From Regulatory to Flood Forecast Inundation Mapping

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Coordinated Hazard Assessment and Mapping Program

- FEMA Region V CTP
- 75 Countywide DFIRMs since 2004
- Statewide MT-2 Review Delegation
- 14 PMR Updates to DFIRMs
  - FEMA funded re-study of the Pecatonica River in Stephenson and Winnebago Counties
Freeport, IL

Leveraging Data to Meet Community Needs
Advanced Hydrologic Prediction Service (AHPS)

- Community Familiarity with NWS Flood Severity
- Couples USGS Gages and NWS Forecasts
- >100 AHPS Inundation Mapping Locations Nationwide
- 1st application in Illinois

http://water.weather.gov/
Flood Inundation Mapping Tool

http://water.weather.gov/ahps/inundation.php
Flood Inundation Mapping Tool

Flood Categories (in feet):
- Major Flood Stage: 16
- Moderate Flood Stage: 14
- Flood Stage: 13
- Action Stage: 11.5

http://water.weather.gov/ahps/inundation.php
NWS Flood Mapping Standards & QC

- NOAA Partnered Guidelines:
  - Best Practices
- Project Development Template:
  - Standards
  - Project Framework
  - Roles

http://water.weather.gov/ahps/inundation.php
Project Phases

• Phase 1: Planning
• Phase 2: Inundation Mapping Production
• Phase 3: AHPS Implementation
• Phase 4: Mapping Maintenance
AHPS FIM Development Process

- **Phase 1**
  - Pre-Scoping & Planning Activities
  - Site Selection & Evaluation Scoping
  - Hydraulic Model Scoping
  - GIS Product Scoping
  - <<Phase 1 Review>>

- **Phase 2A**
  - Hydraulic Model Development by Partner
  - Hydraulic Model Review by NWS
  - <<Phase 2A Review>>

- **Phase 2B**
  - Mapping Product Development by Partner
  - Mapping Product Review by NWS
  - <<Phase 2B Review>>

- **Phase 3**
  - AHPS Beta Site Development
  - AHPS Beta Map Review
  - <<Phase 3 Review>>

- **Phase 4**

- **Maintenance**

- **Scoping & Planning**

- **Hydraulic Modeling**

- **GIS**

- **AHPS Web**
Phase 1: Planning

Site Selection

- AHPS Gage Availability
- Significant Confluences
- Representative Reach
- Detailed Topography
- Flooding Impacts
Phase 2: Inundation Mapping Production

Model Calibration

Event Calibration

Rating Curve Calibration

- **Observed**
- **Calculated**

**Discharge (cfs)**

**W.S. Elevation (ft)**

**Q_Total (cfs)**

- 0 2000 4000 6000 8000 10000 12000 14000 16000

- 740 745 750 755 760

Map Library Production

• Process
  – Depth Grids
  – Bridges, overpasses, and other structures
  – Inundation Areas
  – Flood Summary Report
  – Zoom Levels
Map Library Production

1. XS to WSEL TIN (ESRI’s ArcToolbox & Spatial Analyst)
2. WSEL TIN to WSEL DEM (ESRI’s ArcToolbox & Spatial Analyst)
3. WSEL DEM – Terrain DEM (via Raster Calculator)
Map Library Production

• Depth Grid Library
  – 10 stages / elevations mapped
    • 11.5 = 754.3’
    • 12 = 754.8’
    • 13 = 755.8’
    • 14 = 756.8’
    • 15 = 757.8’
    • 16 = 758.8’
    • 17 = 759.8’
    • 18 = 760.8’
    • 19 = 761.8’
    • 19.5 = 762.3’
Map Library Production

• Process
  – Depth Grids
  – Bridges, overpasses, and other structures
  – Inundation Areas
  – Flood Summary Report
  – Zoom Levels
Map Library Production

- Process
  - Depth Grids
  - Bridges, overpasses, and other structures
  - *Inundation Areas*
  - Flood Summary Report
  - Zoom Levels
Phase 3: AHPS Implementation

Deliverables to NWS

• Inundation Boundaries
• Depth Grids
• Metadata
• Support Data
  – Base Mapping
  – Orthophotography
  – Engineering Support Data
• Effective FIRM 1% and 0.2%
  SFHA, Floodway, and XS

QA/QC

• Hydraulic Model Review
• Geospatial Data Review
• Data submission Review
• Preliminary, Non-public AHPS developmental web launch
  – Stakeholder Review
Phase 3: AHPS Implementation

QA/QC

- Hydraulic Model Review
- Geospatial Data Review
- Data submission Review
- Preliminary, Non-public AHPS developmental web launch
  - Stakeholder Review
Data Web Hosting

- Upload Process

http://water.weather.gov/ahps/inundation.php
Phase 4: Mapping Maintenance

AHPS

- Ongoing Ground Truthing
- Ongoing Impact Evaluation
- Coordination with Subsequent FEMA Studies
- Impacts of land use changes and significant flood events
Summary Points

• NWS has a clear process, standards and technical support staffing established to ensure mapping projects are streamlined and successful.

• Coordinating Risk Map with AHPS FIM was extremely cost effective:
  – 100 hours of additional labor = 1% increase over FEMA RiskMap budget.
  – $4K fee required for NWS web implementation.
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