Building Digitization and Tax Lot Association Methods

This appendix explains the data and general methods used in creating building footprints for the Eugene-Springfield and Lane County landslide hazard and risk study area. These methods included using lidar-derived hillshades, orthorectified imagery, and county tax lots to add to an existing building footprint dataset from LCOG and produce a complete building footprint dataset for the study area. All editing and analysis was performed using Esri® ArcMap®, version 10.4 software. This building footprint dataset and associated generalized tax lot information were used in exposure analysis. However, the generalized tax lot information was not included in the final building footprint delivery.

The Lane County Council of Governments (LCOG, https://www.lcog.org/) provided initial building footprints and tax lots in 2016. The most recent imagery datasets were used to increase the accuracy and precision of these building footprint polygons. These datasets are listed below:

- Lidar-derived, highest hit hillshades at 1-meter resolution. The lidar imagery used is from project areas "Lane County 2014" (collected in 2015) and "Willamette Valley 2009" (collected in 2009). Downloaded via: https://gis.dogami.oregon.gov/maps/lidarviewer/
- Orthoimages from the National Agriculture Imagery Program (NAIP) for 2014 at 1-meter resolution. Downloaded via: https://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/naip-imagery/.
- Orthoimages from the National Agriculture Imagery Program (NAIP) for 2016 at 1-meter resolution. Downloaded via: https://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/naip-imagery/.
- Esri® World Imagery service accessible via ArcMap software (https://www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9)
- Google Street View™ (https://www.google.com/streetview/) and Bing™ "Bird's eye view" imagery accessed using SIGGIS Street & Bird View Esri ArcGIS toolbar add-in (https://www.arcgis.com/home/item.html?id=ce579037a3e442a59d53ec3e4c322088).

The first step to creating a complete building footprint dataset was to assess and update the initial footprint polygons provided by LCOG. All digitizing was done at a 1:800 or larger scale; buildings under 400 square feet were not digitized or edited. During the editing process, footprints were assigned a lineage code as shown in the table below.

Lineage Domain

Code	Description
1	Original LCOG building footprint
2	Original LCOG—Does not exist in current imagery
3	Original LCOG—Modified by DOGAMI
4	Additions—building created by DOGAMI

Lidar-derived, highest hit hillshades were used for digitizing new footprints where buildings were visible in the lidar imagery. If a building did not appear in the lidar-derived data, e.g., was built after the lidar was collected, orthoimages were used (Esri® World Imagery or NAIP). When NAIP was needed, imagery collected in 2014 was used outside of the Eugene-Springfield city limits and imagery collected in 2016 was used within the city limits. After all additional building footprints were added to the overall dataset,

topology checks were conducted to determine if there were any footprints that overlapped each other or were duplicates. Duplicate building polygons were deleted, except for original LCOG footprints not found in current imagery. These were marked as exceptions. Most small “sliver” errors were also marked as exceptions.

Finally, LCOG tax lots, with the aid of World Imagery and NAIP when necessary, were used to assign a generalized land use and improvement value to each building footprint. A building was assigned a generalized land use value based on the zoning value of the tax lot in which it was located. This step began with a visual scan to determine if any footprints (1) spanned multiple tax lots or (2) were not associated with a tax lot. For a building footprint that spanned two or more tax lots, either the building was split between two or more tax lots, or tax lots were merged. This was most common with large commercial buildings, condominiums, or apartments. When a building did not have an associated tax lot, tax lot boundaries were adjusted to include the corresponding building’s centroid. Topology checks were then run to ensure that there were no overlaps in tax lot boundaries. Final quality control checks were done to determine if there were either remaining tax lots with significant building value but no building, or building centroids not located within a tax lot.