

Make like a tree and leaf

Turning unclassified LiDAR into a tree canopy dataset.

Our LiDAR

- Flown leaf-off (Dec. 2011)
- Countywide
- Density of 1pt/sq. meter
- No vegetation classes
- Nearly 2B points

Data Source

Z Range: 382.140000, 1560.680000
LAS Files: 591
Surface Constraints: 2
LAS points: 1,994,656,768

Classification code statistics:

1 Unassigned: 1,090,209,223
2 Ground: 898,001,277
7 Noise: 125,695
9 Water: 5,929,211
10 Reserved: 391,362

Uses

- Contour creation
- DTM/DSM generation
- Ortho photo rectification
- Floodplain determination

Other Uses

- Elevation data in IMS
- Sewer manhole elevation

▼ **JCW Sewer Manholes - 51181** [Show](#)

Manhole	THM1 (64)286
Status	Active LPS
X	2243486.9
Y	207051.8
Structure Type	LPS
Subtype	LPS Pipe Reducer
Map ID	R03SE
Location	TH09, Lsd 6
RimElev	1065.01400000

Lat, Lng (dd): 38.856199, -94.730969
Stateplane X, Y: 2243071, 207233
Elevation: 1049 ft.

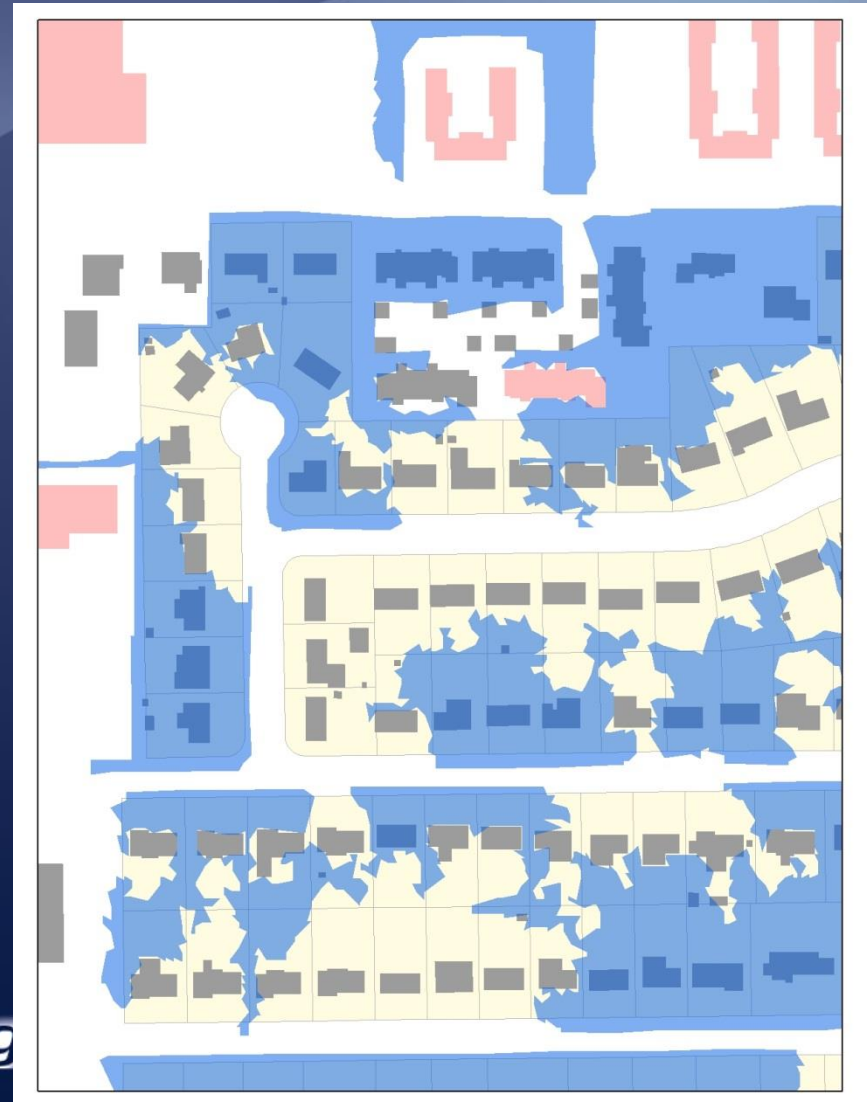
Identify Results	
Property	Location
Welcome Shannon Logout Search Print All Map Feature	
Field	Value
City	Olathe
AIMS Map Number	R03 (T-R-S: 14-24-03)
Quarter Section	SE
Zip Code	66062
Fire District	Olathe Fire
	Nearest Station: Olathe, Stn 3 (1.7 miles)
Sheriff District	0
Commissioner District	3
Commissioner	Steve Klika
Watershed	Tomahawk Creek (TMDL Regulated)
FEMA Flood Panel # (2009)	20091C0096G
Parcel Centroid Coordinates	
KS State Plane, North, NAD83	2243082, 207271.55
Latitude/Longitude (DMS)	38° 51' 22.7", -94° 43' 51.3"
Latitude/Longitude (DD)	38.856304, -94.730927 (Requires Google Earth)
Lidar Elevation (3/06)	1,048.4 ft. (nearest point: 2.2 ft)

Needs

- Public Works needed data to help notify residents of changes to the county leaf pick-up/drop-off procedures
- JCW needed tree data to run root intrusion analysis on their pipes for a multi-million dollar BRE project

The Problem

- Veg data created in 2000
- Gaps in coverage (only 14K features)
- Not very organic
- Other options for updating provide mixed results



Options

- LP 360 (\$4,000/software only)
- Manual update for JCW (160+ hours)
- Manual update full County (240+ hours)
- LiDAR grid from SQL (unknown results)
- LiDAR vendor (\$15,000+ for classification and tree canopy generation)

The Solution (20)

- LAS to Multi-point (2)
- Aggregate points (10)
- Merge & dissolve (1)
- Remove spikes (2)
- Eliminate polygon part (1)
- Smooth (2)
- Small feature clean-up (1)
- Remove features in buildings and pavement edge (1)

} Ran simplify
and repeated

LAS to Multipoint (2)

- 3D analyst required
- Create subset of LiDAR points
- Manageable
- Reduced computing time
- Used as base of polygon generation
- 2nd returns and “first of many”

Aggregate Points (10)

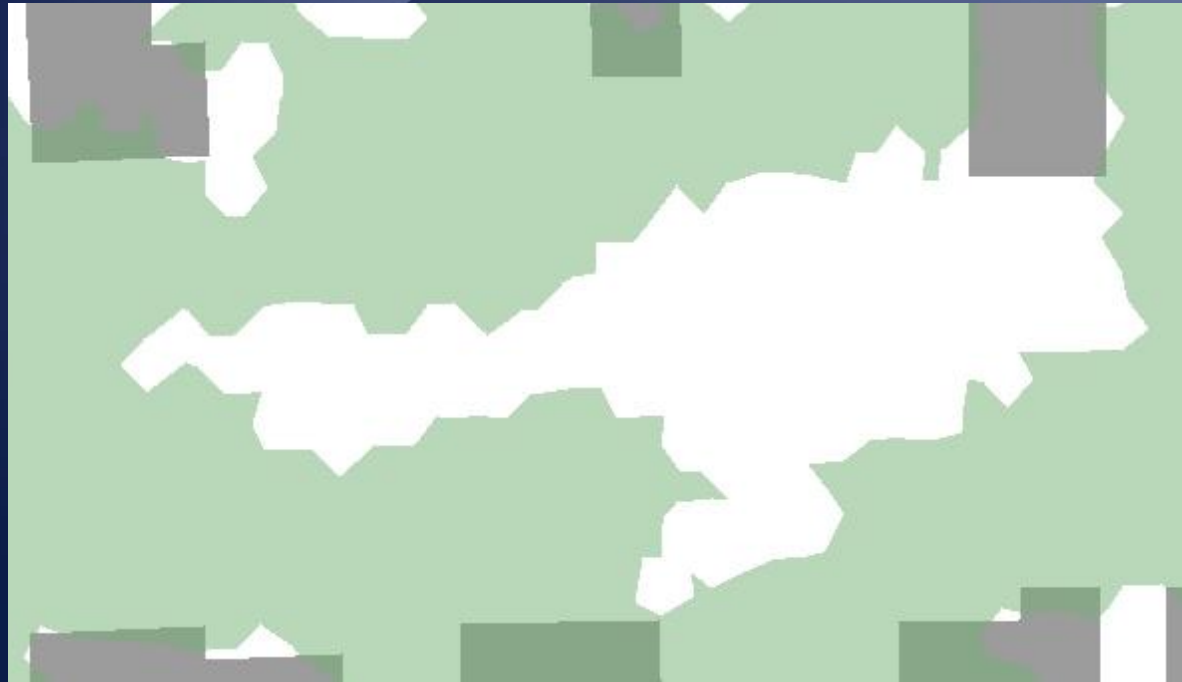
- Split county into 8 sections
- Used distance of 10 feet
- Vector data
- Polygon generation took over an hour per section
- Nearly 80,000 multipoint features

Merge and Dissolve (1)

- Combined 8 sections into 1 dataset
- Countywide
- Nearly 550,000 features generated

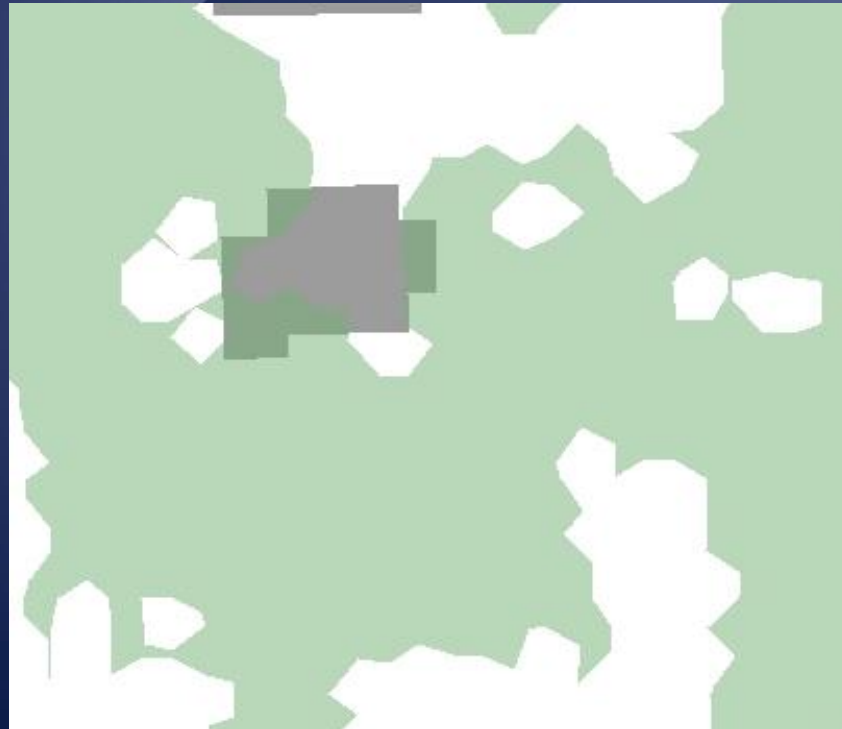
Remove Spikes (2)

- FME
- Removed spikes less than 45°



Eliminate Polygon Part (1)

- No features $< 2,000\text{ft}^2$
- Still see small fields, ponds and streams



Smooth (1)

- Get rid of sharp angles
- Paek smoothing algorithm
- Tolerance 25'
- More aesthetic, organic quality

Cleanup (2)

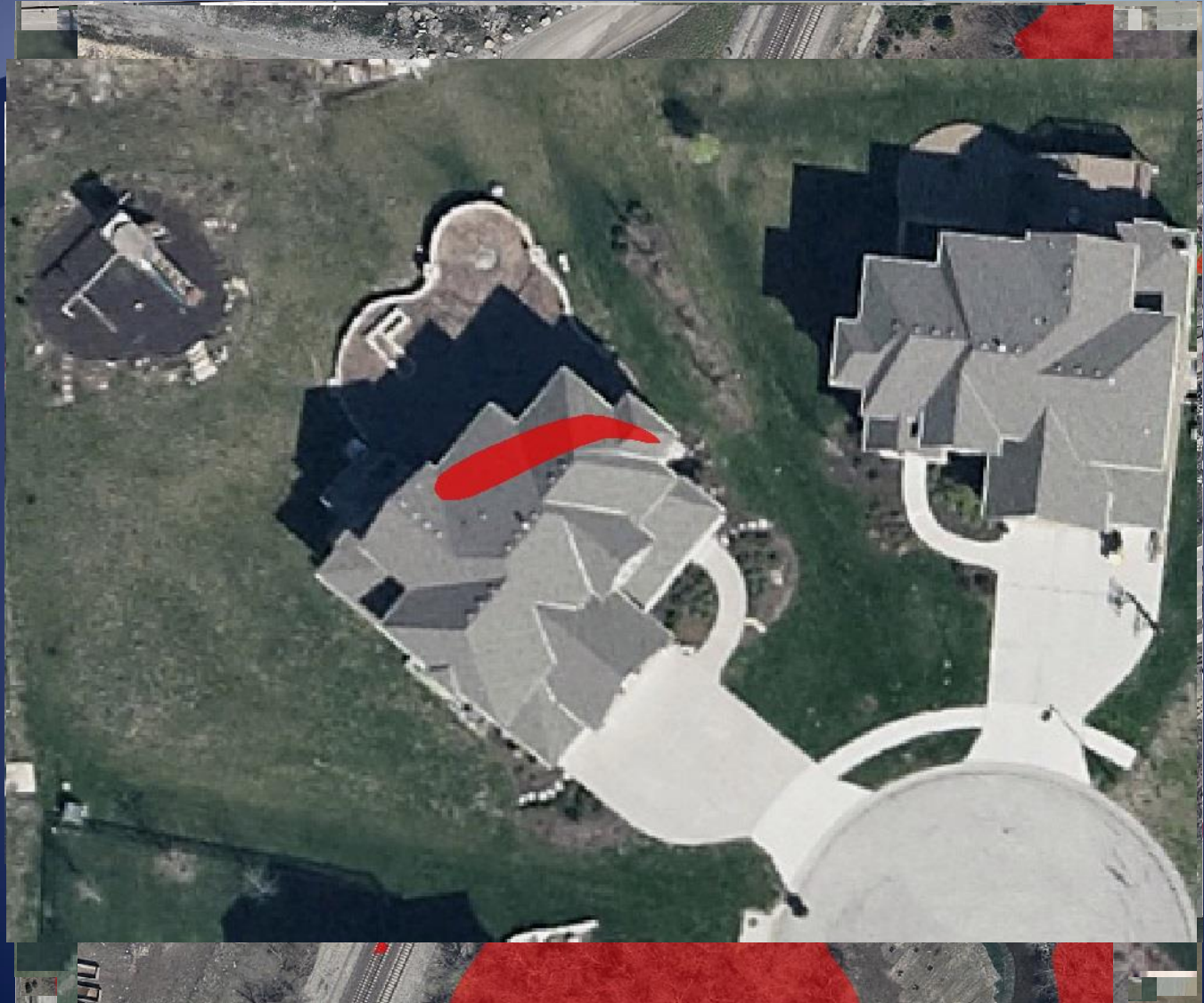
- Features 100% within building footprints and edge of pavement
- No feature $< 50\text{ft}^2$

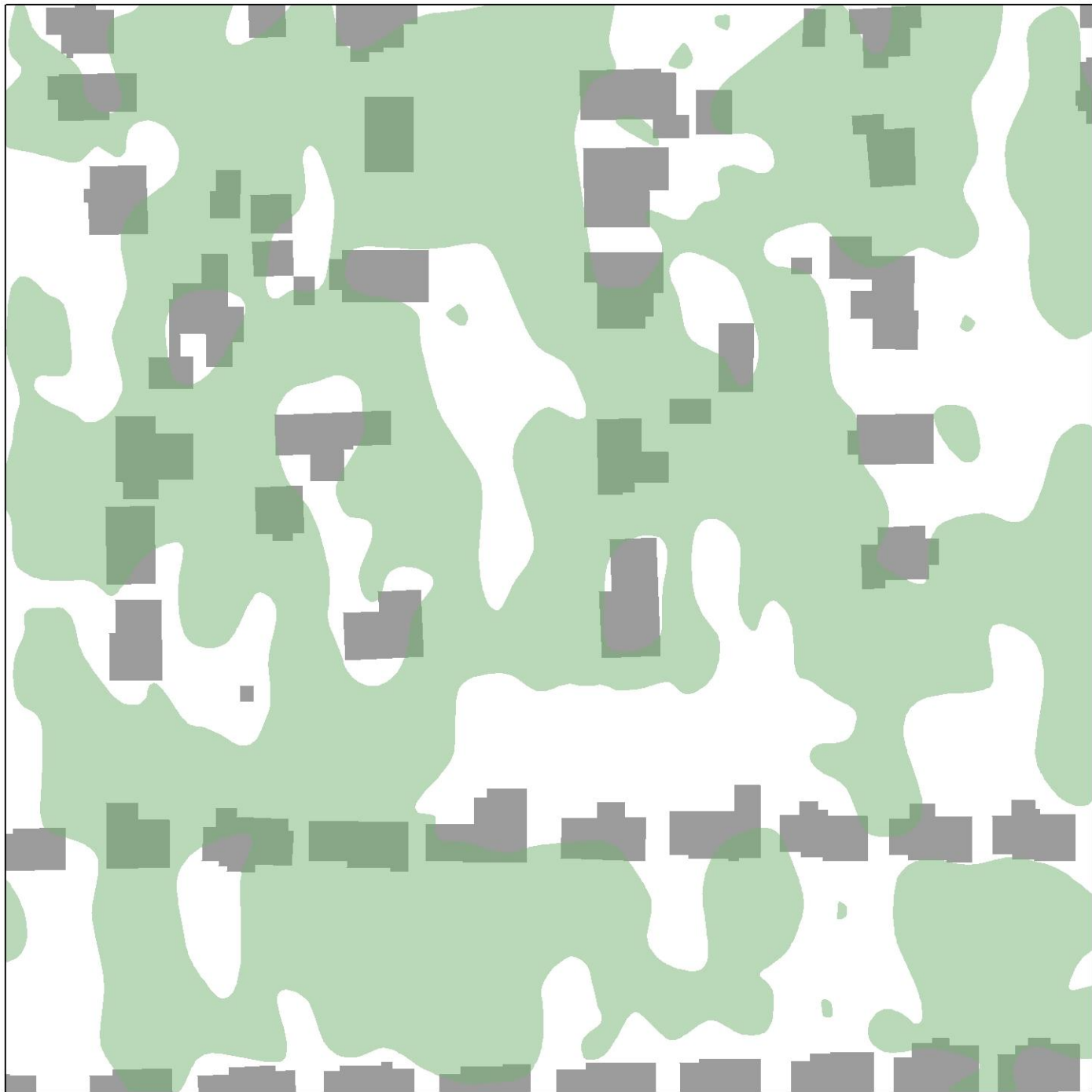
The result

- 2nd returns generated 537,931 features
- First of many returns generated 179,071 features
- Over 717,000 features

QC (50)

- Billboards
- Ball fields
- Cleared trees
- Decks
- Greenhouses
- Home construction
- Highway signs
- Loading docks/other industrial areas
- Noise
- Other construction
- Overlapping eaves
- Pagodas
- Recently cleared lots
- Roof lines
- Semis/Trailers
- Substations/Transmission lines
- Towers
- Trailers
- Trains
- Utility lines/poles
- Weird roofs





Final Results

- 2nd returns yielded 513,109 features (a net decrease of just over 24,800 features)
- First of many returns generated 167,381 (a net decrease of 11,690 features)
- Final dataset (clipped to JoCo) contains over 645,000 features
- Estimated cost/savings (70 hrs @ \$50hr = \$3,500) vs. \$15,350

Accessing the Data

- Planimetric feature on IMS
- Available for download
- Local jurisdictions can access via SDE

Next Steps

- Tentative 6-year update cycle with LiDAR flight
- Could apply avg. height to polygon features by intersecting with LiDAR points
- Could also go back and apply veg classification to LAS files

Q&A

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