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Pike County
Hazard Mitigation Plan (HMP)
2022 Update

Risk Assessment Meeting | November 10, 2021

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Agenda

- Welcome
- Project Status – where we are in the process
- Risk Assessment Overview – draft results to date
- Next Steps

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Project Schedule Review

✓	June/July 2021	Kick-Off Meetings
✓	July-September 2021	Data Collection
❑	November 10, 2021	Risk Assessment Presentation – TODAY!
❑	October-November 2021	Update Hazard Profiles – *in progress*
❑	December 2021	Mitigation Strategy Workshop (date TBD)
❑	June 2021 – March 2022	Plan Development
❑	March 2022	Review Draft Plan
❑	April 2022	Plan Submitted to PEMA
❑	May 2022	Plan Submitted to FEMA

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Worksheet Completion Status

- Received worksheets from all 13 jurisdictions – great job!
  - Tetra Tech will follow-up with the municipalities to fill in any missing gaps
- Providing information and attending meetings is a participation requirement for the HMP
  - Lack of participation in this HMP planning process can prevent funding eligibility

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Public Outreach and Engagement

- Stakeholder and neighboring county surveys were distributed

- To date, we have received over 50 responses to the public survey

- Public Engagement – County and municipalities were sent different tools they can use to help – please continue to share!

  - HMP website
    https://www.pikecountypahmp.com/

  - Social Media announcements – Facebook and Twitter

  - Let Tetra Tech know when you post about the HMP so we can include in the HMP

Risk Assessment Overview

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What is Risk?

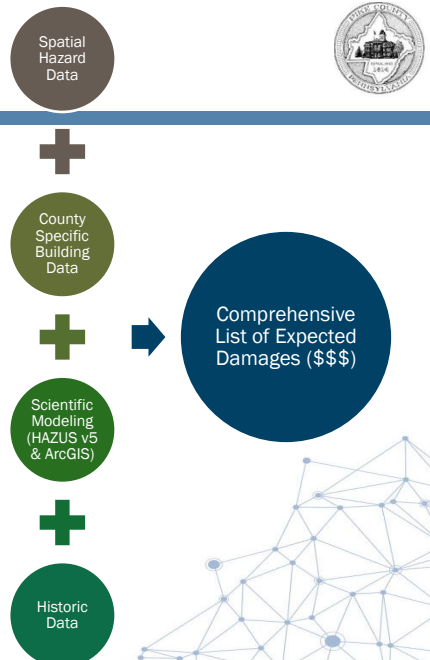Risk is defined as a function of :

✓ Hazard
  - *Source of potential danger or adverse condition*

✓ Exposure
  - *Manmade or natural features that are exposed to the hazard*

✓ Vulnerability
  - *Damage susceptibility of the exposed features*

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Purpose of the Risk Assessment

- To get a better understanding of the risks you face
- Initial results based on available data
- Quantitative data (population/structures exposed, structural damages within hazard zones) used when available
- Qualitative community input (such as unmapped flood areas) integrated to adjust results
- Local community input to adjust relative rankings

Spatial Hazard Data

County Specific Building Data

Scientific Modeling (HAZUS v5 & ArcGIS)

Historic Data

Comprehensive List of Expected Damages ($$$)

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Ranking the Hazards of Concern

How are the rankings calculated? What is the preliminary ranking?

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Preliminary Risk Factor Methodology

- What is used to calculate the risk factor?
  - Probability – what is the likelihood of a hazard event occurring in any given year?
  - Impact – looks at injuries, damages, or deaths from a hazard
  - Spatial Extent – how large of an area will be impacted?
  - Warning Time – is there some lead time associated with the hazard?
  - Duration – how long does the event usually last?

Local community input to adjust preliminary rankings

Probability of Occurrence (30%) **+** Impacts (30%) **+** Spatial Extent (20%) **+** Warning Time (10%) ➔ Duration (10%) **=** Preliminary Risk Factor

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Summary of Risk Factor (RF) Methodology

Risk Assessment Category	Level	Criteria	Index	Weight Value
PROBABILITY *What is the likelihood of a hazard event occurring in a given year?*	UNLIKELY	LESS THAN 1% ANNUAL PROBABILITY	1	30%
	POSSIBLE	BETWEEN 1% & 49.9% ANNUAL PROBABILITY	2	
	LIKELY	BETWEEN 50% & 90% ANNUAL PROBABILITY	3	
	HIGHLY LIKELY	GREATER THAN 90% ANNUAL PROBABILTY	4	
IMPACT *In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	MINOR	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	1	30%
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.	2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE WEEK.	3	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR 30 DAYS OR MORE.	4	
SPATIAL EXTENT *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	NEGLIGIBLE	LESS THAN 1% OF AREA AFFECTED	1	20%
	SMALL	BETWEEN 1 & 10.9% OF AREA AFFECTED	2	
	MODERATE	BETWEEN 11 & 25% OF AREA AFFECTED	3	
	LARGE	GREATER THAN 25% OF AREA AFFECTED	4	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	MORE THAN 24 HRS	SELF-DEFINED	1	10%
	12 TO 24 HRS	SELF-DEFINED	2	
	6 TO 12 HRS	SELF-DEFINED	3	
	LESS THAN 6 HRS	SELF-DEFINED	4	
DURATION *How long does the hazard event usually last?*	LESS THAN 6 HRS	SELF-DEFINED	1	10%
	LESS THAN 24 HRS	SELF-DEFINED	2	
	LESS THAN 1 WEEK	SELF-DEFINED	3	
	MORE THAN 1 WEEK	SELF-DEFINED	4	

(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.) — for WARNING TIME and DURATION

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Preliminary Risk Factor

RISK FACTOR CALCULATION

Risk Factor = Probability x 0.30 + Impact x 0.30 + Spatial Extent x 0.20 + Warning Time x 0.10 + Duration x 0.10

Hazard	PROBABILITY Level	Index	Weight Value	IMPACT Level	Index	Weight Value	SPATIAL EXTENT Level	Index	Weight Value	WARNING TIME Level	Index	Weight Value	DURATION Level	Index	Weight Value	RISK FACTOR
Disease Outbreak	Possible	2	30%	Critical	3	30%	Moderate	3	20%	More than 24 hrs	1	10%	More than 1 week	4	10%	2.6
Drought	Likely	3	30%	Limited	2	30%	Large	4	20%	More than 24 hrs	1	10%	More than 1 week	4	10%	2.8
Drowning	Highly Likely	4	30%	Minor	1	30%	Negligible	1	20%	Less than 6 hrs	4	10%	Less than 6 hrs	1	10%	2.2
Earthquake	Unlikely	1	30%	Minor	1	30%	Large	4	20%	Less than 6 hrs	4	10%	Less than 6 hrs	1	10%	1.9
Environmental Hazards	Highly Likely	4	30%	Limited	2	30%	Moderate	3	20%	Less than 6 hrs	4	10%	Less than 24 hrs	2	10%	3
Extreme Temperatures	Likely	3	30%	Limited	2	30%	Large	4	20%	12 to 24 hrs	2	10%	Less than 1 week	3	10%	2.8
Flood	Highly Likely	4	30%	Critical	3	30%	Moderate	3	20%	12 to 24 hrs	2	10%	Less than 1 week	3	10%	3.2
Hurricane/Nor'Easter	Possible	2	30%	Limited	2	30%	Moderate	3	20%	More than 24 hrs	1	10%	Less than 1 week	3	10%	2.2
Invasive Species	Highly Likely	4	30%	Minor	1	30%	Large	4	20%	More than 24 hrs	1	10%	More than 1 week	4	10%	2.8
Geologic	Possible	2	30%	Minor	1	30%	Negligible	1	20%	Less than 6 hrs	4	10%	Less than 6 hrs	1	10%	1.6
Nuclear Incidents	Unlikely	1	30%	Minor	1	30%	Moderate	3	20%	Less than 6 hrs	4	10%	More than 1 week	4	10%	2
Radon	Highly Likely	4	30%	Limited	2	30%	Large	4	20%	More than 24 hrs	1	10%	More than 1 week	4	10%	3.1
Terrorism	Possible	2	30%	Minor	1	30%	Small	2	20%	Less than 6 hrs	4	10%	More than 1 week	4	10%	2.1
Severe Weather	Highly Likely	4	30%	Limited	2	30%	Large	4	20%	6 to 12 hrs	3	10%	Less than 24 hrs	2	10%	3.1
Severe Winter Weather	Highly Likely	4	30%	Limited	2	30%	Large	4	20%	12 to 24 hrs	2	10%	Less than 24 hrs	2	10%	3
Transportation	Highly Likely	4	30%	Limited	2	30%	Negligible	1	20%	Less than 6 hrs	4	10%	Less than 6 hrs	1	10%	2.5
Urban Fire	Possible	2	30%	Limited	2	30%	Negligible	1	20%	Less than 6 hrs	4	10%	Less than 24 hrs	2	10%	2
Utility	Highly Likely	4	30%	Limited	2	30%	Small	2	20%	Less than 6 hrs	4	10%	More than 1 week	4	10%	3
Wildfire	Highly Likely	4	30%	Minor	1	30%	Moderate	3	20%	Less than 6 hrs	4	10%	Less than 1 week	3	10%	2.8

High > = 2.5
Moderate = 2.0 to 2.4
Low < 2.0

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Disease Outbreak and Pandemic

- Includes:
  - West Nile Virus
  - Lyme Disease
  - Influenza
  - Measles
  - Ebola
  - Zika
  - COVID-19
- Exposure
  - Entire County is vulnerable
  - Increased vulnerability in highly populated areas, tourists
- Overall Ranking - HIGH

1,104
Confirmed Cases of Influenza
(2015-2019)

436
Cases of Lyme Disease
(2015 – 2019)

5,503
Confirmed cases of COVID-19
(as of 11/5/2021)

63 Total Deaths

Disease Outbreak FEMA Declarations

- COVID-19 – DR-4506 – January 2020 to present

Drought

Since 2012, the County has experienced 15 periods of drought.

Potential impacts:
1. Increased wildfire risk
2. Impacts to agriculture/farms
3. Drinking water supply (groundwater and surface water)

Overall Ranking - HIGH

53
Number of farms

24,700
Acres of farmland

$892,000
Total market value of products sold (2017)

From 2017 Census of Agriculture

Drowning

- History
  - Majority of drownings occur along in the Delaware River
  - Pike County EMA conducts water rescues throughout the year
- Overall Ranking - Medium

Earthquake

- History
  - No historic earthquakes with epicenters in Pike County
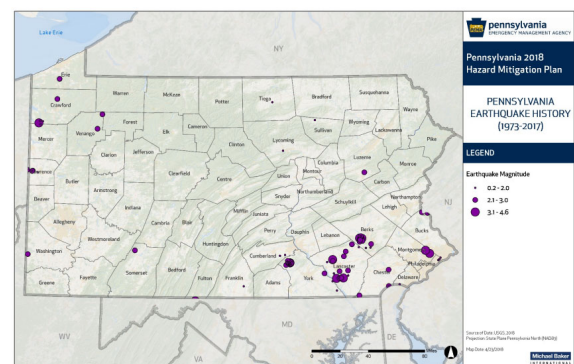- Annualized Losses - $129,570
- Losses from 500-year mean return period (MRP) event
  - $11,398,663 in building damages
  - 8,781 tons of debris
- Losses from 2,500-year MRP event
  - $110,564,051 in building damages
  - 48,071 tons of debris
- Overall Ranking - Low

Environmental Hazards

- Types of hazards:
  - Hazardous materials release (fixed or in-transit)
  - Oil and gas well incidents
- History
  - 5 reported in-transit hazmat incidents since 2017 (US DOT database; North American Hazmat Situations)
- Exposure
  - HazMat sites
  - Major routes that transport hazardous materials
  - Natural gas transmission lines
- Damages depend on the incident
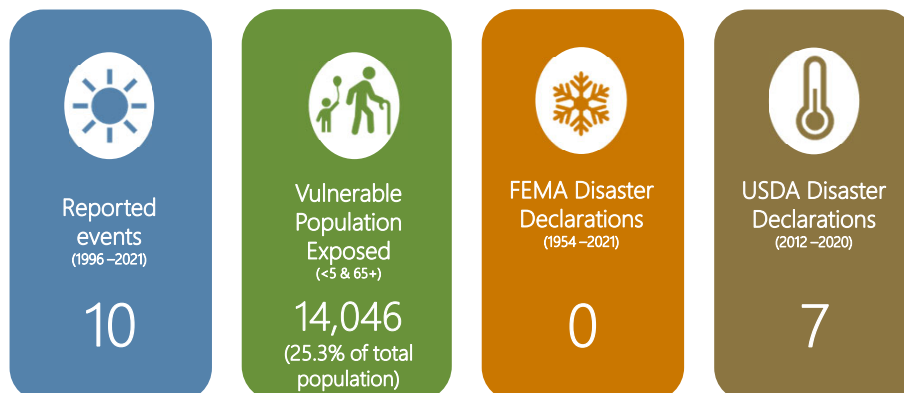- Overall Ranking - High

Extreme Temperatures

Reported events (1996–2021)	Vulnerable Population Exposed (<5 & 65+)	FEMA Disaster Declarations (1954–2021)	USDA Disaster Declarations (2012–2020)
10	14,046 (25.3% of total population)	0	7

Overall Ranking - HIGH

Flood

- Types of hazards:
  - Riverine/flash
  - Urban/stormwater
  - Dam failure
  - Ice jam
- History of Events
  - 6 FEMA disaster declarations
    - DR-273 (1969) – Severe Storms and Flood
    - DR-1093 (1996) – Severe Storms and Flooding
    - DR-1219 (1998) – Severe Storms, Tornadoes, and Flooding
    - DR-1555 (2004) – Severe Storms and Flooding Associated with Tropical Depression Frances
    - DR-1587 (2005) – Severe Storms and Flooding
    - DR-1649 (2006) – Severe Storms, Flooding, and Mudslides
 - 4 ice jams along the Delaware River and Shohola Creek

Courtesy U.S. Geological Survey

FLOOD WARNING
Flooding is happening or will happen soon.
Move to high ground immediately.

FLOOD WATCH
Flooding is possible.
Stay tuned to radio/TV for info and be ready to move to higher ground.

FEMA

Flood

- Risk Assessment Results
  - Estimated 1,749 people in the 1% annual chance flood area (2019 ACS)
  - Estimated $188,590,000 in exposed property value
  - Expected Losses (1-Percent Annual Chance Flood)
    - $3,258,305 in property damage (including residential, commercial, and other occupancy types)
    - 32,175 tons of debris (including finished, structure, and foundation)
   - 1,865 households displaced
    - 854 people seeking shelter
- Overall Ranking – High
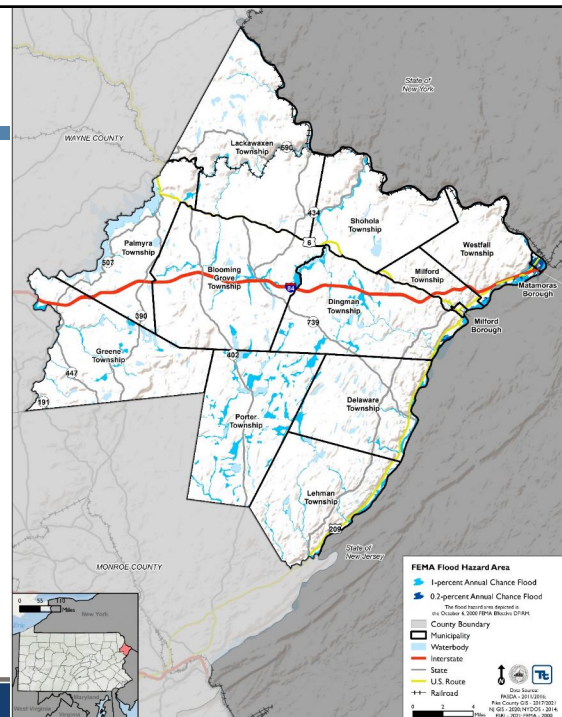
Hurricane/Nor'Easter

- History
  - 28 tropical cyclone events within 60 miles of Pike County since 1861
  - 5 FEMA-declared hurricane/tropical storm events since 1954
  - Several major events that impacted the County over the last 5 years, including recent impacts from Hurricane Ida
- Vulnerability Assessment
  - Annualized Losses: $58,878
  - Losses from 100-year mean return period (MRP) event: TS wind speeds
    - $549,080 (Structure Only) in building damages
    - Less than 100 tons of debris
  - Losses from 500-year MRP event: TS and Cat 1 wind speeds
    - $7,094,001 (Structure Only) in building damages
    - 124 tons of debris
- Overall Ranking - Medium
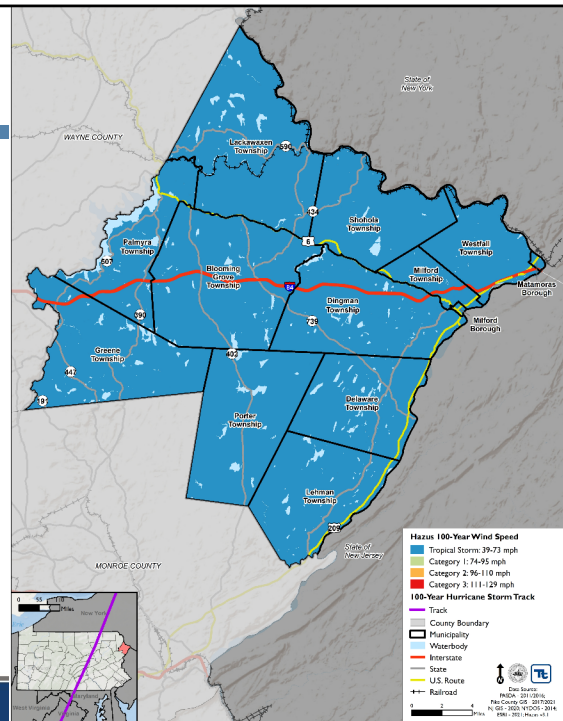
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Invasive Species and Harmful Algal Bloom

- Types of hazards:
  - Emerald Ash Borer
  - Hemlock Woolly Adelgid
  - Ticks and Mosquitos
  - Spotted Lanternfly
 - Harmful Algal Bloom
- Overall Ranking - High


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Geologic Hazards

- Types of hazards:
  - Landslides
  - Subsidence/Sinkholes
- Exposed County population
  - 31.7% of the population is in the high-susceptibility/moderate-incidence zone
- Exposed property value
  - $3,565,516,000 in the high-susceptibility/moderate-incidence zone
- Expected losses depend on the nature and extent of the landslide
- Overall Ranking - Low

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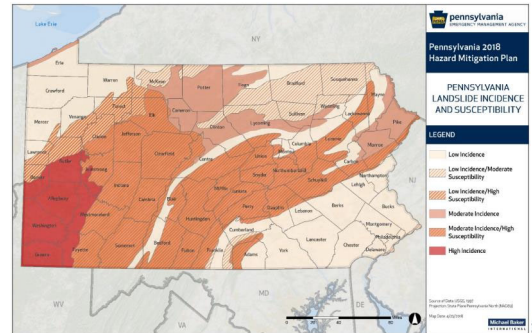
Nuclear Incidents

- Hazard Profile:
  - Susquehanna Steam Electric Station in Luzerne County, PA
  - Indian Point Power Plant in Westchester County, NY
  - History: No major accidents
- Vulnerability Assessment
  - 17,040 estimated population located within the 50-mile nuclear incident hazard area
- Overall Ranking - Medium

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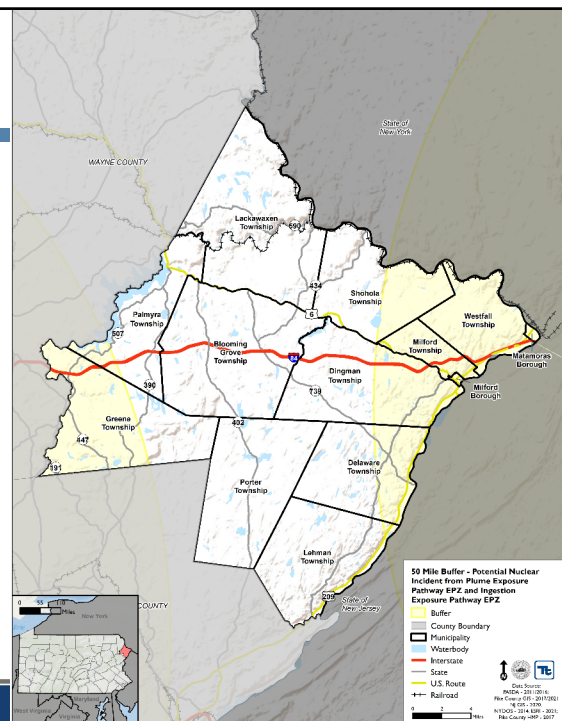
Radon Exposure

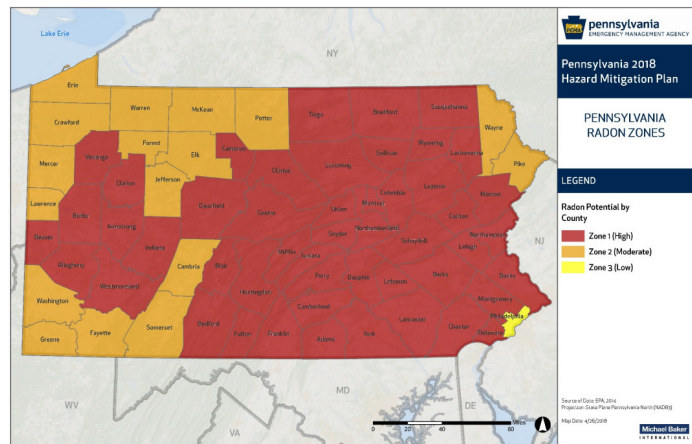- Hazard Profile
  - History
    - Estimated 40% homes in PA have elevated radon levels
    - Tests > 4 pCi/L (picoCuries per liter)
  - Exposure: Entire County (no known safe level of exposure)
  - Impacts Include
    - Lung cancer
    - Contaminated groundwater
    - Economic loss – radon mitigation
    - system (average $1200)
- Overall Ranking - High

Terrorism

- Hazard Profile:
  - History
    - Threats made in several municipalities (e.g., bomb threats)
  - Considerations
    - Influx of people from New York metropolitan area seeking shelter
- Overall Ranking - Medium

Severe Weather

- Hazard Profile
  - Includes: hail, thunderstorms, lightning, tornadoes, heavy rain
  - 129 severe weather events since 1989; 3 injuries and $4.14 million in property damage (as reported to NOAA)
  - 6 FEMA disaster declarations since 1954
- Exposure
  - Entire County is vulnerable to severe weather events
  - Over $8 billion in structural value
  - Impacts
    - Vulnerable populations
    - Damage to roofs and building frames
    - Damage to roadways and infrastructure
    - Power outages
  - Overall Hazard Ranking - High

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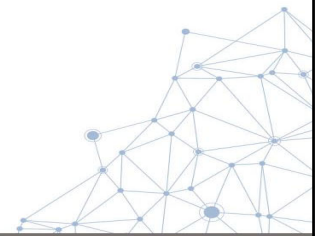
Severe Winter Weather

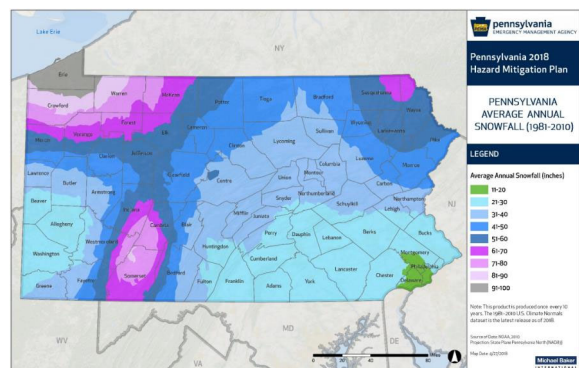- Hazard Profile:
  - 73 winter storm events since 1996
  - 2 disaster declarations since 1954
- Exposure
  - Entire County is vulnerable to heavy snow and ice storms
  - Over $8 billion in structural value
  - Impacts
    - Vulnerable populations
    - Damage to roofs and building frames
    - Cost of snow/ice removal
    - Damage to roadways and infrastructure
  - Overall Hazard Ranking - High

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Transportation Accidents

- Hazard Profile:
  - History
    - 2,303 vehicle crashes (2017-2020)
    - 39 fatalities from automobile crashes (2017-2020)
    - 1 pedestrian fatality (2017-2020)
  - Potential impacts and other damages
    - Release of hazardous materials
    - Interruption of critical supply/access routes
    - Traffic congestion
- Overall Ranking – High

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Urban Fire

- Hazard Profile:
  - Mainly residential structure fires and explosions.
  - Exposure and vulnerability
    - Urban areas have greater vulnerability
    - Compliance with current fire safety codes
- Overall Ranking – Medium

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Utility Interruptions

- Hazard Profile:
  - Often a secondary impact of another hazard event (e.g., thunderstorms, winter storms, hurricanes, strong winds)
  - Exposure: Entire County
    - Regional events are usually the most severe
  - Impacts to vulnerable populations
- Overall Ranking – High

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Wildfire

- Hazard Profile:
  - History
    - 225 wildfires within Pike County between 2002-2008
    - April 2016 – 16-Mile Fire
      - Near border of Monroe and Pike Counties – more than 8,000 acres burned

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Wildfire

- Area of Exposure to Wildland-Urban Interface/ Intermix Area
  - 51,036 residents exposed (92% of total population)
  - 34,620 structures exposed (90.1% of total number of buildings)
    - Approximately $11.4 billion in exposed replacement cost value (87.4% of total RCV)
  - 104 critical facilities exposed
- Overall Ranking – High
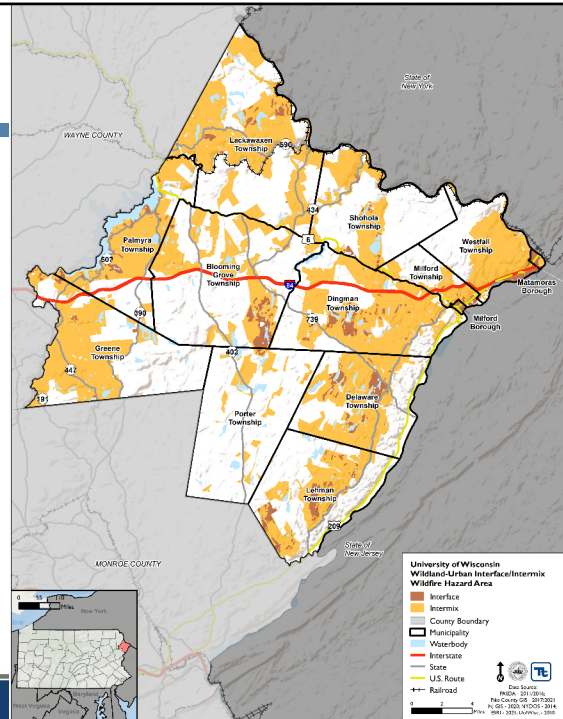
Risk Assessment Results

Hazard Risk	Hazards	Risk Assessment Category					Risk Factor (RF)
		Probability	Impact	Spatial Extent	Warning Time	Duration	
High	Flood	4	3	3	2	3	3.2
	Radon	4	2	4	1	4	3.1
	Severe Weather	4	2	4	3	2	3.1
	Environmental Hazards	4	2	3	4	2	3
	Severe Winter Weather	4	2	4	2	2	3
	Utility	4	2	2	4	4	3
	Drought	3	2	4	1	4	2.8
	Extreme Temperatures	3	2	4	2	3	2.8
	Invasive Species	4	1	4	1	4	2.8
	Wildfire	4	1	3	4	3	2.8
	Disease Outbreak	2	3	3	1	4	2.6
	Transportation	4	2	1	4	1	2.5
Moderate	Drowning	4	1	1	4	1	2.2
	Hurricane/Nor'Easter	2	2	3	1	3	2.2
	Terrorism	2	1	2	4	4	2.1
	Nuclear Incidents	1	1	3	4	4	2
	Urban Fire	2	2	1	4	2	2
Low	Earthquake	1	1	4	4	1	1.9
	Geologic	2	1	1	4	1	1.6

Risk Assessment Results

- Municipal Risk Factor Analysis – what do you think is your municipality's ranking?

Municipality	Disease Outbreak	Drought	Drowning	Earthquake	Environmental Hazards	Extreme Temperatures	Flood	Geologic	Hurricane, /Nor'Easter	Invasive Species	Nuclear Incidents	Radon	Severe Weather	Severe Winter Weather	Terrorism	Transportation	Urban Fire	Utility	Wildfire
Municipality	2.6	2.8	2.2	1.9	3	2.8	3.2	1.6	2.2	2.8	2	3.1	3.1	3	2.1	2.5	2	3	2.8
Blooming Grove Township																			
Delaware Township																			
Dingman Township																			
Greene Township																			
Lackawaxen Township																			
Lehman Township																			

> **Your municipality's risk from this hazard is greater than the County's risk as a whole**

< **Your municipality's risk from this hazard is less than the County's risk as a whole**

= **Your municipality's risk from this hazard is about the same as the County's risk as a whole**

Next Steps

- Complete Municipal Worksheets
- Finalize Risk Assessment – due to Tetra Tech by <u>Tuesday, November 30th</u>
- Conduct Mitigation Strategy Workshop – date TBD
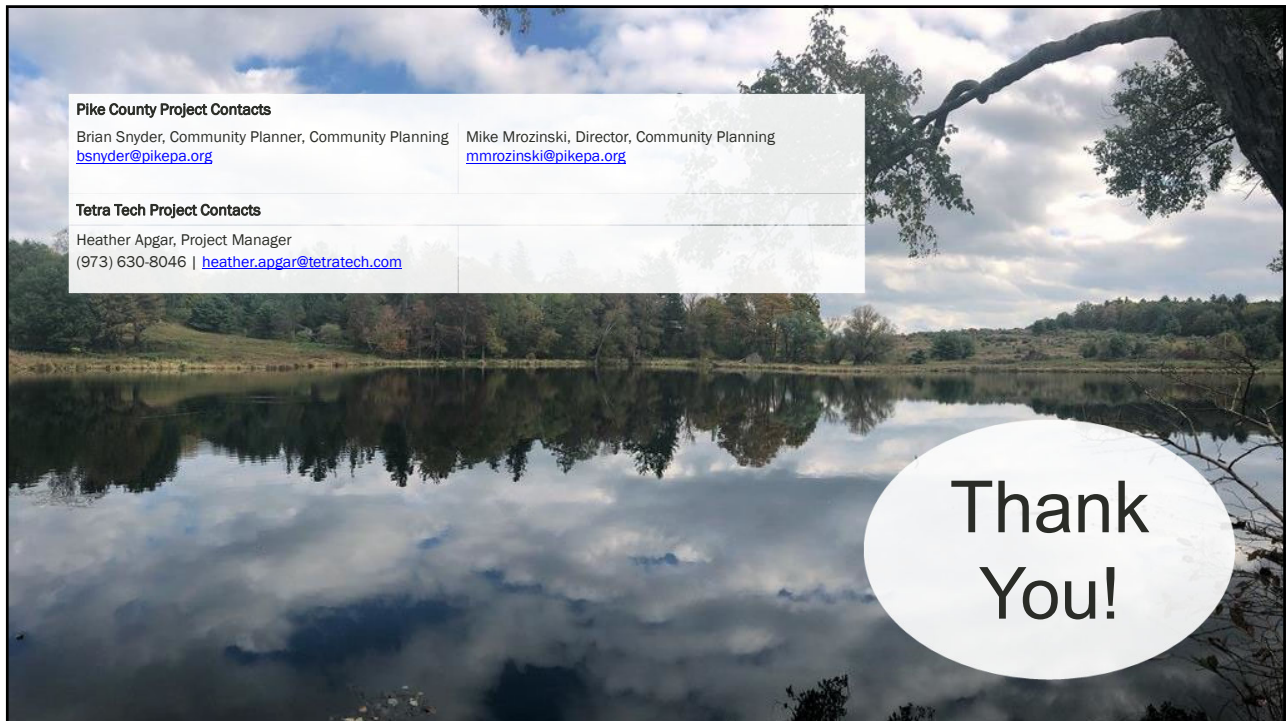 - Start thinking about your mitigation actions!

Questions?

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Thank You!

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