West Virginia GIS Technical Center

West Virginia University

Department of Geology and Geography ⚓ Eberly College of Arts and Sciences

January 28, 2019

TO: Brian Penix
        State Hazard Mitigation Officer
        Capitol Complex Building 1, Room EB-80
        1900 Kanawha Blvd. E.
        Charleston, WV 25302
        (304) 957-2572
        Brian.M.Penix@wv.gov

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: 1st Quarter FY 2019 (10/01/2018 to 12/31/2018)

Dear Brian,

Below is the Description of Work completed during the 1st 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] Evaluated an ArcGIS Python Script Alternative methodology to the Hazus-MH Model for User-Defined Facilities that was successfully implemented by Oregon's Department of Geology and Mineral Industries. An information exchange meeting about this subject occurred with the Oregon Geological Survey (John Bauer) and FEMA Region X Risk Analyst (Cynthia McCoy). The automation of the flood loss estimate models is critical to the completion of this task. Reference: https://www.oregongeology.org/pubs/ofr/p-O-18-04.htm Executed an agreement for risk hazard consulting services with The Polis Center at Indiana University-Purdue University, Indianapolis.
TASK F2: [Statewide geodatabase of site-specific flood risk structures] Created a preliminary data model 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. Began 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] Created a sample 3D community flood risk visualization movie that can be published on the WV Flood Tool.
TASK F4: [Assemble statewide composite flood risk products] Published preliminary *building counts* (bSF) and *areas* (aSFHA) in the Special Flood Hazard Areas for 287 communities (232 municipalities and 55 county unincorporated areas). 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] Contributed preliminary flood risk assessment information for the 2018 State Hazard Mitigation Plan update.
TASK F6: [Publish flood risk data and products to WV Flood Tool] FEMA Community Boundary Layer: 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 was created from U.S. Census incorporated boundaries, 1:24,000- scale USGS topo county boundaries, and local sources. The community boundary layers 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 will be published to the Data Clearinghouse with metadata. Story Maps: In partnership with others, web Story Maps are being developed for major flood disasters of November 1985 and June 2016 for West Virginia.

LANDSLIDE RISK ASSESSMENT

TASK L1: [Landslide Inventory]

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. The Center has compiled or digitized more than 76,000 landslide features.

Purchased a Cannon 9000F MKII Photo, Film and Negative scanner to create a geodatabase of landslide pictures.

TASK L2: [Landslide Method Development]

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

A statistical model is being developed to evaluate various spatial inputs that have a high correlation to mapped landslide incidents: geology, soils, topography (slope, aspect, etc.), proximity to roads and streams.

An information exchange meeting occurred with the Oregon Geological Survey (William Burns) regarding landslides.

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

Initiated 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 landslide risk data and products to WV Landslide Tool]

Started publishing landslide information to the WV Landslide Tool (www.mapwv.gov/landslide). Landslide information includes Historical Landslide Incidences (with pictures), Mapped Landslides, Landslide Susceptibility Model, Landslide Model Inputs, and Reference Layers.

An online Story Map is being developed for the landslide risk assessment published in 1976 by the WV Geological and Economic Survey that was funded by the Appalachian Regional Commission. A Story Map will also be created for the statewide landslide risk assessment funded by this project.

Started development of a mobile web application for reporting landslides in West Virginia.

TASK L5: [Update State Plan]

Contributed preliminary information about the landslide risk assessment project for the 2018 State Hazard Mitigation Plan update. A deliverable of this project is to update the Landslide Hazard Section of the 2023 State Plan update.

DATA DEVELOPMENT & EXCHANGE OF RISK INFORMATION

TASK D1: [Statewide Building Inventory]

Began developing a structure-level inventory of all building 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]

Completed Data Development RFPs/Contract:
- Published RFP and selected Atlas Geographic Data Inc. for digital data gaps of parcels and addresses

- Published RFP for acquisition of leaf-off imagery for targeted counties.

  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.

TASK D3: [Report Data Gaps of Reference Layers]

Jefferson County: Misaligned parcels were reported to the County Assessor's mapper. Further technical consultations will be coordinated between the County and GIS Professional Services company Atlas Geographic Inc. to resolve the parcel layer data issues.

Preston County: An initial scoping meeting was set up with Preston County to correct addressing issues for the town of Rowlesburg. More than 38% of the town is in the Special Flood Hazard Area.

Hardy County: Hardy County has not mapped addresses for the past two years and may need technical assistance from the contracted GIS Professional Services company.

Other communities were contacted to improve addressing and parcel GIS layers: city of Elkins, counties of Braxton, Calhoun, Clay, Logan, Morgan, and Roane.

TASK D4: [Exchange Risk Assessment Information]

Explored the use of Story Maps to exchange hazard information.

Provided USACE with project information to develop a collaborative Silver Jackets proposal in support of the statewide flood risk assessment.

FUTURE: More coordination is needed with FEMA, state, and local agencies along with contractors to exchange relevant data and subject knowledge for hazard risk assessments.

FUTURE: A meeting should be scheduled with the ISO/CRS Specialist and State NFIP Office to identify state-based CRS credits to promote community floodplain management activities that exceed the minimum NFIP standards.

FUTURE: A presentation about the project is scheduled for a Silver Jackets meeting in Charleston, WV, on 02/05/2019.

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.

- **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.

Timeline: The performance period for the Statewide Multi-Hazard Risk Assessments (Project Number: FEMA-4273-DR-WV-0031) is 6/201/2018 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

Kurt Donaldson
Manager
WV GIS Technical Center, WVU
e-mail: kdonalds@wvu.edu