

The Emergent State of Flood Insurance Reform in Lewisburg, PA

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Questions

- 1.) How many properties would a 100 year flood affect?
- 2.) What level of damage would they sustain?
- 3.) How can we model community-wide mitigation options and costs?

Analysis

Data: We calculated the projected depth of a 100 year flood by subtracting ground elevations (PAMAP DEM¹) from a flood base elevation (BFE) surface created by interpolating points digitized from FEMA 100-year BFE cross sections. The Union County, PA, GIS Office provided addressable footprints and parcel boundaries. We estimated first-floor elevations (FFE) by adding front door threshold height above grade (estimated from field observations and examination of Google Street View imagery) to grade elevations derived from the PAMAP DEM and building footprints.

Questions 1 and 2: To find the areas prone to 100 year flooding, we first overlaid the interpolated flood depth layer with the FEMA 100 year flood hazard zone. This method revealed distinct categories of flood depth, as well dry areas above BFE according to PAMAP DEM data, but otherwise designated by FEMA to be present within the floodplain. For each house within the floodplain and below BFE, we subtracted first-floor elevation from flood depth and assigned a mitigation class designation. (Table 1)

Question 3: After establishing a class of mitigation fitting for each structure, placeholder costs were multiplied by the quantity of borough structures within each respective class. These products were consequently summed to achieve a rough preliminary estimate of the cost for community wide mitigation.

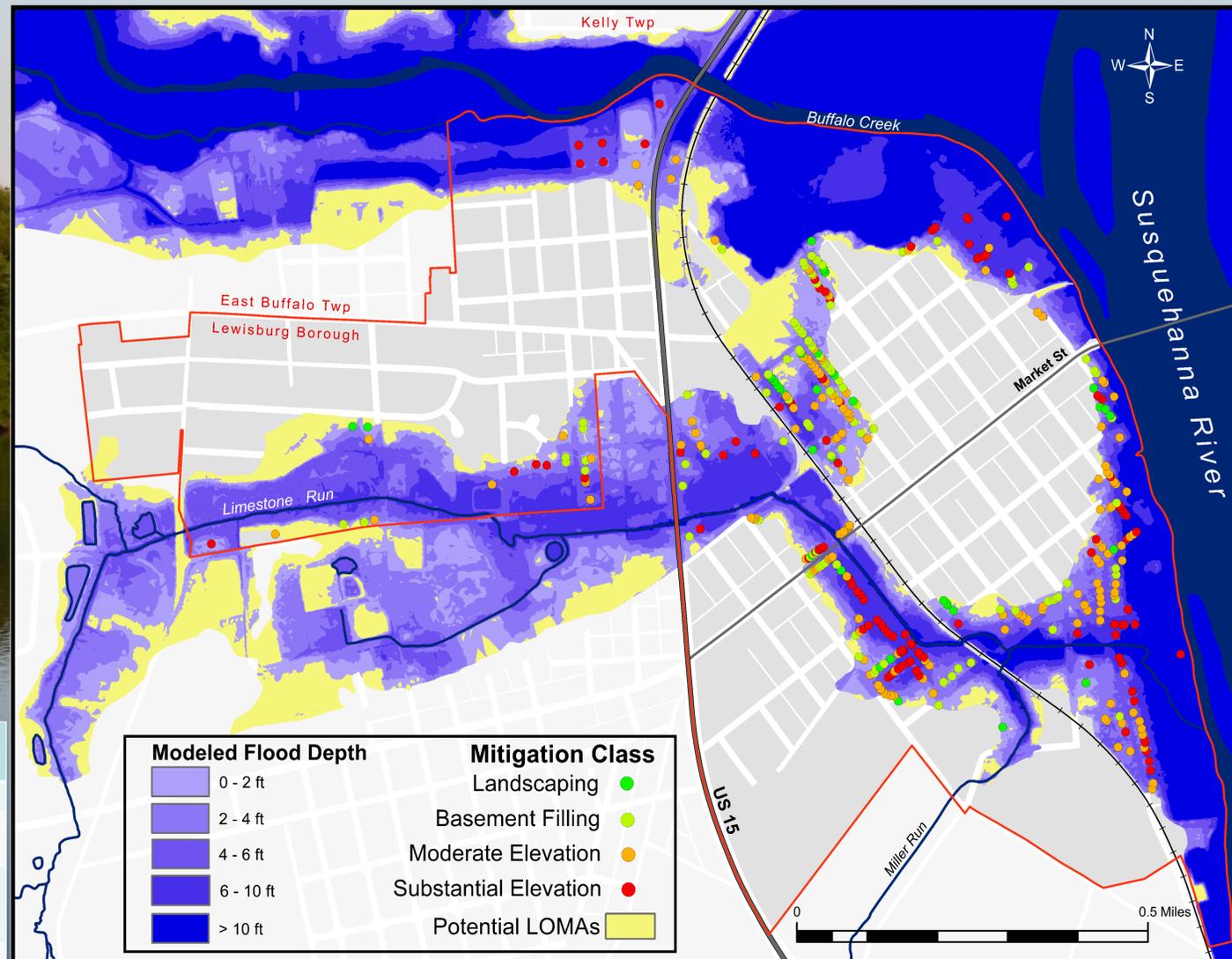
Results are highlighted in the table and map.

| Mitigation Class | Criterion | Borough Structures | Placeholder Cost | Totals |
|-----------------------|--------------------|--------------------|------------------|---------------------|
| LOMA | BFE < 0 | 144 | \$500 | \$72,000 |
| Landscaping | FFE > 2' above BFE | 36 | \$5,000 | \$180,000 |
| Basement Filling | FFE < 2' above BFE | 101 | \$15,000 | \$1,515,000 |
| Moderate Elevation | FFE < 3' below BFE | 154 | \$25,000 | \$3,850,000 |
| Substantial Elevation | FFE > 3' below FFE | 111 | \$50,000 | \$5,550,000 |
| | | | | \$11,167,000 |

Table 1

Introduction

The Biggert-Waters Flood Insurance Reform Act of 2012 and the Homeowner Flood Insurance Affordability Act of 2014 were established with the intention of eliminating incentives to build (and rebuild) in areas where catastrophic damage to buildings is likely. However, these reforms place an undue financial burden on Lewisburg, PA and other historic river towns, where flood damage is almost never catastrophic, and repair costs are far below building replacement value. Barring further policy reforms, property owners have three options: pay excessive flood insurance premiums, forgo the benefits of flood insurance, or mitigate their properties to free themselves of the requirement for flood insurance. In this study, we use Geographic Information Systems (GIS) to analyze exposure to flood risk with the ultimate goal of parameterizing a simple economic model for calculating potential mitigation costs in the Borough of Lewisburg, PA. The results of this study will serve as evidence for the Lewisburg Neighborhoods Corporation to employ when the law comes up for reauthorization in 2017.



Acknowledgements

- [i] Sam Pearson and the Lewisburg Neighborhoods Corporation
- [ii] Duane Griffin, Associate Professor of Geography
- [iii] Madeline Layos, Union County GIS
- [iv] Kathi Hannaford, SEDA-COG

References

- [i] Pennsylvania Department of Conservation and Natural Resources' lidar-based digital elevation model (bit.ly/1Dgjfj9)
- [ii] National Flood Hazard Layer, Base Flood Elevations, Cross-Sections, and Flood Hazard Zones (<http://1.usa.gov/1KFKMK2>)

Discussion and Conclusions

As evidenced by quantities of Borough structures in Table 1, there are hundreds of homes and businesses at risk of flooding within Lewisburg, PA. With considerable impending damage for these buildings, approximately half of which are prone to receiving more than 2 feet of flooding above First Flood Elevation, there is certainly initiative to pursue mitigation.

In the original production of Flood Insurance Rate Maps, FEMA designated its 100 year flood hazard zone on the basis of relatively coarse elevation data derived from 1:24,000 scale maps. The PAMAP DEM data has a much finer accuracy with a horizontal ground resolution of 3.2 feet, vertical accuracy of 18.5 cm in open areas, and 37 cm under tree cover. This PAMAP DEM is a substantial improvement over the 1:24,000 topo maps FEMA used.

By making use of this greater accuracy, we suggest that approximately 20% of the FEMA-designated flood zone in Lewisburg, PA may actually be above BFE. Owners of the 144 structures within this zone may be eligible for a Letter of Map Amendment. LOMAs are permits obtained by submitting a certificate of elevation to FEMA, providing verified evidence that the lowest grade of a property owner's structure is above the original Base Flood Elevation. As for the remaining higher flood impact areas, it is essentially that property owners understand their mitigation options.

As for the costs of such mitigation, further research is necessary. The LNC is in the process of gaining understanding of baseline standards for estimating costs of the five different mitigation options. However due to this study, the LNC now possesses a much clearer understanding of the quantity of homes most likely within these classes. Upon the establishment of actual costs and application to the economic model created, the LNC will have strong, precise evidence in 2017 that will show the financial severity of mitigation costs associated with upholding Biggert-Waters.

***While the PAMAP DEM is a remarkable improvement over the 1:24,000 topo maps FEMA used, our current classifications are *estimates* and are still subject to error.