal communities there, and processes like nutrient cycling.
         2.1.1.2. Since the eastern U.S. was primarily unbroken forest prior to European colonization, many species are adapted to interior forest conditions. Edge habitat differs from interior forest in tree species composition, primary production, structure, development, animal activity, and propagule dispersal capabilities. The edge communities shift to more shade-intolerant, more xeric tree and shrub species, and early successional species. These then broadcast propagules that invade the forest interior. Edges can favor invasive species, which can then displace native species in adjacent areas. Opportunistic animals like raccoons, opossums, and cowbirds also colonize patch edges, and often invade the interior. These edge species often influence ecosystem dynamics by preying on, outcompeting, or parasitizing interior species. Cats and dogs from developed areas can also prey on or harass wildlife.

2.1.1.3. Source: *Maryland's Green Infrastructure Assessment: A Comprehensive Strategy for Land Conservation and Restoration*. http://www.dnr.state.md.us/greenways/gi/gidoc/gidoc.html.

2.1.2. Data layer: D:\Cecil_GI\Cecil_GI_GIS\forest\for_w_1ac_int

2.1.2.1. ESRI Grid format; cell size = 3 m

2.1.3. Methodology:

1.1.1.1. Identify tree canopy from the combined land cover.

1.1.1.2. Identify orchards (apples, peaches) and Christmas trees from the 2016 Cropland Data Layer, and remove from tree layer.

1.1.1.3. Convert building polygons and other impervious surfaces to grid format.

1.1.1.4. Buffer roads, railroads, and utility corridors 3 m and convert to grid format.

1.1.1.5. Convert road and railroad centerlines to grids so there are no artificial breaks as happenes when converting polygons to grids.

1.1.1.6. Subtract impervious surfaces, roads, railroads, and utility corridors from tree canopy.

1.1.1.7. Identify interior forest (>30 m from nearest edge)

1.1.1.8. Identify contiguous groupings of at least 1 ac of interior forest, and add 30 m transition back.

3. Wetlands

3.1. Wetlands + buffer

3.1.1. Data layer: Cecil_wetland_100ft_buffers.shp

3.1.1.1. ESRI shapefile

3.1.2. Methodology:

3.1.2.1. From DNR wetland layer, remove wetlands not within the county boundary

3.1.2.2. Remove farmed wetlands (“Pf”) and permanent open water.

3.1.2.3. Buffer 100 feet

3.1.3. To note, an effective buffer width will vary according to type of wetland, sensitivity to disturbance, intensity of adjacent land use, groundwater depth and hydraulic conductivity, proximity and characteristics of drainage ditches and other water control structures, slope and soil characteristics, species present, and buffer characteristics such as vegetation density and structural complexity, soil condition, etc. (Brown et al, 1990; North Carolina State University, 1998).

3.2. Wetlands of Special State Concern + buffer

3.2.1. Rationale: Regulatory

3.2.2. In Maryland certain wetlands with rare, threatened, endangered species or unique habitat receive special attention. The Code of Maryland Regulations (COMAR) Title 26, Subtitle 23, Chapter 06, Sections 01 & 02 identifies these Wetlands of Special State Concern (WSSC) and affords them certain protections including a 100 foot buffer from development. The Maryland Department of the Environment is responsible for identifying and regulating these wetlands. In general, the US Fish and Wildlife Service's National Wetlands Inventory wetlands provide the basis for identifying these special wetlands. Additional information, determined from field inspections, is used to identify and classify these areas.

3.2.3. Data layer: Cecil_WSSC_100ft_buffers.shp
    3.2.3.1. ESRI shapefile
3.2.4. Methodology:
    3.2.4.1. Remove WSSC not within the county boundary
    3.2.4.2. Buffer 100 feet

4. Floodplains

4.1. 1% (100 year) floodplain
    4.1.1. Rationale: Regulated
    4.1.2. Data layer: Cecil_100_year_floodplain.shp
        4.1.2.1. ESRI shapefile

4.2. 0.2% (500 year) floodplain
    4.2.1. Rationale: Areas vulnerable to severe storms. E.O. 13690 (1/30/15) established a new standard for flood risk reduction, which included delineating floodplains based on:
        4.2.1.1. "(i) the elevation and flood hazard area that result from using a climate-informed science approach that uses the best-available, actionable hydrologic and hydraulic data and methods that integrate current and future changes in flooding based on climate science. This approach will also include an emphasis on whether the action is a critical action as one of the factors to be considered when conducting the analysis;
        4.2.1.2. "(ii) the elevation and flood hazard area that result from using the freeboard value, reached by adding an additional 2 feet to the base flood elevation for non-critical actions and by adding an additional 3 feet to the base flood elevation for critical actions;
        4.2.1.3. "(iii) **the area subject to flooding by the 0.2 percent annual chance flood**; or
        4.2.1.4. "(iv) the elevation and flood hazard area that result from using any other method identified in an update to the FFRMS."
    4.2.2. Data layer: Cecil_500_year_floodplain.shp
        4.2.2.1. ESRI shapefile

5. Riparian buffers

5.1. Buffered streams and shorelines (frpm hydro_ln) 100 feet
5.2. Buffered lakes and ponds (frpm hydro_poly) 100 feet
5.3. Merge buffers
5.4. Dissolve overlaps

6. Steep slopes

6.1. Steep slopes (>25% in Cecil County) have development restrictions if >10,000 ft^2
6.2. From Slopes_LidarBlocks1_thru_6, select value = 3 (>25% slope)
6.3. Select aggregations of slopes >25% that are >10,000 ft^2

7. Highly erodible soils

7.1. "Highly erodible soils" are defined as those soils with a slope greater than 15 percent or those soils with a K value greater than 0.35 and with slopes greater than 5 percent. Cecil County protects erodible soils when they occur in the Critical Area (usually within 1000' of tidal shorelines/wetlands), and if they occur within the Critical Area Buffer, the buffer is extended to incorporate them.

7.2. Slopes >15%

7.2.1. Slope grid was obtained from http://lidar.geodata.md.gov/imap/services

7.2.2. Reclassify slope values >15% to a value of 1; elsewhere No Data.

7.3. Soils with K > 0.35 and slopes > 5%

7.3.1. Reclassify slope values >5% to a value of 1; elsewhere No Data.

7.3.2. Multiply by soils with K > 0.35.

7.3.2.1. Grid of highly erodible soils with slope >5% is K_gt35_sl_gt5

7.4. Mosaic the above two grids

7.4.1. Grid: high_erodible