Using LiDAR for Floodplain Mapping

KGS Annual Meeting

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Division of Water
Department for Environmental Protection
Energy & Environment Cabinet

To Protect and Enhance Kentucky’s Environment
Risk MAP in Kentucky

- Risk Mapping, Assessment, and Planning (Risk MAP) is a collaborative effort that will provide communities with flood information and tools they can use to better protect their citizens.
  - Builds on traditional FIRM and FIS studies
  - Creates non-regulatory flood risk products to better communicate flood risk
  - Direct tie-in to regional/community hazard mitigation planning efforts
  - **Focus on actions that reduce flood risk**

- Watershed (HUC 8) based
- All new studies and mapping based on LiDAR and its derivative products
Risk MAP Deployment
LiDAR for Floodplain Mapping

• Used for:
  – Base terrain layer
  – Hydraulic analyses
  – Floodplain delineation
  – Non-regulatory Risk MAP datasets
Base Terrain Layer

• 5ft cell size DEMs
• Mosaiced to create terrain DEM
Hydraulic Analyses

- Creation of modeling cross sections
- Identification of hydraulic structures
  - Bridges
  - Culverts
Hydraulic Cross Sections

Cross-section profile of USGS 10-meter DEM and LiDAR-based TIN data
Levee Analyses and Mapping

- FEMA Levee Analysis and Mapping Procedures pilot project
  - Condition of levee
  - Closures
  - Mapping
Floodplain Delineation

• More precise identification of flood hazard areas

• Useful for
  – New studies
  – Redelineation of older studies

• LiDAR DEM
  – 15 cm RSME

• NED 10M DEM
  – +/- ½ contour interval
Floodplain Delineation

Poor Fork – Harlan County

LiDAR Floodplain (1% & 0.2% annual chance floodplain)

10M DEM Floodplain (1% & 0.2% annual chance floodplain)
Risk MAP Datasets

- Non-regulatory datasets to better communicate flood risk
  - Changes Since last FIRM
  - Flood Depth and Analysis Grids
  - HAZUS risk assessment
Changes Since Last FIRM

- Communicates areas that have changed since a communities’ last FIRM
Flood Depth Grids

- Create TIN from LiDAR based DEM
- Create TIN from Water Surface Elevations (WSELs)
- Subtract DEM elevation from WSEL to obtain flood depth grid
Flood Depth Grids

1% Annual Chance Floodplain Boundary
10% Depth (10 Year)
High : 17
Low : 0
Flood Analysis Grids

- Grids to depict
  - Probability of flooding in any given year
  - Probability of flooding in 30-year period
Carey Johnson
Kentucky Division of Water
Phone: (502) 564-3410
Email: carey.johnson@ky.gov