FLOOD MITIGATION: TYPES/TECHNIQUES

DATE: NOVEMBER 10, 2021

*THIS MEETING IS BEING RECORDED

WEBINAR SERIES PART 2 OF 3

SOUTHWESTERN PENNSYLVANIA COMMISSION

SEDA-COUNCIL OF GOVERMENTS

*This webinar is brought to you by the Southwestern Pennsylvania Commission – Water Resource Center in partnership with SEDA-Council of Governments (SEDA-COG).

SPECIAL THANK YOU TO:

- Erin Kepple Adams Manager, Water Resource Center
  - If you or your organization have ideas for future workshop topics, please contact Erin Kepple Adams at ekepple@spcregion.org

INTRODUCTION OF SPEAKERS

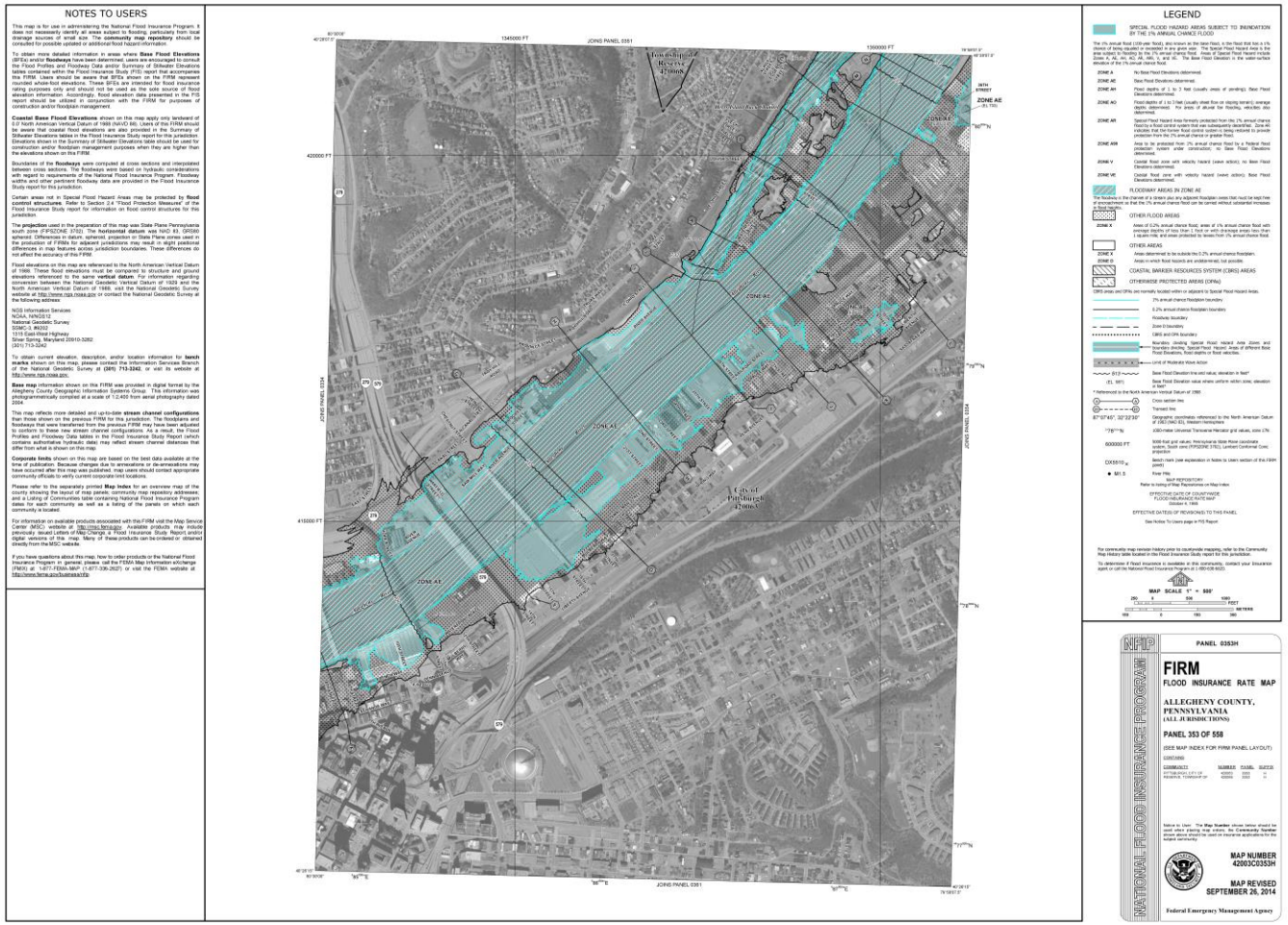
- Teri Provost, CFM
  - SEDA-COG Director of Housing and Flood Resiliency
  - Teri Provost is the Director of Housing Rehabilitation and Flood Resiliency at SEDA-COG. During her 15-year career at SEDA-COG, nine years with the Community Development Program, she has prepared numerous grant applications and is experienced in managing Housing and Urban Development programs. Teri has also developed and managed public works projects throughout the central Pennsylvania counties served by SEDA-COG. Additionally, she is a Certified Floodplain Manager (CFM) and has administered several State- and Federally-funded buyouts and residential elevation projects in flood-prone communities.
- Geralee Zeigler
  - SEDA-COG Flood Resiliency Program Analyst
  - Geralee Zeigler has worked as a Program Analyst within SEDA-Council of Governments' (SEDA-COG) Flood Resiliency Program since November 2019. Her four-year career at SEDA-COG started within the Community Development Program, where she assisted and prepared a variety of grant applications, as well as assumed responsibilities related to the National Environmental Policy Act (NEPA) Environmental Review process, State/Federal Labor Standards Compliance, and project management.

FOCUS OF TODAY'S WEBINAR

- Six Residential Flood Mitigation Efforts
  - Importance
- Structural vs. Non-Structural

NON-STRUCTURAL CONSIDERATIONS

- Flood Insurance Rate Map (FIRM)
  - Compliance
  - Floodplain Ordinance
  - National Flood Insurance Program (NFIP) Status
    - Participating, Not Participating, Suspended or Sanctioned
    - Implications for Community to receive disaster assistance
  - Community Identification (CID)
  - Federally backed mortgages
  - Substantial Damage/Substantial Improvements
  - Historic Structures/Designation



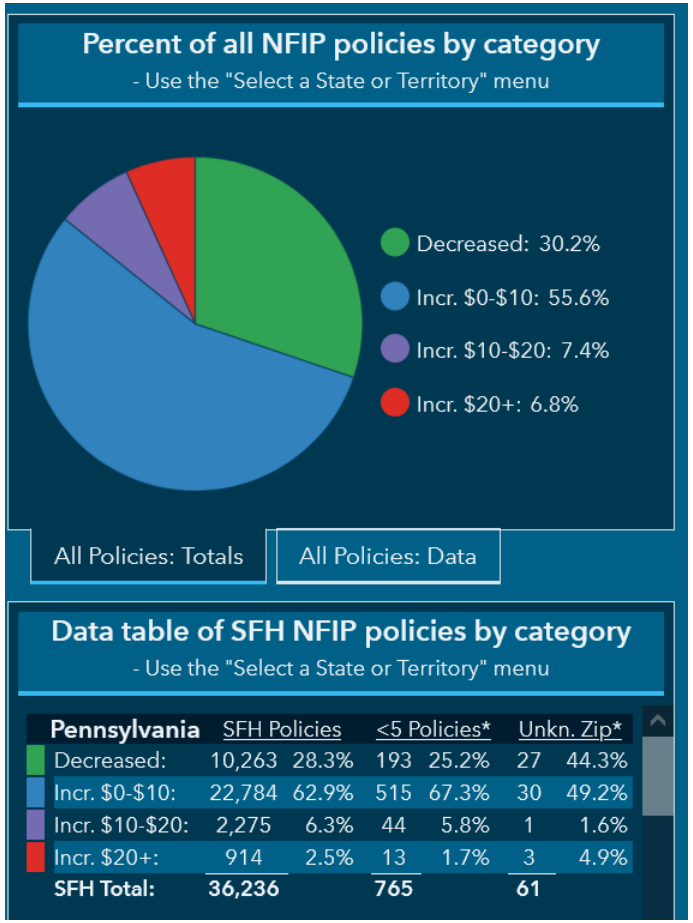
ADDITIONAL NON-STRUCTURAL CONSIDERATIONS

- Risk Rating 2.0
  - FEMA has recently (October 1, 2021) updated the NFIP's methodology and implementation in how NFIP Policyholder's structures receive flood insurance premiums.
  - Zip Code example for 15201 – Pittsburgh, PA
  - Elevation Certificate implications

Risk Rating 2.0 - Equity In Action

First Year Change by State and ZIP - Count of All Policies

		Green bar	Blue Bar	Dk. Blue Bar	Grey bar					
State	**Zip Code**	**< -$100**	**$0 to $10**	**$10 to $20**	**$20 to $30**	**$30 to $40**	**$50 to $60**	**$70 to $80**	**> $100**	**Grand Total**
PA	15201	2	16	8	3	2	6	1	1	39



SIX FLOOD MITIGATION: TYPES/TECHNIQUES

- Raising Utilities/Mechanicals
- Basement Infilling
- Abandoning the 1st Floor
- Structural Elevation
- Relocation of Structure
- Mitigation Reconstruction

RAISING UTILITIES/MECHANICALS

- Raising utilities/mechanicals is simply to relocate these higher dollar items to a location and elevation that minimizes future claims.
- One of the most common claims during a flood event is the loss of mechanicals.
  - Such as boilers, hot water heaters, air conditioning units, etc.
- Typically located on the lowest floor (typically basement) or on-grade outside.
- Tend to be more costly when they need to be replaced, especially after repetitive losses.
- Depending on the height of the Base Flood Elevation (BFE), mechanicals may only need to be raised a few feet but can remain in the basement/lowest floor.
- If the BFE is at or higher than the next highest floor, then these items are placed in an area that will accommodate them on the first floor or higher – think: closet, small addition to the upper floor, or even outside in an insulated enclosure.
- Cost can vary based on the level needed to reach/exceed the BFE and any associated rewiring/replumbing,

RAISING UTILITIES/MECHANICALS – BENEFITS & DRAWBACKS

- **Benefits**:
  - Could reduce future losses to items that are costly to replace repeatedly.
  - Attractive option for homes that are unable to utilize any other mitigation technique (like elevation) due to historic designation or structure is attached to adjacent home(s).
  - This option helps keep homeowners stay in their homes – maintains tax base.

- **Drawbacks**:
  - Raising utilities alone may not fully mitigate this risk is the lowest floor is below the BFE.
  - Small decrease in flood insurance premium for this mitigation compared to other mitigation techniques.
  - If the height of the raising requires the mechanicals to be placed on the first or second floor, then this will likely result in the loss of living/storage space and/or costly rewiring/plumbing.

BASEMENT INFILLING

- Involves abandoning the lowest floor, then backfilling to the necessary height required to make the next highest floor the new lowest floor.
- After abandoning the basement and relocating utilities and mechanicals, the foundation slab is perforated to allow flood water to move freely in and out of the foundation.
- The basement is then backfilled with compacted soil, pea gravel, or flowable fill to the required height and capped with concrete to create an impermeable slab.
- The resulting area between the new slab and the next highest floor effectively becomes a crawl space provided it is properly vented to allow the passage of flood water.
  - The next highest floor now becomes the lowest floor above the BFE.
- This is an effective mitigation technique where the BFE is higher than the lowest floor, but below the next highest/first floor.

BASEMENT INFILLING – BENEFITS & DRAWBACKS

- **Benefits**:
  - May be a desired option, where appropriate, for homes whose construction make it difficult to elevate.
  - Attractive for historic homes/districts - helps maintain historic integrity and aesthetic character.
  - Disturbance to homeowner is minimal, other than loss of storage space.
  - Retention of tax base in keeping home occupiable.
- **Drawbacks**:
  - Loss of storage space in basement area and also accommodating the elevated mechanicals on upper floors.
  - Care must be taken to ensure that the resulting crawlspace meets the FEMA requirements of a crawlspace.
    - If the space is too high, it may be classified as a basement with less effect on the resulting flood insurance premium.
    - Crawlspace must be properly flood vented to receive credit.
  - Cost – technique and type of infilling material used will contribute to some variability.

ABANDONING THE 1ST FLOOR

- Similar to basement infilling.
- The lowest floor (at or near grade) is abandoned and living space is moved up to the next highest floor. The abandoned floor is converted to open space that is compliant with all FEMA regulations, including proper flood venting and non-conversion to livable space. If a basement exists, it can be infilled in the same regard as previously mentioned.
- This mitigation technique is more effective when the BFE is located above the elevation of the first floor, regardless of if there is a basement.

ABANDONING THE 1ST FLOOR – BENEFITS & DRAWBACKS

- **Benefits**:
  - Retains tax base.
  - Abandonment of the first floor is typically less expensive and disruptive to the homeowner as no elevation takes place.
  - If allowable, additional floors can be added to the top of the structure to offset the loss of living space.
  - Abandoning a floor may negatively impact a structure's historical designation, it would have a minimal impact on the aesthetics of a community that may be averse to pure structural elevations.
- **Drawback**:
  - Loss of living space, especially if additional floors is not an option.
  - Basement infill needs to be completed to compliance (FEMA regulation and abandoned flood needs to remain open – non-living space needs to be compliant).

STRUCTURAL ELEVATION

- Accomplished through a controlled lift by separating a home from the existing foundation and jacking the entire structure to an elevation that is at or above the BFE.
- The existing basement is infilled, and upon elevating to the required height using a jacking system, the home is lowered onto a support system.
- Common supporting systems consist of concrete masonry unit walls or piers/piles.
  - If pier/piles are used, water can flow freely during a flood event.
  - In the case of masonry walls, the structure is enclosed, therefore proper flood venting is required to alleviate hydrostatic pressures and to allow draining as floodwaters recede.
- The remaining open space below the elevated structure can be used for storage or parking but cannot be converted into livable space for credit as an uninhabitable space.

STRUCTURAL ELEVATION – BENEFITS & DRAWBACKS

- **Benefits**:
  - No loss of space to owner.
    - The home/business is minimally altered but the owner picks up additional storage and possibly parking underneath.
  - Most high dollar items that would be adversely affected during a flood (hot water heater, air conditioning unit, electrical panels) are elevated as well, resulting in the reduction of losses.
  - Retains tax base.
  - Structure is more marketable, and premiums are more affordable after this mitigation technique is compete.

STRUCTURAL ELEVATION – BENEFITS & DRAWBACKS CONTINUED

- **Drawbacks**:
  - Major drawback = high cost to undertake this type of work privately – few owners can afford to privately fund.
    - Proper elevations require careful consultation with an engineer and the actual shoring and jacking of the structure is best done by experienced specialty contractors.
  - Utilization of grant funding is common for homeowners who carry NFIP, but the process is lengthy, often taking years to begin and close out.
    - Grant funding priority is placed on acquisition/demolition, which makes it difficult to keep application for structural elevations competitive.
    - Compounded with the need to meet state and federal requirements – need for bonding, state wage rates, etc. makes project more expensive than similar work if funded privately.
  - Community concern of aesthetic appeal – perceived as an "unnatural" look.
  - Poses a challenge for individuals with limited mobility.
    - need for compliant ramps can be difficult to effectively construct base on excessive height or space constriction mandated by zoning and other laws.

STRUCTURAL ELEVATION EXAMPLE

- Conditions:
- - Pre-FIRM structure is located in the SFHA (Regular Program),
- - Basement is present with lowest floor below BFE,
- - Elevated structure will sit on concrete masonry block walls with proper flood venting.

- Coverage*: Building Coverage $200,000/$2,000 deductible (1.20/1.51) prior to elevation
- Contents Coverage $75,000/$2,000 deductible (1.41/1.55) prior to elevation
- Coverage**: Building Coverage $200,000/$2,000 deductible (.30/.08) after elevation
- Contents Coverage $75,000/$2,000 deductible (.38/.12) after elevation

- Mitigation Construction Cost – Privately Funded: Varies ~$40, 000 - ~$80,000
- Mitigation Construction Cost – Federal/State Funded: Varies ~$100, 000 - ~200,000 + elevation
- Effect on NFIP Policy: Prior to elevation $4,093, after elevation $530 (+4 BFE)
- Effect on Private Flood Insurance Policy: None, any mitigation would be contained on an E.C. which is not considered when calculating private insurance policy premiums.

STRUCTURAL ELEVATION EXAMPLE

Illustration purposes only* (prior to elevation):

- Premium Calculation: Multiply Rate x $100 coverage: Building $2,834/Contents: $1,128
- The first $60,000 in building is multiplied by 1.20 ($720) and the remaining is multiplied by 1.51 ($2,114)
- The first $25,000 in contents is multiplied by 1.41 ($353) and the remaining is multiplied by 1.55 ($775)
- Deductible Factor: Building 1 x $2,834/Contents: 1 x $1,128
- Premium Increase or Reduction with deductible: $0/$0
- Total: $3,962
- Add ICC: $56
- Subtotal: $4,018
- Add Reserve Fund Assessment (15%): $603
- Subtotal: $4,621
- Add Prohibition Surcharge: $0
- Add NFIAA Surcharge: $25
- Add Federal Policy Fee: $50
- Total Amount Due: $4,696

Illustration purposes only (after elevation)**:

- Premium Calculation: Multiply Rate x $100 coverage: Building $292/Contents: $155
- The first $60,000 in building is multiplied by .30 ($180) and the remaining is multiplied by .08 ($112)
- The first $25,000 in contents is multiplied by .38 ($95) and the remaining is multiplied by .12 ($60)
- Deductible Factor: Building 1 x $292/Contents: 1 x $155
- Premium Increase or Reduction with deductible: $0/$0
- Total: $447
- Add ICC: $8
- Subtotal: $455
- Add Reserve Fund Assessment (15%): $68
- Subtotal: $523
- Add Prohibition Surcharge: $0
- Add NFIAA Surcharge: $25
- Add Federal Policy Fee: $50
- Total Amount Due: $598

RELOCATION OF STRUCTURE

- Relocation of a flood prone structure as a form of flood mitigation is accomplished by merely moving the structure out of the floodplain.
  - Letter of Map Amendment (LOMA)
    - An application process in submitting certain mapping and survey information to FEMA – FEMA then issues documentation that officially removes a property and/or structure from the SFHA. Applicants will likely need to hire a Licensed Land Surveyor or Registered Professional Engineer to prepare an Elevation Certificate for the property.

RELOCATION OF STRUCTURE – BENEFITS & DRAWBACKS

- **Benefits**:
  - Preserves tax base (provided the relocation is still within municipal limits)
  - Relocation can be used to mitigate historically significant structures by maintaining historic value and aesthetic integrity.
- **Drawbacks**:
  - While an attractive mitigation strategy, relocation is an extremely expensive procedure that requires careful coordination and specialty contractors.
  - Relocation also has limitations in that it requires a suitable location outside of the regulatory floodplain.
    - Many of the affected structures in central Pennsylvania sit on postage stamp sized parcels with limited space to relocate the structure on the same parcel.
    - Furthermore, many parcels lack the necessary elevation change to move a structure out of the floodplain and above the BFE, or they simply lack enough space outside of the regulatory floodplain.
  - While relocation should not be ruled out as an effective mitigation strategy, the constraints of the work and lack of suitable opportunities within the region relegate relocation to a less desirable option at the present time.

MITIGATION RECONSTRUCTION

- FEMA defines Mitigation Reconstruction as, "the construction of an improved, elevated building on the same site where an existing building and/or foundation has been partially or completely demolished or destroyed" and "is only permitted for structures outside of the regulatory floodway".

Q&A

WRAP UP

UPCOMING PRESENTATIONS & CONTACT INFORMATION

UPCOMING PRESENTATIONS

- Flood Management for Non-Residential Structures
  Wednesday, December 15, 2021, from 12pm-1pm
  - Webinar: Floodplain Management for Non-Residential Structures – SEDA Council of Governments (seda-cog.org)

CONTACT INFORMATION

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