



July 19, 2024

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SUBJECT: Invoice for COMS Task3: Landslide Mapping for WV Flood Tool; FY22 CTP Project Management (PM) Grant 2022-23

Dear Kevin,

In accordance with the FY22 CTP Service Agreement signed October 2021, this invoice in the amount of **\$15,000.00** is for updating landslide information (Special COMS Task 3) for the WV Flood Tool (www.mapwv.gov/Flood). See the scope of work as outlined in the amended 2022-23 (FY22) CTP Community Outreach Mitigation Strategies (COMS) plan dated July 2022, and authorized under a WV-48 service agreement between the WVEMD and WV GIS Technical Center, West Virginia University. Refer to the WVEMD [Statement of Work](#) documents for more details about the specific tasks.


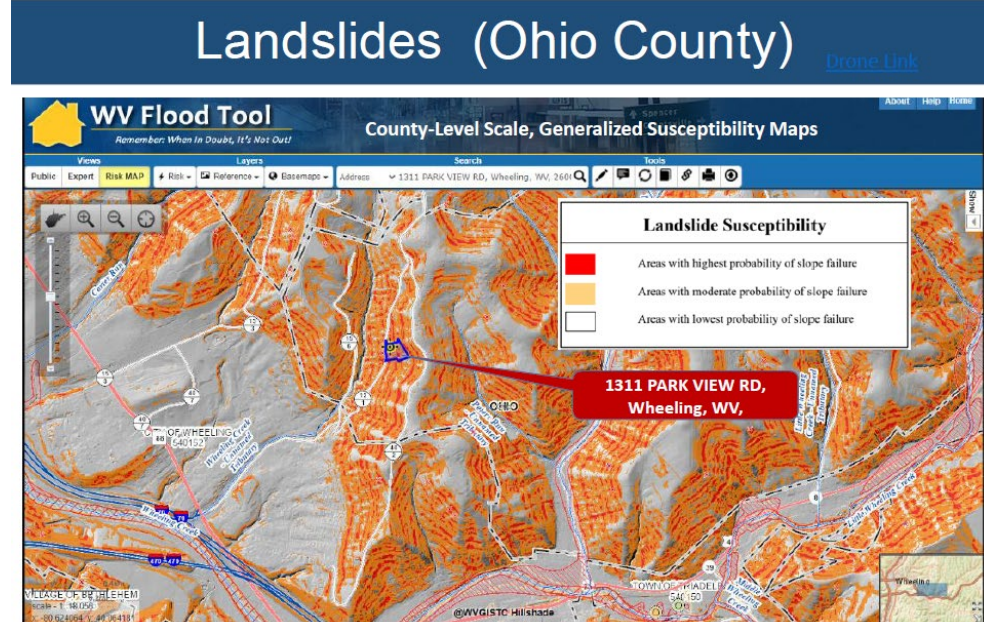
Invoice #	Services Rendered	Amount
02012024	COMS Task 3. [MAP LANDSLIDE INCIDENTS FROM THE NEW FEMA LIDAR FOR 38 COUNTIES]. Landslides are identified in the State Hazard Mitigation Plan as the #2 hazard in West Virginia. Climate change models for West Virginia that forecast heavy precipitation events for mountainous terrain with steep slopes will result in a higher incidence of landslides. Figure COMS-3.1. Ohio County home destroyed Spring 2024.	\$15,000
Time Period 10/1/2022 to 7/19/2024	Landslides (Ohio County) Drone Link	
Special Project 3		

Figure COMS-3.2. High landslide susceptibility model on WV Flood Tool where Ohio County home was destroyed in Spring 2024.



Activities Summary:

- Mapped an additional 61,000 landslides from the new FEMA-purchased LiDAR delivered in September 2021 that covers 38 counties.
 - Updated [LiDAR Mapping](#) status graphic of all landslide points published to [WV Flood Tool](#) (Risk MAP View) and [WV Landslide Tool](#).
 - Updated [Table 2](#) (MLRA Landslide Characteristics) on page 13 of Landslide Risk Assessment Report with new mapped landslides
- Completed a report in August 2023 on [Climate Change and Landslide susceptibility in West Virginia](#).
- Generated a new statewide 2-meter landslide susceptibility grid from the all the newly mapped LiDAR landslides and published to the WV Flood Tool.
- Generated new static graphics showing which physiographic regions based on landslide incidents and susceptibility are at more risk for landslides.
- Landslides Mapped: [Landslide Density](#) | [Landslide Count](#)
- Landslide Susceptibility: [High Susceptibility](#) | [Medium-to-High Susceptibility](#)

Table COMS-3.3. Total landslides mapped using LiDAR.

Mapped Landslides	Description
116,399	Total landslides mapped using high resolution (1- or 2-meter) LiDAR
100,469	Landslides mapped using high resolution FEMA 1-meter QL2 LiDAR
15,920	Landslides mapped from other LiDAR sources but verified with newer FEMA 1-meter LiDAR sources.

	<p>Table COMS-3.4. Metrics and methodology of Landslide Project. For the WV Landslide Project, 205,442 landslides were inventoried from both LiDAR mapping and historical data collections.</p> <p>For entire Landslide Project, inventoried 205,442 landslide features from LiDAR mapping and historical landslide data collections.</p> <ul style="list-style-type: none"> ○ LiDAR Mapping <ul style="list-style-type: none"> ▪ 116,399 landslide points mapped using high resolution (1- or 2-m) LiDAR. <ul style="list-style-type: none"> – 100,469 Landslides mapped using high resolution FEMA 1-meter QL2 LiDAR – 15,920. Landslides mapped from other LiDAR sources but verified with newer FEMA 1-meter LiDAR sources. ○ Other Sources <ul style="list-style-type: none"> ▪ 89,903 from historical and other sources <ul style="list-style-type: none"> – 46,330 landslide polygons digitized based on WV Geological and Economic Survey 1976 study. – 41,307 landslide polygons digitized based on a USGS 1975-1985 study. – Other studies and 2016 WV DOT points (n=1,406) – FEMA landslide buyout properties <p>LiDAR Mapping: Most common landslides mapped were slides and slumps (98%). Landslide locations were mapped throughout West Virginia using LiDAR elevation data products, including hillshade and slopesshade grids. Mapped failure types included slide, debris flow, lateral spread, multiple failures (when several failures were present in a small area, but were too small or close together to map separately), rock falls, and undetermined failure type. The nature of the West Virginia landscape and the LiDAR imagery limited mapping to landslides at least 33 feet wide.</p> <p>Landslide Resources:</p> <ul style="list-style-type: none"> • Landslide Incidents Graphic • Landslide Susceptibility Graphic • Landslide Methodology Paper (2020) 	
Grand Total	Total invoice amount:	\$15,000

Please use the following information for paying electronically:

Payment Transfer Information:

OASIS: 4187 111 1463 1463 6909 H514

WVU Acct: 11. 110530213. 11303179. 4108501. 999. 99999999

If you have any questions, or need clarifications, please do not hesitate to call.

Sincerely,

A handwritten signature in black ink that reads "Kurt Donaldson". The script is cursive and fluid.

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

CC: WVU Revenue Services - RevenueServices@mail.wvu.edu