

## FAQS

*What is a Digital Elevation Model (DEM)?*

Data points representing latitude, longitude and elevation combined to create a digital representation of the earth's surface.

*What is LIDAR?*

LIDAR - Light Detection and Ranging; an integration of airborne laser and global position system (GPS) technology. Laser pulses are directed at the earth's surface from equipment aboard an airplane or helicopter. The laser reflections are recorded and the range is calculated from the instrument's orientation in space and the time required for the laser light to travel back to the aircraft.

*How accurate is the information collected using LIDAR technologies?*

Accuracy is directly related to the altitude of the aircraft and the power of the laser. The current data specification:

- Vertical
  - Bare earth: 15 cm (0.492 feet) Root Mean Square Error (RMSE)
  - Vegetation: 27 cm (0.886 feet) RMSE
- Horizontal
  - 1.0m (3.28 feet) RMSE

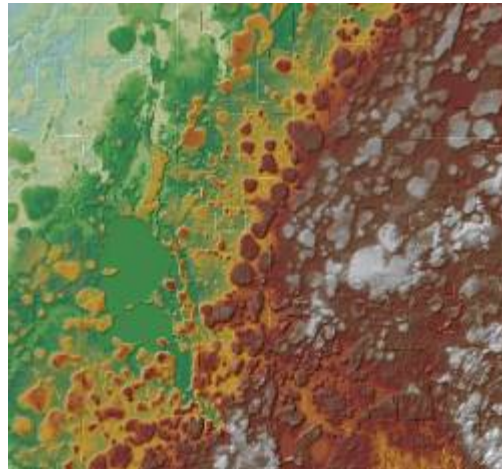
*Are there proven technologies to store and distribute these large scale databases?*

Yes. There are numerous public and private examples of models to store and disseminate large amount of spatial data. One example is the DNR's own Data Deli which can be accessed at (<http://www.dnr.state.mn.us>).

## PARTNERS

This project was funded from the Clean Water Legacy Act, a portion of the Minnesota Legacy Amendment. The project has many partner agencies and governmental units including:

- Minnesota Department of Natural Resources
- Minnesota Geospatial Information Office (MnGeo)
- Minnesota Department of Transportation
- US Geological Survey
- US Army Corps of Engineers



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## MINNESOTA ELEVATION MAPPING PROJECT

### CLEAN WATER LEGACY ACT

#### *LIDAR Digital Elevation Model*



Source: Aero-Metric, Inc.

[www.gis.state.mn.us/committee/elevation/](http://www.gis.state.mn.us/committee/elevation/)

## ELEVATION MAPPING INITIATIVE

The goal of this project is to develop and deliver a seamless high-accuracy digital elevation map of the State of Minnesota to better manage resources, provide decision-makers with more accurate information, and to facilitate the flow of data among all levels of government, from local to federal.

Accurate topographic information greatly enhances the ability of today's decision makers and resource managers to understand how water interacts with the landscape and provides the foundation for developing innovative, effective, and defensible resource management strategies.

## PROJECT SPECIFICATIONS

The intended scope of the first phase of this project includes those counties that are part of the Minnesota River Basin that do not have high-accuracy elevation data already available. It will also cover counties south and west of the basin. The counties included in this phase are Brown, Chippewa, Cottonwood, Douglas, Faribault, Jackson, Kandiyohi, Lac Qui Parle, Le Sueur, Lincoln, Lyon, Martin, Murray, Nicollet, Nobles, Pipestone, Pope, Redwood, Renville, Rock, Sibley, Swift, Waseca, Watonwan, and Yellow Medicine.

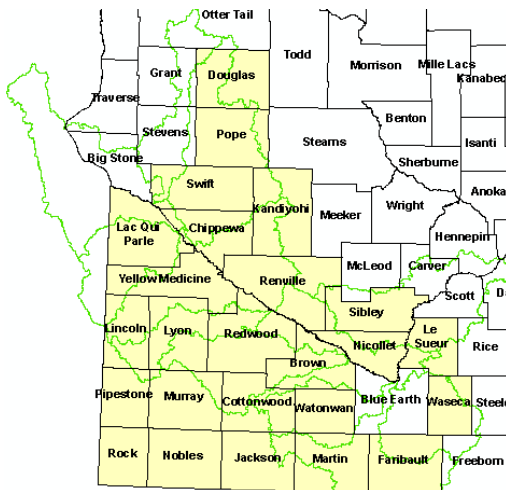
This collection approach maximizes economy of scale benefits and results in consistent end products across a large area of the state.

Data will be collected to FEMA flood plain mapping standards to support integration with existing data and the generation of two foot contours. The Minnesota Department of Natural Resources, in collaboration with the Minnesota Geospatial Information Office and others, will be managing contracts with vendors, to ensure that data specifications are met, to provide easy access to the

elevation data and to work with local partners. Local partnership opportunities exist to serve on a number of project committees, as well as for in-kind work opportunities. One such opportunity stems from lessons learned from previous LiDAR projects regarding the importance of data accuracy test points. Independent verification of the accuracy of the data provided by the LiDAR consultant is recommended by the Federal Geographic Data Committee and American Society for Photogrammetry and Remote Sensing (ASPRS).

Anticipated deliverables include:

- Data points representing latitude, longitude and elevation at the earth's surface (15cm vertical RMSE, 1m horizontal RMSE)
- Edge of water breaklines
- Breakline enforced two-foot contours
- Breakline enforced Bare Earth Elevation Model
- Web-based data access and distribution



## PROJECT COST

The costs for this project are estimated to be \$2.5 million (100% state funded). Local participation in test point collection will help contain costs and insure confidence in accuracy of deliverables.

## PROJECT BENEFITS

Benefits for resource managers, decision-makers, and residents of the State of Minnesota will be profound; enhancing resiliency, capacity, performance, and efficiency at every level of decision-making in each jurisdiction. Known benefits from high resolution data include:

- More accurate flood plain maps
  - Flood damage mitigation
  - Increased flood and drought resiliency
  - Targeted restoration activities
- Enhanced planning & project development
  - Transportation infrastructure
  - Land use management
  - Human development
- Detailed surface hydrologic and hydraulic modeling
- More efficient natural resources management
- Innovative tools for conflict resolution
- Problem identification
- Increased agricultural productivity
- Credible flood damage and natural resource enhancement project site selection criteria.
  - Enhanced project evaluation tools
- Major cost reduction in all civic projects

Future applications using high-resolution topographic data are limited only by our ability to comprehend how these data will eventually be integrated with new technologies and used to make decisions that enhance the lives of the residents of Minnesota.

## NEXT STEPS

Public meetings are being held across the state to describe the project and develop local partnerships. The project manager would like to identify local partners who can participate on committees and provide in-kind help for the collection of data test points.