NJDEP – A Partner and Hazus User in the USGS Flood Inundation Mapping (FIM) Program

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Slide Titles Inserted Here

- Background -

- Goals -

- Challenges -

- Solutions -

- Results -

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Project Process

Data Collection	Inundation Mapping	Risk Assessment

- H&H Models from ongoing FEMA re-studies
- LiDAR
- NWS Flood Impacts (E-19)

- Calibrate FEMA model to USGS rating curve
- Establish WSEL values for target stages
- Develop inundation maps and depth grids

- Develop user-defined facilities from NJ ModIV tax rolls
- Evaluate parcels/structures against FIM depth grids (HAZUS)
- Assemble Results & Communicate Risk

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Developing Building Data

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From Tax Roll to HAZUS UDF

- **Develop Hazus User-Defined Facilities (UDF)**
  - Individual buildings/parcels in Hazus as UDF
  - Represented as point feature
  - Required model attributes:
    - Occupancy (33 Default Types)
    - Building Type (5 Default Types)
    - Replacement Cost
    - Year Built
    - Number of Stories
    - Foundation Type (7 Default Types)
    - 1st-Floor Height

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Sporadic Building Coverage

Project Gages and Project Areas
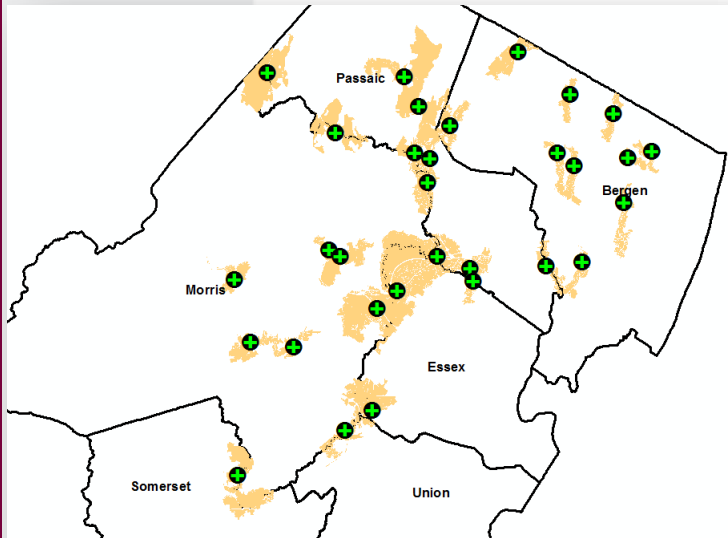
Building Footprint Coverage in Red
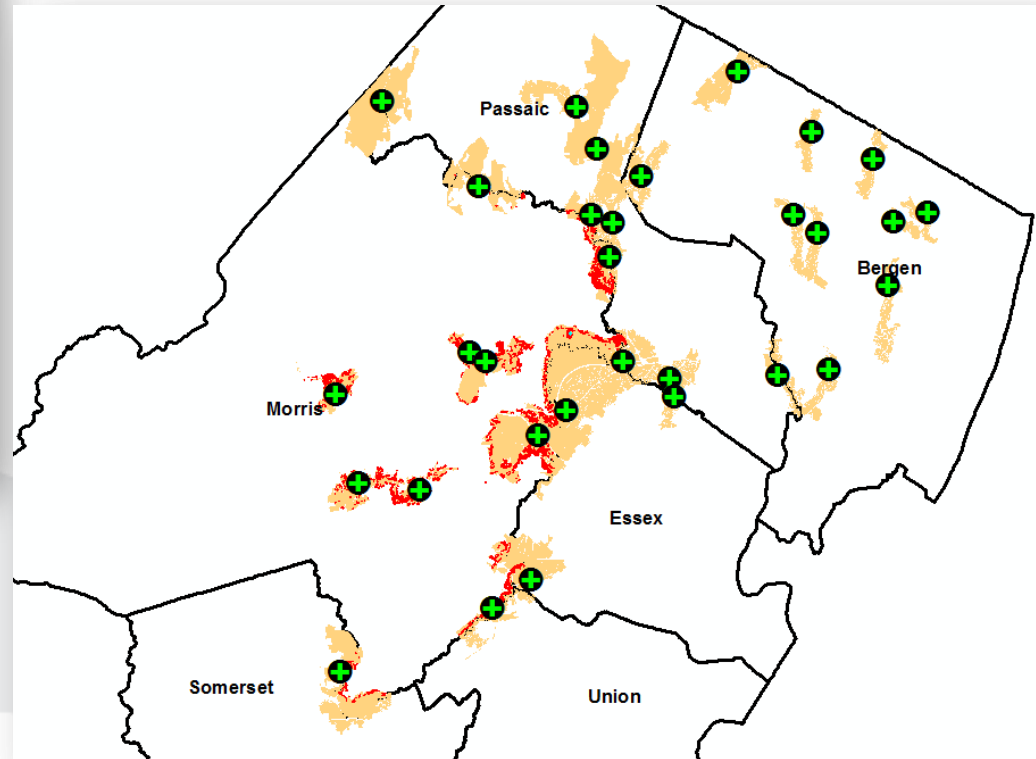
SOLUTION: use centroid of parcel, then adjust to roof-top.

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One footprint, many uses

Occupancy	Cost_SF
COM1	$ 82.63
COM2	$ 75.95
COM3	$ 102.34
COM4	$ 133.43
COM5	$ 191.53
COM6	$ 224.29
COM7	$ 164.18
COM8	$ 170.51
COM9	$ 122.05

SOLUTION: split building polygons

Salon (COM3) $102.34/ft^2

Restaurant (COM8) $170.51/ft^2

Retail (COM1) $82.63/ft^2

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Outbuildings

MAIN Building

Accessory Building
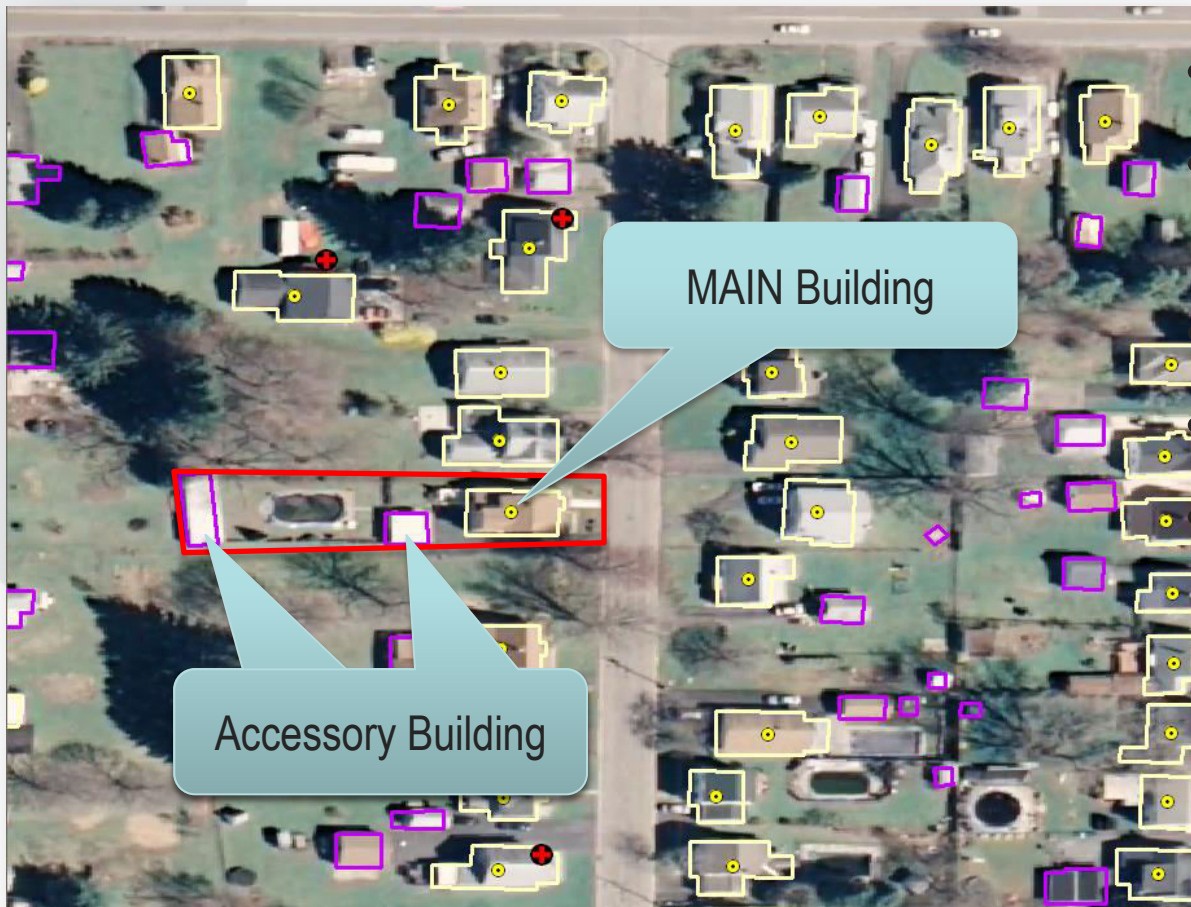
- Distinction:
- "**MAIN**"
  "**ACCESSORY**"

- Necessity:
  Transfer of parcel data to buildings.

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Spatial Inconsistencies

- Structures straddle parcels; Tax Assessor records only associated with one of the parcels

- 1 Parcel to Many Building Assignments; condo or false buildings

SOLUTION: analyze building polygons and assign appropriate parcel and census block

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NJ MOD IV Database Conflation

Revised as of January 2010

MOD IV USER MANUAL TABLE OF CONTENT

1	Vacant Land
2	Residential (four families or less)
3A	Farm (Regular)
3B	Farm (Qualified)
4A	Commercial
4B	Industrial
4C	Apartment
5A	Class I Railroad Property
5B	Class II Railroad Property

- **Property Class (2) in NJ can be one of four types in Hazus**

Table 3.1 Hazus Building Occupancy Classes

Hazus Label	Occupancy Class	Standard Industrial Codes
Residential		
RES1	Single Family Dwelling	
RES2	Mobile Home	
RES3A	Multi Family Dwelling - Duplex	
RES3B	Multi Family Dwelling – 3-4 Units	
RES3C	Multi Family Dwelling – 5-9 Units	
RES3D	Multi Family Dwelling – 10-19 Units	
RES3E	Multi Family Dwelling – 20-49 Units	
RES3F	Multi Family Dwelling – 50+ Units	
RES4	Temporary Lodging	70
RES5	Institutional Dormitory	
RES6	Nursing Home	8051, 8052, 8059

SOLUTION: additional attributes MUST be considered

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Deciphering MOD IV

Revised as of January 2010

MOD IV USER MANUAL TABLE OF CONTENT

- The field is "supposed to" follow a specific format…reality is otherwise
- Approximately 254,000 unique values in this field for State of NJ
- Approximately 6,000 unique values in this field for the project area

Building Description Field

This is a fifteen space, alpha-numeric field.

Example: 1.5SSTL2AG means: 1 1/2 story stone colonial with a 2 car attached garage

Example Actual Values

BLDG_DESC	FREQUENCY	INTERPRETATION
2SF	1573	2story framed
1SF	1488	1story framed
1 F	1458	1story framed
1SF1G	1077	1story framed 1garage
2SF2G	787	2story framed 2garages
1SF2G	695	1story framed 2garages
1SFG1	654	1story framed 1garage
1S F	572	1story framed
1F	496	1story framed
1S F G1	465	1story framed 1garage
2SF1G	432	2story framed 1garage
2S-F	386	2story framed

SOLUTION: street-level photos, interpretations from other tax data (*or*) assign per Hazus default scheme.
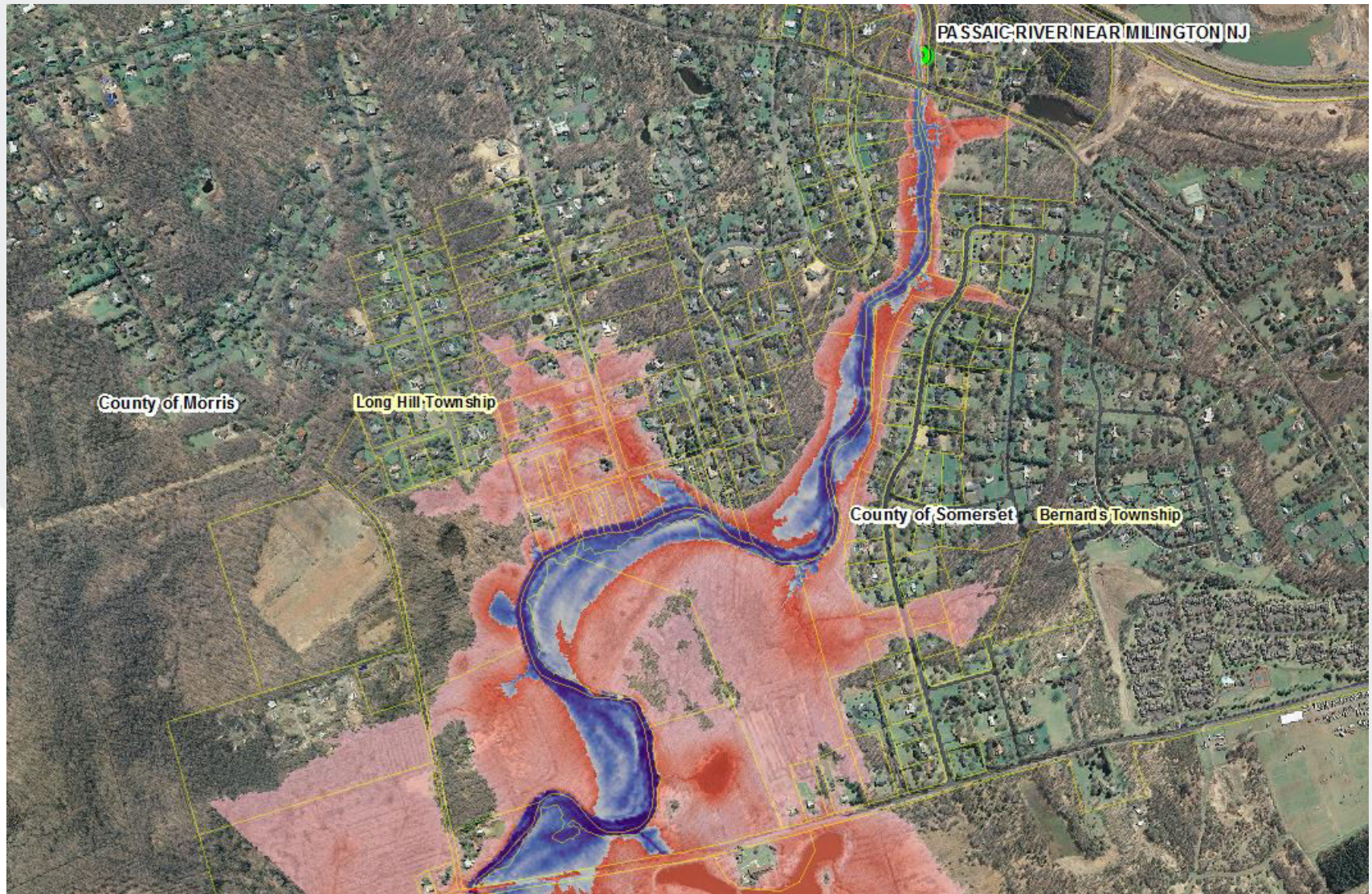
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Draft Results

Gage Locations

○ Results Obtained

▸ Passaic Basin
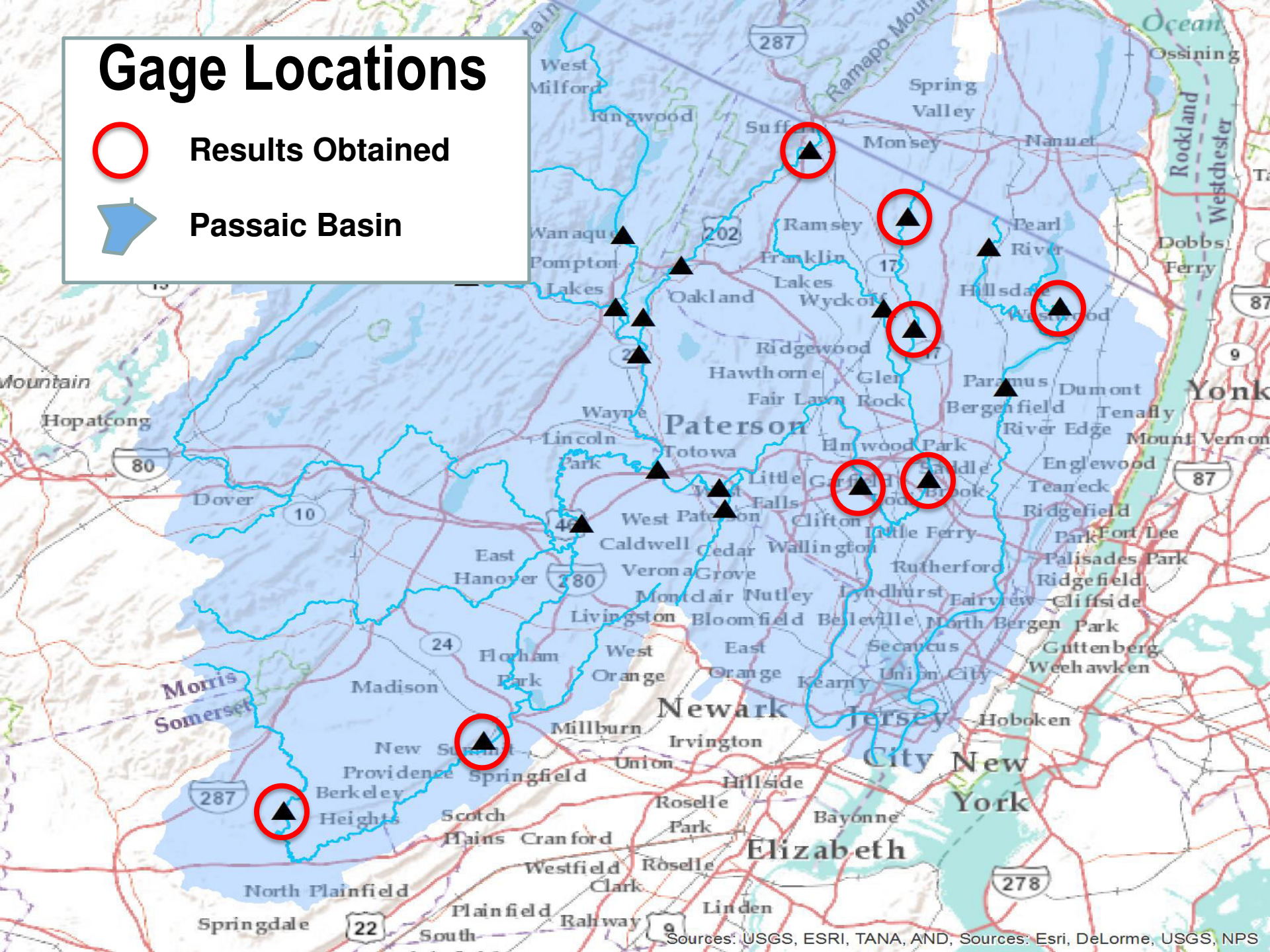
Increasing Stages = Increasing Damages

Increasing Stages = Increasing Damages

- Exemplary - Passaic River near Millington, NJ

Gage (Common Name)	Stage	Stage (ELEV)	Number Parcels Intersect Max Stage	Number Parcels Intersect Each Stage	Percent Parcels Affected	Parcels Increase	Number Buildings Within Max Stage Parcels
PASSAIC RIVER NEAR MILINGTON NJ	1	220.7	226	127	56%	N/A	193
	2	221.7		138	61%	11	
	3	222.7		149	66%	11	
	4	223.7		169	75%	20	
	5	224.5		180	80%	11	
	6	225.7		202	89%	22	
	7	226.7		226	100%	24	

Gage (Common Name)	Number Buildings w/ Damage Each Stage	Percent of Total Number of Buildings w/ Damage	Exposure1 (Building)*	Exposure1 (Contents)**	Combined Exposure (Building & Contents)
PASSAIC RIVER NEAR MILINGTON NJ	0	0%	$ 139,000,000	$63,300,000	$ 202,300,000
	0	0%			
	0	0%			
	0	0%			
	7	4%			
	20	10%			
	38	20%			

1 Includes values for all valid modeled buildings; i.e., does not include detached garages or sheds or other similar appurtenance-type structures. Exception, Saddle River in Lodi was modeled with detached garages for exemplary purposes.

* Estimated replacement value & ** Estimated contents value based on % of Building Value.

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Increasing Stages = Increasing Damages

- Exemplary - Passaic River near Millington, NJ

Gage (Common Name)	Total Loss (Building)	Total Loss (Contents)	Total Loss (Inventory)	Combined Loss (Building & Contents)	Percent Loss (Building)	Percent Loss (Contents)	Combined Percent Loss (Building & Contents)
	$ -	$ -	$ -	$ -	0%	0%	0%
	$ -	$ -	$ -	$ -	0%	0%	0%
	$ -	$ -	$ -	$ -	0%	0%	0%
PASSAIC RIVER NEAR MILINGTON NJ	$ -	$ -	$ -	$ -	0%	0%	0%
	$ 200,000	$ 90,000	$ -	$ 290,000	0%	0%	0%
	$ 600,000	$ 300,000	$ -	$ 900,000	0%	0%	0%
	$1,700,000	$1,100,000	$ -	$ 2,800,000	1%	2%	1%

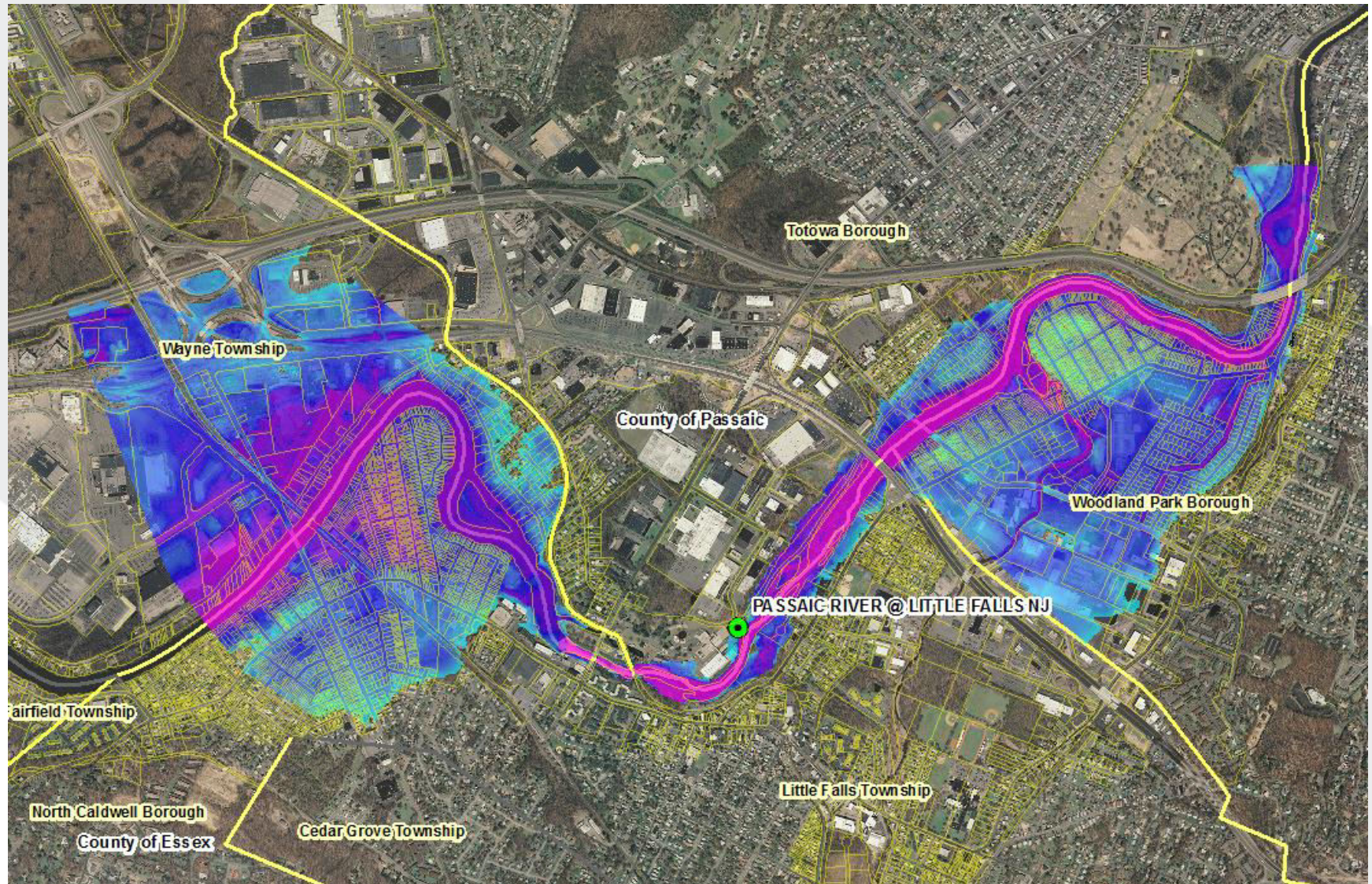**Dewberry**

Focus On Preparedness

Rankings – Draft Gage Results

- Percent Loss (Building) and then (Contents)

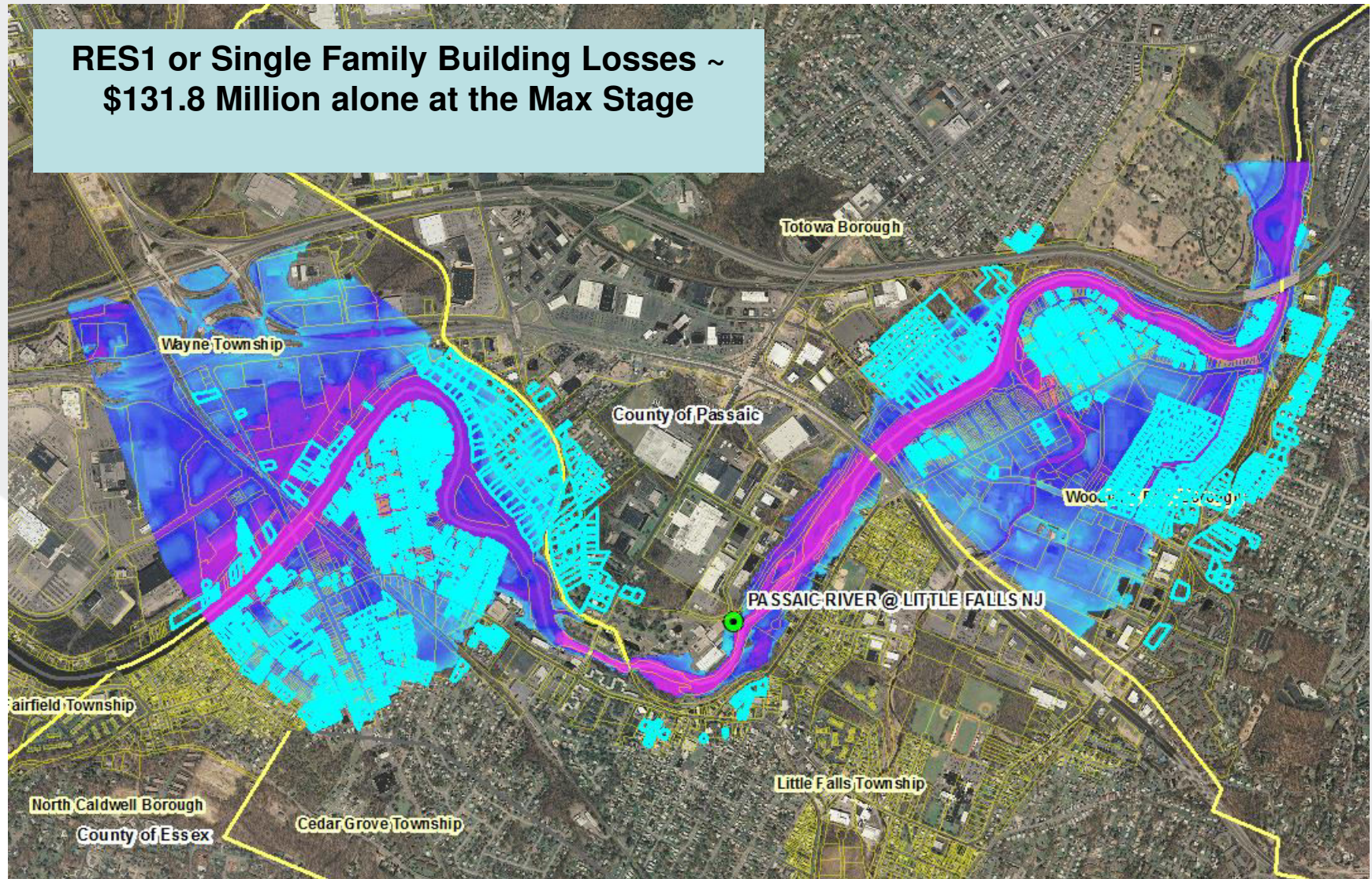| Gage (Common Name)	Percent Loss (Building)	Percent Loss (Contents)	Combined Percent Loss (Building & Contents)	Priority For Mitigation (Building)
PASSAIC RIVER @ LITTLE FALLS NJ	24%	87%	45%	1
PASSAIC RIVER DUNDEE DAM AT CLIFTON, NJ	12%	49%	25%	2
Saddle River @ Lodi	9%	13%	11%	3
HACKENSACK RIVER @ RIVERVALE NJ	8%	8%	8%	4
SADDLE RIVER @ RIDGEWOOD NJ	5%	6%	6%	5
SADDLE RIVER @ UPPER SADDLE RIVER NJ	4%	12%	7%	6
RAMAPO RIVER NEAR MAHWAH NJ	3%	6%	4%	7
PASSAIC RIVER NEAR MILINGTON NJ	1%	2%	1%	8
PASSAIC RIVER NEAR CHATHAM NJ	0%	2%	1%	9

Gage (Common Name)	Percent Loss (Building)	Percent Loss (Contents)	Combined Percent Loss (Building & Contents)	Priority For Mitigation (Contents)
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RAMAPO RIVER NEAR MAHWAH NJ	3%	6%	4%	7
PASSAIC RIVER NEAR CHATHAM NJ	0%	2%	1%	8
PASSAIC RIVER NEAR MILINGTON NJ	1%	2%	1%	9

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MAX Stage – Passaic River @ Little Falls NJ

RES1 or Single Family Building Losses ~ $131.8 Million alone at the Max Stage

Prioritizations (Rankings)

- ## Combined Percent Loss (Building & Contents)

PASSAIC RIVER @ LITTLE FALLS NJ	24%	87%	45%	1
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PASSAIC RIVER NEAR MILINGTON NJ	1%	2%	1%	8
PASSAIC RIVER NEAR CHATHAM NJ	0%	2%	1%	9

- Draft results show Passaic River @ Little Falls is Ranked #1
- **More USGS Gages are yet to be completed**

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