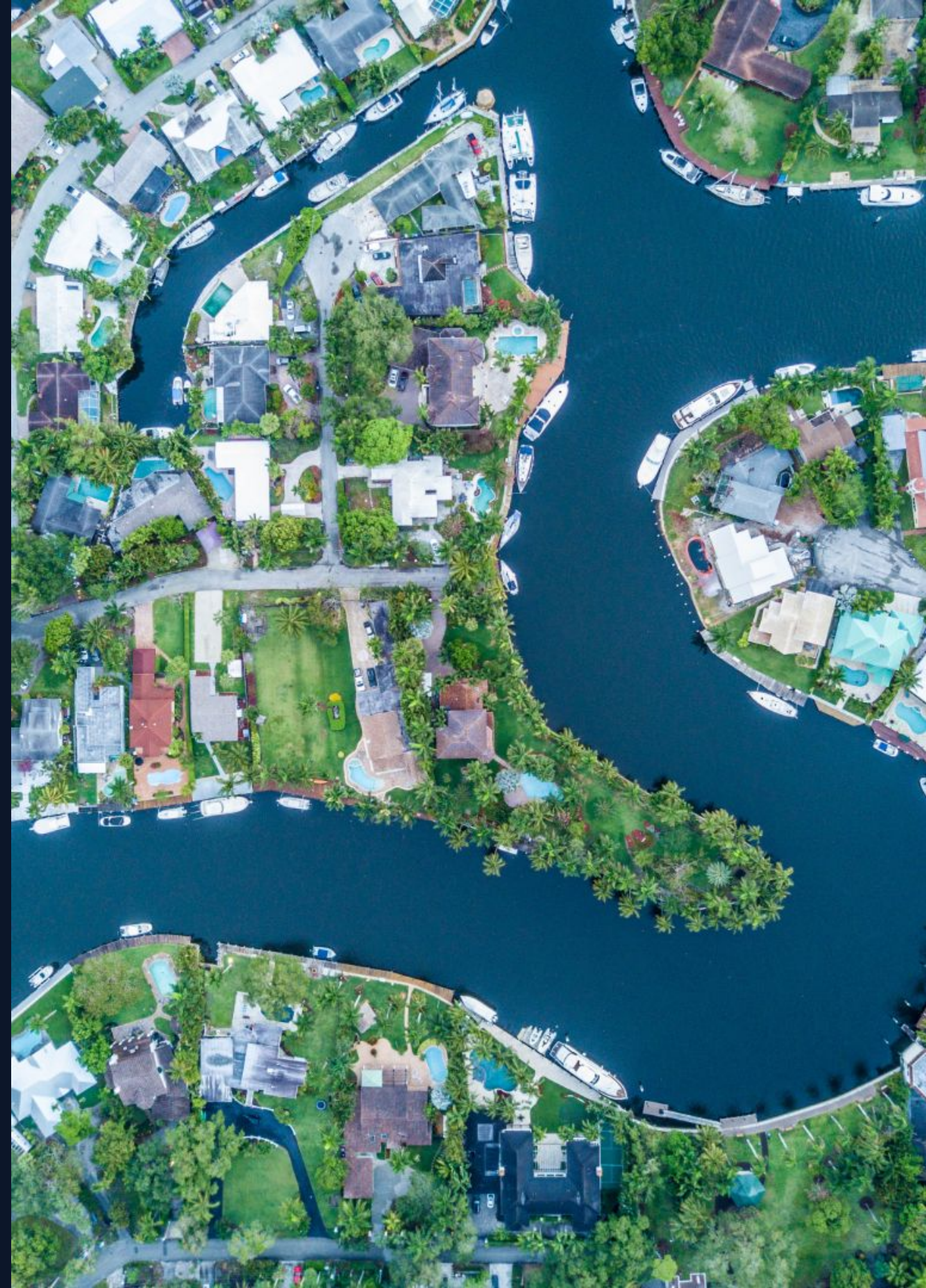




Planning for Substantial Damage: Lessons from Louisville, KY

January 8, 2025

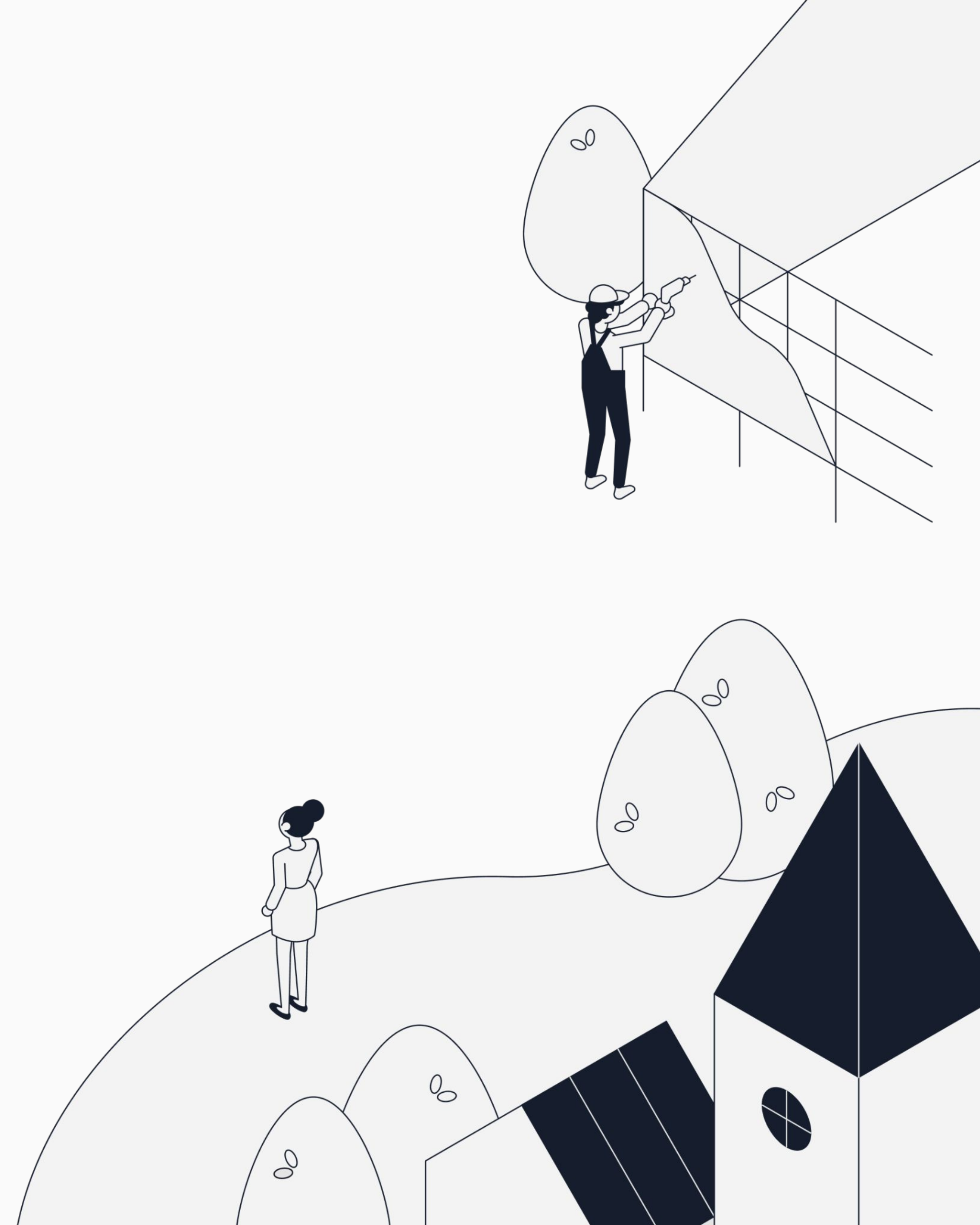
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WELCOME

Housekeeping

- This presentation is being recorded
- The recording and presentation will be shared via email and posted on our blog
- Use the Q+A or the Chat to ask questions
- CFMs: Complete the post-attendance survey to receive your CEC. The CEC Certificate will be sent via email to you (and the list will be sent to ASFPM) next week



Agenda

- 1 Introduction
- 2 Planning for Substantial Damage
- 3 Q&A

Agenda

- 1 Introduction**
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PARTNERS

We work with over
120 of the most at-risk
communities
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Cedar Rapids
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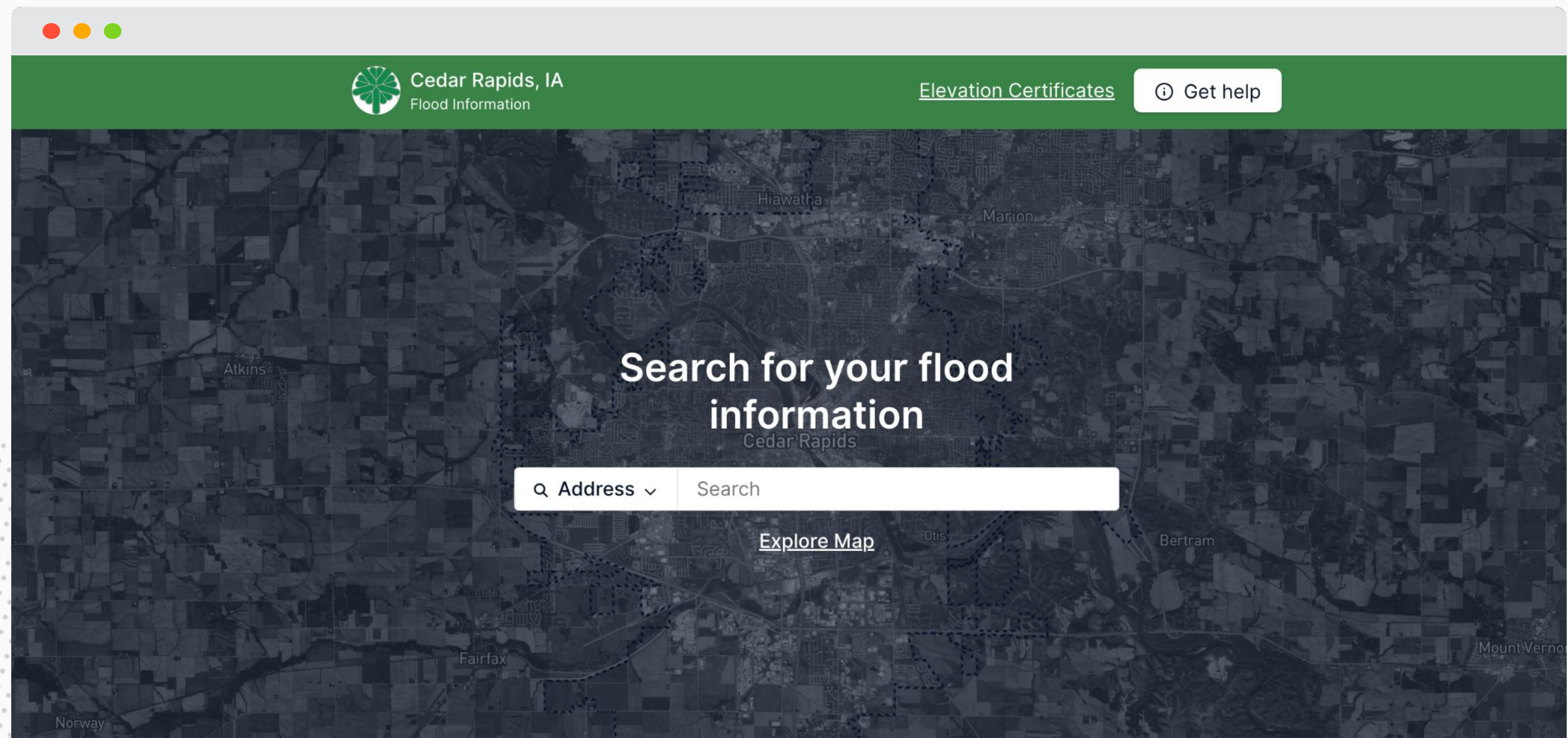
Calvert County
Maryland



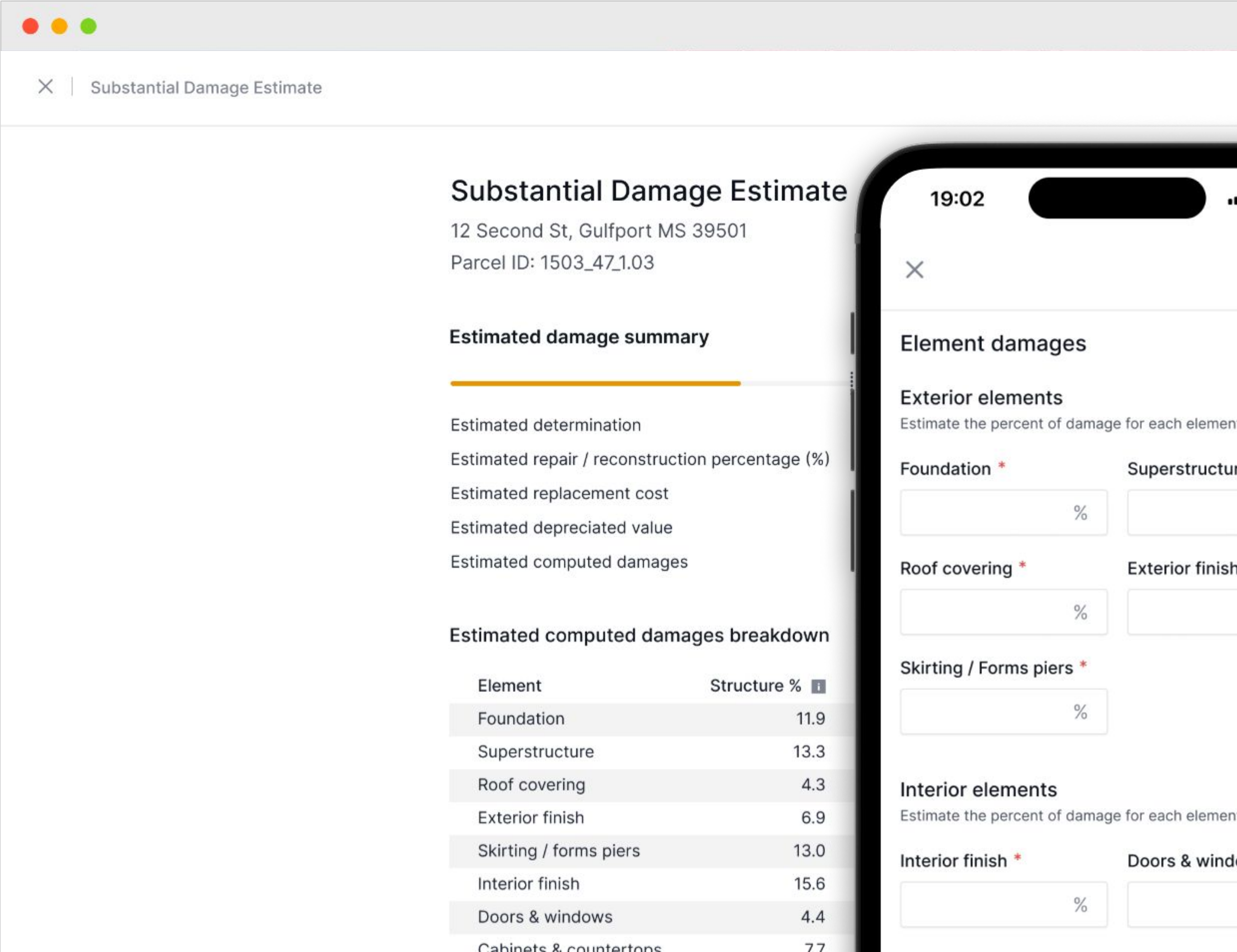
Georgetown County
South Carolina

OUR SOLUTION

Forerunner empowers gov. agencies to do more.



Forerunner's new Substantial Damage Estimates feature helps gather data post-event.



Agenda

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- 2 Planning for Substantial Damage**
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Lori Rafferty, P.E., CFM

Floodplain & CRS Administrator

Louisville & Jefferson County Metropolitan Sewer District

Louisville-Jefferson County, KY

Managing Substantial Damage

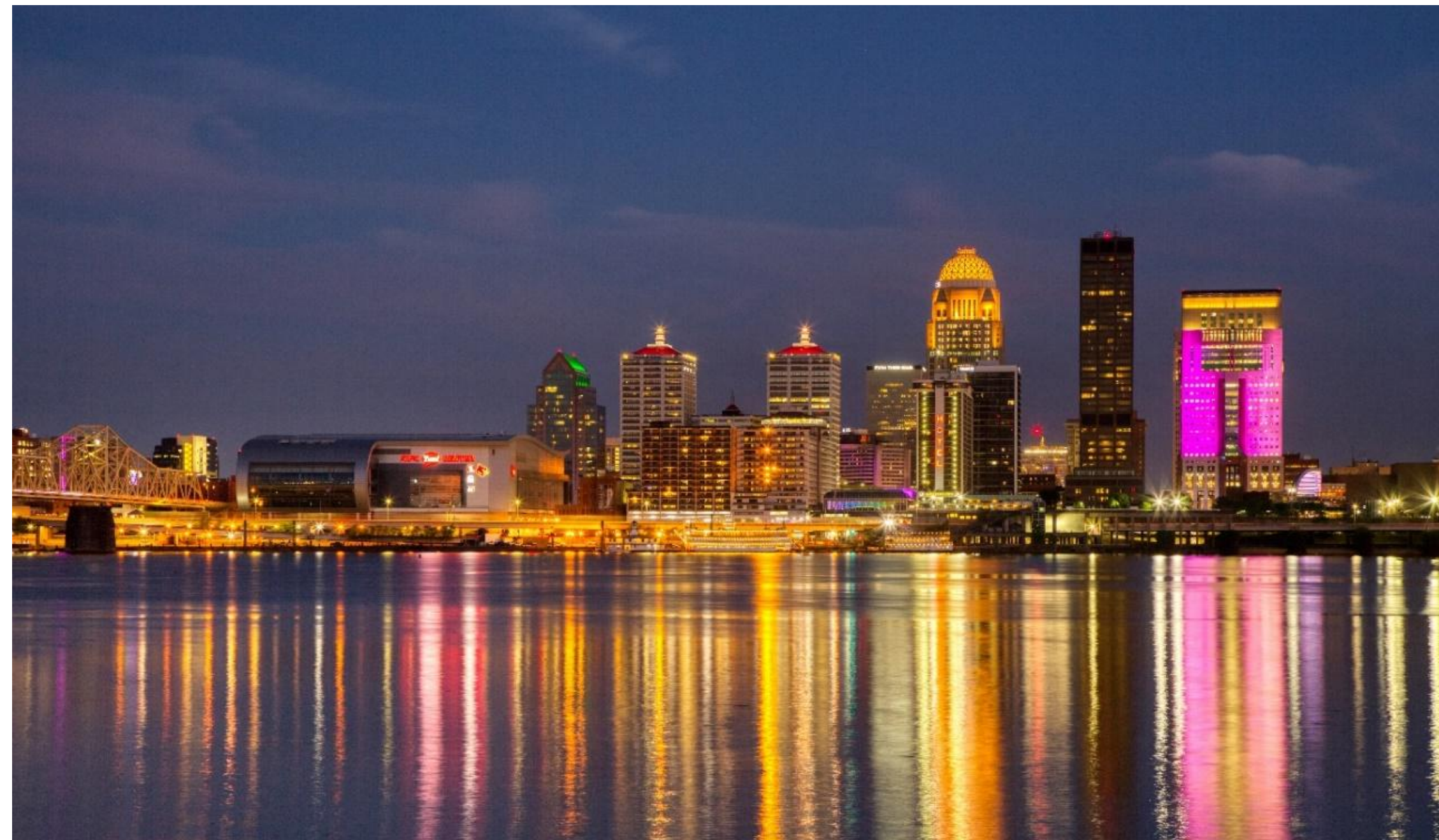
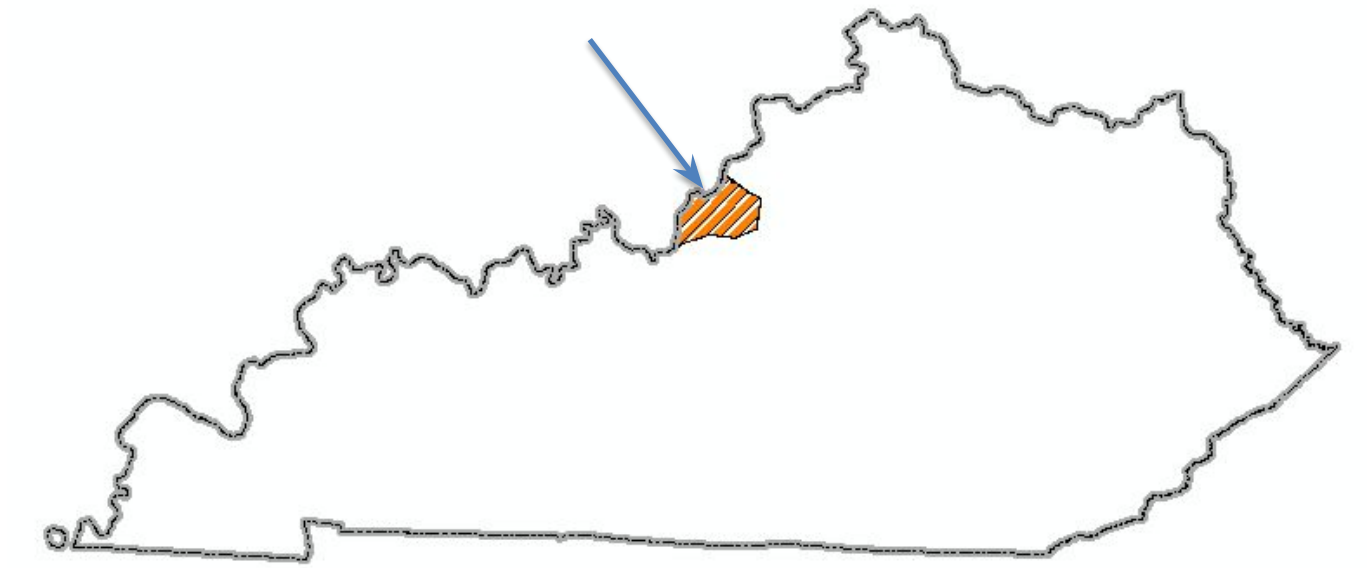


Lori Rafferty, PE, CFM
Assistant Director - Stormwater Services



Louisville-Jefferson County, KY

- Largest community in Kentucky
- City of Louisville and Jefferson County merged in 2003
- Population – approximately 770,000





155 million gallons
treated daily

5 water quality
treatment centers

376 square-mile
drainage area

1,100+ miles
of pipe

26 miles of floodwall
and earthen levee

\$34B in property
protected



Floodplain Statistics

- MSD is responsible for floodplain management within Jefferson County
- Louisville has participated in the NFIP since 1978 and in the Community Rating System (CRS) since 1990
- Currently a CRS Class 3 community
- Approximately 11% of Jefferson County is in a regulated floodplain
- Approximately 10,000 homes and businesses are regulated by the Louisville Metro Floodplain Ordinance



What is Substantial Damage?

“The 50% Rule”

If damages from ANY source (flood, fire, tornado, earthquake, etc..) equal or exceed 50% of the market value,

then...

the structure must be brought into compliance with floodplain regulations (elevated, floodproofed, or removed).



Why substantial damage requirements?

- Required for National Flood Insurance Program communities
- Reduction of future flood losses



2017



2020

* Photos courtesy of Paul Osman, CFM, technical reviewer for CRS

Who makes the decision about substantial damage?



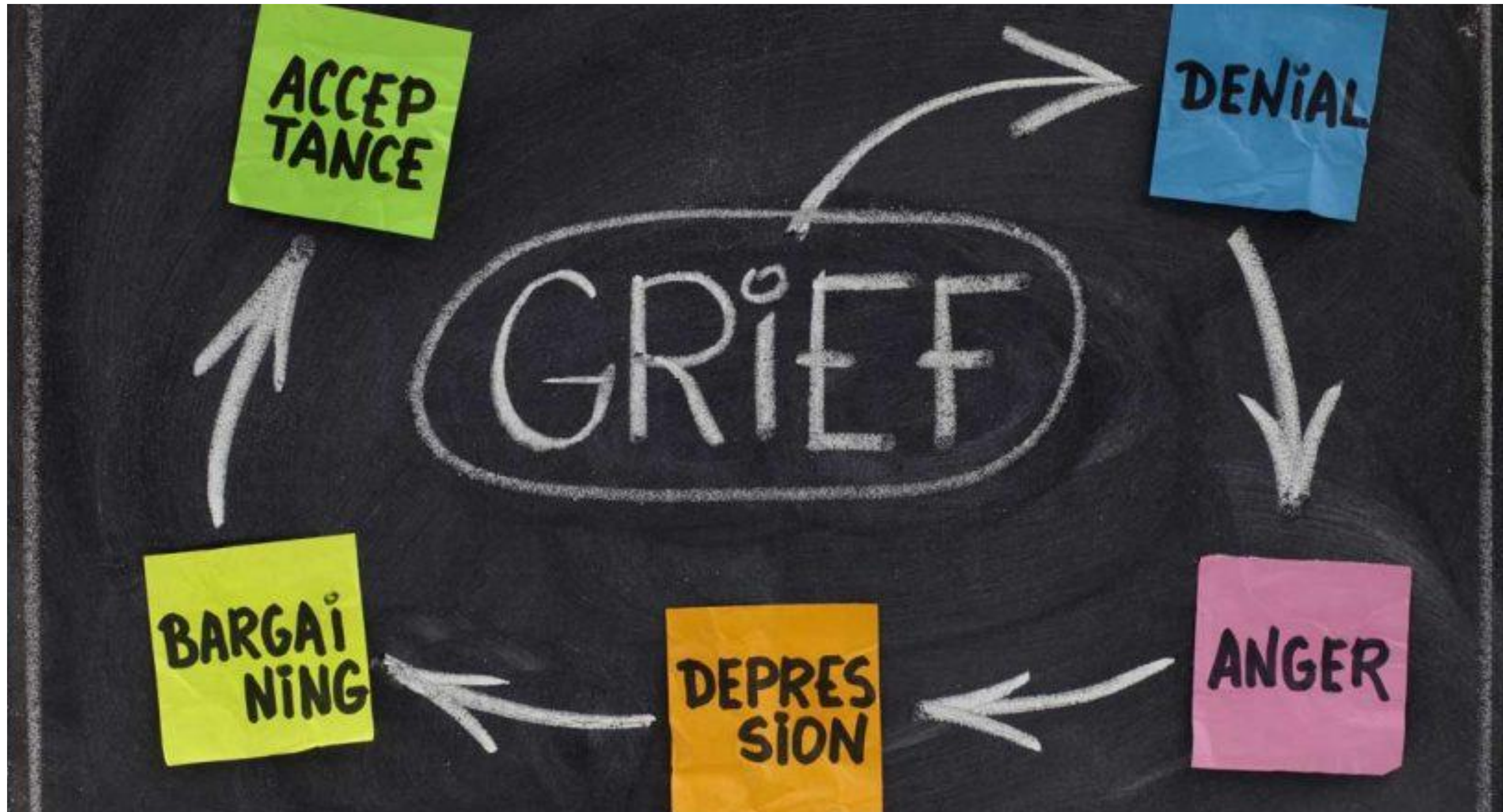
- The decision about a structure being substantially damaged is made at the local-government level, generally by a building-department official or floodplain manager
- The substantial damage determination method is determined by the community
 - Visual inspections
 - FEMA's Substantial Damage Estimator (SDE) tool
 - Contractor estimates
 - NFIP claims information
 - Flooding over “x” feet means the building is substantially damaged

What happens when a building is substantially damaged?

- The building must be brought into compliance with local floodplain-management regulations:
 - Owners who decide to rebuild may need to elevate their structures, or change them in some other way to comply with those local floodplain regulations and avoid future losses;
 - Owners of non-residential structures may need to flood-proof their buildings.
- Increased cost of compliance (ICC)
 - Up to \$30,000 to help with costs of elevating, relocating, or demolishing structure
 - Must carry NFIP flood insurance
 - Structure must be substantially damaged by a flood

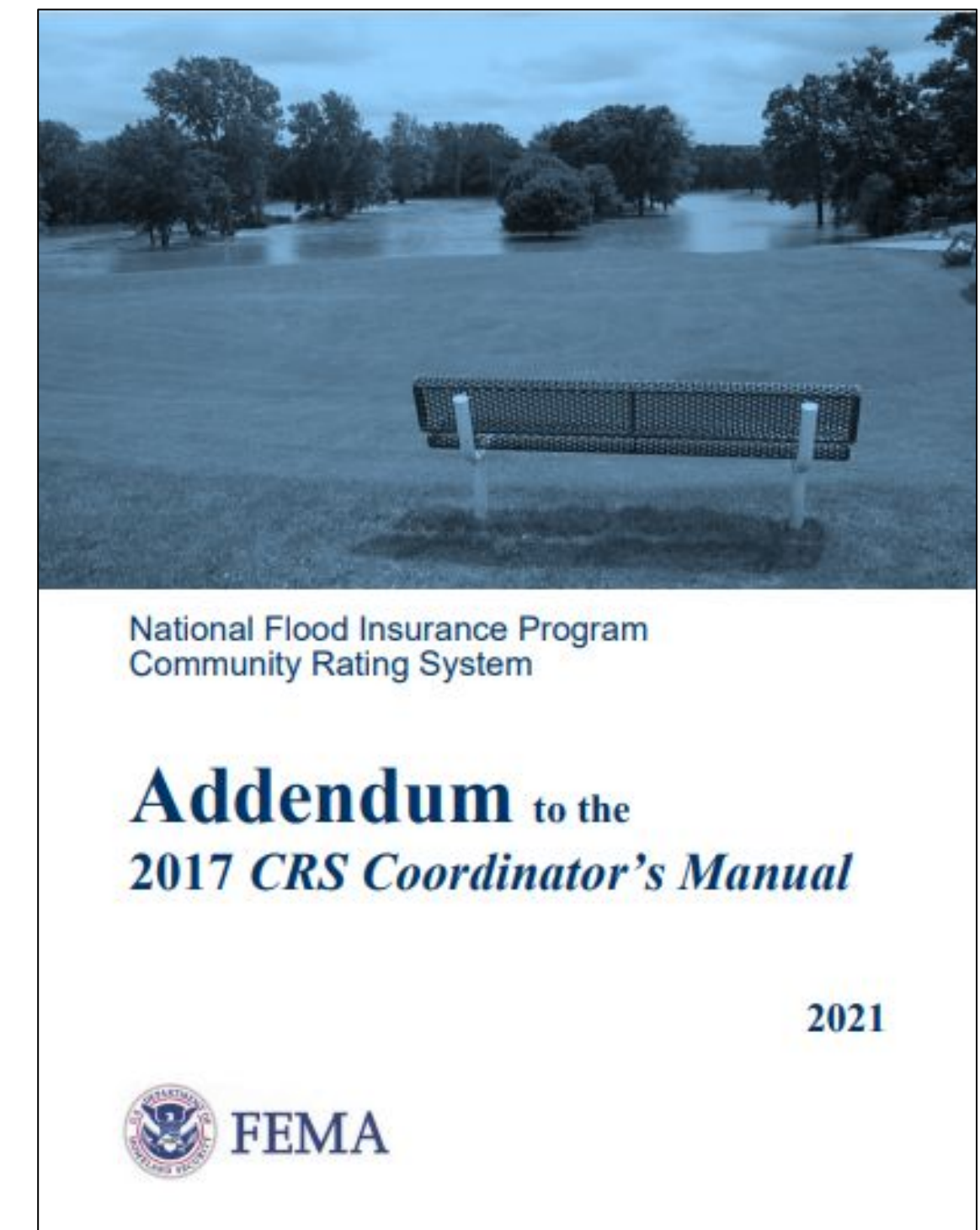


Property Owner's Reaction to Substantial Damage



Planning for Substantial Damage

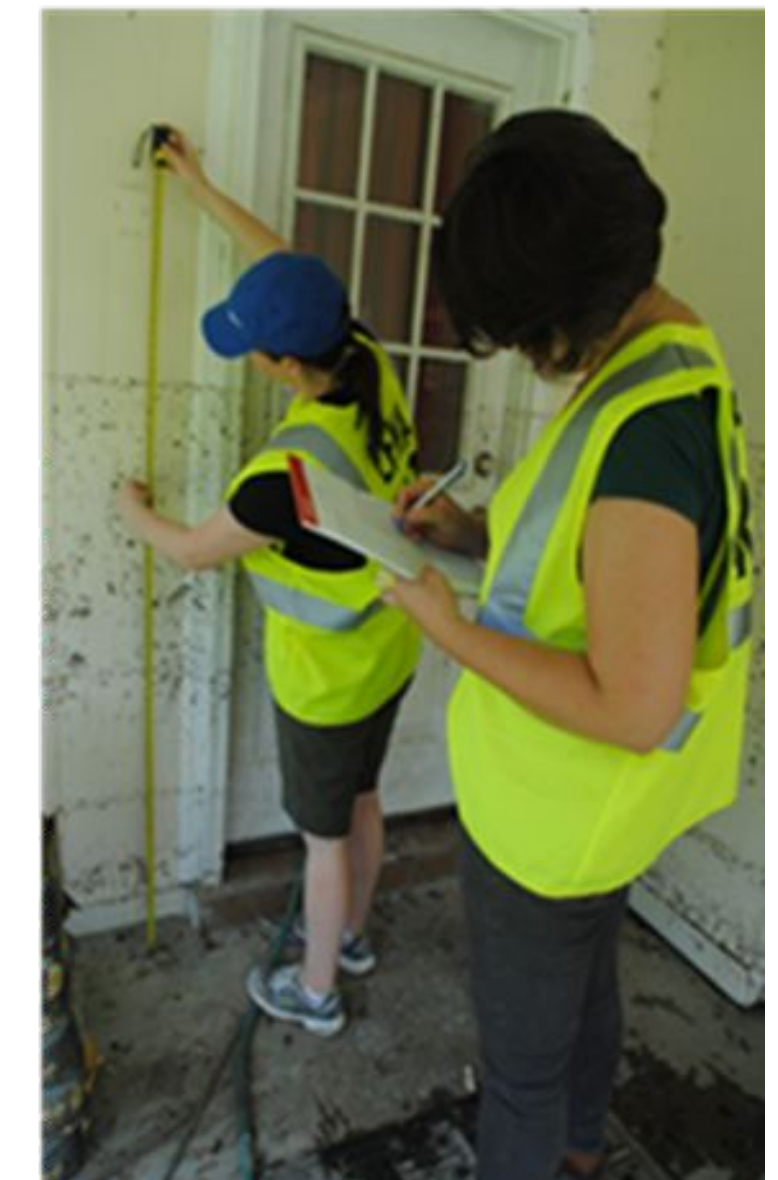
- CRS has created a Substantial Damage Management Plan option in the 2017 Addendum
- Substantial Damage Management Plan (SDP): Up to 140 points for a community plan to prepare for substantial damage estimates and determinations after a flood
- Maximum credit is 140 points
 - Development of plan – 40 points
 - Pre-populate FEMA's Substantial Damage Estimator – 50 points
 - Pre-flood mitigation alternatives – 50 points



Why create a substantial damage plan?

A Substantial Damage Plan Helps!







- ✓ Outlines community responsibilities,
- ✓ Identifies buildings and collects available data,
- ✓ Describes a community's approach to damage estimates (for all types of events),
- ✓ Develops a strategy and game plan,
- ✓ Prepares education and outreach materials,
- ✓ Finds help (if needed) performing substantial damage determinations,
- ✓ Reduces the local official's stress level!



Substantial Damage Management Plan

- Seven Credit Criteria (basic requirements) for the SDP
 - (1) Definition of Substantial Damage/Substantial Improvement
 - (2) Cumulative Substantial Improvement or Lower Threshold for Substantial Damage/Improvement
 - (3) Six Step Plan
 - (4) Annual Evaluation Report
 - (5) Share Annual Evaluation Report with community leaders
 - (6) Updates and revisions to SDP
 - (7) Provide SDP to State Coordinator or FEMA Region (if requested)

Substantial Damage Management Plan

1		Assess Vulnerability. <ul style="list-style-type: none"> • Review Regulations. • Identify risk. • List/map structures.
2		Assemble a Team. <ul style="list-style-type: none"> • Identify staff + needs. • Organize Team.
3		Identify Post Flood Actions. <ul style="list-style-type: none"> • Plan damage assessment process. • Communicate with community.
4		Build a Database. <ul style="list-style-type: none"> • Collect basic building information. • Pre-populate the SDE (SDP2)
5		Identify Pre-Flood Actions. <ul style="list-style-type: none"> • Engage the public. • Explore mitigation alternatives (SDP3)
6		Plan Implementation and Updates. <ul style="list-style-type: none"> • Annual Evaluation Reports. • Periodic SDP updates.

Steps 2 – 5 can be done in any order.

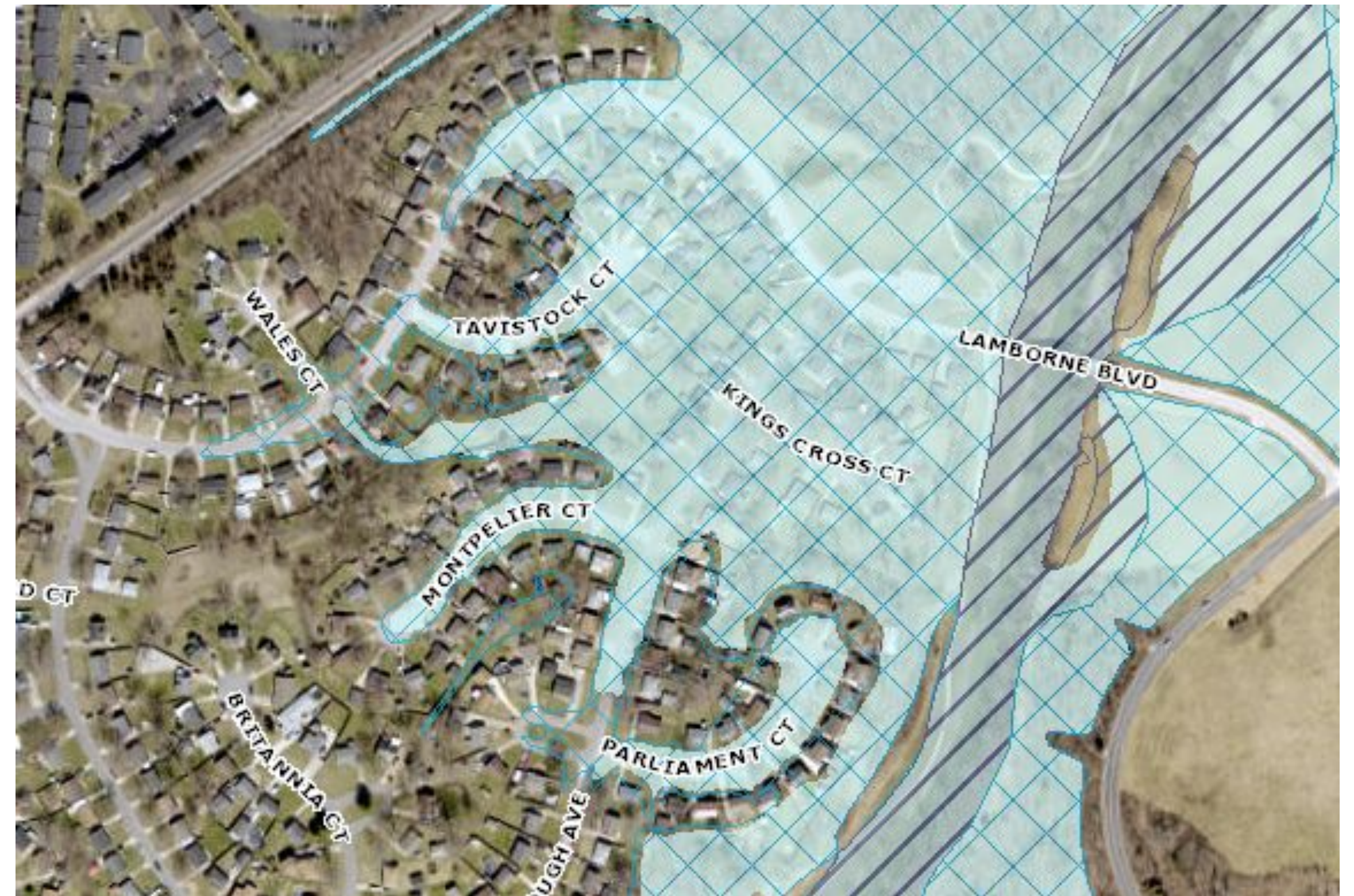
Step 1. Assess the community's vulnerability to substantial damage

SDP must include:

- a) The community's definition of substantial damage/improvement
- b) Description of previous substantial damage and substantial improvement determinations
- c) A list and map of SFHA properties with buildings that have the potential to be substantially damaged.
- d) A description of other building or flood factors that the community considered during the assessment (i.e. procedure for tracking cumulative damage or community-determined flood zones)
- e) A general description of buildings on the potential substantial damage list

Identify Structures in the Special Flood Hazard Area

- Louisville Metro
 - Approximately 9,000 buildings in the Special Flood Hazard Area (SFHA)
 - Approximately 10,000 buildings in the local regulatory floodplain (LRFP)



Identify Structures in the Special Flood Hazard Area



- MSD has estimated 1st floor elevation for all buildings in the SFHA and LRFP
- PVA data includes number of stories, basement or no basement, square footage, construction type, building value
- Flood elevations determined using GIS for each structure
- Calculated Flood depth = Flood elevation – 1st floor elevation

USACE Depth-Damage Curves

- EGM 01-03 Residential depth-damage functions for structures without basements
- EGM 04-01 Residential depth-damage functions for structures with basements
- No standard USACE damage functions approved nationwide for commercial structures
- MSD assumed 40% damage (instead of 50%) to account for unknowns like future climate change and 1-year cumulative substantial improvement requirement

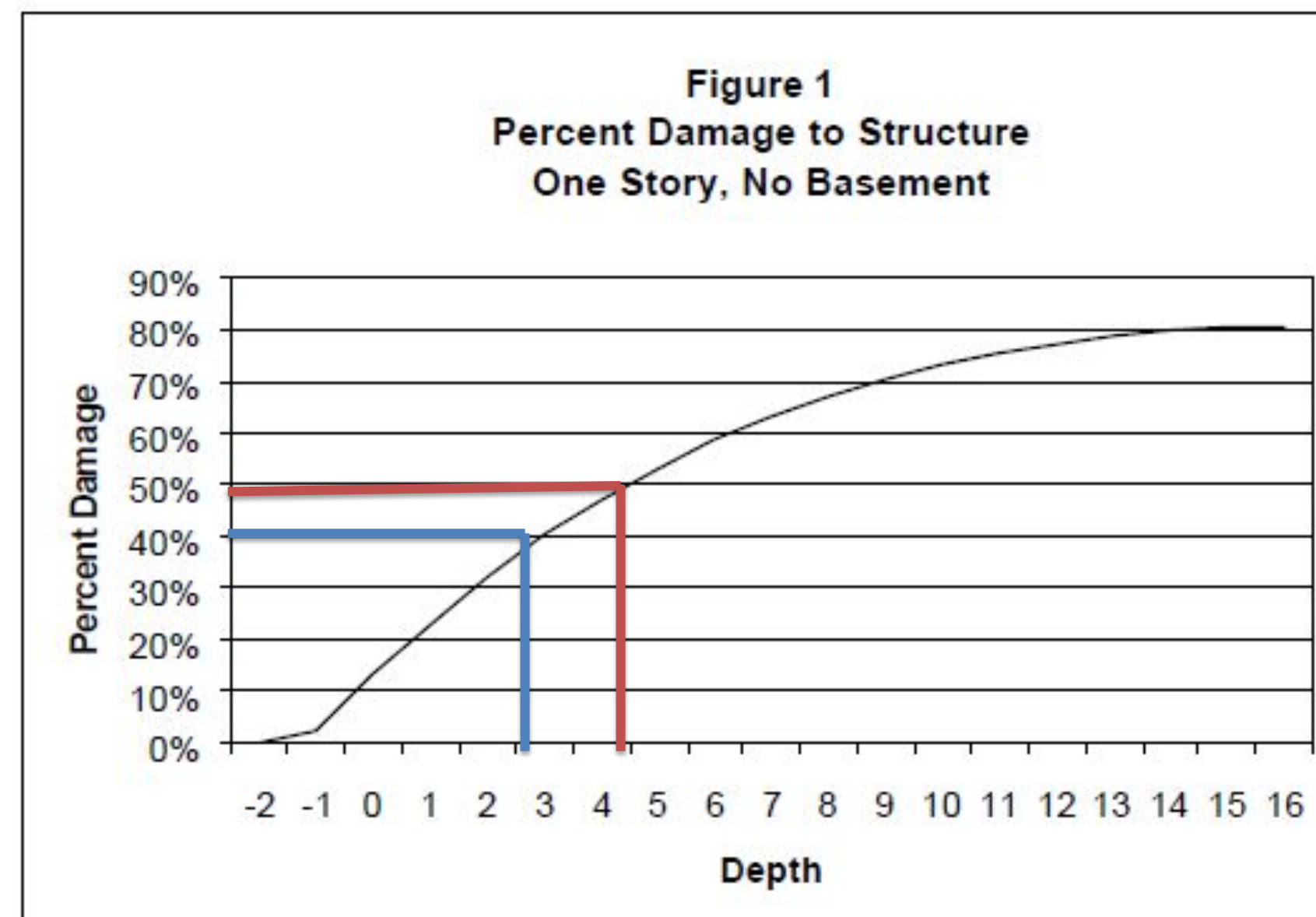
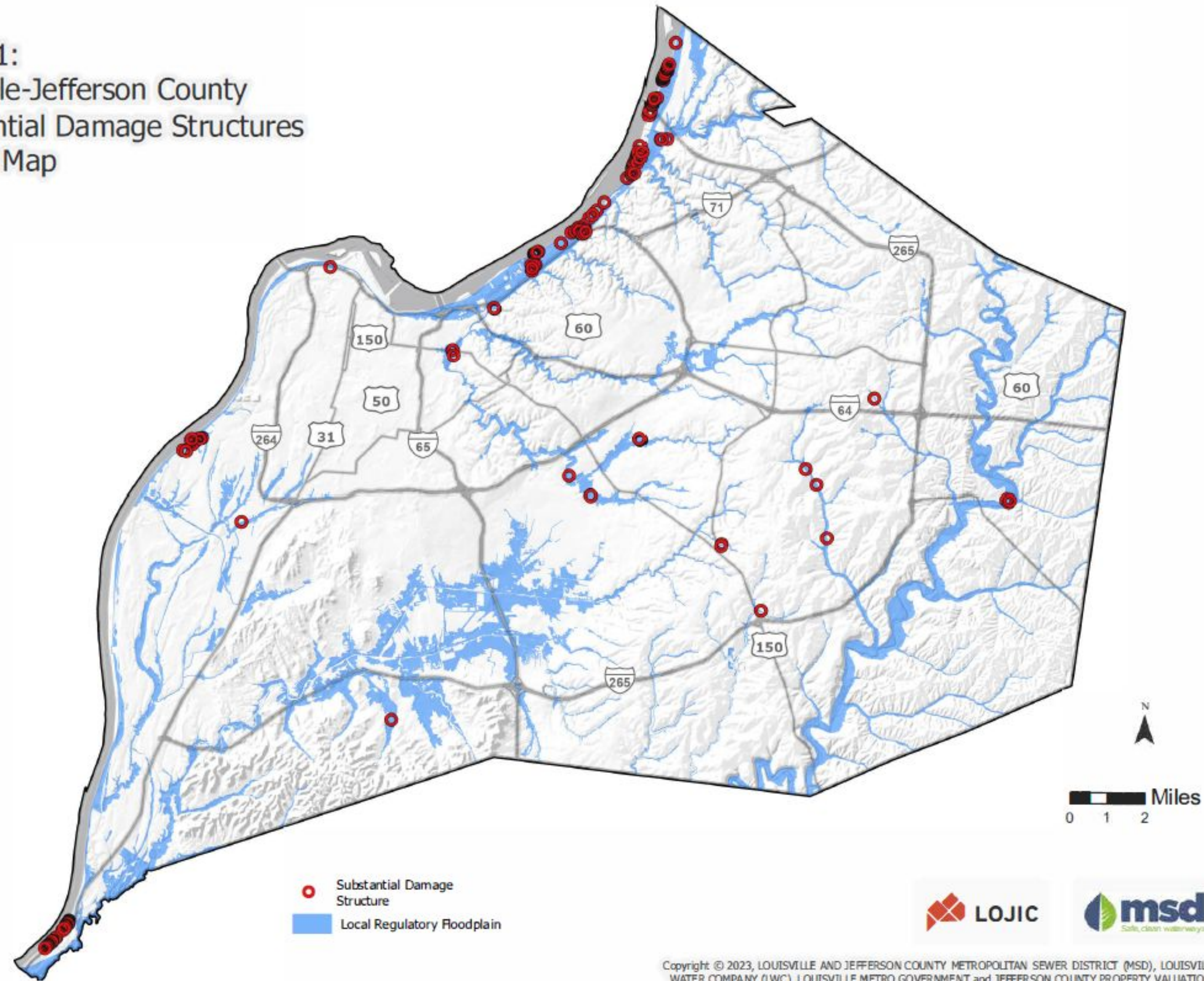


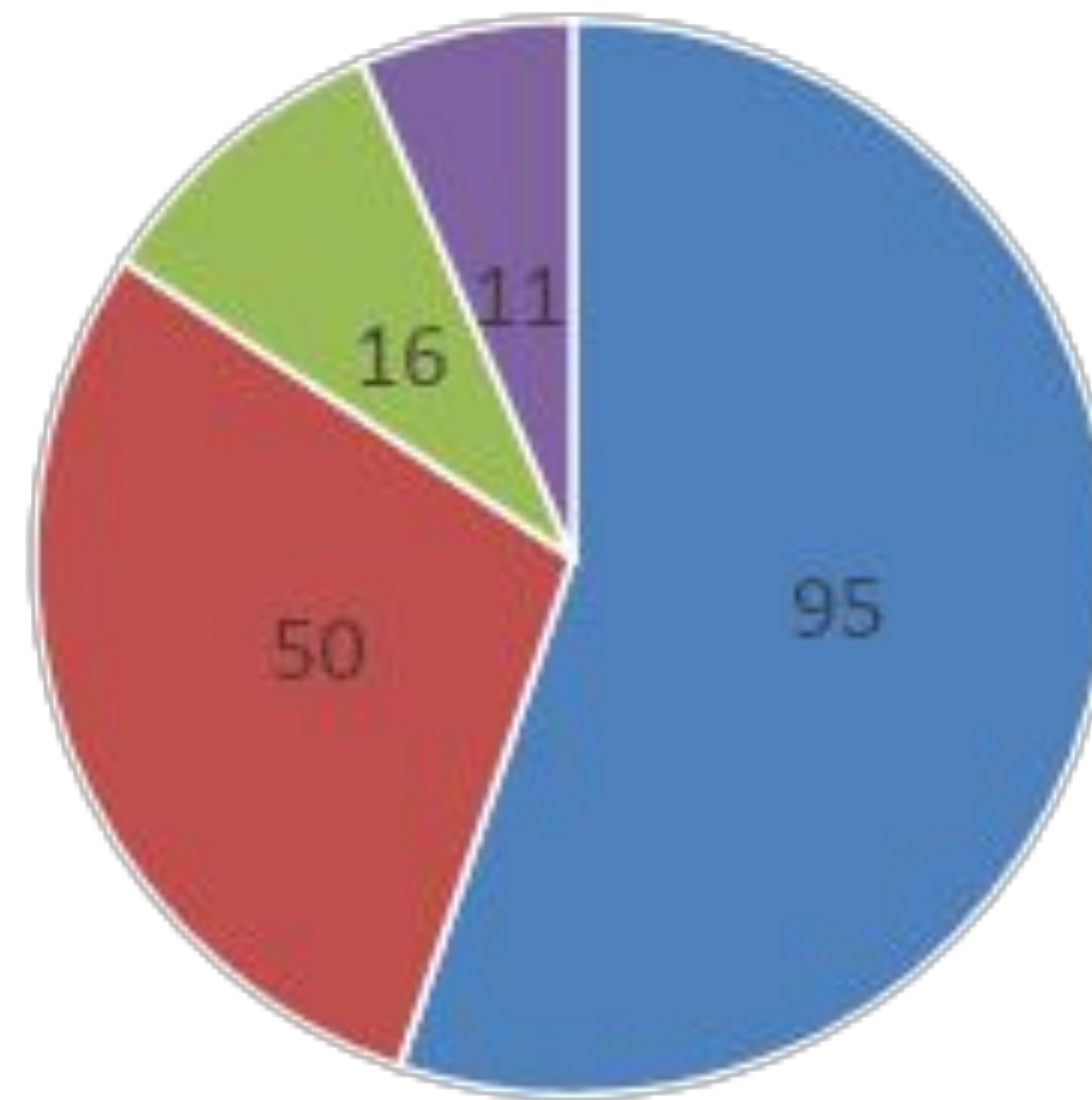
Table 1 One Story, No Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-2	0%	0.0%
-1	2.5%	2.7%
0	13.4%	2.0%
1	23.3%	1.6%
2	32.1%	1.6%
3	40.1%	1.8%
4	47.1%	1.9%
5	53.2%	2.0%
6	58.6%	2.1%
7	63.2%	2.2%
8	67.2%	2.3%
9	70.5%	2.4%
10	73.2%	2.7%
11	75.4%	3.0%
12	77.2%	3.3%
13	78.5%	3.7%
14	79.5%	4.1%
15	80.2%	4.5%
16	80.7%	4.9%

Figure 1:
Louisville-Jefferson County
Substantial Damage Structures
Overall Map



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Types of Potential Substantially Damage Structures



* 172 structures total determined to have potential for substantial damage

- One Story, No Basement
- Two or More Stories, No Basement
- One Story, with Basement
- Two or More Stories, with Basement

Step 2. Identify community's team for management of substantial damage

- Team should include:
 - Floodplain administrator
 - Department or office responsible for issuing permits for post event repairs
 - Sufficient additional personnel for the substantial damage work effort after a major flood or other event
- Consider other personnel resources, such as the State NFIP Coordinator and/or FEMA post-disaster resources



Estimated Number
of Structures



Estimated Time for Each
Inspection or Assessment




Staff or Field Teams



Total Estimated Hours

Step 3. Identify the post-event efforts related to substantial damage

- Post-event coordination and communication efforts.
 - Meetings of the substantial damage management team and training for all team members,
 - Assigned areas of responsibility for team members,
 - Determinations of whether interim permit procedures are needed,
 - Communication with elected officials, and
 - Communication with property owners.



**Get a permit
before you repair
or build in a floodplain**

MSD is responsible for permitting and inspecting all new construction—including repairs and improvements to existing structures in the floodplain, according to the Louisville Metro Floodplain Ordinance.


To apply for a floodplain permit:

- Download the Application for a Permit to Develop/Repair in a Floodplain, visit <http://www.msdlouky.org/insidemsd/pdfs/apppermit.pdf>
- For repairs or improvements to an existing structure, provide an itemized estimate of material and labor costs of the repairs or improvements to be made, including demolition costs—even if this work is to be done by the homeowner or a volunteer. It is not required to include cleanup costs in the estimate.
- Provide building value—PVA data or owner-provided appraisal.
- Submit the application and all documents listed above.

In person:
MSD, 700 W Liberty Street, Louisville, KY 40203
Monday through Friday, 9 am to 4 pm

Or by email:
FloodPermits@louisvillemad.org

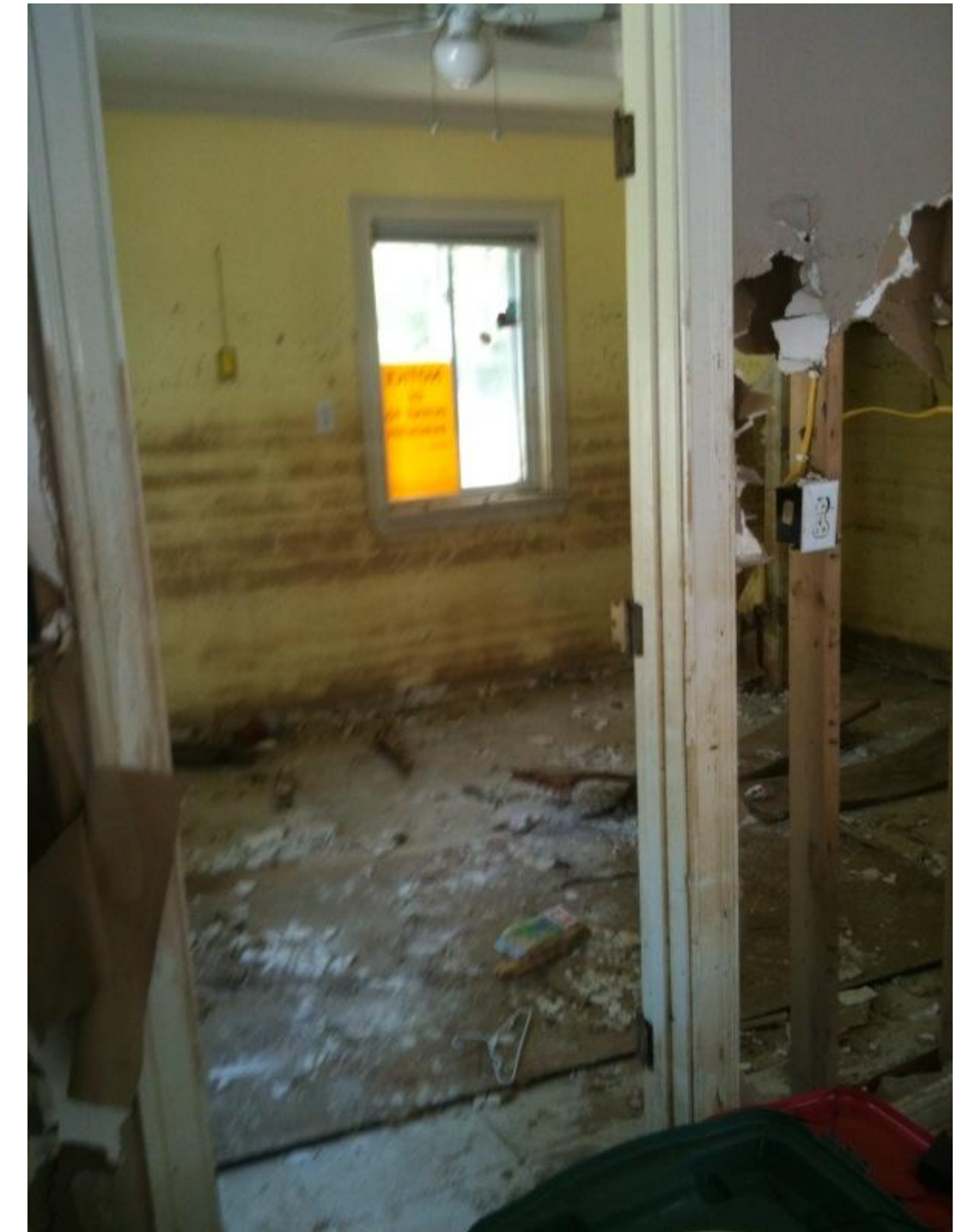
For questions concerning floodplain permitting, call 502.540.6126.



[@LouisvilleMSD](https://twitter.com/LouisvilleMSD)

Step 3. Identify the post-event efforts related to substantial damage

- Damage estimate and substantial damage determination procedures, such as:
 - Conducting damage inspections of floodplain buildings,
 - Making damage estimates for each damaged floodplain building,
 - Establishing a market value for each damaged floodplain building,
 - Making substantial damage determinations,
 - Establishing an appeal process for substantial damage/substantial improvement determinations, and
 - Issuing damage determination letters.



Step 3. Identify the post-event efforts related to substantial damage

- Post-substantial damage determination procedures for compliance, such as
 - Enforcing permitting for repairs and mitigation compliance; and
 - Providing periodic updates to the State NFIP Coordinator and the FEMA Regional Office (or disaster office, if applicable).

Step 4. Build a property database

- Database should include:
 - Property identification number
 - Building type (residential/non-residential)
 - Foundation type
 - Number of stories
 - Square footage
 - Fair market value
 - Lowest floor and/or first floor elevation, if available
- Optional – Pre-populate FEMA's Substantial Damage Estimator tool



Step 5. Identify actions the community can take to address potential damage



- Annual substantial damage training for the substantial damage management team members;
- Substantial damage and substantial improvement public information (newsletters, social media, information at kiosks);
- Handouts for property owners; and
- Communication with elected officials about community responsibilities regarding substantial damage, and if applicable about cumulative substantial improvement

Step 5. Identify actions the community can take to address potential damage

- Optional: Consider mitigation alternatives for areas of potential substantial damage
- Potential alternatives:
 - Relocation
 - Acquisition/demolition
 - Building elevation
 - Retrofitting
 - Flood reduction project*
 - Restudy*
- Consider funding options

*MSD added alternative

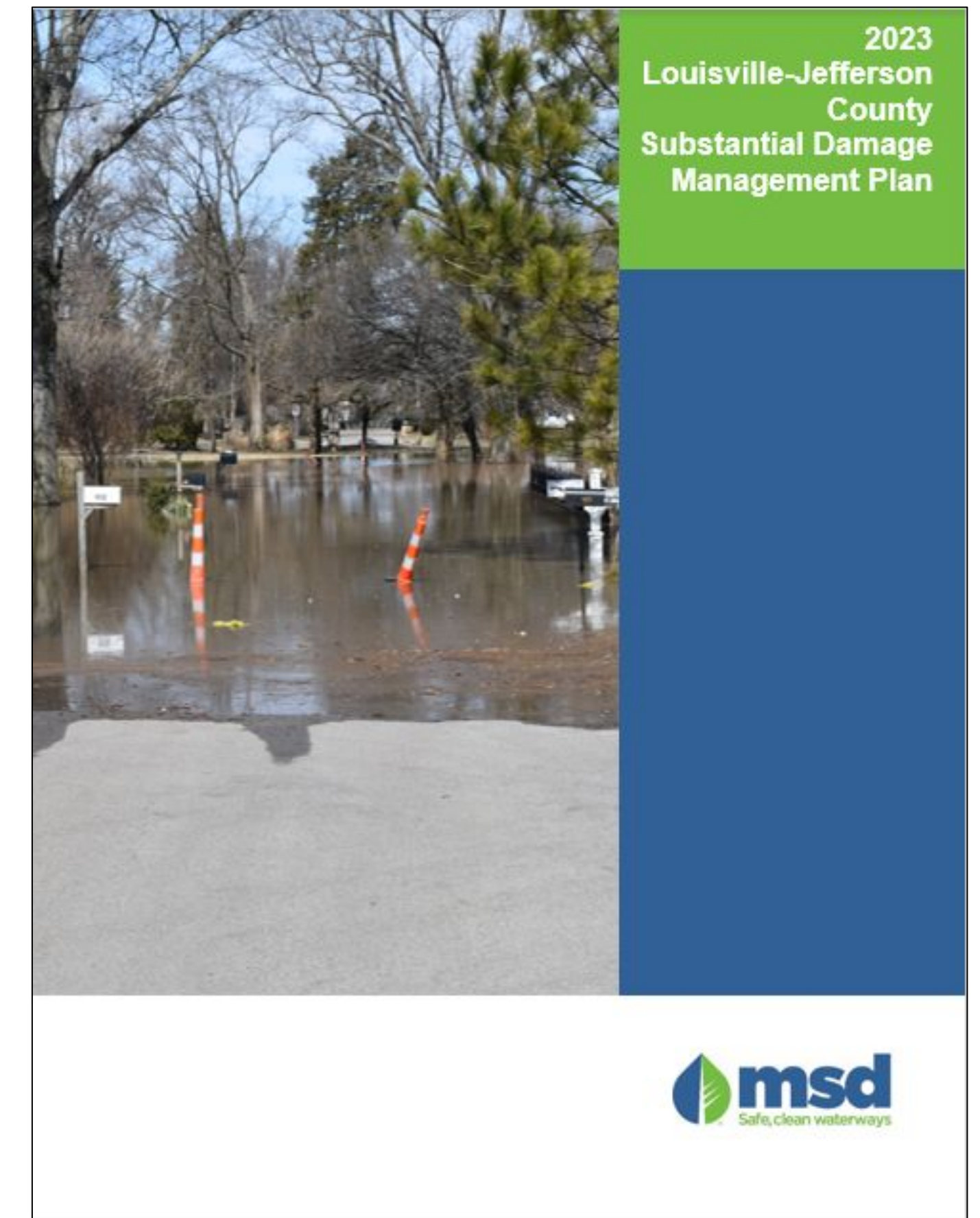


Step 5. Identify actions the community can take to address potential damage

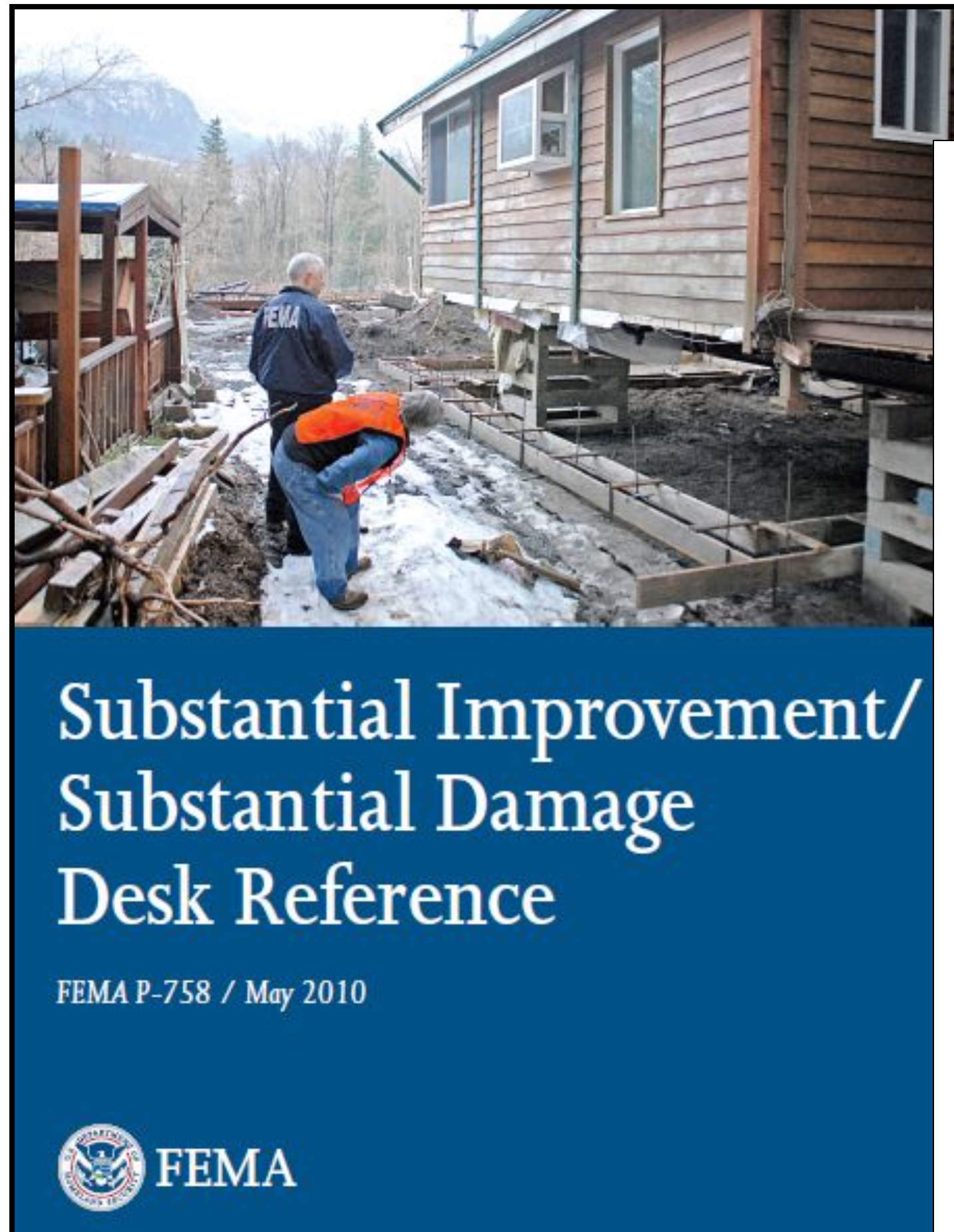
Flooding Source	Area	Property Identifier	Relocation	Acquisition	Elevation	Retrofitting	Flood Project	Restudy	Justification
SOUTH FORK BEARGRASS CREEK	Bashford Manor	Bashford Manor 1		X					Brick, slab
SOUTH FORK BEARGRASS CREEK	Broadmoor Park	Broadmoor Park 1		X					Slab foundation
SOUTH FORK BEARGRASS CREEK	Broadmoor Park	Broadmoor Park 2		X					Floodway, slab foundation
SOUTH FORK BEARGRASS CREEK	Broadway	Broadway 1		X		X			Commercial, slab foundation
SOUTH FORK BEARGRASS CREEK	Broadway	Broadway 2		X		X			Commercial, slab foundation
FLOYDS FORK	Douglas Hills	Douglass Hills 1		X			X		Brick, walkout basement garage, potential culvert replacement or flood basin project
CEDAR CREEK	Fern Creek	Fern Creek 1		X					Slab foundation, brick
SOUTH FORK BEARGRASS CREEK	High Gate Springs Subdivisor	High Gate Springs 1		X				X	Slab foundation
SOUTH FORK BEARGRASS CREEK	High Gate Springs Subdivisor	High Gate Springs 2		X				X	Slab foundation
SOUTH FORK BEARGRASS CREEK	High Gate Springs Subdivisor	High Gate Springs 3		X				X	Slab foundation
SOUTH FORK BEARGRASS CREEK	High Gate Springs Subdivisor	High Gate Springs 4		X				X	Slab foundation
POND CREEK	Hollyvilla	Hollyvilla 1		X					Slab foundation, stone construction
FLOYDS FORK	Jeffersontown	Jeffersontown 1				X			Commercial, slab, floodway, remove part of structure in floodway, retrofit remaining
CHENOWETH RUN	Jeffersontown	Jeffersontown 2				X			Brick, walkout slab basement impacted
FLOYDS FORK	Jeffersontown	Jeffersontown 3		X					Gov. owned metal storage bldg, floodway, slab foundation, remove structure
CITY/OHIO RIVER	Lake Dreamland	Lake Dreamland 1		X					Floodway
CITY/OHIO RIVER	Lake Dreamland	Lake Dreamland 2		X					Floodway
CITY/OHIO RIVER	Lake Dreamland	Lake Dreamland 3		X					Floodway
CITY/OHIO RIVER	Lake Dreamland	Lake Dreamland 4		X					Floodway
CITY/OHIO RIVER	Lake Dreamland	Lake Dreamland 5		X					Floodway
CITY/OHIO RIVER	Lake Dreamland	Lake Dreamland 6		X					Floodway
CITY/OHIO RIVER	Lake Dreamland	Lake Dreamland 7		X					Floodway
CITY/OHIO RIVER	Lake Dreamland	Lake Dreamland 8		X					Floodway
CITY/OHIO RIVER	Lake Dreamland	Lake Dreamland 9		X					CMU, crawl
CITY/OHIO RIVER	Lake Dreamland	Lake Dreamland 10		X	X				Crawlspace, vinyl
CITY/OHIO RIVER	Lake Dreamland	Lake Dreamland 11		X					Slab
CITY/OHIO RIVER	Lake Dreamland	Lake Dreamland 12		X	X				Crawlspace, vinyl
CITY/OHIO RIVER	Lake Dreamland	Lake Dreamland 13		X	X				Crawlspace, vinyl
CITY/OHIO RIVER	Lake Dreamland	Lake Dreamland 14		X	X				Crawlspace, vinyl
SOUTH FORK BEARGRASS CREEK	Mellwood Avenue	Mellwood Ave 1		X	X				Crawlspace, siding
SOUTH FORK BEARGRASS CREEK	Mellwood Avenue	Mellwood Ave 2		X	X				Crawlspace, siding
SOUTH FORK BEARGRASS CREEK	Mellwood Avenue	Mellwood Ave 3		X					Crawlspace, siding
MUDDY FORK BEARGRASS CREEK	NE Ohio River Beach Area	NE Ohio River Beach 1		X					Slab, brick
CITY/OHIO RIVER	NE Ohio River Beach Area	NE Ohio River Beach 2		X	X	X			Siding, on piers, would need to elevate 15' min
CITY/OHIO RIVER	NE Ohio River Beach Area	NE Ohio River Beach 3		X					Floodway
CITY/OHIO RIVER	NE Ohio River Beach Area	NE Ohio River Beach 4		X					Floodway

Step 6. Determine implementation steps and procedures for updating the plan

- Propose an update process for the substantial damage management plan and/or schedule
- Provide for an annual evaluation report
- Share with the elected officials, along with the evaluation reports



Substantial Damage Resources



Developing a Substantial Damage Management Plan

for Credit under the
Community Rating System
of the
National Flood Insurance Program



Substantial Damage Estimator (SDE) User Manual and Field Workbook

Using the SDE Tool to Perform
Substantial Damage Determinations

FEMA P-784 / Tool Version 3.0 / August 2017



Substantial Damage Management Plan Checklists

§12.d. Substantial Damage Management Plan (SDP) Review Checklist

Community:		NFIP #:		Date of review:	
Document Title/date:					
Reviewer:		CRS Specialist:			

Credit Criterion	Qualify?	Notes
Basic SDP1 Credit Criteria		
1. SD/SI definition meets or exceeds NFIP minimum		
2. CSI and/or LSI (if applicable) are reflected in the plan		
3. Plan uses the 6-step process (below)		
4. Evaluation Report (or updated plan) shows a planning review		
5. Plan or Evaluation Report shared with community leaders.		
6. Plan or review of 6 step process provided at cycle visit		
7. Plan made available to State or FEMA (if requested)		
Six Step Planning Process		
Step 1. Assess Vulnerability to Substantial Damage		
1 (a) SD/SI definition and references to other regs		
1 (b) Description of prior SD activities and determinations		
1 (c) List of properties with potential to be SD		
1 (c) Map of areas with potential to be SD		
1 (d) General description of other flood factors or SD tracking		
1 (e) General description of buildings or structure features in SD area		
Step 2. Identify and Assemble a Sub Dam Team		
2 (a) A description of team leadership and organization		
2 (b) Includes personnel needed to complete SD work		
2 (c) Considers other resources or departments if needed		

Substantial Damage Management Plan Checklist 2021 Addendum

Credit Criterion	Qualify?	Notes
Step 3. Identify Post Event Actions to Manage Sub Dam		
3 (a) Describes post event coordination and communication efforts including:		
- A general outline of SD team management and training		
- Evidence of communication with elected officials		
- Strategy for communication with property owners		
3 (b) Details on the actual SD process (who, when, how, etc.)		
3 (c) Post event strategies such as:		
- Procedure for notifying residents		
- Strategy for compliance and enforcement		
Step 4. Build a SD Property Database		
4 (a) A basic SD database including information needed to begin damage assessments (property information, building information, and building value).		
- Explanation of resources used to populate database		
- Database complies with Privacy Act		
4 (b) Optional SDP2 credit for full database and SDE population (see below)		
Step 5. Identify Pre-Flood Actions		
5 (a) At least one action to educate the community about SD:		
- Annual SD team training		
- Public information strategy (handouts, newsletters, etc.)		
- Communication with elected officials		
5 (b) Optional SDP3 credit to develop a mitigation strategy for each SD area (see below)		
Step 6. Implementation Steps and Updates		
6 (a) Who will complete Annual Report and when		
6 (b) Shared SDP with elected officials		
6 (c) Propose an update schedule or process		

Substantial Damage Management Plan Checklist 2021 Addendum

Next Steps

- Send annual letter to residents in the floodplain explaining substantial damage/improvement requirements
- Apply for grants to acquire homes in areas that are likely to become substantially damaged in the future
- Complete annual evaluation reports and update plan every 5 years

Questions?



Agenda

- 1 Introduction
- 2 Planning for Substantial Damage
- 3 Q&A

Thank you!

Susanna Pho
susanna@withforerunner.com

Lori Rafferty
lori.rafferty@louisvillemusd.org