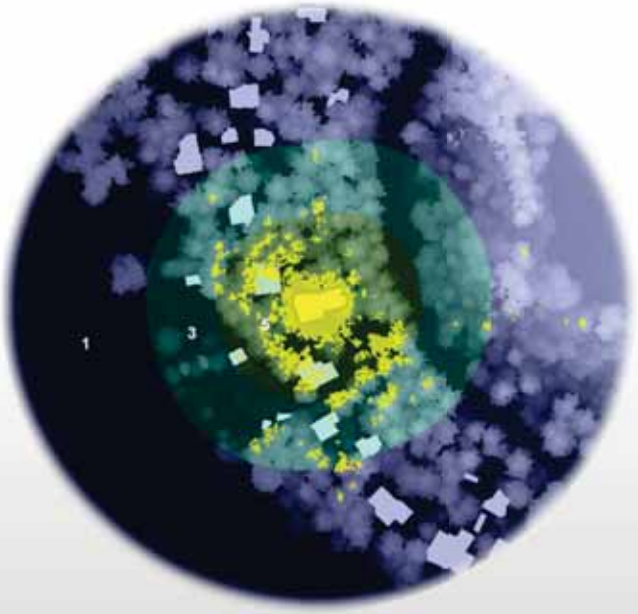
Viewshed Analysis to Rank Home Privacy

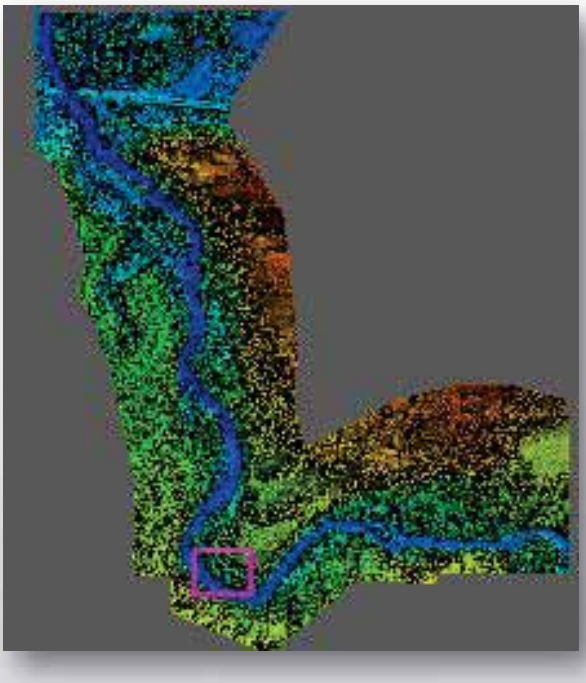


Jen Memhard and Emily Rush

Geog 593
December 11, 2014

Study Area

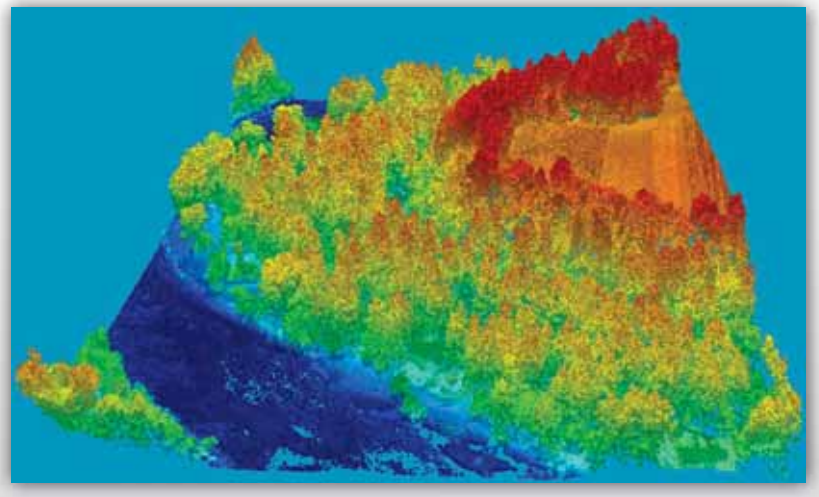
Scenic, private residential neighborhood along the Sandy River, east of Portland, OR, on the Historic Columbia River Highway



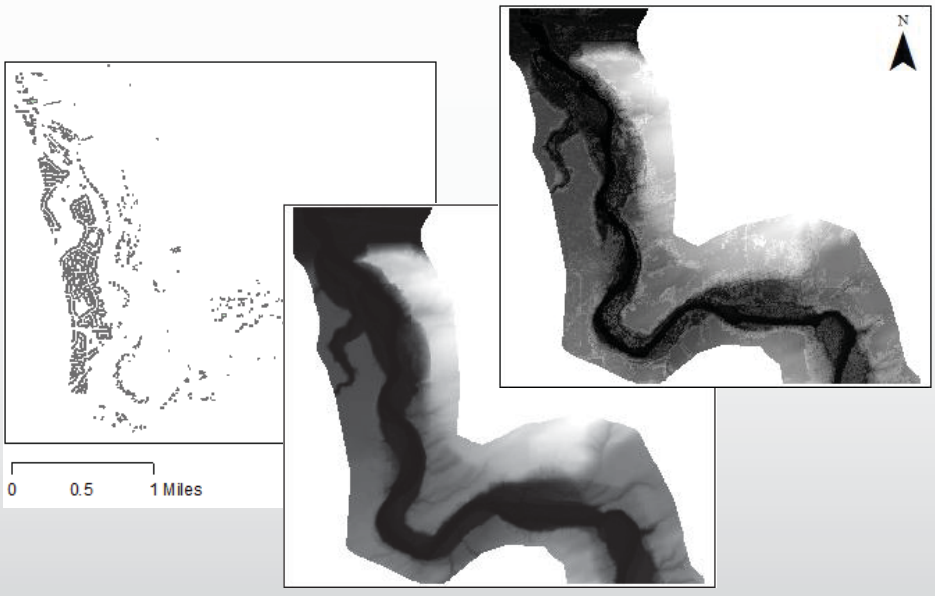
Data Source: Oregon LiDAR Consortium, Sandy River 2011 Lidar Project

ENVI: LiDAR for Feature Extraction

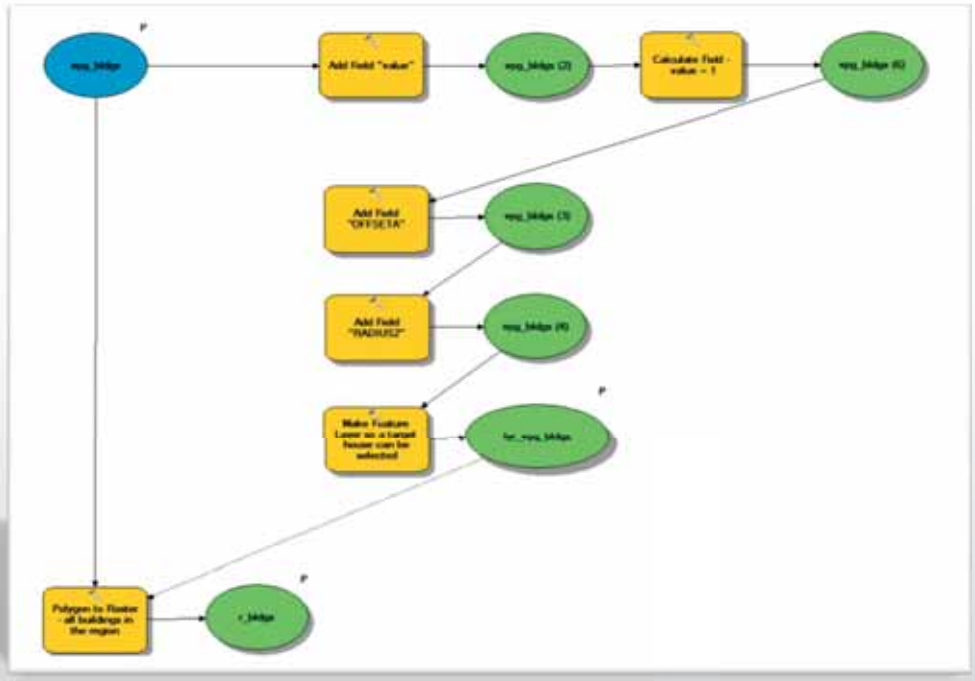
- Building footprints extracted from first-return lidar point cloud



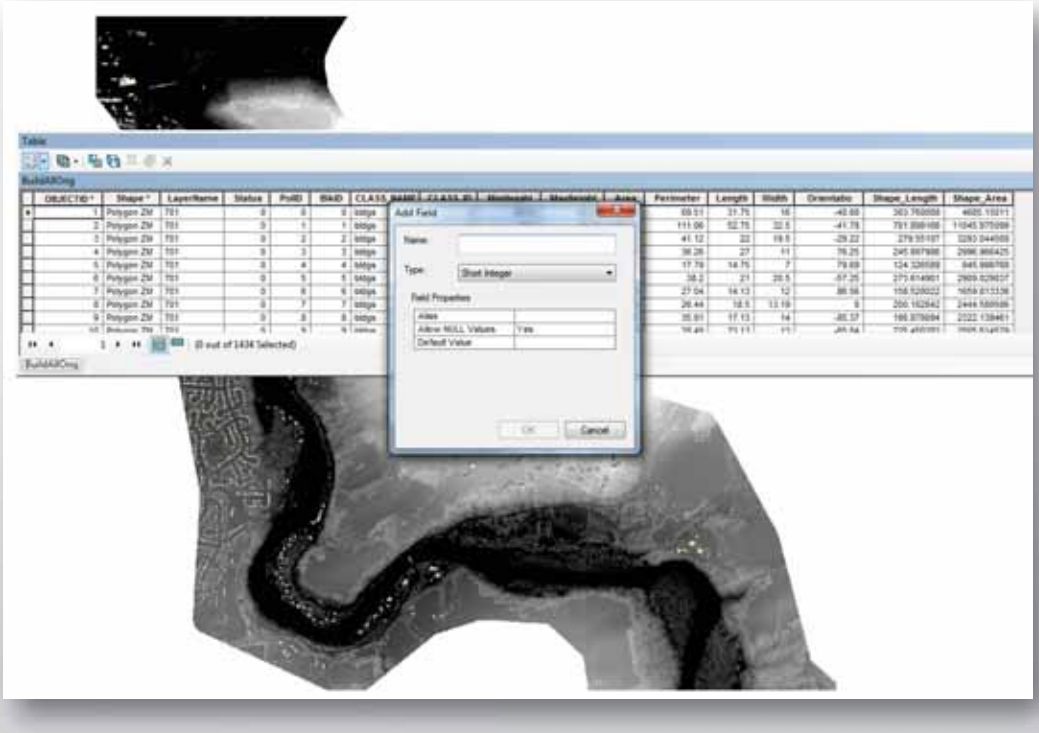
Model Inputs: Building Footprints; Bare Earth and First Return DTMs



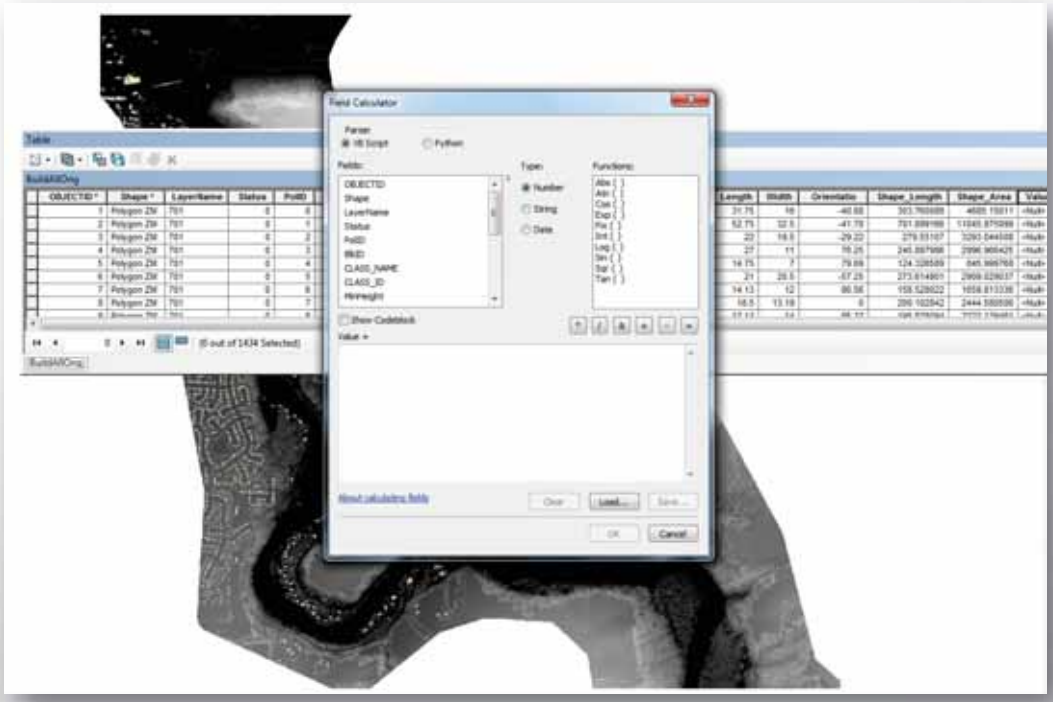
Model 1: First tool



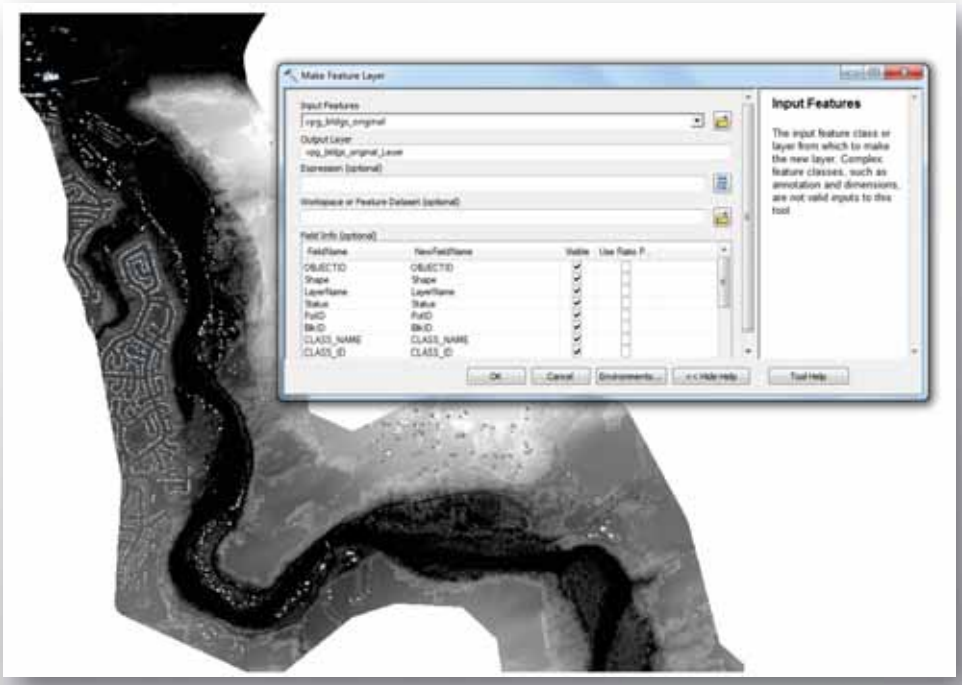
Model 1: Add Fields



Model 1: Field Calculator

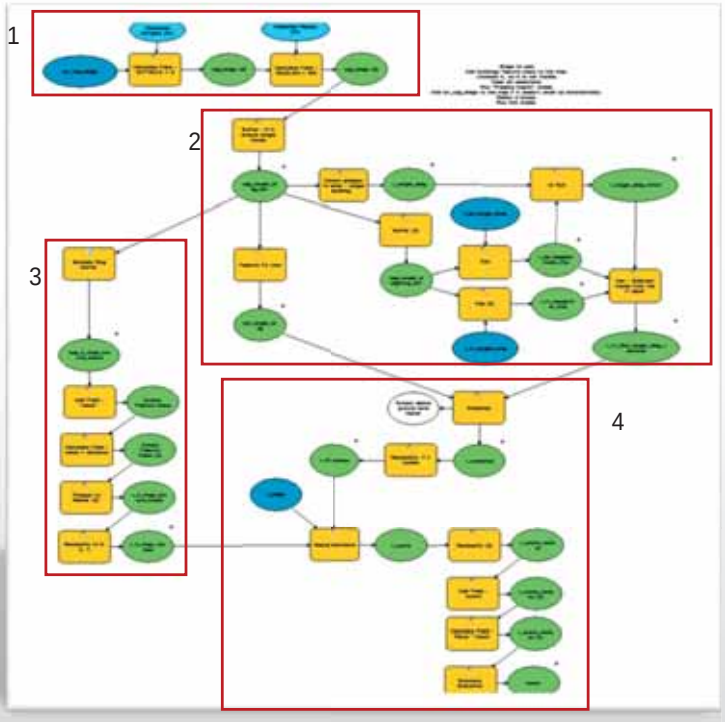


Model 1: Create Building Layer

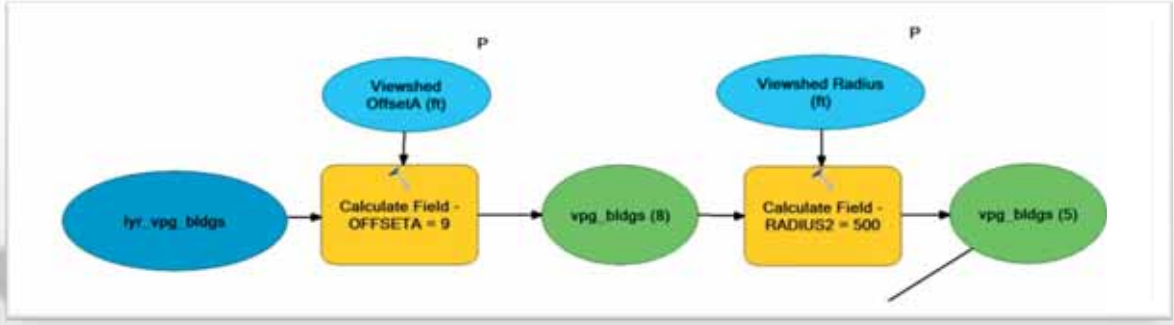


Model 1: Polygon to Raster

Model 2



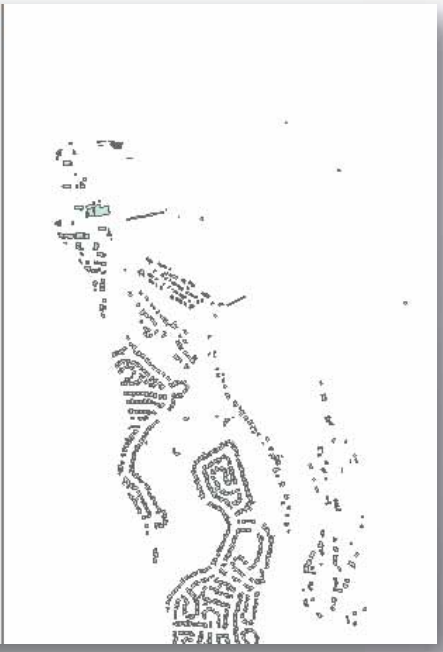
Model 2: Segment 1, Calculate Fields



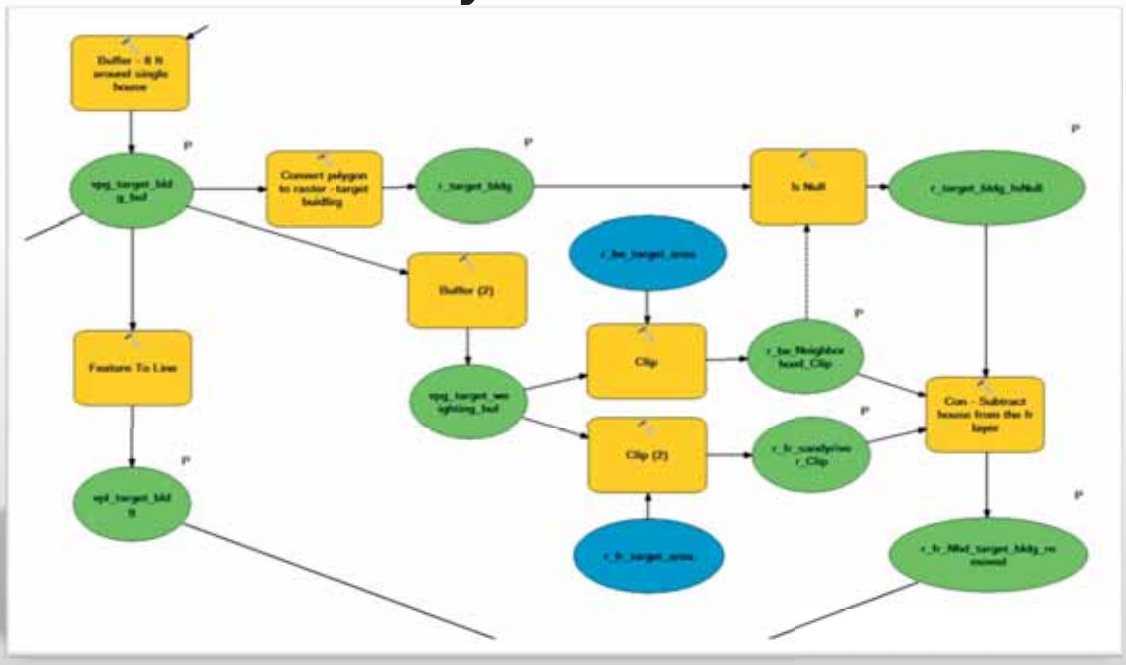
Model 2: Segment 1, Calculate Fields

vpg_bldgs_Layer1

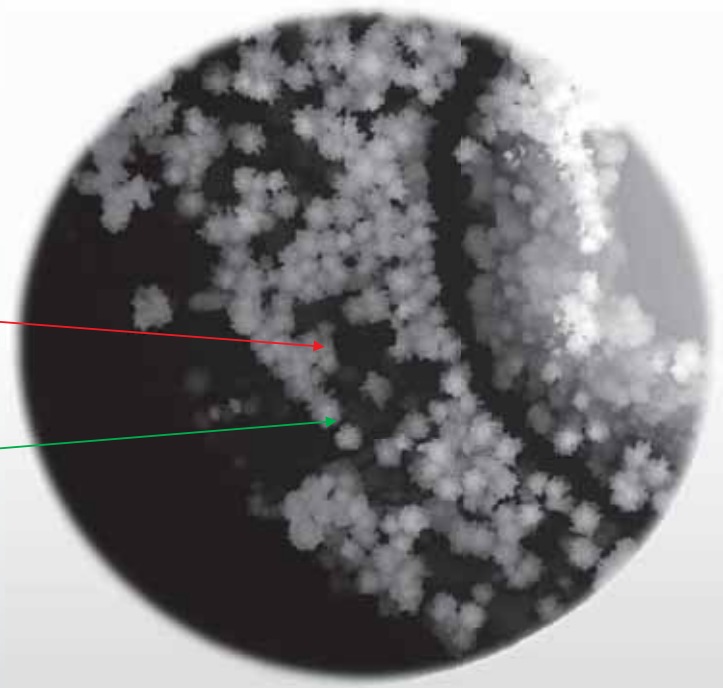
Shape_Length	Shape_Area	value	OFFSETA	RADIUS2
303.760088	4685.15011	1	9	500
701.899166	11045.975099	1	9	500
279.55107	3293.044508	1	9	500
245.897986	2996.966425	1	9	500
124.326589	845.999768	1	9	500
273.614901	2909.029037	1	9	500
158.528022	1659.813336	1	9	500
200.102842	2444.580506	1	9	500
195.878094	2322.139461	1	9	500
225.450282	2505.614529	1	9	500
175.777819	1143.95739	1	9	500
88.531329	390.485865	1	9	500
72.701933	271.086835	1	9	500
101.9464	382.073595	1	9	500
307.232966	4648.839179	1	9	500
242.77959	3051.904736	1	9	500
230.909315	2799.134397	1	9	500
148.674875	1293.155204	1	9	500
86.831722	352.79534	1	9	500
194.683408	2248.87153	1	9	500
197.57682	2251.297673	1	9	500
65.478903	255.245089	1	9	500
319.675936	3977.516796	1	9	500
201.217071	2167.390125	1	9	500
124.281444	372.443833	1	9	500
187.651004	1696.03829	1	9	500

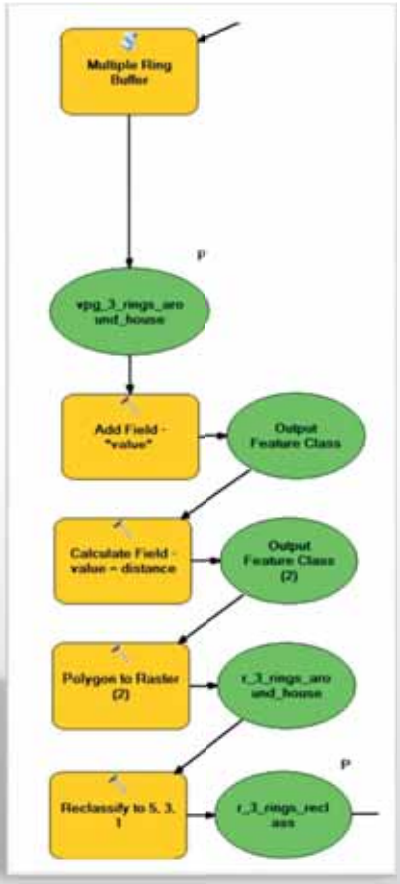


Model 2: Segment 2, Null House and Create Polyline



Model 2: Segment 2, Remove Selected House





Model 2: Segment3, Multiple Ring Buffer

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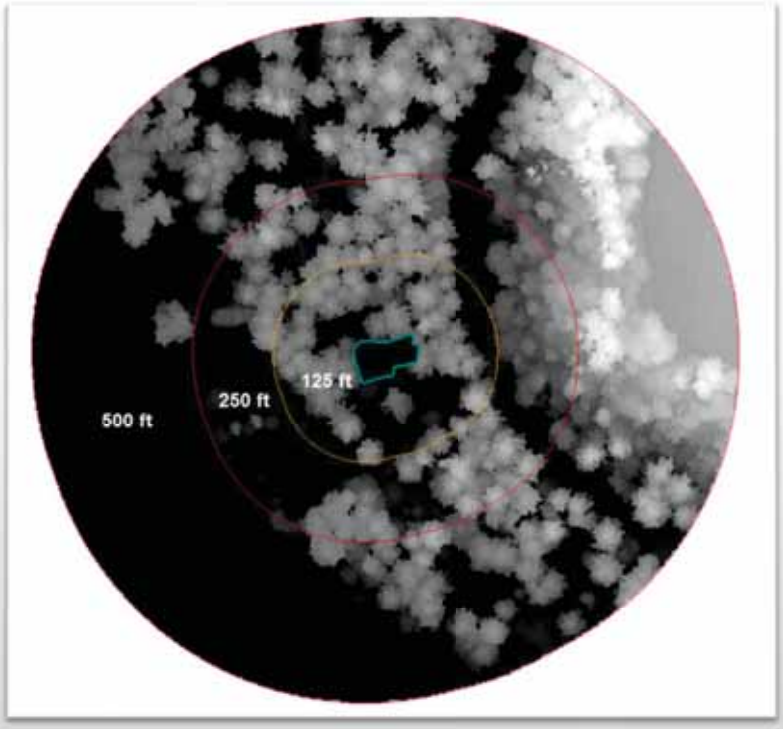
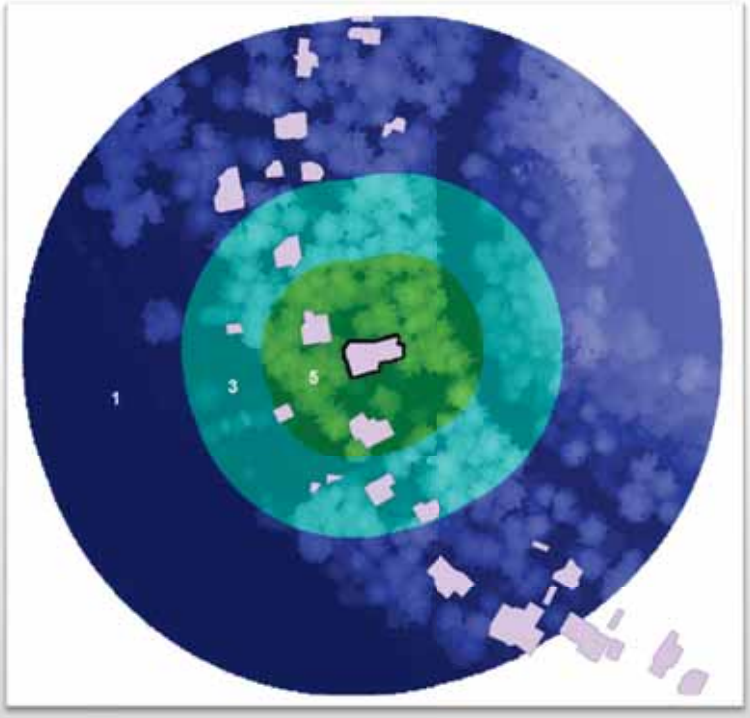
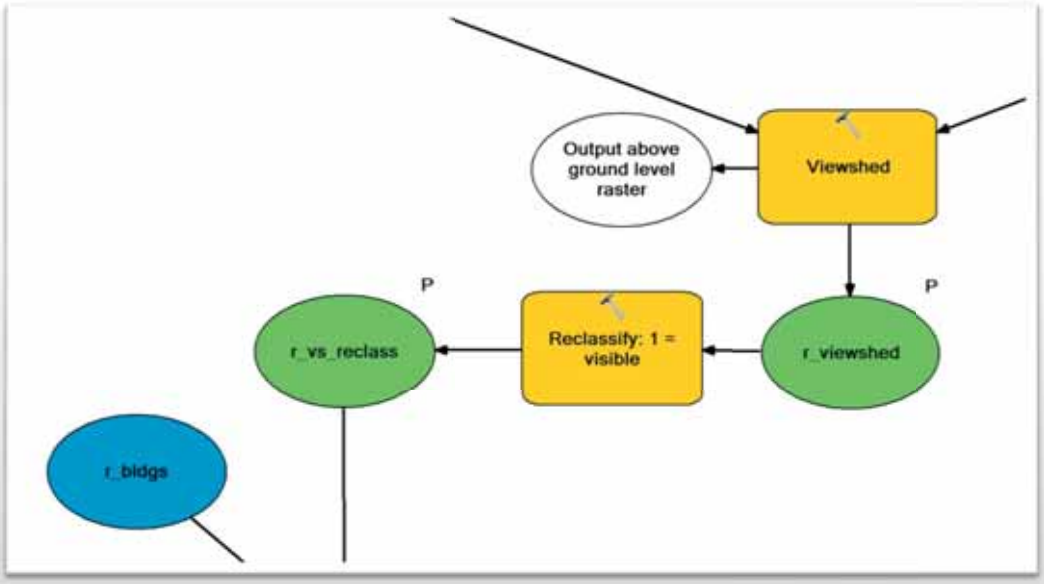


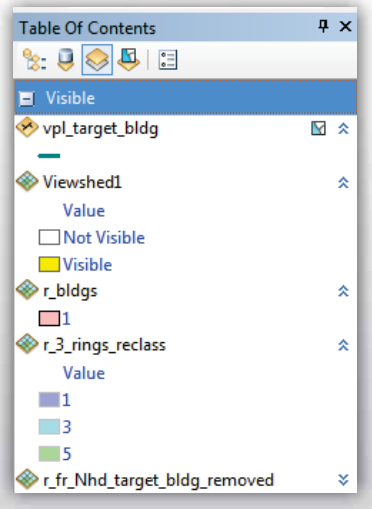
Model 2: Segment 3, Polygon to Raster & Reclassify

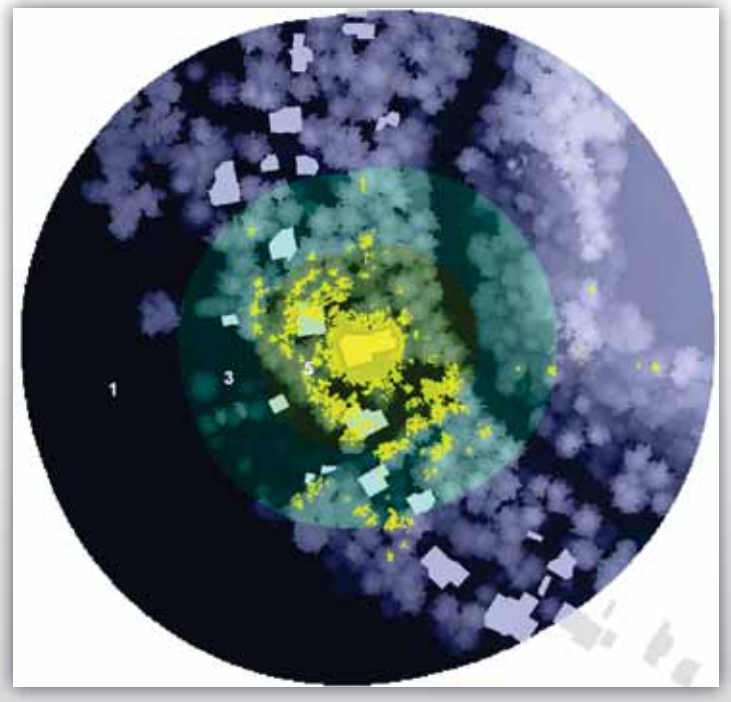


Model 2: Segment 4, Viewshed

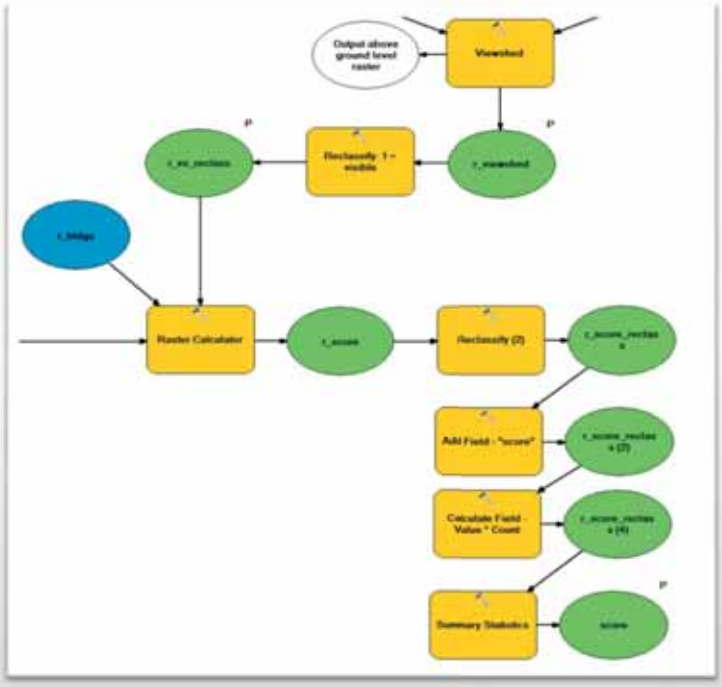


Model 2: Segment 4, Viewshed

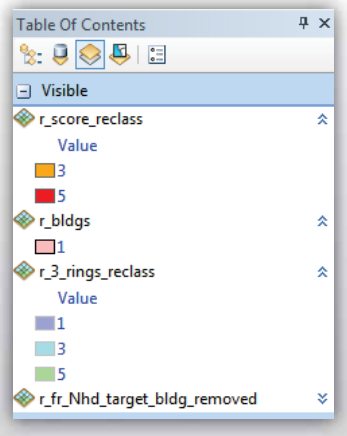


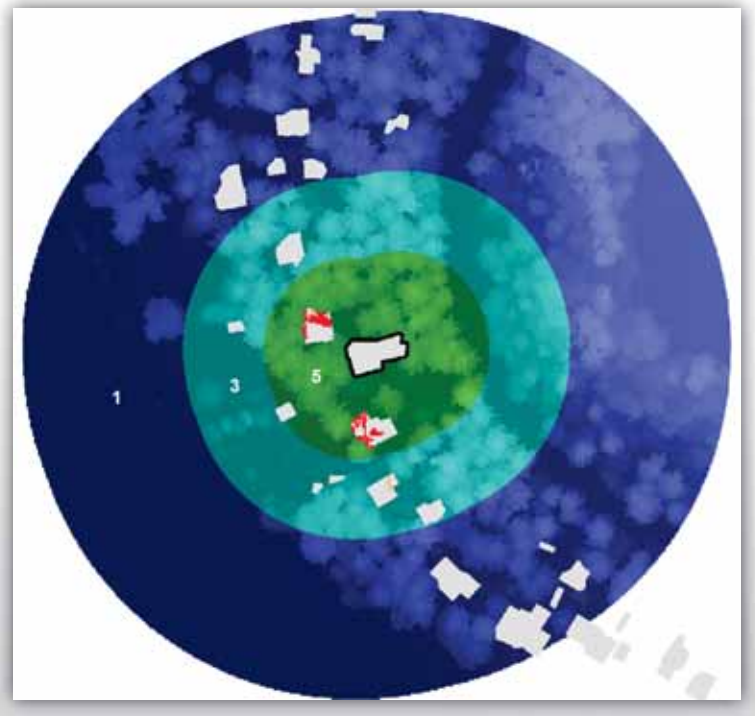


Model 2: Segment 4, Calculating Privacy Score

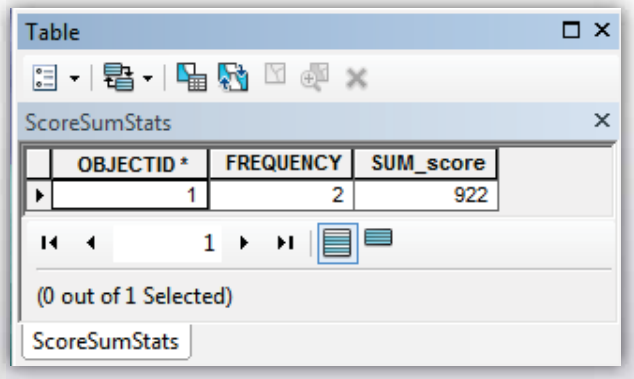


Model 2: Segment 4, Calculating Score

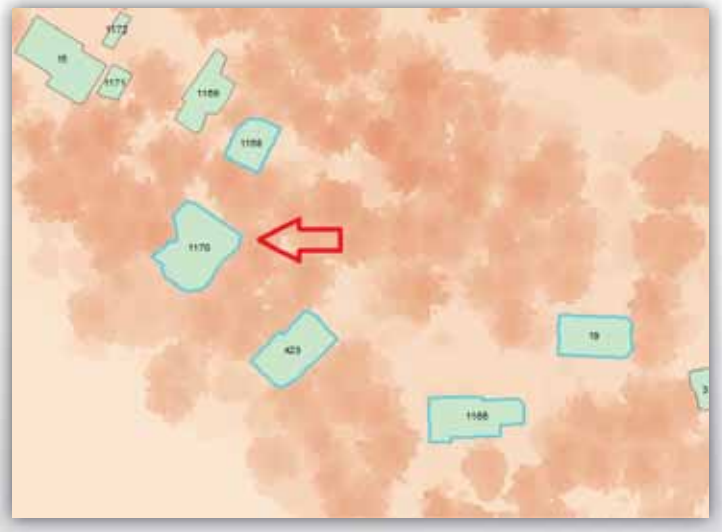




Model 2: Segment 4, Privacy Score: '922'.



Results of 5 Test Houses

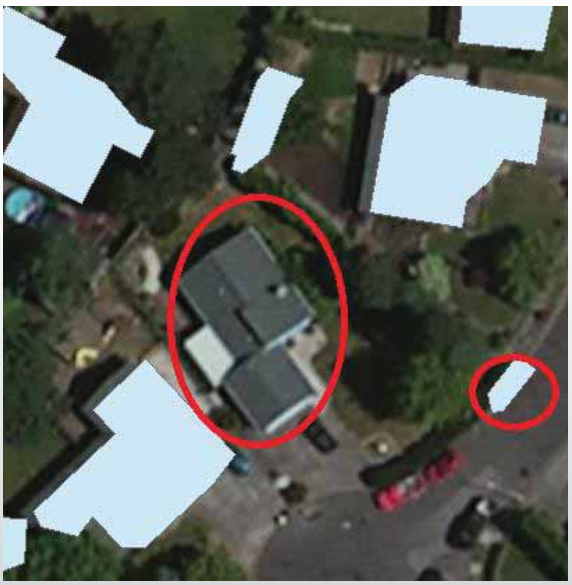


Building ID	Privacy Score
1170	No Data (perfect privacy)
423	1
1168	25
1166	705
19	1234

Issues

Lidar feature extraction errors:

- Some buildings missed
- Some natural features (hedge) classified as buildings



Conclusion

- We have created a reusable tool
- Enhancements
  - Window locations could be used instead of the vertices of the building footprint (note this would require additional data input by the user);
  - Include 2nd and 3rd floors
  - Include outside recreation areas
  - Road visibility
  - Privacy enhancement by the addition of landscaping.

References

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