* For evaluative purposes, I’ve created three versions of exclusions, as follows:
* Night time population only
  + Assumes that distributed wind turbine heights are constrained by the residential population density, with nighttime population as a surrogate for residential population
  + Created by reclassifying Landscan 2011 night time population (from HSIP 2012 database) into the following classes:

|  |
| --- |
| 0 people per 90 m night time – 80 m max height |
| 1-4 people per 90 m night time – 50 m max height |
| 4-6 people per 90 m night time – 40 m |
| 6-10 people per 90 m night time – 30 m max height |
| >10 people per 90 m night time—exclude/no turbines allowed (this indicates a high population residential area) |

* + Results are saved in:
    - S:\mgleason\DG\_Wind\Data\Analysis\landscan\_exclusions
    - \*\* raster values indicate the max height allowed in each cell
* Night time population plus canopy cover
  + Night time population + canopy cover at 20%
    - Where canopy cover is greater than or equal to 20%, turbines less than 50m in height will be excluded. Turbines 50m and above will not be affected. Based on average canopy cover in the surrounding 90m by 90m area.
  + Night time population + canopy cover at 40%
    - Where canopy cover is greater than or equal to 40%, turbines less than 50m in height will be excluded. Turbines 50m and above will not be affected. Based on average canopy cover in the surrounding 90m by 90m area.
  + Implementation:
    - Calculate focal mean in 3x3 moving window off of the NLCD 2001 Canopy Cover rasters
      * Focal Statistics 3x3 rectangular moving window, stats = mean (output to esri grid for CONUS or gdb raster for AK, HI to facilitate completion on big rasters)
    - Reclassify two different versions:
      * >=20% 🡪 0, <20% 🡪 1
      * >=40% 🡪 0, <40% 🡪 1
      * In Raster Calculator:
        + "[region]\_3x3\_mean"<20
        + "[region]\_3x3\_mean"<40
    - Project reclassified canopy cover rasters to WGS84, with same cellsize and alignment as reclassified Landscan nighttime pop exclusions rasters
      * Set environments extent, cellsize, and snap raster based on the corresponding reclassed landscan rasters
      * Project with nearest neighbor sampling to WGS84 geographic
    - Using the projected reclassified canopy cover rasters, use Raster calculator to set the final exclusion layer:
      * Con(("hi\_maxheightm" < 50) & ("hi\_cc\_20pc\_wgs84" == 0),0,"hi\_maxheightm")
  + Results are saved as:
    - S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\ak\_maxheight\_cc\_20pc
    - S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\ak\_maxheight\_cc40pc
    - S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\hi\_maxheight\_cc\_20pc
    - S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\hi \_maxheight\_cc40pc
    - S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\us\_maxheight\_cc\_20pc
    - S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\us \_maxheight\_cc40pc
  + Projected all results to 200 m , WGS 84 Albers grid (using nearest neighbor resampling), saved as:
    - S:\mgleason\DG\_Wind\Data\Analysis\landscan\_exclusions\usmaxhtm\_200m
    - S:\mgleason\DG\_Wind\Data\Analysis\landscan\_exclusions\akmaxhtm\_200m
    - S:\mgleason\DG\_Wind\Data\Analysis\landscan\_exclusions\himaxhtm\_200m
    - S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\us\_maxheight\_cc\_20pc\_200m
    - S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\ak\_maxheight\_cc\_20pc\_200m
    - S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\hi\_maxheight\_cc\_20pc\_200m
    - S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\us\_maxheight\_cc\_40pc\_200m
    - S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\hi\_maxheight\_cc\_40pc\_200m
    - S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\ak\_maxheight\_cc\_40pc\_200m