West Virginia GIS Technical Center

West Virginia University

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TO: Brian Penix
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Project: Statewide Multi-Hazard Risk Assessments (TEIF/TEAL)
       Project Number: FEMA-4273-DR-WV-0031
       Performance Period: 6/20/2018 – 6/4/2021

Quarterly Report - Description of Work: 2nd Quarter FY 2019 (01/01/2019 to 03/31/2019)

Dear Brian,

Below is the Description of Work completed during the 2nd Quarter Fiscal Year 2019.

The work tasks are organized the same as the corresponding goals and deliverables. A total of 15 deliverables align with the work tasks or goals: 6 flood risk assessment, 5 landslide risk assessment, and 4 data development.

Table 1. Deliverables organized by three major work tasks: flood risk assessment, landslide risk assessment, and data development. There are a total of 15 principal work tasks or deliverables for the entire project. System administrative tasks are not included.

Major Work Tasks	Designation Letter	Work Tasks Goals Deliverables
Flood Risk Assessments	F	6
Landslide Risk Assessments	L	5
Data Development	D	4

Table 2. Work Completed for WV Statewide Multi-Hazard Risk Assessments

WORK TASKS / GOALS / DELIVERABLES (2018-2021)
HMGP Grant: Multi-Hazard Risk Assessments

FLOOD RISK ASSESSMENT
TASK F1: [Site-specific flood risk assessments for 287 Incorporated/Unincorporated Communities] Continued development on automating flood loss models outside of Hazus software. This includes planned coordination between FEMA Region III and Jesse Rozelle, Program Manager with the Natural Hazards Risk Assessment Program	Hazus. The Natural Hazards Risk Assessment Program is currently working on migrating the Hazus model off of the ArcGIS platform, and are exploring Open Source and Web Based alternatives. This office is aiming to modernize the software to enable big data processing, increased interoperability for hazard, infrastructure, and social vulnerability data, and other goals. The automation of the flood loss estimate models is critical to the completion of this task and thus interest in the new directions of FEMA and the Oregon Geological Survey (John Bauer) / Region X (Cynthia McCoy) as referenced in the previously quarterly report. Reference: https://www.oregongeology.org/pubs/ofr/p-O-18-04.htm
TASK F2: [Statewide geodatabase of site-specific flood risk structures] Continued preliminary data model development for the Flood Risk Assessment Geographic Information System (FRAGIS), a detailed geodatabase of the characteristics and damage estimates of structures in the Special Flood Hazard Areas. This input model data is referred to as "User-Defined Facilities" in FEMA's Hazus modeling software. Continued verifying primary buildings and exposure values for structures located in the 100-year regulatory and non-regulatory floodplains for six counties: Fayette, Hancock, Jefferson, Mercer, Mineral, and Preston.
TASK F3: [3D flood risk visualizations] No update.
TASK F4: [Assemble statewide composite flood risk products] Revised *building counts* (bSF) and *areas* (aSFHA) in the Special Flood Hazard Areas for 287 communities (232 municipalities and 55 county unincorporated areas) using updated input layers. It is estimated there are more than 100,000 structures in the Special Flood Hazard Area for West Virginia. Both the bSF and aSFHA are important statistics for communities participating in FEMA's Community Rating System (CRS) program.
TASK F5: [Update State Hazard Mitigation Plan] No update.

TASK F6: [Publish flood risk data and products to WV Flood Tool]
Identified errors and corrected **FEMA Community Boundary** Layer which is a critical layer for hazard risk assessments. The GIS Technical Center updated the currentness and accuracy of the FEMA's Community Boundary Layer on the WV Flood Tool. The updated community layer of all incorporated and unincorporated jurisdictions was created from U.S. Census incorporated boundaries, 1:24,000- scale USGS topo county boundaries, and local sources. Public land boundaries were extracted and not included in the Community Boundary Layer. The community boundary layer consists of 295 records: 55 counties, 232 municipalities (8 municipalities are geographically split over two counties). The community boundary layer is important for linking users of the Flood Tool to the correct community profile/hazard risk data. This critical boundary layer has published to the Data Clearinghouse with metadata. Data Link: http://www.wvgis.wvu.edu/data/dataset.php?ID=484

Story Maps: In partnership with others, continued development of web Story Maps for the major flood disasters of November 1985 and June 2016 in West Virginia.

LANDSLIDE RISK ASSESSMENT

TASK L1: [Landslide Inventory]

- Published 41 landslide data points with photos
- Mapped 1100 landslide points for the eastern part of West Virginia using 1m Lidar-derived DEM

TASK L2: [Landslide Method Development]

Knowledge experts employed at West Virginia University were identified and hired to collaborate on the project. Experts include Dr. Steve Kite (Geomorphologist), Dr. James Thompson (Soil Scientist), Dr. Aaron Maxwell (Geologist/Modeler), and Dr. Maneesh Sharma (Geologist/GIS).

- Dominant Soil Parent Material variable was added to gSSURGO
- Road and Stream layers were prepared for modelling

TASK L3: [County-Level Landslide Map and Report Generation]

Continued efforts on a landslide susceptibility pilot for Monongalia County using a machine learning technique called Maximum Entropy Modeling. Professor Aaron Maxwell is conducting the modeling.

TASK L4: [Publish to Landslide Web Application]

- Published new operational, reference and background layers to Landslide Inventory Tool (www.mapwv.gov/landslide).

- Started developing two online Story Maps associated with landslides

TASK L5: [Update State Plan]

No update

DATA DEVELOPMENT & EXCHANGE OF RISK INFORMATION

TASK D1: [Statewide Building Inventory]

Continued developing a structure-level inventory of all buildings and facilities exposed to multi-hazards. Data resources for site-specific building information and identification include the site address, parcels, assessment records, leaf-off imagery, building footprints, insurance and business databases, critical facilities, etc. This task provides the building exposure information for multi-hazard assessments.

TASK D2: [Fill in GIS Data Gaps of Key Reference Layers]

Two statewide data contracts were awarded to vendors to fill GIS data gaps for select communities. The development of GIS map reference layers, specifically parcels, addresses, and aerial imagery, is necessary to fulfill the requirements of county and state hazard risk assessments and products.

- PARCELS/ADDRESSES: Contract awarded to Atlas Geographic Data Inc. for parcel/address mapping for targeted communities
  - http://data.wvgis.wvu.edu/pub/temp/FEMA/FRA/Contracts/Digital_Tax_Maps_and_Addresses-Contract_20190114_(U19ATLAS).pdf
  - Parcel MOUs signed by six county assessor offices; FEMA grant dollars obligated $306,513; local government cost share $27,474
  - Address MOUs signed for by four county offices; two in progress; FEMA grant dollars obligated $50,795; local government cost share $85,595

- LEAF-OFF AERIAL IMAGERY: Contract awarded to Blue Mountain / Thrasher Group for leaf-off imagery for targeted counties
  - http://data.wvgis.wvu.edu/pub/temp/FEMA/FRA/Contracts/WV_State_Aerial_Imagery_Contract_U19THRASHER_20190227.pdf
  - Leaf-Off imagery MOUs signed for 13 counties
  - FEMA grant dollars obligated $56,958; local government cost share $205,536

TASK D3: [Report Data Gaps of Reference Layers]

Data gaps of key reference layers for select communities continue to be identified and corrected under Task D2.

TASK D4: [Exchange Risk Assessment Information]

Coordination Meetings and Exchange:

FLOOD RISK:
- FEMA Region III: Monthly coordination meetings with Matthew McCullough and Will Melville.

LANDSLIDES
- Presentation and coordination meeting with State Geologist, Mitch Blake, WV Geological & Economic Survey on April 3, 2019

DAM/LEVEE FAILURE FLOOD RISKS:
- WV Silver Jackets Team: Several meetings with USACE WV Silver Jackets Team in support of the statewide flood risk assessment.

Future presentations scheduled for Silver Jackets' Ohio River Basin Workshop, WV Assessors' Conference, and WV Floodplain Managers Conference.

Table 3. Major accomplishments to date

MAJOR ACCOMPLISHMENTS	DATE	GOAL
Published preliminary *building counts* (bSF) and *areas* (aSFHA) in the Special Flood Hazard Areas for 287 communities (232 municipalities and 55 county unincorporated areas) using revised input layers.	November 2018	F4
From eight sources of various published landslide studies, reports, and maps for West Virginia, created an initial geodatabase of historical landslide incidents from the year 1973 to present. Compiled or digitized more than 75,000 landslide features.	December 2018	L1
The WVU Study Team completed a preliminary landslide susceptibility pilot for Monongalia County using a machine learning technique called Maximum Entropy Modeling.	December 2018	L2
Created a more accurate FEMA Community Boundary Layer for 287 communities	January 2019	F6
Awarded statewide contract to Atlas Geographic Data Inc. for parcel/address mapping in support of hazard risk assessments	January 2019	D2
Awarded statewide contract to Blue Mountain Inc. / Thrasher Group for leaf-off imagery in support of hazard risk assessments	February 2019	D2
Signed MOUs with 22 counties for GIS reference layers in support of hazard risk assessments. Reported data gaps to various communities.	March 2019	D2 D3
Published landslide information to the WV Landslide Tool (www.mapwv.gov/landslide). Landslide information includes Historical Landslide Incidents (with pictures), Mapped Landslides, Landslide Susceptibility Model, Landslide Model Inputs, and Reference Layers	March 2019	L4

Project Overview: The Statewide Hazard Mitigation Project funded by the FEMA Hazard Mitigation Grant Program (HMGP) involves three major components. The grant recipient and sub-recipient are the State Hazard Mitigation Office (Brian Penix) and the WV GIS Technical Center at West Virginia University (Kurt Donaldson), respectively. Refer to Project Narrative for more details.

- **Flood Risk Assessments**: Create site-specific flood risk assessments for 287 communities (232 municipalities and 55 unincorporated areas. Referred to as the Total Exposure in Floodplains (TEIF) project. Results will be published on the WV Flood Tool (www.mapwv.gov/flood) and to the Flood Risk Assessment Geographic Information System (FRAGIS).

- **Landslide Risk Assessments:** Generate landslide incident and susceptibility maps for 55 counties. Referred to as the Total Exposure in Areas of Landslides (TEAL) project. Results will be published on the WV Landslide Tool (www.mapwv.gov/landslide).

- **GIS Data Development:** The development of complete and current community boundaries, parcels, site addresses, and leaf-off imagery is necessary to fulfill the requirements of county and state hazard risk assessments and products. These GIS data layers are essential for pinpointing and estimating building loss for at-risk structures and facilities.

Link to Project Narrative: http://data.wvgis.wvu.edu/pub/temp/FEMA/FRA/p/WVU-1_HMGP_ProjectNarrative_09282018.pdf

Timeline: The performance period for the Statewide Multi-Hazard Risk Assessments (Project Number: FEMA-4273-DR-WV-0031) is 6/20/2018 to 6/4/2021. Outputs of this project include the flood and landslide risk assessments for upcoming local and state hazard mitigation plan updates.

Please contact me if you have any questions.

Sincerely,

Kurt Donaldson

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