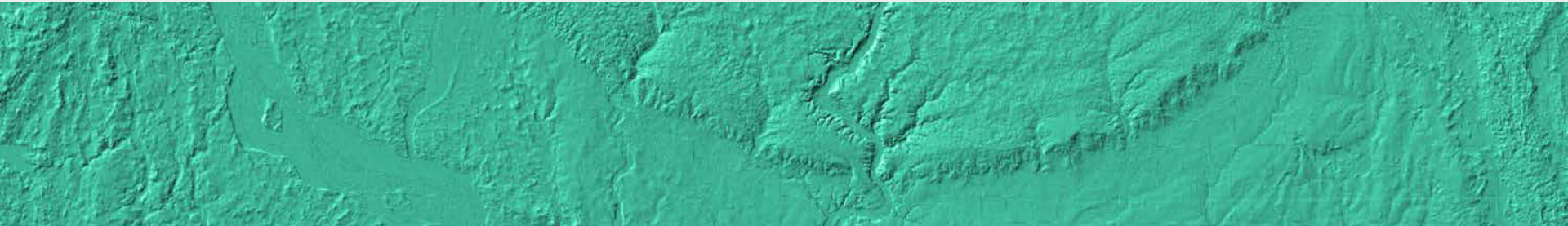




# LiDAR for Iowa

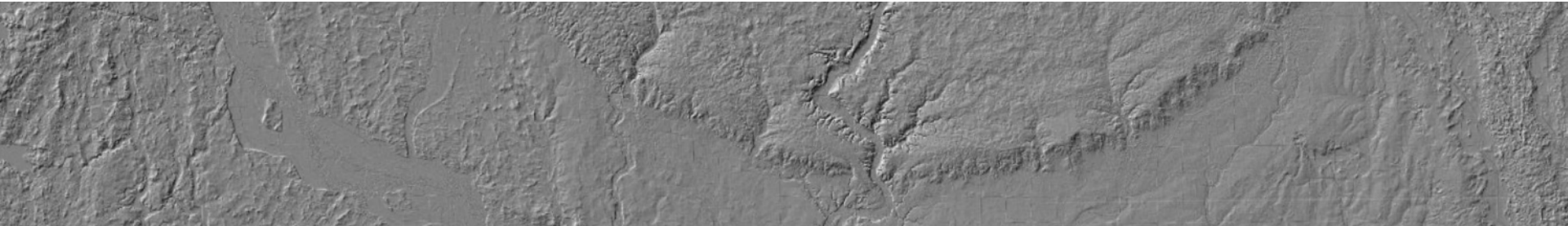
Refreshing Iowa's Elevation Data





# LiDAR for Iowa

- Refresh Iowa's Elevation data to meet USGS 3DEP QL2 Standards or better
- Produce elevation products usable in a broad range of applications
- Provide the raw point cloud and elevation products to project partners and the public





# LiDAR Refresher and Background

**LiDAR** (light detection and ranging) is a remote sensing method that measures distance to a target using pulses of laser light and measuring the reflected pulses with a sensor. Many types of sensors.

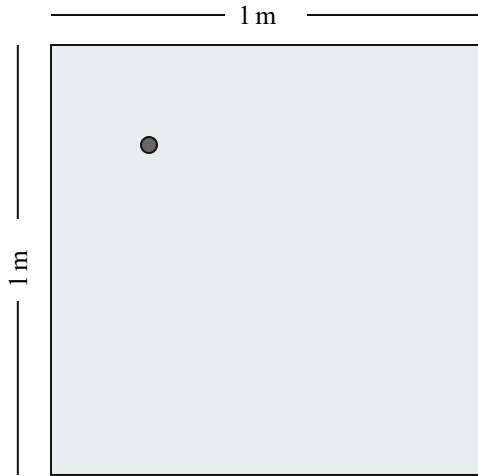
**Point cloud** - the distances (Z coordinates) that are combined with position using GPS collected coordinates (X, Y coordinates), intensity, and return values to create a dense collection of elevation points. Density of the point cloud often expressed as point per square meter.

**Digital Elevation Model (DEM)** - a cell or raster based model usually representing the elevation of the earth's surface. Often interpolated from the last-return point cloud data or derived from aerial photos.

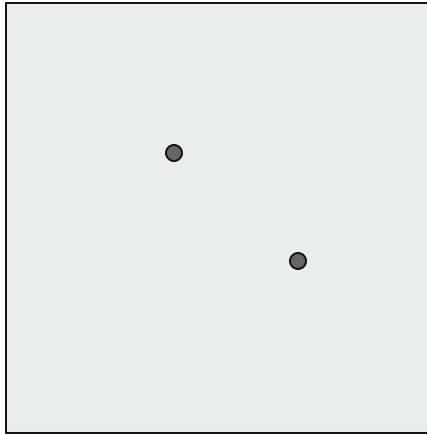
**Quality Level (QL)** - USGS categories used to define LiDAR accuracy and density specifications. Number of points on average collected for a given area, vertical and horizontal accuracies.



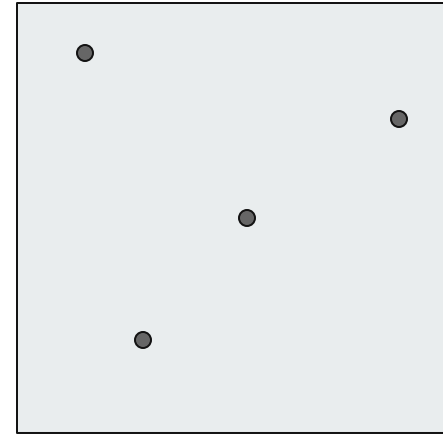
# Point Density



QL 3 - 1 point on average  
Iowa's current data



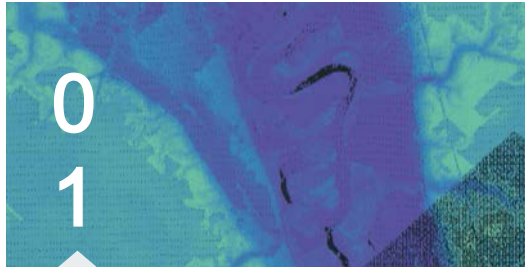
QL 2 - 2 points on average  
Proposed collection



QL 2+ - 4 points on  
average

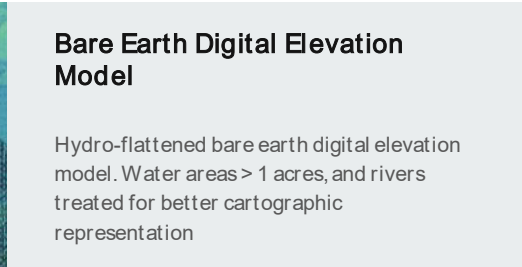


# Iowa Core Products



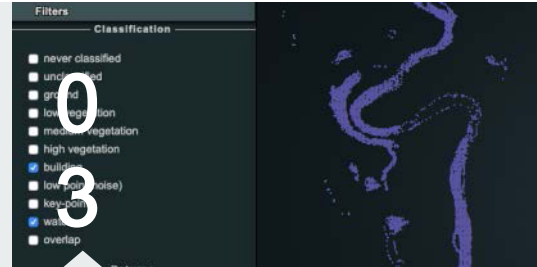
## Point Cloud Data

LiDAR point cloud data collected from fixed wing aircraft following USGS 3DEP QL2 or better specifications.



## Bare Earth Digital Elevation Model

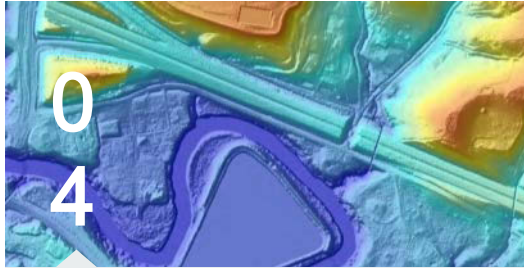
Hydro-flattened bare earth digital elevation model. Water areas > 1 acres, and rivers treated for better cartographic representation



## Point Classification

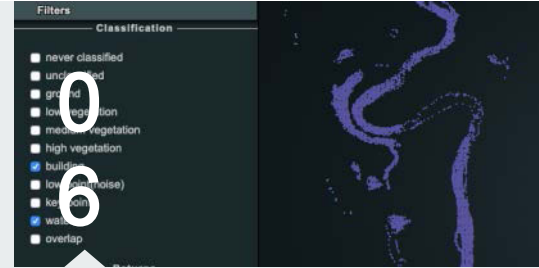
Points will be classified to meet current 3DEP specifications. Examples include: water, earth surface, overlap, etc.

# Desired Products



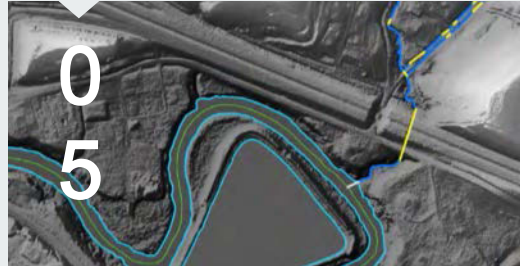
## Hydro-enforced bare-earth elevation model

DEM Treatment. The bare-earth DEM will be hydro-conditioned and hydro-enforced. This ensures the DEM will be suitable for hydro-modelling by having sinks filled and that water flows towards the stream network.



## Enhanced Hydro-flattening

DEM treatment. Hydro-flattening for narrow streams and waterbodies. Criteria yet to be determined



## Enhanced Point Classification

Additional point classification including buildings, low and high vegetation.



# Costs

Costs are based on per sq. mile costs. Low estimate is from 2018 estimate using the USGS Independent Government Cost Estimate through the GPSC. High estimate is from the 2017 USGS provided estimate for applicants for the 2018 BAA grant process. Additional product costs were provided as estimates from Michigan and Kansas who have recently completed similar sized projects

LIDAR Collection and Core Products

**\$10.6 - \$12.5M**

Additional Desired Products

**\$1.4 - \$1.7M**



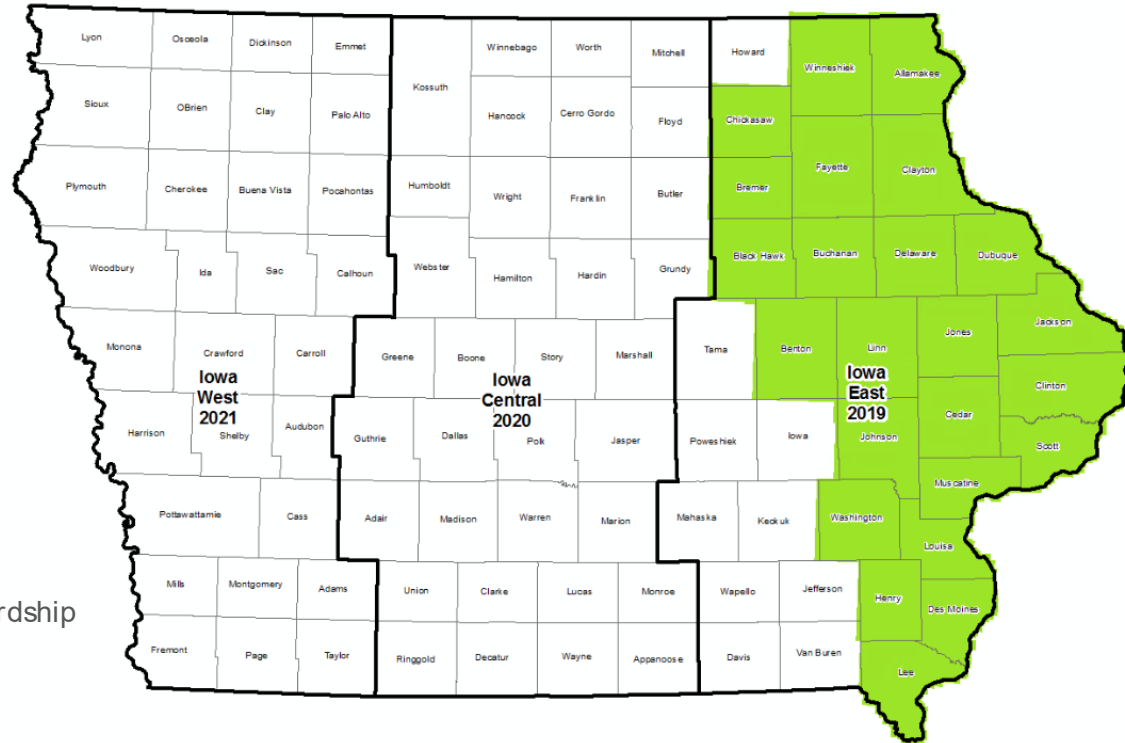
# Progress

LiDAR Collection and Core Products

# \$2.8M

\$2.2M Iowa NRCS Office  
\$100K Iowa Dept. of Agriculture and Land Stewardship  
\$560K USGS BAA Grant

## Anticipated Spring 2019 Collection







# Iowa Elevation and LiDAR Data Milestones



# LiDAR for Iowa

Patrick Wilke-Brown	State of Iowa, Office of the CIO	Dr. Nathan Young	Iowa Flood Center   IIHR–Hydroscience & Engineering
Aaron Greiner	City of Des Moines	Peter Kyveryga	Iowa Soybean Association
Brian Gelder	Iowa State University - Ag and Biosystems Engineering	Rick Havel	Johnson County, Iowa
David James	USDA - ARS National Laboratory for Agriculture and the Environment	Robin McNeely	Iowa State University - GIS Facility
Gregg Hadish	USDA- Natural Resources Conservation Service	Susan Kozak	Iowa Dept. of Agriculture and Land Stewardship
Jamie Peterson	Pottawattamie County, Iowa	Tony Toigo	Iowa Dept. of Agriculture and Land Stewardship
John DeGroote	University of Northern Iowa - GeoTREE	Zach Vanderleest	Iowa Dept. of Natural Resources
Jon Paoli	Iowa Homeland Security and Emergency Management		
Kathryne Clark	Iowa Dept. of Natural Resources		

# Questions

Patrick Wilke-Brown  
patrick.wilke-brown@iowa.gov