Risk Management
Imperatives
Risk Management Imperatives

For North Carolina, in response to present and future hazards, we believe we **MUST** accurately and efficiently:

- Model / depict hazard probability and extent;
- Store, utilize, manage and display hazard and risk data;
- Identify vulnerabilities;
- Calculate risk / impact at the structure level;
- Enable stakeholders to mitigate and cover through insurance such impacts;
- Assess the impact of flood modeling on policies; and,
- Provide real-time and forecasted alerting and damage assessment; and,
- Efficient damage assessment and recovery.

To Accomplish these Imperatives, Technology **MUST** and **CAN** be Efficiently Utilized.
LiDAR-Derived Digital Elevation Model
(circa 2000-2005)

HILLSHADED RELIEF OF NORTH CAROLINA
Statewide LiDAR Derived Elevation Acquisition Project For Floodplain Mapping

The State of North Carolina, through the North Carolina Floodplain Mapping Program, commissioned the acquisition, processing, quality control, and delivery of new elevation data and models. The elevation data and model were acquired through a Light Detection and Ranging (LiDAR) system. This data was acquired in three phases from 2001 to 2006. The Phase II LiDAR data is under process. Automatic Vegetation Removal (AVR) and noise filtering were performed, leaving vegetation, noise, bridges, buildings, and other man-made structures in the surface model. These artifacts are removed by manual editing before delivery of the final LiDAR dataset. It is the largest contiguous LiDAR acquisition in history as of January 2007.

~ 6684'
~ Mean Sea Level

Atlantic Ocean

Geospatial & Technology Management
North Carolina Floodplain Mapping Program
30 Meter Elevation Model

30 Meter Point Spacing
10 Meter Elevation Model

10 Meter Point Spacing
3 Meter Elevation Model (2003 NC LiDAR)

4 Meter Point Spacing
QL2 Elevation Model

0.3 Meter Point Spacing
30 Meter Elevation Model

*Virtually no agreement with actual survey elevation data
10 Meter Elevation Model

*Very few points matching actual survey data
3 Meter LiDAR (2003)

*A more defined surface. Lacks true channel topographic definition.

5 ½ Foot Vertical Error in Stream Bed Elevation
NC QL2 LiDAR (2014)

*Nearly mirrors existing high precision survey data.*
Next Generation Building Footprint Extraction

Classification  Elevation  Intensity  Imagery

Profile
Structures – First Floor Elevation Collection (LiDAR)

First Floor Elevation Estimated from Point Cloud
Second Generation Topography
Geiger / Photon Counting Acquisition

Geiger / Photon Counting

• Advancement in technology to efficiently split single pulse into 100x and receive each as unique points.

• Pilot tested in Mecklenburg County.

• 20 points per square meter with nominal post spacing of 0.7 meters.

• 8 ppm deliverable at same or reduced cost.

• Data collected will support a 9.25 cm (3.36 inches) RMSEz.
Duke Substation and Facility
(Perspective from Gorman Street facing south, with ground removed)
Duke Substation and Facility
(Perspective from RR tracks facing northwest)
Duke Substation and Facility
(Hillsborough & Turner Street, Raleigh)
Geiger 30 ppsm – Ground illumination

Hospital Parking Deck
200 S College St #500
Charlotte, NC
Ground within vertical obstruction

Illumination of ground through eight-story hole
Classification to NCDOT road/bridge files (8ppsm)
Next Steps

For North Carolina, the next steps for technology is to:

• Update Building Footprints with Geiger Mode LiDAR
• Generate a spatially enabled linear road surface and asset database
• Generate inundation map libraries for all Dams and Levees
• Pilot and Validate Urban Flooding utilizing Geiger Mode LiDAR
• Establish an updated Land Classification / Land Use
• Generate Transmission / Distribution Dataset