

Panel Decision & Report

**SRP NJWTP021717-TOWNSHIP OF WAYNE,
PASSAIC COUNTY, NJ**

February 6, 2019



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Summary

Based on the submitted scientific and technical information, and within the limitations of the Scientific Resolution Panel (SRP), the SRP has determined that the Community's data does not satisfy NFIP standards, thus FEMA's data is not corrected, contradicted, or negated.

Introduction

This report serves as the recommendation to the Federal Emergency Management Agency (FEMA) administrator from the National Institute of Building Sciences (NIBS) Township of Wayne, NJ Scientific Resolution Panel (SRP). SRPs are independent panels of experts organized, administered and managed by NIBS for the purpose of reviewing and resolving conflicting scientific and technical data submitted by a community challenging FEMA's proposed flood elevations used to develop proposed flood hazard data for the National Flood Insurance Program's (NFIP) Flood Insurance Rate Maps (FIRM).

Panel

Panel ID: NJWTP021717

Panel Name: Township of Wayne, Passaic County, NJ

FEMA Region: II

Panel members:

1. Ms. Carolyn Gilligan, PE, Senior Technical Consultant, LJA Engineering, Inc.

Ms. Gilligan has more than 30 years of managerial and technical experience in hydrology and hydraulics, including watershed studies, drainage studies of major waterways, design of storm water detention systems, drainage channels, and storm water collection systems. She has previously been involved in the implementation plans for the establishment of impact fees, watershed ordinance reports, levee improvement districts, municipal utility district creation reports, criteria manuals for public agencies, and FEMA studies. Ms. Gilligan is proficient in the use of XP-SWMM, HEC-1, HEC-2, HEC-RAS, adICPR, and Flood Frequency Analysis, as well as extensive use of application programs for hydrology and hydraulics. Ms. Gilligan received a Bachelor of Science degree in Civil Engineering and a Bachelor of Arts degree in Urban Planning from Michigan State University. She is a Licensed Professional Engineer in Texas and Michigan.

2. Mr. Terry Hull, PE, Associate Vice President, Dewberry Engineers, Inc.

Mr. Hull's 30 years of experience focuses on water resources including hydrologic and hydraulic modeling – mostly for government agencies including state water management districts and departments of transportation, FEMA, and the U.S. Army Corps of Engineers (USACE). As president of Taylor Engineering, Inc., he directed the firm's Region IV and VI work under joint venture contracts with FEMA HQ, Region IV, and Region VI. He also served as contract manager for multiple,

consecutive FEMA and USACE contracts. He performed and directed flood hazard studies applying a variety of hydrologic and hydraulic models including HEC-HMS, HEC-RAS, AdICPR, FESWMS, RMA-2, MIKE-11 and -21, SWMM, and SWAT. His BS and MS degrees were in engineering fluid mechanics. He holds professional engineering licenses in seven states.

- 3. Dr. Vijay Singh, PhD, D.Sc., D. Eng. (Hon.), Ph.D. (Hon.), D.Sc (Hon.), PE, P.H., Hon. D. WRE,** Distinguished Professor, Regents Professor and Caroline & William N. Lehrer Distinguished Chair in Water Engineering, Texas A & M University.

Dr. Singh has more than 45 years of experience in teaching, research, technology transfer, and consulting in hydrology, hydraulics, water resources engineering, and probabilistic and stochastic modeling. He has been President of American Institute of Hydrology, and is currently President-Elect of American Academy of Water Resources Engineers. He has served on numerous panels at national and international government levels. He is author/co-author of more than 30 books and has edited 68 books, and has published 1100 journal articles in peer-reviewed journals. He is editor-in-chief one journal and two book series and serves on editorial boards of numerous journals. He has received more than 90 national and international awards for contributions in hydrology and hydraulics. His work on kinematic wave theory, entropy theory, copula theory and systems theory is highly cited.

- 4. Dr. David Williams, PE, CFM, PH, D.WRE, CPESC, F.ASCE,** President, DTW & Associates, Fort Collins, CO.

Spanning over 40 years, Dr. Williams has a variety of work experience which includes National Technical Director for Water Resources for PBS&J and HDR, co-founder and President of WEST Consultants (a nationally recognized water resources engineering firm), the U.S. Army Corps of Engineers (USACE), and adjunct professor at San Diego State University. His work experience includes being an airborne Combat Engineer with the 7th Special Forces Group (Green Berets), over 18 years as a federal government hydraulic engineer with the USACE at the Waterways Experiment Station (WES) in Vicksburg, MS, both the Nashville and Baltimore Districts, and the Hydrologic Engineering Center (HEC) in Davis, CA. He has presented short courses throughout the U.S. for the American Society of Civil Engineers (ASCE) and other professional and public organizations such as ASFPM and FMA on computer training using HEC-2, HEC-RAS, HEC-HMS, Bridge Scour and HEC-6 in addition to courses on channel toe protection design, sediment transport, stream restoration, fluvial geomorphology and streambank protection. His national society activities have included past chairs of the ASCE/EWRI Committees on Sedimentation, Computational Hydraulics, Probabilistic Approaches and Stream Restoration, Executive Committee member of the American Institute of Hydrology, and past President of the International Erosion Control Association (IECA).

- 5. Mr. Andrew Yung, PE, CFM, D.WRE,** Principal/Chief Hydrologist, Walter P Moore and Associates, Inc., The Woodlands, TX.

Mr. Yung has over 30 years of experience as an engineer, planner, and hydrologist. In his 23 years with Walter P Moore, he has managed a wide range of engineering projects involving hydrology, hydraulics, floodplain modeling, master drainage studies, channel modification and hydraulic

structure designs, watershed impact analyses, detention facility designs, and dam safety analyses. He is very familiar with HEC-HMS/HEC-1, HEC-RAS/HEC-2, HEC-DSS, and HEC-SSP and provides technical support and training to users of these programs. Prior to joining Walter P Moore, Mr. Yung was employed with the Harris County Flood Control District (HCFCD), Planning Department in Houston, Texas, where he managed watershed planning projects across the County. Mr. Yung began his career with Dewberry in Fairfax, Virginia, where he provided engineering design support for numerous public and private water resources design projects and provided review for the National Flood Insurance Program. He is a licensed Professional Engineer in Texas, Georgia, and Louisiana and is an active member of ASFPM, TFMA, and NHWC.

Basis for Appeal

By the letter dated January 26, 2016, the Township of Wayne, New Jersey (Community) submitted technical information challenging the proposed Base (1-percent annual chance) Flood Elevations (BFEs), Special Flood Hazard Area (SFHA) determinations, and floodway delineations, as proposed by the Federal Emergency Management Agency (FEMA), on the preliminary Flood Insurance Rate Map (FIRM) and in the Preliminary Flood Insurance Study (FIS) for Passaic County, New Jersey dated January 9, 2015.

Data Submitted by the Community and FEMA

The following data used to generate the appealed flood elevations and the correspondence submitted as part of the Township of Wayne, Passaic County, New Jersey challenge have been provided to the Panel:

Community

1. Cover letter from Heather Vitz-Del Rio, PE, Director of Public Works, Township of Wayne, dated January 26, 2016
2. Technical Report titled *Appeal of FEMA's Preliminary Flood Insurance Rate Maps for the Township of Wayne, NJ*, dated January 26, 2016, prepared by GEA Environmental Consultants, Inc. (GEA), including supporting tables and figures.
3. Updated HEC-RAS unsteady flow hydraulic model for the Central Passaic River and JPEG images of bridges over the Passaic River in the Township of Wayne.
4. SRP request form cover letter, February 17, 2017.
5. SRP request form, February 17, 2017.

FEMA

1. January 23, 2017 resolution letter from Michael Moriarty, Director, Mitigation Division, FEMA Region II, in response to the Wayne Township's appeal letter of January 26, 2016, which included a technical report from GEA Environmental Consultants, Inc.
2. Attachment A - Technical Appeal Resolution Summary, Township of Wayne, Passaic County, New Jersey, January 23, 2017 regarding the concerns raised by GEA.

3. January 23, 2017 resolution letter from Michael Moriarty, Director, Mitigation Division, FEMA Region II, in response to the Wayne Township's submittal of January 26, 2016 appealing the preliminary FIRM and FIS report for the Township of Wayne, dated January 9, 2015 and appeal report from Storm Water Management Consulting.
4. Technical Appeal Resolution Summary, Township of Wayne, Passaic County, New Jersey, January 23, 2017 regarding the concerns raised by SWM consulting.
5. RAMPP Hydrologic and Hydraulic model data.
6. URS Hydraulic Model data
7. Passaic County Effective FIS, September 28, 2007.
8. Preliminary FIRM & FIS, January 9, 2015.

Summary of Panel Procedures

An SRP kickoff meeting was held on October 15, 2018 via web-based teleconference presentation. The NIBS Director, Ms. Dominique Fernandez, explained the SRP procedures, Panel members were introduced, and a Panel Chair, Ms. Carolyn Gilligan was selected. Panel progress schedule for SRP report completion, coordination of communications with NIBS and the Panel, and the roles in completing the final report were discussed. The Chair's responsibility for leading the Panel review of Community, and FEMA submissions were discussed. The Panel was tasked to review the technical information and data provided by FEMA and the Community. The Panel was tasked to keep their deliberations tightly focused on scientific and technical issues and correctness of the conflicting data. All subsequent Panel meetings were held via web-based teleconference calls.

A first Panel meeting was held on November 5, 2018 to review the submitted data, review Panel progress, clarify Panel questions, and discuss individual Panel member's scope and responsibilities leading to the final Panel report.

The second Panel meeting was held on December 12, 2018 to review the Community's technical procedures, discuss the Panel written submissions, and discuss preliminary Panel decision. A vote was held within the scope of the NIBS's regulations, and the Panel's final decision was based on a unanimous vote of the five Panel members. The schedule for preparing draft determination reports and the final determination report was established.

A draft report outlining the SRP procedures and technical data reviewed was prepared by the Panel Chair and distributed to Panel members. A vote was held within the scope of the NIBS's regulations, and the Panel's final decision was based on a unanimous vote of the five Panel members. Based on the members' vote, a final report (this report) was prepared containing conclusions regarding the overall technical correctness of the information submitted to NIBS by the Community and FEMA.

Recommendation

Based on a unanimous Panel vote, the Panel recommends denial of the challenge. The Community's data does not satisfy NFIP mapping standards defined in FEMA's Guidelines and Specifications for Flood Hazard Mapping Partners (NFIP standards), thus FEMA's data is not corrected, contradicted, or negated.

Rationale for Findings

The Community submitted scientific and/or technical data in support of challenges to the updated flood hazard information prepared by FEMA for the Community. The challenge that a mathematical error was made in converting the water depths recorded at stream gages along the Passaic River that were used to calibrate and verify the unsteady flow HEC-RAS model of the River was confirmed by FEMA. The modeling was recalibrated and the resulting changes were incorporated into the preliminary FIRM and portions of the FIS report; however, the Community felt that the incorporated changes did not address the following deficiencies presented in its original challenge and requested review by an SRP:

1. Arbitrary ineffective flow areas
2. Obstructions not properly modeled
3. Manning's "n" values are inappropriate

The recommendation and rationale presented in this report address only the items listed in the SRP request submitted by the Community.

Ineffective Flow Areas

The Community objected to the ineffective flow areas in the FEMA model, stating that the "areas bear no relation to the physical environment and are technically incorrect". As an example, the Community presented a cross-section that showed a building within the ineffective flow area, but did not provide additional technical data to support the statement. It has been noted that the floodway at the referenced cross-section covered approximately two-thirds of the ineffective flow area; however, changes to the FEMA model made in response to a separate challenge regarding the conversion of gage depth readings that were used to calibrate and verify water surface elevations in the HEC-RAS model of the Passaic River did reduce the floodway width at this location.

FEMA responded by calling attention to the floodplain width for the study reach, which ranges from approximately 0.75 miles to two miles. Since much of the floodplain is in the overbank area, those areas would represent storage with limited conveyance. Modeling these areas as ineffective flow area is reasonable. Additionally, as FEMA stated, ineffective flow areas can also reflect the impact of inundated structures.

The Panel agrees with FEMA that inundation of large areas of the overbank does indicate limited conveyance and that the Community has not provided technical or scientific data negating FEMA's data.

Obstruction Modeling

The Community stated that the hydraulic model ignored major obstructions, thus “creating a model that is erroneous and does not reflect actual conditions.” Again, the Community presented a cross-section that showed a building within the ineffective flow area, but did not provide additional technical data to support the statement.

According to FEMA’s Technical Appeal Resolution Summary, “obstructions (particularly buildings) within the floodplain provide storage for floodwaters. Designating the obstructions as normal ineffective flow areas removes active conveyance, but considered the storage available in the structures.”

The Panel agrees with FEMA that, in order to consider the storage of flow within inundated structures, those structures should be modeled as ineffective flow areas and that the Community has not provided technical or scientific data negating FEMA’s data.

Manning’s “n” values

The Community presented data at a single cross-section showing Manning’s “n” values for the Passaic River channel and overbanks, maintaining that the “n” values were excessive and technically incorrect; however, no additional technical data was provided to support the statement.

The Hydrologic and Hydraulic TSDN prepared by Risk Assessment, Mapping and Planning Partners (RAMPP) (A Joint Venture between Dewberry, ESP and URS Corporation) Section D.5.2.5 states “Manning’s n values for the channel section were estimated based on the survey field photos and 2007 aerial imagery.” The 2002 Land Use/Land Cover dataset developed by NJDEP was used to estimate Manning’s n values for overbank areas. Additionally, according to FEMA’s Technical Appeal Resolution Summary, the final selection of Manning’s n values was based on the calibration of the model to USGS gage data. That a good calibration was made to the observed rating curves at the stream gage locations validates the roughness coefficients chosen for the channel and overbank areas.

The Panel agrees with FEMA that calibration to the observed rating curves at the stream gage locations satisfies NFIP standards and the Community has not provided technical or scientific data negating FEMA’s data.

References

FEMA, November 2009. Guidelines and Specifications for Flood Hazard Mapping Partners, Appendix C. Guidance for Riverine Flooding Analyses and Mapping.

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