

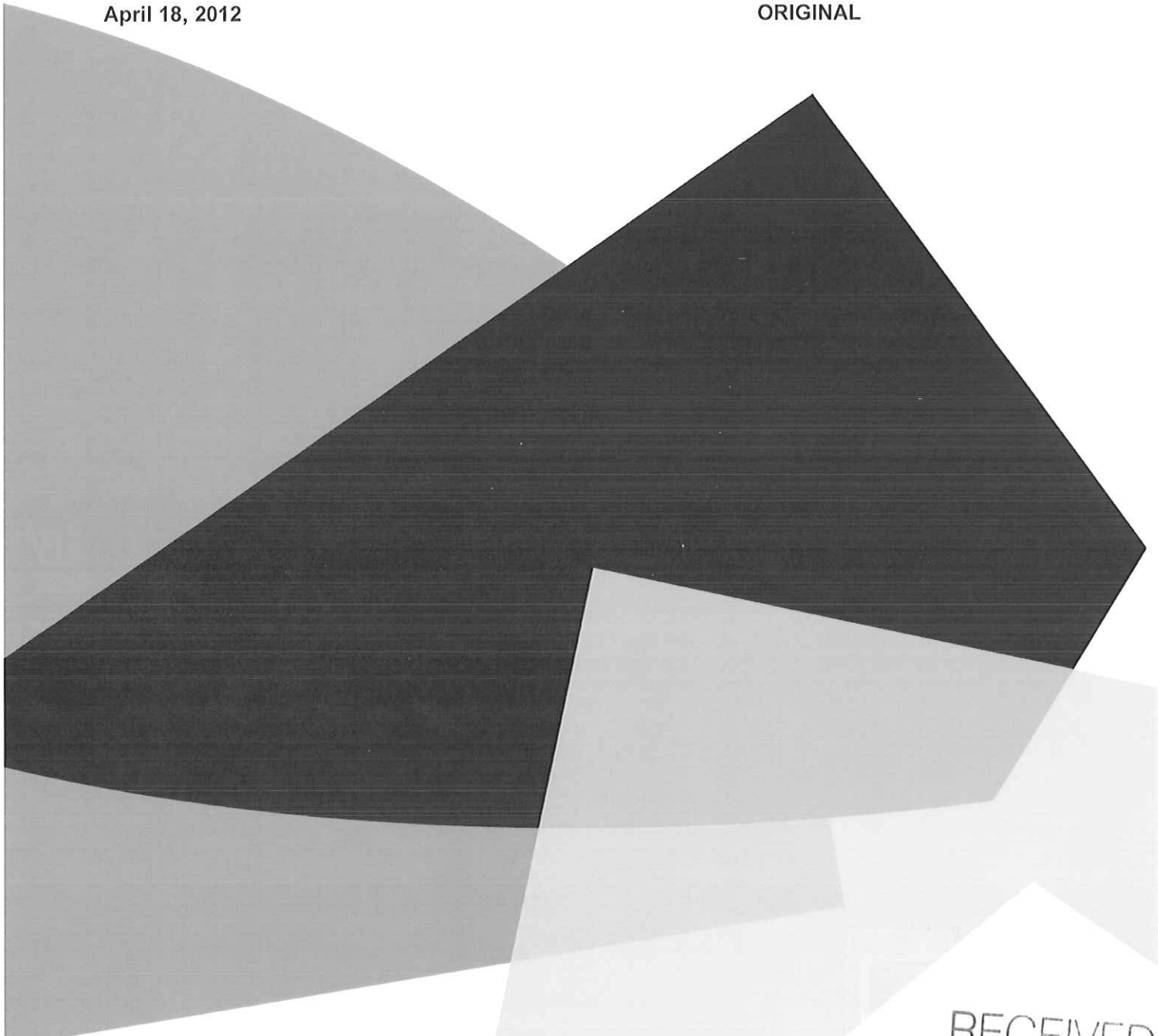
**Expression of Interest
Hazus-MH Analysis Phase II
RFQ: HSE01232**

ATKINS

West Virginia Division of Homeland Security and
Emergency Management

April 18, 2012

ORIGINAL



Plan Design Enable

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WV PURCHASING
DIVISION



Atkins North America, Inc.
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Calverton, MD, 20705

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Fax: +1.301.210.5156

www.atkinsglobal.com/northamerica

April 7, 2012

Tara Lyle
State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

**Subject: HAZUS MH Analysis Phase II
RFQ HSE01232**

Dear Ms. Lyle:

We understand that the West Virginia Division of Homeland Security and Emergency Management (WVDHSEM) endeavors to institute effective hazard mitigation management measures to avoid or decrease disasters and their effects. By developing the Phase I statewide HAZUS-MH analysis, WVDHSEM took a significant step in supporting this goal. In order to successfully complete Phase II of your statewide Hazus project, you need a project team that can provide the highest level of commitment and expertise to this project.

As a nationally recognized leader in emergency management with unparalleled experience and expertise with Hazus, GIS, local risk assessment, and hazard mitigation planning, Atkins is eager to provide WVDHSEM with extraordinary services through responsiveness, flexibility, innovation, and commitment. We are confident our team of Hazus experts, GIS analysts, and specialists will provide the skills required to prepare Phase II of the West Virginia Hazus Analysis. The enclosed expression of interest includes our responses to the evaluation criteria contained in the request for quotations.

The principal strengths of our proposal are three-fold. First, we offer substantial expertise working within the Hazus environment, starting with our work with Hazus development in the early 1990s to present day. We are highly adept at data collection, quality control, and the process of involving appropriate stakeholders. We also fully understand the interrelationships between Hazus and the many local applications of Hazus data and outputs including local hazard mitigation planning, risk assessment, loss estimation, risk analysis, risk communication, and emergency management.

Second, through our internally developed software program One Click Floodplain (OCF), Atkins can develop depth grids with a significant improvement in quality compared to the Hazus flood model, and with minimum added cost. OCF depth grids can be directly imported into Hazus and have been used by Atkins previously for the Federal Emergency Management Agency (FEMA).

Third, our Hazus capabilities range far beyond data collection, data management, and basic Hazus Level 1 analysis. We continually look for opportunities to push the operation and application of the software to best meet client needs. As such, Atkins is fully prepared to support this project over and above the minimum expectations set forth in the scope of work through our certified training services, CDMS knowledge and Android and iPhone applications, and experience with development of FEMA RiskMAP capabilities.

Thank you for your consideration of our firm, and we look forward to hearing from you. Should you have any questions regarding our submittal or need any additional information, please contact me at 301.210.6800, ext. 4381213.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas Schweitzer". The signature is fluid and cursive, with the first name "Thomas" and last name "Schweitzer" clearly distinguishable.

Thomas Schweitzer, PE, GISP, CFM
Vice President
Senior Group Manager – Floodplain Hazard Management

Title page

Title: Expression of Interest HAZUS MH Analysis Phase II

RFQ#: HSEO1232

Buyer: TL/32

Firm: Atkins North America, Inc. (Atkins)

Address: 3901 Calverton Boulevard, Suite 400, Calverton, Maryland 20705

Phone: 301.210.6800

Email: thomas.schweitzer@atkinsglobal.com

Authorized point of contact: Thomas Schweitzer

Date: 4/2/2012

Signature: _____



EXHIBIT 10

REQUISITION NO.: HSE1232

ADDENDUM ACKNOWLEDGEMENT

I HEREBY ACKNOWLEDGE RECEIPT OF THE FOLLOWING CHECKED
ADDENDUM(S) AND HAVE MADE THE NECESSARY REVISIONS TO MY
PROPOSAL, PLANS AND/OR SPECIFICATION, ETC.

ADDENDUM NO.'S:

NO. 1 X

NO. 2 X

NO. 3

NO. 4

NO. 5

I UNDERSTAND THAT FAILURE TO CONFIRM THE RECEIPT OF THE
ADDENDUM(S) MAY BE CAUSE FOR REJECTION OF BIDS. VENDOR
MUST CLEARLY UNDERSTAND THAT ANY VERBAL
REPRESENTATION MADE OR ASSUMED TO BE MADE DURING ANY
ORAL DISCUSSION HELD BETWEEN VENDOR'S REPRESENTATIVES
AND ANY STATE PERSONNEL IS NOT BINDING. ONLY THE
INFORMATION ISSUED IN WRITING AND ADDED TO THE
SPECIFICATIONS BY AN OFFICIAL ADDENDUM IS BINDING.

[Handwritten Signature]
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SIGNATURE

ATKINS
.....
COMPANY

4/16/2012
.....
DATE

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Section 1: Qualifications of Firm

Atkins (www.atkinsglobal.com) is a multidisciplinary firm that provides comprehensive consulting services in a wide range of areas, including emergency management, water resources, planning, engineering, construction, environmental sciences, and information technologies. Since 1960 we have served the infrastructure needs of public and private clients throughout the United States. Atkins has approximately 2,900 staff located in 70 offices nationwide. We bring both top local talent and best practices shared from our colleagues around the world to deliver cost-effective solutions and services to our communities.

In the wake of some of the nation's worst natural disasters, many government agencies have turned to Atkins to assist with recovery efforts and to develop strategies for minimizing the effects of future hazard events. To best meet these needs, Atkins has dedicated staff of expert planners, engineers, policy specialists, geographers, and scientists who focus entirely on providing emergency management services including hazard mapping, disaster preparedness, response, recovery, and mitigation services. The Atkins team can provide services across the entire spectrum of risk identification and mitigation. The Atkins team has worked with more than 500 local communities nationwide in developing hazard mitigation plans. Nearly all of these plans included HAZUS analyses and loss estimates prepared by the Atkins team.

Past projects have involved activities such as risk assessment, mitigation planning, floodplain mapping, evacuation studies, and the design and implementation of hazard mitigation measures such as flood control structures, home elevations, facility retrofits, and property acquisitions. Our firm's post-disaster work has involved damage assessment, debris management, and the administration of recovery and reconstruction programs.

Since 1994 Atkins has led the technical development and application of FEMA's nationwide loss estimation methodology—Hazardus-MH—and its associated National GIS Inventory databases. Using GIS technology, Hazardus initially allowed users to compute estimates of damages and losses that could result from an earthquake. Atkins personnel were instrumental in creating that initial foundation to the Hazardus software. To further support FEMA's mitigation and preparedness efforts, Hazardus was expanded into Hazardus-MH, a multi-hazard methodology with new models for estimating potential losses from hurricane, wind, and flood hazards. Atkins continues to provide software development, technical support, and training assistance to FEMA, states, and local governments in the use and application of Hazardus-MH to achieve the risk assessment requirements of DMA 2000 and the intent of the newly created Risk MAP program. In addition, Atkins was the lead contractor responsible for the national Hazardus User conferences in 2007–2011.

Atkins, through our FEMA Production and Technical Service (PTS) contract performed a Hazardus Average Annualize Loss analysis for 4 FEMA regions cover

Atkins can provide on-site Hazardus training with our team of FEMA-certified Hazardus instructors who teach all aspects of the Hazardus application including the Comprehensive Data Management System (CDMS). Atkins has a mobile training lab of 10 laptops that allows us to bring the training directly to your facilities. This allows you to avoid the issues with travel or setting up computers for the class. The training is also FEMA- approved for certification.

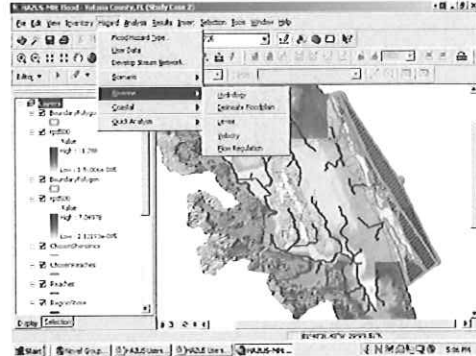
Project experience

The following projects highlight relevant contracts our team has supported that involve performing Hazus-MH, GIS, and risk assessment services.

FEMA Hazus–MH Development

Initially the Hazards U.S. (Hazus) loss estimation software provided by FEMA assisted in the analysis of potential losses from earthquakes. The release of Multihazard Hazus, or Hazus-MH, in February 2004 marked an important milestone in the ongoing development and application of the risk assessment tool that included the analysis of potential losses for multiple hazards including floods, hurricanes, and winds, in addition to earthquakes.

Since the inception of Hazus in 1992, Atkins—under a contract with FEMA—managed the development and release of Hazus. From the beginning, Atkins team members have worked with and supported Hazus-MH and have been engaged in scientific and engineering knowledge; software architecture, testing, and deployment; and continuous improvements, enhancements, and use. This experience provides the team with a unique insight and talent for the development, operation, and maintenance of Hazus-MH software. With each seismic event, Atkins revalidates the earthquake model and compares model outputs to data derived from the real event to optimize the tool for assessing damage, economic loss, and social impacts. In 2007 Atkins took the technical lead on the New Madrid Earthquake Scenario Task Force that was established to troubleshoot technical problems related to the use of Hazus for scenario development. Atkins' ability to form a team with domain knowledge of the earthquake model contributed to the successful resolution of complex problems associated with this multi-state, multi-year project.



Atkins has also continued to serve FEMA as the lead system integrator and "shell" developer for all of the Hazus-MH components including the flood model, earthquake model, hurricane model, and shell. In this capacity, Atkins has facilitated meetings and provided final integration, testing, and compilation of all system and user documentation.

Multiple public agencies from fire departments to metropolitan planning organizations use Hazus-MH daily to run scenarios on different hazards for multiple purposes (i.e., emergency management and response). Private organizations, such as insurance companies, take advantage of this tool to estimate losses. Hazus has become so popular that several user groups have been formed to share information, knowledge, and best practices information. Atkins assists individuals and user groups through technical support and continues to provide enhancements to the software in a constantly evolving process.

Completion: The project is ongoing; tasks have been submitted on time.

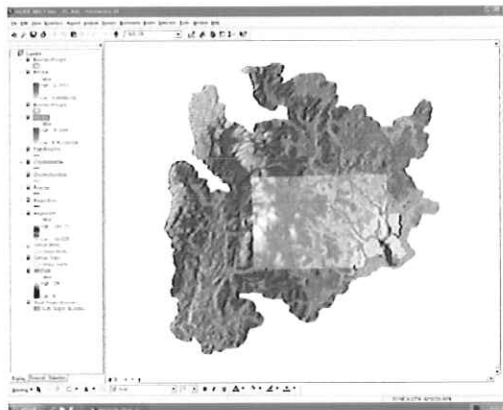
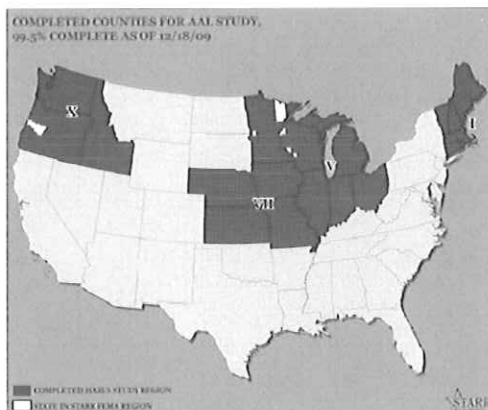
Client: David Adler Manager - Hazus Program Zimmerman Associates, Inc. (ZAI) (sub to ZAI)

FEMA Risk MAP Program, Average Annualized Loss Project, FEMA Regions I, V, VII, and IX

FEMA initiated the Average Annualized Loss Study in 2009 to standardize flood loss estimates and increase awareness of potential flood losses across the country. Atkins led the effort for FEMA in Regions I, V, VII, and IX by conducting a Level 1 analysis on every county in the region. The work was performed as a separate task under the FEMA Production and Technical Service (PTS) contract.

Deliverables for Atkins included HAZUS-MH MR4 *.hpr files for 1,121 individual county studies, covering 19 states. Analysis included data for the 10-, 50-, 100-, 200-, and 500-year return periods as well as the generation of the average annualized flood loss data. Summary tables for losses and a report outlining the study procedures, issues, and limitations were produced. To complete the work within the project schedule of 4 months, Atkins setup more than 40 computers to run the analysis around the clock. Atkins assisted other PTS contractors in trouble shooting processing issues and completing runs for larger counties in their regions. Atkins performed the final national roll-up of the results and data files for FEMA.

Completion: The project was completed within the contract schedule of 4 months and within budget.
Client: Eric Berman, Federal Emergency Management Agency



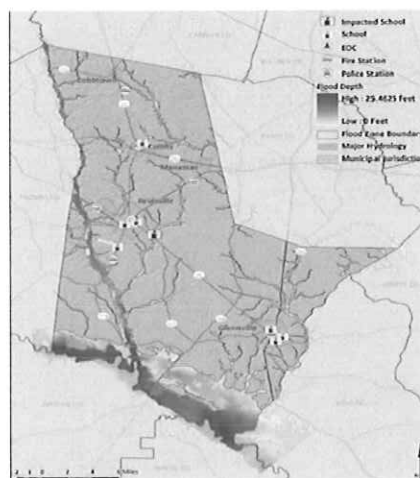
Comprehensive Data Management System Software (CDMS) Development

Prior to creation of the Comprehensive Data Management System (CDMS) by Atkins in 2007, it was necessary for Hazus-MH users to expend a large amount of manual effort to incorporate new pieces of data into the predefined formats required by Hazus-MH. In order to reduce this effort, Atkins programmers designed CDMS as an upgrade to replace the existing BIT and InCAST utilities previously utilized within the Hazus-MH environment. The CDMS design encompasses all the functionality of these pre-existing utilities and provides additional functionality to automate routines and reduce the level of effort involved in updating Hazus-MH datasets. CDMS supports the transfer of data into and out of master datasets, provides validation of new data into the system, and allows users to query and print information within the system.

Completion: The project was completed within the contract schedule and within budget.
Client: Phil Schneider, National Institute of Building Sciences

Georgia Flood Map Modernization Program, Georgia Department of Natural Resources

This project for the Georgia Department of Natural Resources (DNR) involved the production and management (as sole contractor) of Georgia's statewide Flood Map Modernization Program, in compliance with FEMA. The program began in 2004 and Atkins' responsibilities included the completion of all phases of floodplain mapping, statewide planning, map modernization management support, and mapping activities, including scoping, outreach, field reconnaissance, hydrology, hydraulics, floodplain mapping, QA/QC, preliminary DFIRM production, and post-preliminary DFIRM processing.

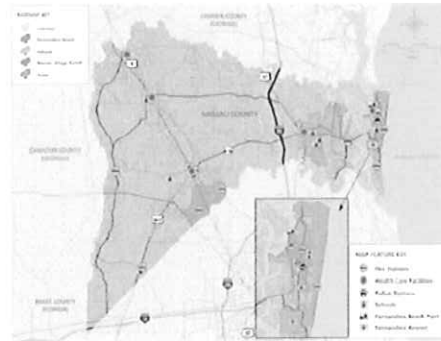


As a subtask to this already impressive responsibility, Atkins was asked to prepare preliminary flood studies based on Level 2 Hazus-MH runs for 30 counties and Metro Atlanta using the new floodplains developed for the DFIRM product. The floodplains depth grids were imported into Hazus. These Hazus studies included direct physical damages, direct economic losses, social vulnerabilities, social impacts, agricultural considerations, and mitigation opportunities

Completion: The project was completed within the contract schedule and within budget.
Client: Collis Brown, Georgia Department of Natural Resources

2007 LMS Risk Assessment Update, Broward County, Florida

Atkins reviewed the pre-existing hazard identification and vulnerability assessment for Broward County, as included in Chapter 4 of the Broward County Local Mitigation Strategy, and prepared a comprehensive update to this chapter using the latest available data and enhanced risk assessment methods. Hazus-MH wind speed data, inventory and damage functions, and methodology were used to determine the annual expected losses due to hurricane wind. Tables were prepared to show annualized property losses and annualized percent loss ratios by jurisdiction within the county.



For flood, riverine flood hazard areas were modeled using Hazus-MH for the 10-, 50-, 100-, and 500-year flood events.

Flood depth was estimated at the pixel level for affected areas, along with the proportion of the area affected within the census block. Hazus-MH was utilized to estimate floodplain boundaries, potential exposure for each event frequency, and loss estimates based on probabilistic scenarios using a Level 1 analysis. Tables were prepared to show potential building losses for 10- and 50-year riverine flood events by jurisdiction and potential building losses for 100- and 500-year riverine flood events by jurisdiction.

Completion: The project was completed within the contract schedule and within budget.

Client: Lori Vun Kannon, Broward County

References

Atkins' past performance on contracts has been recognized and rewarded by our clients, with 90 percent of our work coming from repeat clients, including numerous reselections on multi-year contracts and written commendations for the outstanding quality of our work. We encourage you to contact our references for direct evidence of our strong past performance.

Federal Emergency Management Agency: Risk Analysis Division

Contract: FEMA HSFEHQ-09-D-0370, Nationwide Average Annualized Loss Study

Performance period: 9/1/2009-6/30/2010

Point of contact: Eric Berman
Hazus Program Manager
Federal Emergency Management Agency
U.S. Department of Homeland Security
500 C. Street S.W.
Washington, D.C. 20472
eric.berman@dhs.gov
202.646.3427

Georgia Department of Natural Resources

Contract: State Wide Floodplain Mapping

Performance period: 9/1/2011-12/31/2013

Point of contact: Collis Brown
Georgia Department of Natural Resources
4220 International Pkwy,
Ste 101,
Atlanta, GA 30354
Collis.Brown@dnr.state.ga.us
404.362.2606

Environmental Protection Agency: Water Division

Contract: EP-BPA-11-C-0019/EP-B12C-00003, Wetlands and Aquatic Resources Technical Support GS-10F-0005M, Benefits of Green Infrastructure in Flood Damage Reduction

Performance Period: 12/10/2011 to 7/31/2012

Point of contact: Lisa Hair
Task Order Project Officer
EPA Office of Water
Room 7333E EPA West
U.S. EPA Office of Water (4503-T)
1200 Pennsylvania Avenue N.W.
Washington, D.C. 20460
hair.lisa@epa.gov
202.566.1043

Project management and key staff

The Atkins' project manager will be Thomas Schweitzer, PE, GISP, CFM, who has more than 26 years of experience in the engineering and mapping field. The proposed team is detailed in the organization chart below and role defined in the project team description in the next section. Our QC team will review both the floodplain delineations used in the Hazus loss calculation as well as review the actual loss data from Hazus. The floodplain (H&H) will be reviewed by a floodplain engineer, and the loss data reviewed by a mitigation planner/Hazus specialist. This will guard against any possible anomalies in the data. We have an expert technical resource to assist in the proper importing customized reports as well as any solving any issues encountered with the Hazus software or analysis. Three qualified technical staff members will perform the actual Hazus analysis, report, and maps.

Figure 1. Project organization

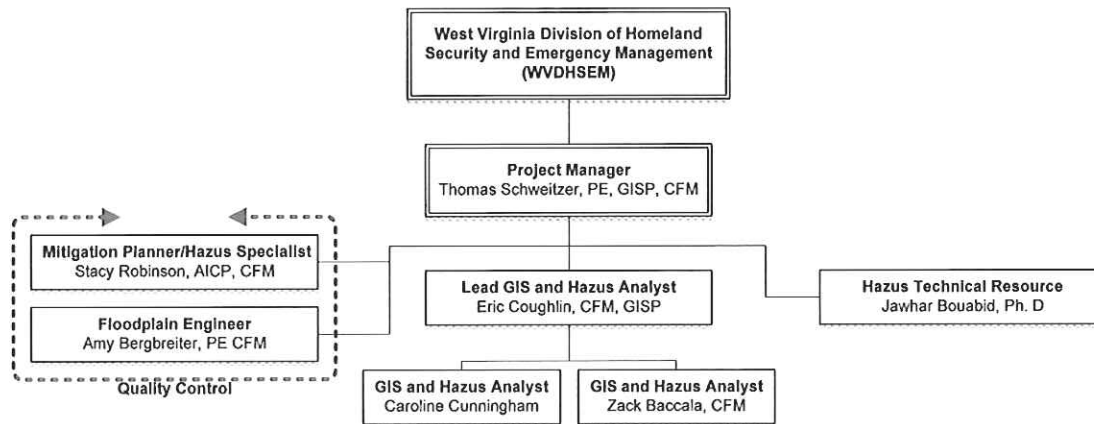


Figure 2. Key staff participation

| Name | Role | Participation |
|----------------------------------|--|---------------|
| Thomas Schweitzer, PE, GISP, CFM | Project manager and principal | 10% |
| Jawhar Bouabid, Ph.D. | Hazus technical resource | 5% |
| Stacy Robinson, AICP, CFM | Mitigation planner/ Hazus specialist/QC | 5% |
| Amy Bergbreiter, PE, CFM | Floodplain engineer/QC | 5% |
| Eric Coughlin, CFM, GISP | Lead GIS and Hazus analyst | 33% |
| Zack Baccala, CFM | GIS and Hazus analyst | 32% |
| Caroline Cunningham | GIS and Hazus analyst | 10% |

Section 2: Qualifications of Staff

Atkins has assembled a highly experienced and technically solid team to perform this project for West Virginia DHSEM. This team has extensive working experience in the use Hazus, delineating floodplains hazards, and calculating loss information within the Hazus tool and using the data for mitigation planning. Not only does Atkins have seasoned users of Hazus, they actually programmed the software. Atkins continues to provide software development, technical support, and training assistance to FEMA, states, and local governments in the use and application of Hazus.

Our staff has extensive expertise using GIS software and data for hazard identification, hazard analysis, vulnerability assessment, loss estimation, and risk communication for a wide range of natural and human-caused hazards. As part of this experience, Atkins is also very familiar with the Hazus-MH methodology and has used this GIS extension to analyze flood, hurricane wind, and earthquake hazards for municipalities, counties, and states across the nation. We are adept at using best available data, whether from local, regional, state, national, or federal sources, and our planners have knowledgeable insight into the most appropriate and meaningful use of the data for hazards analysis. We have also learned a variety of techniques to graphically enhance map products using other software tools, such as Adobe Illustrator and Adobe Photoshop, to create illustrations that more effectively support risk communication efforts.

Atkins employs 29 GIS professionals, each of whom holds a GISP certification. Additionally, a total of 65 GIS analysts are available within the company to assist with all manner of geospatial solutions, and many of our professional emergency management planners and floodplain engineers are fluent in GIS technology and practices. Atkins is highly equipped and qualified to manage any type of GIS-based project demand.

Project Staff

Thomas Schweitzer, PE, GISP, CFM, will be the project manager and Atkins' principal. Mr. Schweitzer has 26 years of engineering and GIS experience and has worked in the floodplain mapping and emergency management field for 11 years. He has led teams of engineers and GIS analysts in FEMA floodplain mapping projects nationwide, and was project manager for the FEMA Nationwide Average Annualized Loss study. He was also project manager for the USACE National Levee Database, in which Atkins collected more than 5,600 miles of data in 27 USACE districts. He is currently a senior project manager under the FEMA Production and Technical Services contract.

Jawhar Bouabid, Ph.D., will serve as the Hazus technical resource for any issues with the application or extraction of data from the existing state HRPS and importing or development of custom reports. He has been a key member of the Hazus earthquake model development team since 1994. Dr. Bouabid has extensive experience with all existing models in Hazus, the technical details behind each model, and how they are implemented.

Stacy Robinson, ACIP, CFM, will support the Hazus analysis as a senior Hazus specialist. She will lead the QC of the loss analysis results and give general support to the analysis effort. She has 13 years of local, regional, state, and federal project experience in hazard mitigation, vulnerability and risk assessment, benefit-cost analysis, and loss estimation. She has experience in the creation and analysis of loss estimation results from Hazus-MH studies to perform risk assessments and losses-avoided studies. Ms. Robinson has instructed basic and advanced Hazus-MH courses through FEMA's Emergency Management Institute (EMI), both on campus and in the field. She was the recipient of the 2008 1st Quarter Hazus User of the Year Award, issued by FEMA for innovative uses of Hazus-MH in hazard mitigation planning and loss estimation, and has also been granted recognition by FEMA as a Hazus-MH Trained Professional.

Amy Bergbreiter, PE, CFM, has eight years of experience in civil and environmental engineering. As the floodplain engineer she will provide review and QC of the floodplain generated for the Hazus loss analysis. She has extensive floodplain hydrologic and hydraulic analysis and floodplain management services. Her modeling and software experience includes the use of XP-SWMM, HEC-RAS, HEC-HMS, HEC-1, HEC-2, and GIS software.

Eric Coughlin, CFM, GISP, will lead the Hazus analysis, report development, and mapping phases of this project. Mr. Coughlin's experience includes all aspects of developing, editing, maintaining, and producing reliable and well-documented GIS databases, analysis, and cartographic products. He has used GIS and hazard modeling as a tool to assist emergency management, natural hazard risk assessment and mitigation planning, risk communication, and floodplain management. He is the founder and current president of the

North Carolina Hazus User Group (NCHUG) and is currently working to meet FEMA's requirements for the HAZUS-MH Trained Professional recognition. In addition, he is a certified Hazus instructor.

Zachary Baccala, CFM, will assist in the Hazus analysis and report and map generation. He is a senior GIS analyst, certified floodplain manager, and ESRI-certified Desktop Associate with 8 years of GIS experience. Mr. Baccala has experience in all aspects of GIS software manipulation including data processing, map and database production, tool creation, and software development. He assisted with the 2005 statewide Level 1 Hazus flood analysis for the State of Maryland using Hazus-MH MR1 under the guidance of Dr. Michael Scott. Mr. Baccala has also designed tools to work directly with the Hazus data format, extracting and populating data into the Hazus SQL and inventory database structures. He is a certified Hazus instructor, working on his Hazus-MH Trained Practitioner certification, and is also the current president of the Maryland Hazus User Group (MDHUG).

Caroline Cunningham will assist in the Hazus analysis and report generation. She is a FEMA-authorized Hazus trainer and a Hazus Trained Professional, and recently produced a handbook to guide communities in preparing, sheltering, and responding to vulnerable populations in disaster situations. Recently, Ms. Cunningham contributed to several hazard mitigation plans, working in all aspects of the planning process. Further, she has reviewed hazard mitigation plans from across the country on behalf of FEMA. Ms. Cunningham is proficient in Hazus-MH and ArcGIS, using both programs in plan development. She also assisted with the FEMA Nationwide Average Annualized Loss study. She is a certified Hazus instructor.

Thomas J. Schweitzer, PE, CFM, GISP

Vice President/Project Manager

Atkins

Education

B.S., Landscape Design,
University of Maryland,
1983

Registrations/Licenses

Professional Engineer
Virginia 029710, 1997

Certifications

Certified Floodplain Manager
(CFM), 2003
Geographic Information System
Professional (GISP), 2008

Professional Affiliations

Association of State Floodplain
Managers (ASFPM)
Society of American Military
Engineers (SAME)
Floodplain Mapping Association
(FMA)

Software

ESRI ArcGIS
ArcView
MicroStation
AutoCAD
Access
HAZUS

Publications

Mantecon, Roberto D., and
Thomas J. Schweitzer, "Shoring
Up Levees." Professional
Surveyor Magazine, Vol. 29,
No. 10, October 2009, pp.14-
16.

Thomas Schweitzer, P.E., CFM
and Howard Davis, CFM,
"Inventorying Levees to
Improve Safety," USACE
National Levee Database Pilot
Inventory Project, The Military
Engineer, 10/2007.

Mr. Schweitzer serves as senior group manager within Atkins' integrated water resources division. He has more than 26 years of collective experience in engineering consulting and geographic information systems (GIS) technology. He has broad background in engineering, including experience in civil, environmental, and water resources engineering. This experience combined with his GIS and mapping technologies knowledge has allowed him to successfully manage teams of engineers and GIS specialists in various projects involving the engineering, development of geospatial data and databases, including digital mapping. He has practical experience in database design, including Oracle, MS Access and Geo-databases. He possesses a working knowledge of spatial data migration, conversion and mapping. Additionally, his experience includes 3D terrain modeling.

Mr. Schweitzer's relevant project experience includes:

Production and Technical Service (PTS) Contract, Federal Emergency Management Agency (FEMA) Headquarters, Washington, DC. Senior project manager for the Letter of Map Changes (LOMCs) area for the PTS contract for FEMA.

Responsibilities include managing the LOMC area for processing of MT-1 and MT-2 cases for the STARR JV (Atkins is the lead partner of the JV); managing and overseeing staff of 25 plus GIS analyst, scientist and engineers performing the technical review of MT-1 and MT-2; supporting FEMA with enhancement of the process using geospatial technologies, and general case processing support; supporting FEMA Regions on various flood mapping issues relating to MT-2; perform training at state and regional conference on MT-2 and MT-1 process and procedures.

Hazus Average Annualized Loss Study for FEMA Regions I, V, VII, X for FEMA Risk MAP Program. This project was part of an effort to develop standardized flood loss estimates and increase awareness of potential flood losses on a nationwide basis. Deliverables for the 1,121 counties studied were individual Hazus-MH HPR files, summary tables for losses, and a report outlining the study procedures, issues and limitations. This effort included riverine and coastal counties and took more than three months to complete. Mr. Schweitzer managed and coordinated the roll-up process of all the Hazus study regions for the contiguous United States, working with other FEMA PTS contractors and working closely with the Hazus developers to ensure all results were compiled.

USACE National Levee Database (NLD) Program, Various Locations. Mr. Schweitzer served as project manager/director in charge of project teams performing the NLD program for 24

districts nationwide. Atkins captured over 5,600 miles of levee centerline and profiles as part of the NLD program and additional districts. As part of the initial pilot program we assisted in the development of procedures and processes for field data collection, information research, geodatabase development, and attribute population. The pilot program also required tested the database structure and further refining the database model.

Atkins is capturing the levee centerline and profiles for the designated levees within each district. Field data collection was performed using Real-Time Kinematic (RTK) GPS methods. Additionally, 12 other levee feature locations are being surveyed. In addition to the centerlines, cross-sections are being captured at designated locations along the levees and floodwalls. All data is being delivered in a geospatial database.

California Department of Water Resources, Urban Levee Geotechnical Evaluations, California. Atkins is tasked with managing data collection needs for the Urban Levee Geotechnical evaluations project including historical levee performance, location of boreholes, and other geotechnical related data. These data are then geo-referenced and entered into a Geographic Information System (GIS). Atkins is also responsible for creating web-based mapping applications and spatial database design. Mr. Schweitzer managed the project.

FEMA Flood Map Production Coordination Contract. As program manager, Mr. Schweitzer was responsible for managing the technology and mapping section for the central region's team of the FEMA MCC contract for five years. Responsibilities included oversight of all digital flood insurance rate map (DFIRM) activities associated with studies, restudies, and Letters of Map Revisions (LOMRs). The DFIRM mapping was performed extensively using ESRI ArcGIS software applying the new FEMA DFIRM specifications including graphics and database standards. Mr. Schweitzer led the development of Atkins DFIRM mapping processes and procedures. He assisted in the development of new GIS software tools for FEMA DFIRM data attribution and map production.

Mr. Schweitzer was involved in developing the FEMA DFIRM graphics and database specifications for use by the MCC and CTP in producing the new GIS based DFIRM product. As program manager of the mapping section, he oversaw a staff of 30 GIS and technology professionals in the areas of GIS and DFIRM mapping, database design, application, and web development.

Jawhar Bouabid, Ph.D.

Principal Technical Professional

Atkins

Education

Ph.D., Philosophy in
Engineering, Rensselaer
Polytechnic Institute
M.S., Civil Engineering,
Washington University
B.S., Civil Engineering,
Washington University

Professional Affiliations

American Society of Civil
Engineers (ASCE)
Earthquake Engineering
Research Institute (EERI)

Dr. Bouabid has over 18 years of experience in multi-hazard risk modeling and in developing practical solutions and strategies that effectively support decision making with respect to the implementation of best risk management practices. Dr. Bouabid designed the engineering backbone and architecture for the earthquake model in Hazus-MH (FEMA's Multi-hazard Risk Assessment Software) and integrated all the engineering data needed for seismic risk assessments into this application. He also has extensive experience with flood and hurricane models in Hazus, the technical details behind each of these models, and how they are implemented.

During the last 10 years in particular, Dr. Bouabid worked closely, executed, and/or provided technical guidance to cross-functional and multi-disciplinary teams specializing in GIS, engineering, software development, and client outreach and training.

Dr. Bouabid's current role with Atkins includes the following tasks:

Tsunami Risk Assessment Model, FEMA. Dr. Bouabid is overseeing the technical development of a \$1 Million tsunami risk assessment model for the U.S. This project started in September 2011 and is expected to be wrapped up by August 2013.

Hazus-MH for Canada, Natural Resources Canada, Vancouver, British Columbia. Dr. Bouabid customized and updated the Hazus engineering and hazard data to enable this application for Canada.

Hazus-MH Shell and Earthquake Model Software, FEMA. Dr. Bouabid is responsible for the maintenance and update of underlying engineering and hazard data in the earthquake model of Hazus-MH.

Building Code Adoption Tracking Losses Avoided Studies, FEMA. Serving as a subject matter expert on how to model and assess benefits in Hazus stemming from changes in building codes for flood, earthquake and hurricane.

National Technical Review (NTR) of Proposed Mitigation Projects under the FEMA Hazard Mitigation Assistance (HMA) Grant Programs. Dr. Bouabid has served as a subject matter expert on the NTR team to assess the engineering feasibility and effectiveness of these projects.

Technical Director, Risk Management Solutions (RMS) 6/2006 – 10/2010 (also worked for RMS 5/1994 - 8/1999).
Dr. Bouabid's role while at RMS included:

- Developing quantitative methodologies for the assessment of data quality issues and their impact when assessing earthquake and hurricane risk for the insurance industry
- Designing processes for compiling a comprehensive database that can be used to improve building attributes and assumptions critical for modeling the earthquake and hurricane risk.

Project Director, Atkins, 8/1999–6/2006. Dr. Bouabid's role in his earlier tenure with Atkins included:

Validation Study for a Peer-reviewed Hurricane Wind Model.

Comparison and benchmarking study of observed data that was collected after Hurricanes Charley, Frances, Jeanne, Ivan, and Dennis with modeled results using FEMA's multi-hazard risk assessment model (Hazus-MH). Collected data included damage, debris generated, social and economic impact, and damage to critical facilities. Dr. Bouabid provided technical advisory, oversight and guidance.

Multi-hazard Risk Assessment Studies. Managed and conducted several regional and statewide multi-hazard risk assessment studies for state, regional and local governments in compliance with the Disaster Mitigation Act of 2000 criteria. Studies at the State level included Arizona, Delaware, Florida, Louisiana, and South Carolina. Studies at County level included more than 100 counties in Texas, San Diego County in California, and Maricopa County in Arizona.

Nationwide Independent Study for Assessing the Effectiveness of Hazard Mitigation Grant Program. Modeled and estimated economic benefits achieved for flood, wind, and earthquake mitigation projects funded under FEMA's Hazard Mitigation Grant Program.

Flood Benefit Cost Study, Clark County and Vicinity in Nevada.

Assisted Clark County Regional Flood Control District with estimating the economic benefits achieved by building more than \$1 billion of flood control structures within the vicinity of the City of Las Vegas. This study considered both existing built areas as well as areas planned for future growth.

Using Hazus-MH for Risk Assessment. Dr. Bouabid provided technical assistance for using Hazus-MH to plan for and mitigate risks from earthquake, flood, and wind hazards. Activities also involved identifying data needs and gaps, preparing the risk assessment studies to several pilot communities to estimate losses from natural and man-made hazards.

Stacy Franklin Robinson, AICP, CFM

Senior Planner

Atkins

Education

B.A., Public Policy Analysis,
University of North
Carolina - Chapel Hill

Certifications

American Institute of Certified
Planners (AICP), 018846,
Certified Floodplain Manager
(CFM), (NC-06-0173)
Executive Certificate,
Community Preparedness and
Disaster Management,
University of North Carolina at
Chapel Hill, July 2007
FEMA-designated HAZUS
Trained Professional

Software

FEMA's BCA Software version
4.5.5

Professional Affiliations

American Planning
Association (National and NC
Chapters)
American Institute of Certified
Planners (AICP)
Association of State
Floodplain Managers (National
& NC Chapters)
Authorized HAZUS-MH
Vendor for Flood Analysis and
Hurricane Analysis
International Association of
Emergency Managers

Ms. Robinson has 15 years of local, regional, state, and federal project experience in loss estimation, vulnerability and risk assessment, hazard mitigation planning, and benefit-cost analysis. She has been involved in the post disaster response, recovery, and/or redevelopment process for more than 30 federally declared disaster events resulting from various hazard impacts. Ms. Robinson has reviewed, written, and updated many types of emergency management-related plans including emergency operations plans, continuity of operations plans, debris removal plans, long-term recovery plans, and hazard mitigation plans. She has also been a part of the preparation of risk assessments for more than 500 jurisdictions across the United States (including 12 states and one island territory).

She has extensive experience in the creation and analysis of loss estimation results from Hazus-MH in levels 1, 2, and 3 to perform risk assessments and losses avoided studies as evidenced through her work on more than 230 Hazus analyses. She has instructed basic and advanced Hazus-MH courses through FEMA's Emergency Management Institute (EMI), both on campus and in the field, and has instructed courses for FEMA's Benefit-Cost Analysis software. She also received the 2008 1st Quarter Hazus User of the Year Award from FEMA for innovative uses of Hazus-MH in loss estimation and hazard mitigation planning, and has also been granted recognition by FEMA as a "Hazus-MH Trained Professional." She is the only certified private sector Hazus-MH Trained Professional in the nation.

Ms. Robinson's project experience includes the following:

Program Area Lead for Assessment and Planning, FEMA Risk Mapping, Assessment, and Planning (Risk MAP) Program, Regions I, V, VII, X. Program area lead and subject matter expert for the Strategic Alliance for Risk Reduction Joint Venture (STARR JV) for all activities related to risk/vulnerability assessment and hazard mitigation planning support to FEMA Headquarters and for FEMA Regions I, V, VII, and X. This includes assisting in the creation, development, and execution of risk assessment methodologies and products.

National Technical Review for the FEMA Hazard Mitigation Assistance Grant Applications, Benefit-Cost Analysis Team.

Ms. Robinson has been a BCA team member since 2003, assisting FEMA with the annual technical review of applications for funding through pre-disaster mitigation (PDM), repetitive flood claims (RFC), severe repetitive loss (SRL), and flood mitigation assistance (FMA) programs. Technical reviews analyzed and ranked applications based on completeness, credibility, feasibility, and

technical accuracy. Ms. Robinson served as lead for RFC technical review for 2007 and 2008 funding cycles. As of Oct. 2011, Ms. Robinson has seven years of NTR experience.

Hazard Mitigation Technical Assistance Program, FEMA. Ms. Robinson was the mitigation planner and task manager for multiple task orders relating to loss estimation and hazard mitigation for FEMA Headquarters. Ms. Robinson assisted in the development of methodologies to create a Losses Avoided Toolkit, focusing on loss estimation methodology. Efforts included managing the subject matter expert team in review of grant applications to verify FEMA loss estimations and benefit calculations were compliant with FEMA rules and regulations. She has also served as subject matter expert on the FEMA National Technical Review for Hazard Mitigation Assistance grant program since 2003.

Vulnerability and Risk Assessments, Writer/Analyst/Quality Control, Various Locations. Assessments were conducted for multiple hazards (including flood [riverine and coastal], storm surge, hurricanes, earthquakes, erosion, etc.) using Hazus-MH, FEMA's loss estimation software, and a statistical risk assessment methodology for the following jurisdictions:

Puerto Rico: Municipio des Aguada, Moca, and Vieques

North Carolina: State of North Carolina, 12 counties (including municipalities)

Virginia: Southampton County, City of Franklin, Rappahannock-Rapidan Regional Commission, Piedmont Planning District Commission, Northern Virginia Regional Commission, and for municipalities in the Southside Hampton Roads Region (including Virginia Beach and Norfolk)

Texas (including municipalities within each jurisdiction): Lower Colorado River Authority, Houston-Galveston Council of Governments, Guadalupe-Blanco River Authority, Alamo Area Council of Governments, Jackson County, West Central Texas Council of Governments, Heart of Texas Council of Governments, Brazos Valley Council of Governments, Texas Colorado River Floodplain Coalition, City of Southlake and the Rio Grande border region.

Delaware: State of Delaware, including all three counties (and their municipalities) as well as the cities of Dover, Newark, New Castle, and Wilmington.

New Jersey: Monmouth County (including 53 municipalities)

Florida: State of Florida, Broward County, Nassau County, Manatee County, and Florida International University (facility-specific)

Georgia: City of Savannah

Mississippi: Harrison County

South Carolina: State of South Carolina, City of Myrtle Beach, University of South Carolina system (facility-specific)

California: City of Del Mar

Louisiana: State of Louisiana

Missouri: State of Missouri

Amy Bergbreiter, P.E.

Sr. Engineer
Atkins

Education

B.E., Civil and Environmental
Engineering, Princeton
University

Registrations/Licenses

Professional Engineer:
Georgia, PE035198, 2011
Michigan, 6201055844, 2011
Minnesota, 46897, 2011

Certifications

Certified Floodplain Manager
(CFM):
US-04-01340, 2004
National Council of Examiners
for Engineering and Surveying
(NCEES), 34238, 2011

Software

XP-SWMM, HEC-RAS, HEC-
HMS, HEC-1, HEC-2, and
GIS

Professional Affiliations

Sigma Xi
American Society of Civil
Engineers (ASCE)

Amelia (Amy) Bergbreiter has eight years of experience in civil and environmental engineering. As project manager/senior engineer with Atkins, she provides project management, hydrologic and hydraulic analysis, stormwater facility design, and floodplain management services. Her modeling and software experience includes the use of XP-SWMM, HEC-RAS, HEC-HMS, HEC-1, HEC-2, and geographic information system (GIS) software.

Ms. Bergbreiter's Atkins project experience includes:

Production and Technical Service (PTS) Contract, FEMA HQ, Washington, DC. Ms. Bergbreiter served as a lead engineer for 4 countywide DFIRM projects. Responsibilities included oversight and review for all engineering tasks. Under this contract Ms. Bergbreiter also serves as a lead technical resource for the development of FEMA's new levee analysis and mapping procedures for non-accredited levees. Responsibilities included coordinating senior technical experts across more than 10 firms and other Federal Agencies, presenting the proposed approach to communities and FEMA staff, and writing guidance and standards for the new approach.

Upper Chattahoochee Watershed Study, Georgia Department of Natural Resources, Atlanta, GA. Project engineer. As a participant of FEMA's Cooperating Technical Partners (CTP) Program, the Georgia Department of Natural Resources updated the flood hazard maps for Metro Atlanta in Fiscal Year 2009. Atkins developed over 200 miles of new detailed hydrologic and hydraulic studies and 600 miles of approximate studies using a combination of HEC-HMS, PeakFQ, USGS regression equations, and HEC-RAS. In addition, Atkins reviewed and incorporated over 200 miles of detailed studies and 150 miles of approximate studies submitted by local communities. To improve the risk communication to the large population affected by the study, the process included an extended outreach program and the development of many of FEMA's RiskMAP non-regulatory products. She managed the engineering tasks; conducted field reconnaissance; reviewed the hydrologic and hydraulic studies; and coordinated with the local communities on the scope of work, data provided, and expected changes to the flood hazard delineations.

Flood Studies, Wisconsin Department of Natural Resources, Barron and Oconto Counties, WI. Project engineer. The Wisconsin Department of Natural Resources selected Atkins through a quality and price competitive bid to perform detailed flood study, riverine redelineation, and coastal redelineation for

Barron and Oconto Counties. Atkins is performing detailed flood studies for 12 miles of stream and 12 lakes in Barron County, and 25.2 miles of stream in Oconto County. These studies include field survey of structures, revision of hydrologic models provided by DNR to incorporate the lakes, development of detailed HEC-RAS flood models, floodplain mapping, and development of the Flood Insurance Study (FIS) text for the study. She completed the detailed, Zone AE hydraulic study and floodplain mapping of three streams in Oconto County and 8 lakes in Barron County using HEC-RAS, HEC-GeoRAS, and HEC-HMS for the 0.01 and 0.02 percent annual chance floods. The 0.01 percent chance annual floodway was mapped with a 0.0-foot encroachment value.

Flood Map Modernization IDIQ, FEMA Region V. Project engineer involved with the creation and review of hydrologic, hydraulic, and floodplain mapping studies. Atkins is currently producing countywide end-to-end DFIRMs for 33 counties in Indiana, Illinois, Michigan, and Minnesota. These projects include scoping, outreach, field reconnaissance, limited detail hydrology and hydraulics, Zone A hydrology and hydraulics, redelineation, incorporation and review of leverage studies, floodplain mapping, preliminary DFIRM production, and post-preliminary DFIRM production. This effort comprises 1771 DFIRM panels, 1434 miles of redelineation, 862 miles of leverage study data incorporation, 5838 miles of new Zone A floodplain mapping, 192 miles of new limited detail study, and 195 miles of coastal (stillwater) floodplain redelineation.

DFIRM Review, Lee County, Lee County, FL. Project engineer. Lee County hired Atkins to provide technical and procedural support during the post-preliminary FEMA mapping phase. Support included reviews of both coastal and riverine flood hazard data used to represent the coastal flood zones for the preliminary FIRMs. Atkins also reviewed over 200 miles of new detailed riverine hydrology and hydraulics data. Atkins generated successful appeals and protests to the DFIRM maps on behalf of the County for 24 flooding sources, and reviewed and commented on appeals received by the county from other organizations. She reviewed the riverine and hydrology and hydraulics for this project and coordinated with both the county and local engineering firms on the FEMA appeals process.

Eric Coughlin, CFM, GISP

Project Manager/ Lead Hazus

Atkins

Education

B.A., Geography, San Diego State University, 1999
Certificate in Geographic Information Systems, San Diego State University, 1999

Registrations/Licenses

Certified Floodplain Manager (CFM) License # NC-09-0330
Certified geographic information systems professional (GISP) License # 00055367
FEMA Hazus-MH Trained Professional

Professional Affiliations

North Carolina Hazus User Group (NCHUG) – President
Association of State Floodplain Managers (ASFPM)
North Carolina Association of Floodplain Managers (NCAFPM)
Georgia Association of Floodplain Management (GAFM)
Geographic Information Systems Certification Institute (GISCI)
Carolina Urban and Regional Information Systems Association (CURISA)

Professional Development

FEMA IS-00100.a, 2009
FEMA IS-00200.a, 2009
FEMA IS-00700.a, 2009
FEMA IS-00800.b, 2009

Instructor

FEMA Production and Technical Services
Contractor Hazus Trainer Training, 2010

Eric Coughlin is a project manager, a certified floodplain manager (CFM), and a certified geographic information systems professional (GISP) with more than 12 years of comprehensive GIS experience. Eric is experienced in all phases of developing and managing dependable and well-documented GIS databases, performing advanced spatial analysis, data modeling and authoring professional-quality maps using Esri's ArcGIS suite of products. Eric applies his skills to process evaluation, project planning, solutions development, data processing and optimization, quality assurance, technical reporting and project documentation. Eric has broad experience collaborating with public agencies, at all levels, on GIS-related and project management tasks. He is currently focusing on integrating GIS methods and natural hazards modeling as tools to support emergency management, risk assessment, mitigation planning, and floodplain management. Eric is a FEMA "Hazus-MH Trained Professional" and the founder and current leader of the North Carolina Hazus User Group. Additionally, Mr. Coughlin is a FEMA authorized Hazus instructor and has taught FEMA accredited Hazus-MH classes throughout the U.S. Eric maintains an active role in the geospatial field through affiliation with numerous local and national professional organizations.

Relevant project experience includes:

Hazus Average Annualized Loss Study, FEMA Risk MAP Program, Regions I, V, VII, X. This project was part of an effort to develop standardized flood loss estimates and increase awareness of potential flood losses on a nationwide basis. Deliverables for the 1,121 counties studied were individual Hazus-MH HPR files, summary tables for losses, and a report outlining the study procedures, issues and limitations. Mr. Coughlin was tasked with setting-up and maintaining a 10-seat Hazus workstation laboratory running the 1% annual chance flood model in a Hazus "Level I" analysis on more than 200 individual U.S. counties. This effort included riverine and coastal counties and took more than three months to complete. Eric then assisted compilation of the results that were then "rolled-up" into a national dataset now in use by FEMA.

Building Code Adoption Tracking Losses Avoided Studies for FEMA Headquarters. Eric is serving as building data collection and GIS analysis lead to develop, implement, evaluate and refine a first generation methodology to quantify the losses avoided at a national level due to the adoption and enforcement of disaster-resistant building codes, including: seismic, flood, and hurricane hazards. Eric is collecting spatial data for use in Hazus models containing code adoption statistics, construction type by parcel, construction age, replacement values, demographic information and existing hazard

FEMA Authorized Hazus
Trainer, 2010
FEMA E313 Basic Hazus
Multi-Hazards, 2010
FEMA E172 Hazus Multi-
Hazards for Flood, 2011
FEMA E317 Comprehensive
Data Management
System, 2011

modeling data. Creating a tangible understanding of the economic and social benefits realized by communities that adopt building codes provides an incentive for other communities to follow and aligns with FEMA's strategic mission to reduce the loss of lives and property damages occurring in disasters.

Risk MAP Early Demonstration Project: Areas of Mitigation Interest (AOMI) in Lewis County, Washington for FEMA Region X. Lewis County, Washington was chosen by FEMA Region X as a pilot community for the AOMI product. Development of Initial Flood Risk Map that includes AOMI elements such as community identified "hot spots", previous flood claim areas, riverine flood control structures (e.g. dams, levees), floodplain "pinch point" (e.g. undersized culverts and bridge openings, etc), significant proposed and recent floodplain development, and locations of successful mitigation projects. Along with broad client-directed GIS planning and analysis tasks, Eric created the FEMA standardized Flood Risk Map.

Hazus Scenario Earthquakes Analyses, Goettel & Associates, Washington, Oregon and California. Mr. Goettel hired Atkins to assist with multiple Hazus scenario earthquake analyses. Mr. Coughlin directed the analysis, reporting and map production utilized USGS ShakeMaps data for use in scenario earthquakes for the Cascadia Subduction Zone and other faults in the Pacific Northwest as well as the San Andreas and Verdugo faults in Burbank, California.

Risk Assessment Pilot Project and Hazus Data Update, FEMA Region X, Kodiak Island, AK. Kodiak Island is subject to a range of hazards including earthquake, tsunami & flood. Mr. Coughlin is the project manager and lead technical analyst for the collection and processing of local building stock and essential facilities data for use in FEMA's Comprehensive Data Management System (CDMS). The updated buildings will be incorporated into the Hazus model to improve the loss estimates and provide a clear picture of infrastructure at risk. The model results will be included in the Kodiak Island Multi-Hazard Risk Assessment Update.

Upper Chattahoochee River Basin Flood Mapping and Risk Assessment, Georgia Department of Natural Resources (DNR). As part of a Cooperating Technical Partner Agreement with FEMA, the Georgia DNR has accepted delegation and responsibility of the Risk MAP Program for the State of Georgia. This work included 140 miles of detailed study. Eric is the lead technical analyst for production of FEMA's Risk MAP-based flood risk reports for three metro Atlanta counties. Detailed infrastructure and demographic data is being collected and used to enhance the common inventories for a refined Hazus "Level II" analysis. These reports will allow communities to gain a clear picture of their relative risk to riverine flooding.

Zachary J. Baccala, CFM

Senior GIS Analyst

Atkins

Education

B.S., Geography & GIS,
Salisbury University
A.A.S., Culinary Arts, Baltimore
International College

Certifications

Certified Flood Manager,
US-11-05564, 2011
Esri Certified ArcGIS Desktop
Associate 10,
V00E4B1K1FRE5ZMW,
2011

Professional Development

FEMA Hazus Trained
Professional
FEMA Authorized Hazus
Instructor for Hazus Basic,
Hazus Flood, CDMS for
Hazus

Professional Affiliations

Maryland Hazus User Group
(MDHUG) – President
Association of State Floodplain
Mangers (ASFPM)

Instructor

FEMA Production and
Technical Services
Contractor Hazus Trainer
Training, 2010
FEMA Authorized Hazus
Instructor, 2010
FEMA E313 Basic Hazus
Multi-Hazards, 2010
FEMA E172 Hazus Multi-
Hazards for Flood, 2011
FEMA E317 Comprehensive
Data Management System,
2011

Zachary Baccala's eight years of GIS experience have primarily focused on floodplain mapping. His experience encompasses all facets of DFIRM production, including floodplain delineations, panel cartography, base flood elevation (BFE) plotting, database creation and management, and Hazus annualized loss estimation. In addition to fully understanding the complexities of floodplain mapping and digital data management, Mr. Baccala is particularly adept at coordinating and directing project efforts to meet individual client needs. Mr. Baccala coordinated the development of FloodMap Desktop 10—an Atkins-developed software that provides users with an automated process to create the full suite of regulatory and non-regulatory Risk MAP products. He has extensive experience in the development of non-regulatory Risk MAP products, including performing risk assessments and losses estimates for more than 100 Hazus-MH studies.

Mr. Baccala has coordinated and led instruction of the Flood Map Desktop software through online webinars, conference training, and onsite training with clients. These trainings consist of 2-3 day, hands-on instruction of the software with supplied training materials and sample data. As a FEMA Authorized Hazus Instructor, Mr. Baccala has taught Hazus courses for the FEMA Region V office, as well as the Emergency Management Institute. These courses consist of 4 day hands-on instruction using Hazus and providing real world examples of how Hazus can be used for risk assessments and mitigation planning.

While at Atkins, Mr. Baccala's project experience includes:

Technical Support for EPA Stormwater Rulemaking: GIS analyst for a study to quantify the economic benefits of nationwide implementation of green infrastructure. The study investigates the flood losses avoided as a result of the proposed stormwater regulations over the period between 2020 and 2040. The project utilizes hydrologic and hydraulic modeling, loss estimation using FEMA's Hazus model, and future projections of economic activity and assets exposed to flood risk. The study determined that GI can have a significant impact on flood loss reduction when implemented on a watershed basis. Environmental Protection Agency Office of Water, Washington, DC. Mr. Baccala's role is to process the various GIS datasets needed for modeling and performing the Hazus analysis.

Hazus Average Annualized Loss Study, FEMA Risk MAP Program, FEMA Regions I, V, VII, X. This project was part of an effort to develop standardized flood loss estimates and increase awareness of potential flood losses on a nationwide basis. Deliverables for the 1,121 counties studied were individual Hazus-MH HPR files, summary tables for losses, and a report outlining the study procedures, issues and limitations. Mr. Baccala managed the analysis of more than 250 individual U.S. counties, completed on 10 machines, tied to a single SQL server repository. This

effort included riverine and coastal counties and took more than three months to complete. Mr. Baccala coordinated the roll-up process of all the Hazus study regions for the contiguous United States, managing multiple SQL server installations and working closely with the Hazus developers to ensure all results were compiled.

FloodMap Desktop10 Development. Flood Map Desktop10 (FMD10) is publically available software that acts as an extension of ArcGIS allowing the creation of FEMA's regulatory and non-regulatory products. Mr. Baccala coordinated the development process of FMD10 working with mangers, clients, and developers to create a user-friendly product that is user friendly. Mr. Baccala's understanding of the Hazus data structure and SQL database layout has enabled him to design tools specifically for populating the Flood Risk Database through entirely automated methods.

Flood Map Production Coordination Contract, FEMA. Mr. Baccala served as lead and supporting GIS analyst for DFIRM production for FEMA Region V. Responsibilities included base cartographic data collection, community data collection, data capture and editing, data merging, DFIRM database creation, preliminary DFIRM production, and final DFIRM delivery. He worked closely with the engineering staff to produce DFIRMs and flood hazard data, and served as study lead for Hancock County, Indiana; Bay County, Michigan; Chippewa County, Pine County and Todd County, Minnesota. Mr. Baccala served as GIS analyst on the GPO process for completed studies in FEMA Region VII. Mr. Baccala served as GPO lead, making all necessary corrections to the final printed map panels, completing the DFRIM database, and submitting all mapping data to the FEMA map service center.

Geographic Information System Lease Management Application, Metropolitan Nashville Airport Authority, Nashville, TN. Mr. Baccala is supporting the update of Nashville airport's GIS data and ArcIMS site. He is responsible for updating the display map for the ArcIMS site, which identifies the location of occupants and lessees within the airport.

Georgia Flood Map Modernization Program, Georgia Dept. of Natural Resources (DNR), Atlanta, GA. This project involves the production and management of Georgia's statewide flood map modernization program, in compliance with FEMA regulations. Responsibilities include the completion of all phases of floodplain mapping, including statewide planning, map modernization management support (MMMS), and the following mapping activities: scoping, outreach, field reconnaissance, hydrology, hydraulics, floodplain mapping, QA/QC, preliminary DFIRM production, and post-preliminary DFIRM processing. Additional responsibilities include training state personnel to update floodplain maps in house. Mr. Baccala's responsibilities include producing countywide DFIRMs in 9 counties, with another 20 in scoping. His involvement includes floodplain mapping, DFIRM production, understanding DFIRM cartographic specifications, and quality control.

Caroline A. Cunningham

Risk Assessment Specialist

Atkins

Education

M.R.P., Land Use and Real Estate Development Specializations, University of North Carolina
B.S., Environmental and Natural Resources Management, Clemson University

Software

FEMA's BCA Software version 4.5.5

Ms. Cunningham joined the Atkins team after completing a Master's Degree in City and Regional Planning. Ms. Cunningham is proficient in ArcGIS, Hazus, and Comprehensive Data Management Systems (CDMS) and utilizes these programs for hazard risk assessments throughout the country. She has completed risk assessments for hazard mitigation plans at the local, state, regional, and university levels. In addition to hazard mitigation plans, she has utilized Hazus and GIS in post disaster recovery plans. Ms. Cunningham is also a FEMA authorized Hazus Trainer and a Hazus Trained Professional. She brings a strong background in real estate and economic development principals, having worked in and studied both fields.

Ms. Cunningham's relevant project experience includes:

Pre-Disaster Mitigation Plan, Mississippi Gulf Coast Community College (MGCCC) System. This project used FEMA's CDMS to update Hazus building-specific inventory on six MGCCC campuses in the Gulf Coast region of Mississippi. In order to collect the necessary data, building inspections were conducted in addition to using available building records. Hazus-MH MR5 essential facility school inventory (EF2) was updated with the obtained data. This permitted improved Hazus modeling and enhanced loss estimations for earthquake, hurricane wind, and flood hazards. In addition, a complete hazard risk assessment in compliance with the Disaster Mitigation Act of 2000 (44 CFR 206.1) was conducted as part of this project for the MGCCC campus system.

Disaster Resistant University (DRU) Hazard Mitigation Plan, University of South Carolina (USC) System. Hazus building-specific inventory was updated on ten campuses throughout South Carolina by utilizing FEMA's CDMS. This updated inventory resulted in improved and enhanced Hazus loss estimations for the college system. Analysis was conducted for earthquake, hurricane wind, and flood hazards. This process included data collection through building inspection, as well as use of available building records. In addition, a complete natural hazard risk assessment was conducted as part of the hazard mitigation plan for the USC campus system in compliance with the Disaster Mitigation Act of 2000 (44 CFR 206.1).

Hazus Average Annualized Loss Sensitivity Project, FEMA Regions V, VII, IX, and X for FEMA Risk MAP Program.

This project was a continuation of the Average Annualized Loss project which was part of an effort to develop standardized flood loss estimates and increase awareness of potential flood losses on a nationwide basis. Deliverables for the 1,121 counties studied

were individual Hazus-MH HPR files, summary tables for losses, and a report outlining the study procedures, issues, and limitations.

Multi-Hazard Mitigation Plan, Seminole Tribe of Florida (STOF)
FEMA's CDMS was used to update Hazus general building stock, population count, and essential inventory for eight tribes throughout the state of Florida. Hazus inventory was updated at the census block level for several hundred blocks. General building stock updates included building count by occupancy. Essential facility inventory updates included number of facilities by type and any available building-specific attribute data for schools, medical care facilities, emergency operation centers, police departments, and fire stations. Inventory updates were used in Hazus-MH MR4 for enhanced loss estimations for the hurricane wind and flood hazards. The inventory update process and Hazus analysis was part of a complete hazard risk assessment conducted as part of the STOF Multi-Hazard Mitigation Plan in compliance with the Disaster Mitigation Act of 2000 (44 CFR 206.1).

Essential Facility Hazus Data, Broward County, FL. CDMS is being utilized to update the default essential facility inventory in Hazus 2.1 for Broward County, Florida. Building-specific information was collected for each of the fire stations, hospitals, police departments, and emergency operation centers within the County. Attributes collected included location, elevation, hazard specific building type, foundation type, building replacement value, and contents value, among others. Such data will be used to run an enhanced, level 2 analysis for storm surge, hurricane wind, and flood hazards in Hazus 2.1.

Customized Hazus Training, University of Massachusetts (UMASS) Amherst. Ms. Cunningham is responsible for developing and conducting a customized Hazus 2.1 training for UMASS Amherst. Deliverables and expectations for the training include understanding the basics of Hazus; the flood, hurricane wind, and surge models; utilizing level 2, enhanced hazard data when available; and how to integrate custom data into Hazus using CDMS. Trainings will be conducted in-person and via webinar.

Hazus Analysis for Hazard Mitigation Plans. Ms. Cunningham is responsible for conducting Hazus analysis for hazard mitigation plans. A sample of the plans she has contributed to follows:

- State of Alabama Hazard Mitigation Plan
- Brunswick County, North Carolina Multi-Jurisdictional Plan
- High Country Regional Multi-Jurisdictional Plan (North Carolina)
- City of Myrtle Beach, South Carolina Hazard Mitigation Plan
- New Hanover County, North Carolina Multi-Jurisdictional Plan
- Toe River Regional Multi-Jurisdictional Plan (North Carolina)

Section 3: Work Plan and Schedule

The state of West Virginia seeks to update their Phase I Hazus information using the most current Hazus-MH release, version 2.1. This will take advantage of improvements to the loss analysis within the Hazus tool. The work will include the conversion of the Hazus MR3 data to the most current version of Hazus. Additionally, the analysis of the 500-year return period losses will be performed along with the Average Annualized Loss (AAL) calculation. Updating the data will assist the State to better institute effective hazard mitigation management measures to avoid or decrease flood disaster and their effects. The information can be used to assist in:

- Eliminating or reducing the intensity of their occurrence.
- Protecting the people who come in contact with them.
- Altering the way people live and the systems and societies they create in order to avoid the hazard altogether.

To accomplish this task Atkins offers our exceptional flood risk assessment and management skills to the State of West Virginia to perform the Hazus Analysis Phase II.

Task 1: Perform Statewide HAZUS MH 2.1 Analysis Phase II

Perform upgrade to Hazus- MH 2.1 (or Most current) of the Phase I HAZUS-MH MR3 hpr files.

Since Hazus is not backward compatible more than one version, to upgrade the current Hazus-MH MR3 hpr files Atkins will have to first upgrade the MR3 files to MR4, then to MR5, to Hazus 2.0 and finally version 2.1. The conversion will be performed by importing the current MR3 data from the hpr files into the version MR4 then saved out as version MR4. This will be done three more times to bring the files to the current version 2.1. Though this is a straight forward process, we are aware of issues experienced with corruption of hprs when performing this conversion process, with projects having flood loss analysis in the hprs. This usually shows up on the first conversion that is performed. If the conversion is not successful, the option would be to perform the full analysis for that study region using the version 2.1.

Perform analysis at the county level with 10 sq. mile drainage areas. Analyze data to include runs by watershed of the AAL and 500-year flood return frequency.

Once the conversion to version 2.1 is complete, Atkins will attempt to run failed reaches from the Phase I work. It should be noted that the process for creating the floodplains has changed since MR3 and this could be an issue with rerunning failed reaches from the phase I, in Hazus 2.1. The State will be briefed on the results; Atkins will request guidance on how to proceed if some reaches still fail. The 500 year return period analysis will be performed and checked to make sure all reaches were completed, successfully. The USGS 10 meter NED will be used for analysis. If any reaches fail the analysis will be attempted again. Any reaches not able to run properly will be discussed with the State and guidance as to how to proceed will be requested.

The 500 year loss analysis will then be completed for each study regions. To run the AAL analysis within version 2.1 of Hazus will require running the 25 year return period year losses. This is because the new AAL analysis within Hazus 2.1 requires different return periods (10, 25, 50, 100, and 500) to calculate the AAL. Once the 25 year return period is completed, the final step will be to run the AAL analysis for the study regions.

It should be noted the results for any floodplains delineations and losses run under Hazus 2.1 will differ from those run within Hazus MR3 version, due to the improvements and modification introduced into Hazus. This in general will not be a problem unless there is a side by side comparison of the data.

Under Task 3, Atkins proposes rerunning the entire analysis within Hazus 2.1 as an alternate to the conversion of the MR 3 hprs. Atkins believes the costs of this would be comparable to the conversion of the existing files and would give the State more accurate and current flood risk analysis.

Provide report output in electronic format for each county in a customized and client specific version of standard Hazus default format.

Atkins will import the existing custom templates developed during Phase I by WVDHSEM to create the report outputs. If for some reason the existing template does not import properly in the process, Atkins is very familiar with the Hazus database and extraction of data from the database to create custom reports and will recreate the format. We have created custom reports for other projects from Hazus data in the past.

Provide mapped reports output in electronic format for each county in a customized and client specific, user-friendly format.

Atkins will import the template created by WVDHSEM in Phase I and will compile the digital map outputs as required. If the map template for some reason does not import properly due to conversion issues, Atkins will create the template in Hazus version 2.1. Atkins mapping and cartographic specialist have created customized maps before from the Hazus database. We are experienced in using many type of base maps including Google Earth, Bing maps, and ERSI map services.

Export files to be relinquished to WVDHSEM for distribution.

Atkins will compile all the project data for use and distribution by the State. Atkins will use portable hard drives to transfer the data to the state. We have used this method successfully, delivering over a terabyte of data produced during the national AAL study to FEMA in lockable, waterproof, and shockproof hard cases. We understand that delivering the data in a timely manner and ensuring the data arrives safely is as important as the product itself.

Task 2: Progress Reports and Draft Deliverables**Monthly progress reports**

Atkins will submit monthly project reports summarizing the activities, issues, and progress of the project. Items covered will include summaries and progress of data preparation, flood hazard development, flood loss analysis, and Hazus report and map generation. Issues and issue resolutions will be documented as well. The reports will include written progress as well as tracking spreadsheet and map of counties and watershed analysis progress against the proposed schedule.

When appropriate Atkins will submit draft deliverable for review and approval by WVDHSEM. Based on comment Atkins will make adjustments to the deliverables

Quarterly progress reports and applicable deliverables to FEMA Region III

Atkins will submit quarterly project reports summarizing the activities, issues, and progress of the project. These will be in place of the monthly report for that month. Items covered will include summaries and progress of data preparation, flood hazard development, flood loss analysis, and Hazus report and map generation. Issues and issue resolutions will be documented as well. The reports will include written progress as well as tracking spreadsheet and map of counties and watershed analysis progress against the proposed schedule.

When appropriate Atkins will submit draft deliverable for review and approval by WVDHSEM. Based on comment Atkins will make adjustments to the deliverables

Atkins will work with WVDHSEM to produce the required reporting and quarterly deliverables to FEMA Region III.

Final deliverables preparation

Before final deliverables are submitted, Atkins will produce a sample of the final products (reports and maps) for review and final approval by WVDHSEM. Based on the final comments, Atkins will make adjustments to the deliverables and submit the final product for acceptance.

The final deliverables will be electronic files of all base data, floodplains and depth grids, Hazus hpr files, all county reports, and maps.

Task 3: Value Added Post Project Service

Project maintenance and support services

As noted in Addendum No. 2, no maintenance and support services are required as part of this project.

Qualified training services for the WVDHSEM staff on the Hazus deliverables and program

Atkins can provide onsite support for training and education to any communities or government agency if requested. We have four certified Hazus trainers that can support WVDHSEM or other agencies and communities. Our Hazus instructors can teach Basic Hazus, Hazus for Flood, and CDMS for Hazus. Atkins has a mobile Hazus training lab which allows us to train up to 10 people at just about any location of choice. Having the mobile lab by-passes the difficulties of having to make sure all participants load the training data and have the right access and permissions on their computers.

Potential value-added application to enhance the value of the deliverables (creative ideas and implementation)

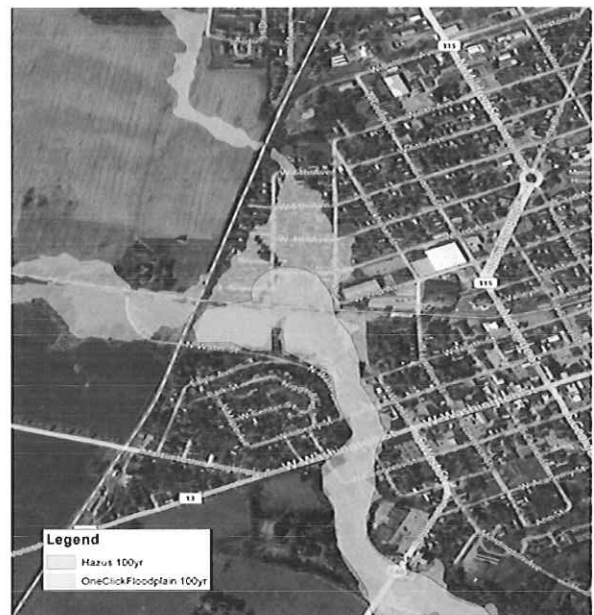
Many improvements and changes have been made to the Hazus loss estimation analysis (with version 2.1) since the Phase I analysis was completed with Hazus MR3. Some of these are list below.

- All return periods now use a single set of cross-sections (more consistent floodplains between return periods, improved processing time)
- Reach-specific Manning's roughness coefficients based on land cover grids (more accurate floodplains)
- Improved the merging of topography data (improved processing)
- Multiple flood user-defined depth grids (UDG) with differing return periods can now be imported
- Changed the AAL calculation replacing the 200 year with the 25 year return period (better results).
- Removed the 2 and 5 year return periods from the AAL calculation (reduced over estimation of losses)
- Improved software code that increase processing speed, as much as 60%.

In addition to the improvement in Hazus the improvement to computer hardware has decreased the processing time required to run the loss analysis.

As a potential value added and enhancement to the deliverables. Atkins recommends running a completely new analysis for the State using Hazus 2.1. Any data from the MR3 files that the State wants to retain will be extracted from the MR3 HPR files and stored in a database for use. The entire process of floodplain development and loss analysis can be completely run within Hazus just as before if the State prefers. The other option would be to develop floodplain external to Hazus.

Atkins would propose to develop the flood hazard (floodplains) data outside of Hazus using our One Click Floodplain (OCF) tool, which automates the modelling and floodplain development. This tool will be able to develop more accurate floodplains in a much shorter



period of time. OCF is capable of delivering floodplain delineations along with depth grids that can be imported directly into Hazus and used for determining flood losses. Using OCF will yield more accurate floodplain delineation results than the hydrology and hydraulic tools within Hazus, thus giving you more accurate loss information. The figures to the right and below are two examples of the difference between the Hazus floodplains (yellow) and OCF floodplains (blue). Notice the gaps in the Hazus floodplains that would impact loss calculations.



Atkins has used OCF data previously for Hazus, providing data to FEMA for the Department of Homeland Security PPD-8 National Scenario Development exercise. OCF was used to model seven return periods of flooding, providing floodplains and depth grids, which were imported into Hazus with no additional processing, enabling Atkins to provide the needed results much faster and more accurately than could have been done with other methods. Atkins would use the USGS 10 Meter DEMs. Atkins believes we can produce the new analysis at roughly the same cost as the conversion of the Phase I data. This method would create a more consistent updated loss analysis for each return period and the AAL.

Additionally, the FEMA Risk MAP program has developed new non-regulatory products as part of the floodplain mapping process. The non-regulatory products include the Risk MAP database, Risk Report, and Risk MAP. As part of the development of these products Hazus data is used to communicate flood risk and assess mitigation opportunities. Atkins can deliver the initial data used to populate the Risk database, state-wide at a minimal cost to the State. Atkins will extract the data from Hazus and populate the Risk database in the required format.

West Virginia Phase II Hazus Analysis

