Columbia County
EMERGENCY MANAGEMENT AGENCY

All-Hazard Mitigation Plan Update
Columbia County, PA

Risk Assessment Planning Team Meeting
April 5, 2016

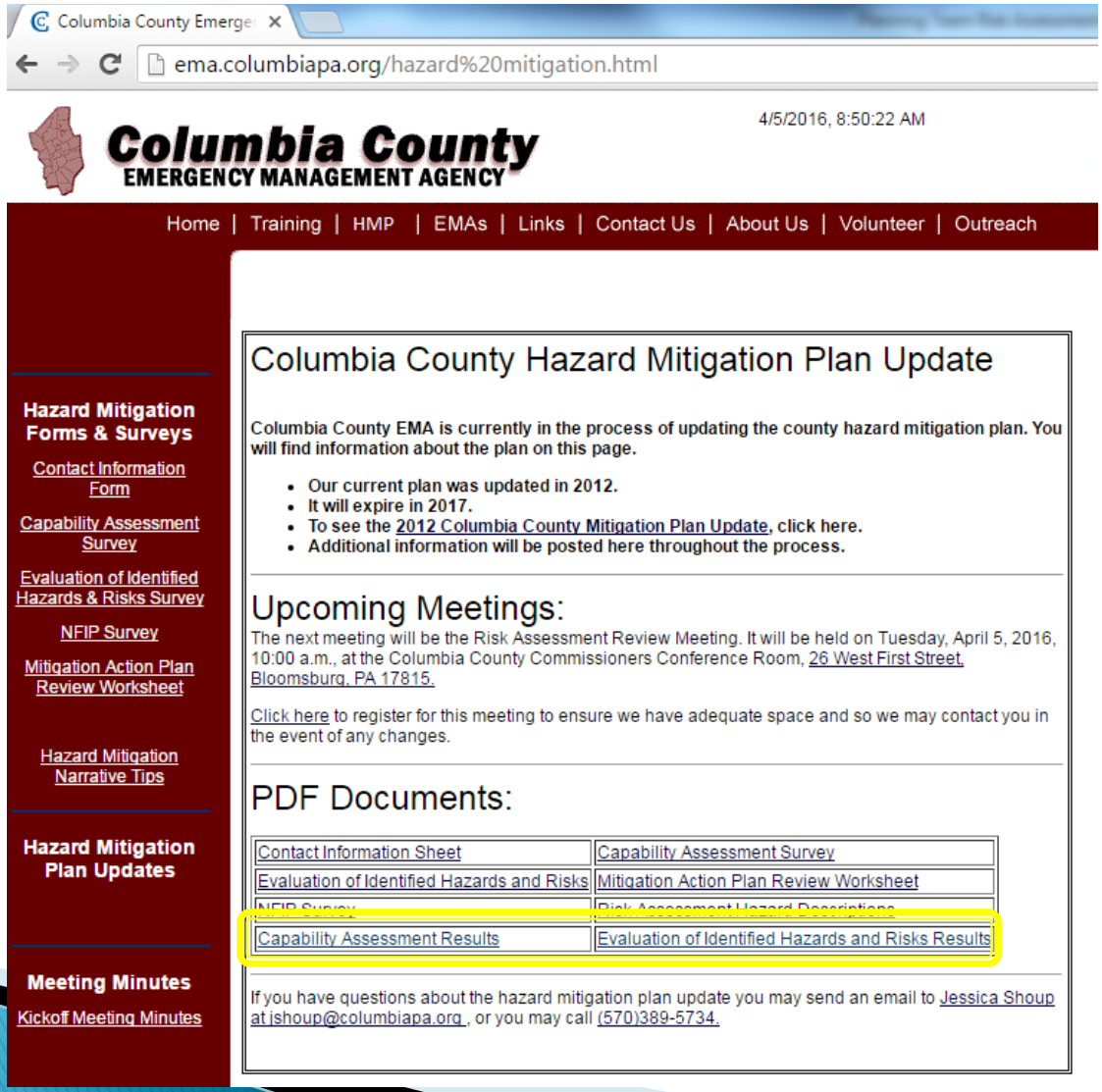
Agenda

- Welcome and Introductions
- Project Overview & Kickoff Meeting Summary
- Capability Assessment, Evaluation of Identified Hazards & Risks, NFIP Review
- Risk Assessment
  - Hazard Identification
  - Risk Assessment Summary by Hazard
  - Hazard Ranking and Risk Factor
- Mitigation Strategy
  - What is a Mitigation Strategy?
  - Goals and Objectives
  - Mitigation Action Techniques
  - Mitigation Action Plan Development
- Planning Timeline
- Question and Answer Session

Kickoff Meeting Summary

- Discussed Planning Process and Local Requirements
- Assessed Capabilities
- Evaluated Hazards

Capability Assessment, Evaluation of Identified Hazards and Risks, National Flood Insurance Program

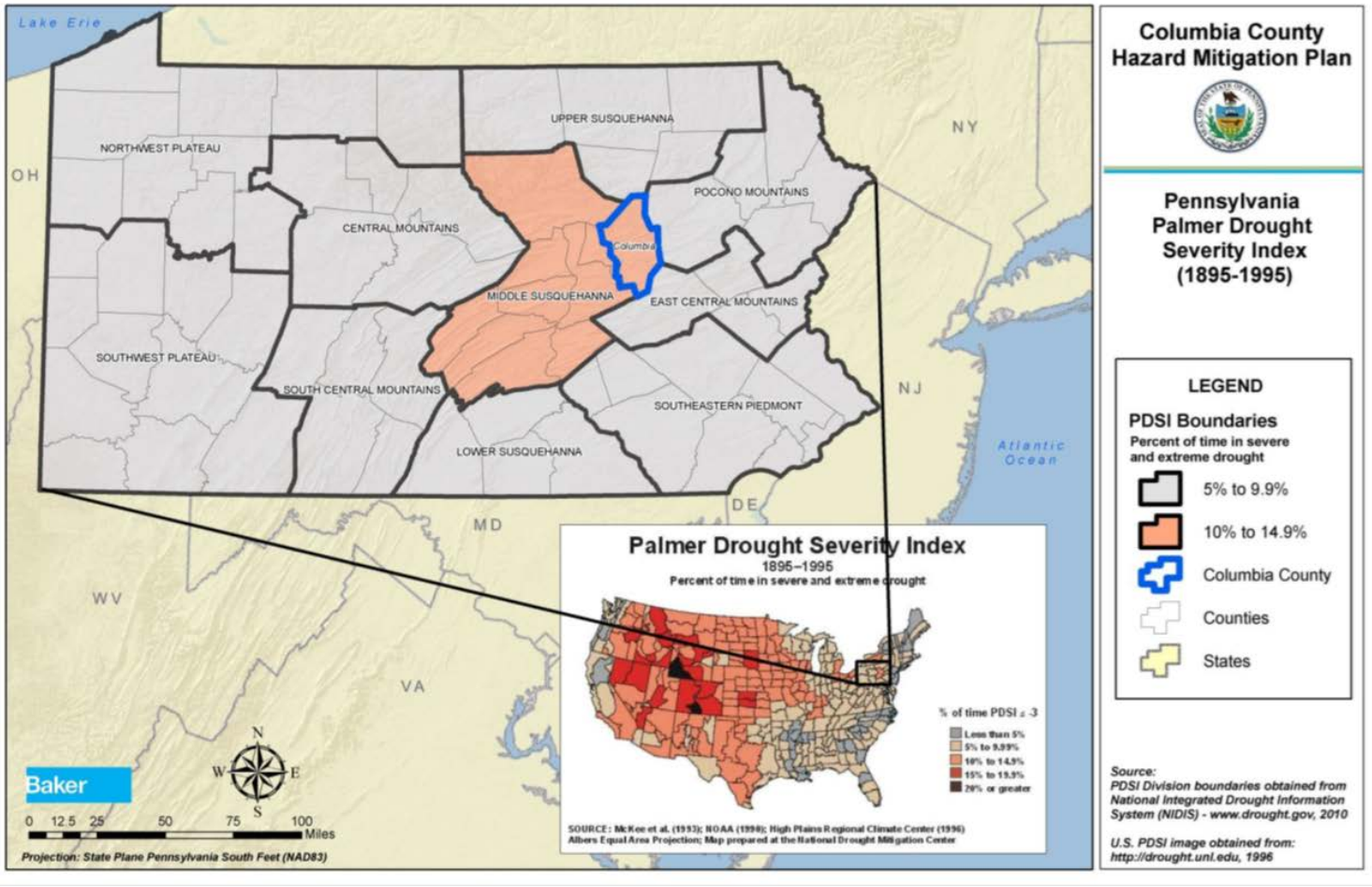


Capability Assessment Results

Evaluation of Identified Hazards and Risks Results

Risk Assessment

Drought



Risk Assessment

Drought

- PA DEP Drought Data
  - 2 “Watch” in 2015
  - Decreased
- Palmer Drought Severity Index (1895 – 1995)
  - PA in severe or extreme drought 10%-14.9%
- Future Occurrence Risk Factor Methodology
  - Possible

Risk Assessment

Drought

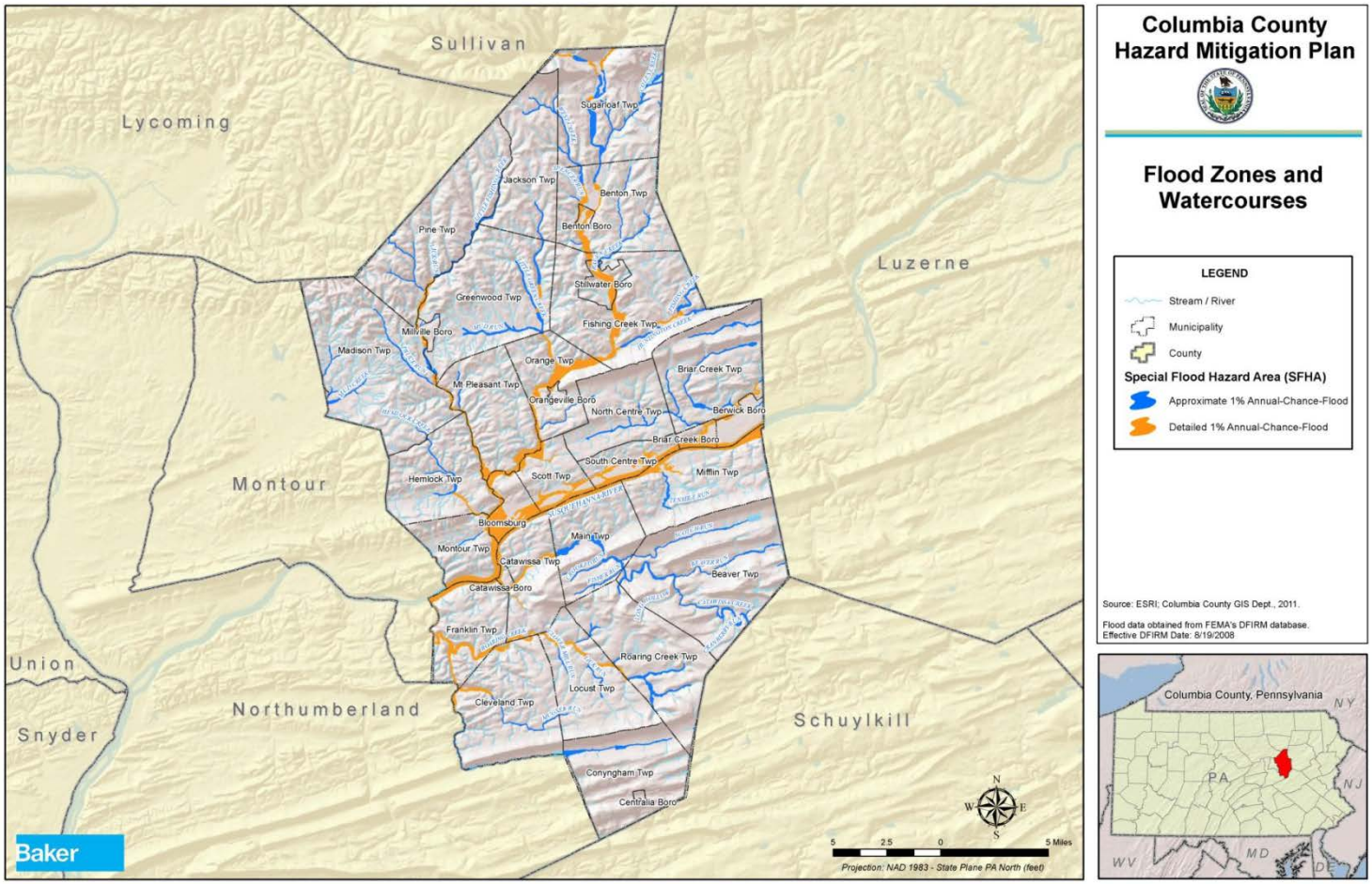
Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (2 x .30) + (1 x .30) + (4 x .20) + (1 x .10) + (4 x .10) =2.2

- 2.2 = Moderate Hazard

Risk Assessment

Flash Flood, Flood, Ice Jam



Risk Assessment

Flash Flood, Flood, Ice Jam

- National Weather Service
  - 4 flash flooding events since last plan
- Future Occurrence Risk Factor Methodology
  - Highly Likely
- Critical Facilities, Structure & Population Vulnerability, Worst Case Scenario

Risk Assessment

Flash Flood, Flood, Ice Jam

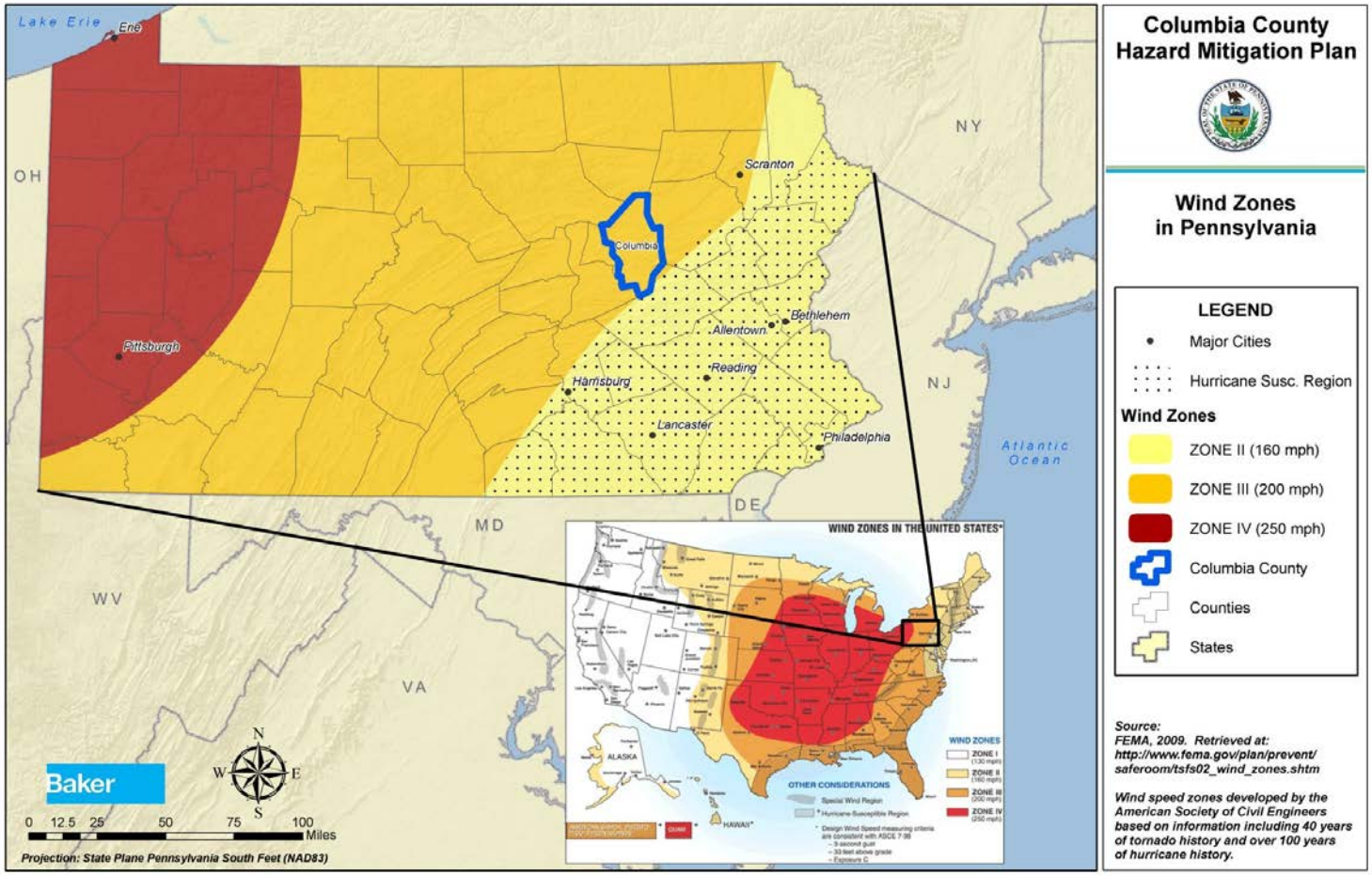
Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (4 x .30) + (3 x .30) + (3 x .20) + (2 x .10) + (3 x .10) =3.2

- 3.2 = High Hazard

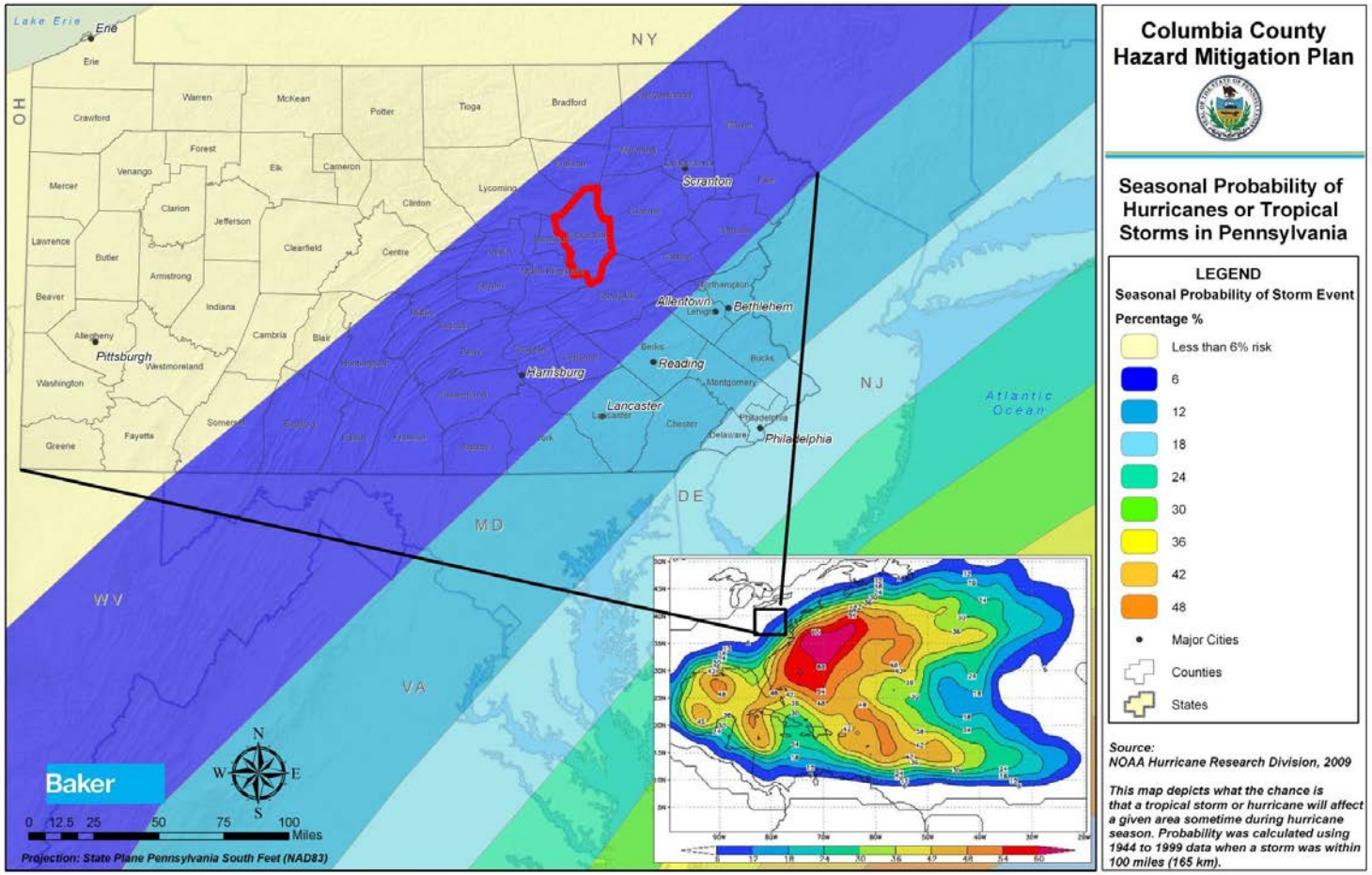
Risk Assessment

Hurricane, Tropical Storm, Nor'easter



Risk Assessment

Hurricane, Tropical Storm, Nor'easter



Risk Assessment

Hurricane, Tropical Storm, Nor'easter

- Saffir-Simpson Scale
- NOAA
  - 6% chance tropical storm/hurricane between June & November
- Future Occurrence Risk Factor Methodology
  - Possible

Risk Assessment

Hurricane, Tropical Storm, Nor'easter

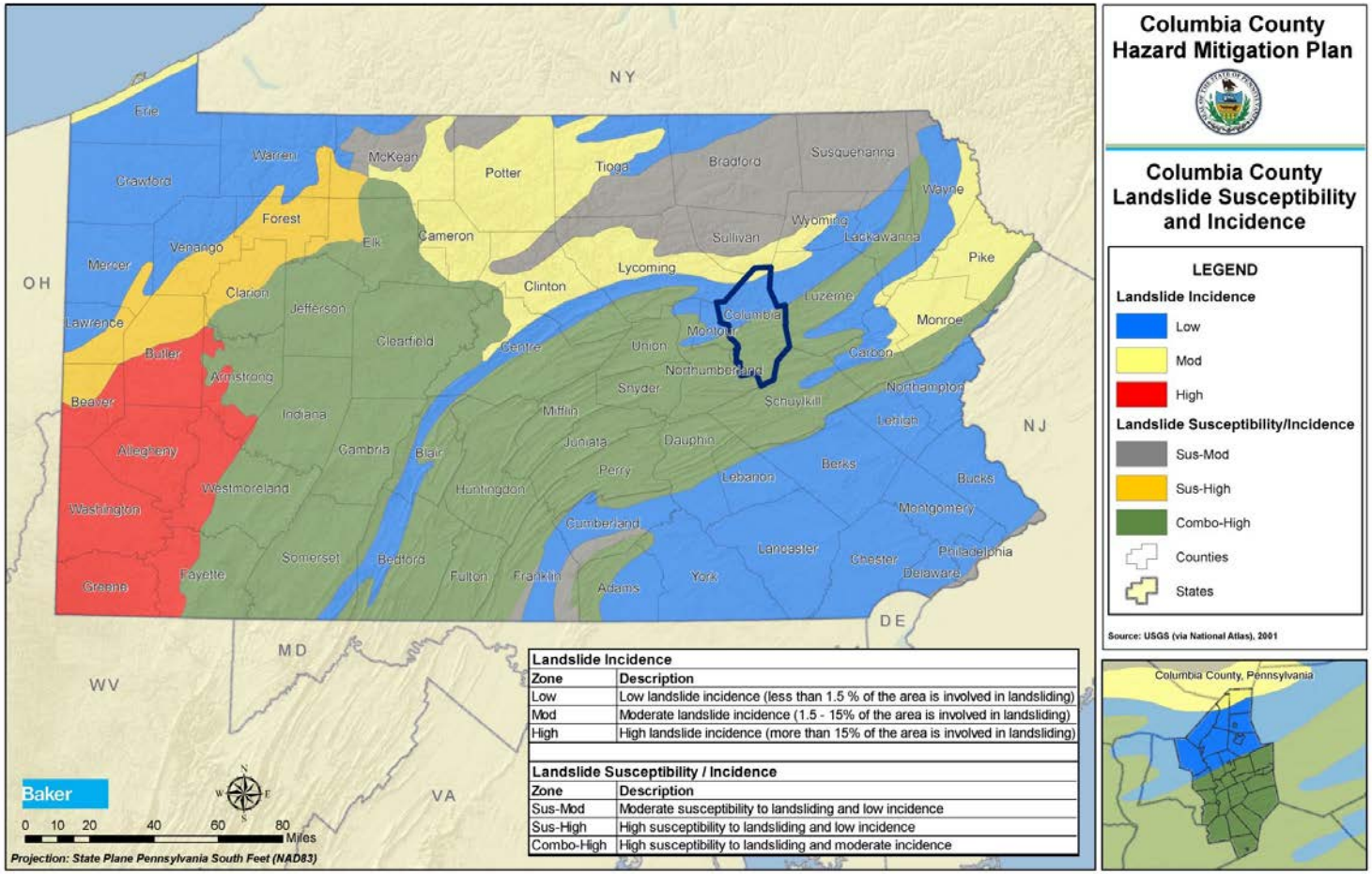
Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (2 x .30) + (2 x .30) + (2 x .20) + (1 x .10) + (2 x .10) =1.9

- 1.9 = Low Hazard

Risk Assessment

Landslide



Risk Assessment

Landslide

- Historical events
  - Loss of life & property damage unlikely
- Future Occurrence Risk Factor Methodology
  - Possible

Risk Assessment

Landslide

Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (2 x .30) + (1 x .30) + (3 x .20) + (2 x .10) + (2 x .10) =1.9

- 1.9 = Low Hazard

Risk Assessment

Pandemic

- Columbia County
  - Expected to experience pandemic outbreak every 11 to 41 years
  - 41 cases and 1 death from H1N1 in the 2009-2010 outbreak
- Future Occurrence Risk Factor Methodology
  - Possible

Risk Assessment

Pandemic

Table 4.3.6-1: List of previous significant outbreaks of influenza over the past century (Global Security, 2009; World Health Organization, 2009).

DATE	PANDEMIC NAME/SUBTYPE	WORLDWIDE DEATHS (APPROXIMATE)
1918-1920	Spanish Flu / H1N1	50 million
1957-1958	Asian Flu / H2N2	1.5-2 million
1968-1969	Hong Kong Flu / H3N2	1 million
2009-2010	Swine Flu / 2009 H1N1	17,700

- Avian Flu
- West Nile Virus

Risk Assessment

Pandemic

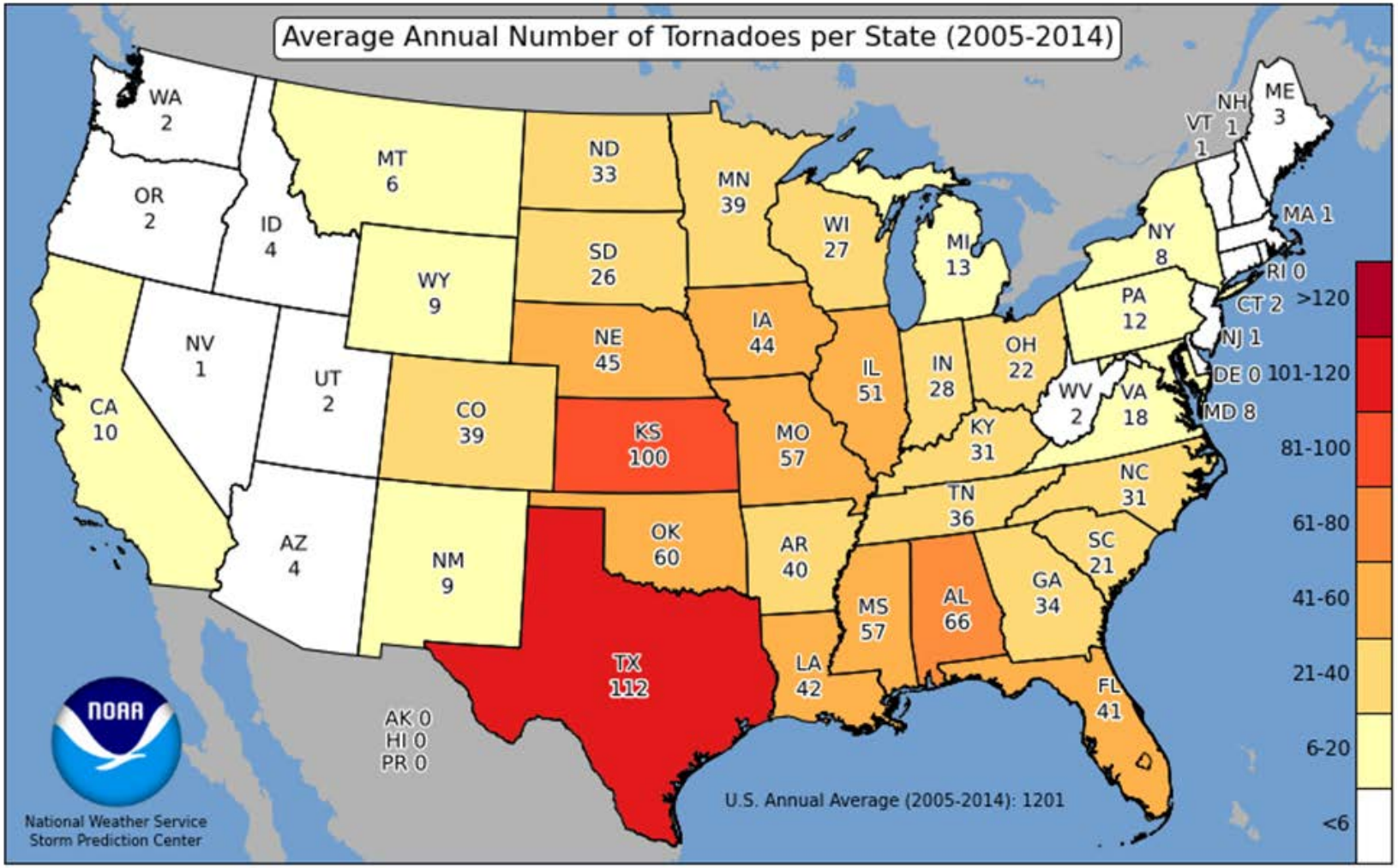
Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (2 x .30) + (1 x .30) + (2 x .20) + (1 x .10) + (4 x .10) =1.9

- 1.8 = Low Hazard

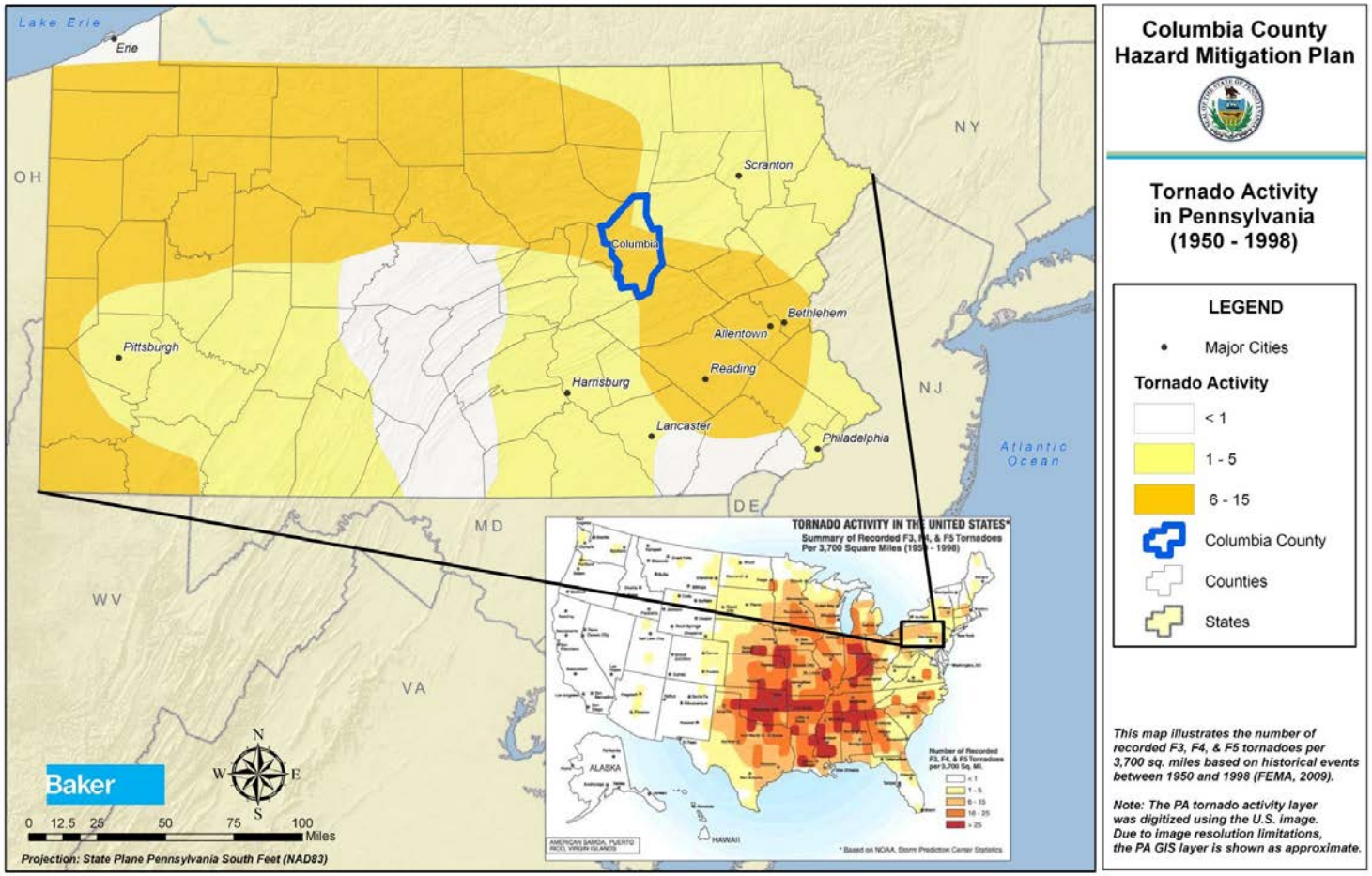
Risk Assessment

Tornado, Windstorm



Risk Assessment

Tornado, Windstorm



Risk Assessment

Tornado, Windstorm

- Columbia County Worst Case
  - April 1982 – F2
  - 30 yards wide & 4 miles long
  - $25,000 damage & one injury

  - April 2002 – F1
  - 300 yards wide & 6 miles long
  - $360,000 damage & no injuries

Risk Assessment

Tornado, Windstorm

- Between 1950 & 1998
  - 6-15 tornados (F3, F4, & F5) per 3,700 sq. miles
  - 30% – 39% chance of F3, F4, or F5 tornado per year
- Future Occurrence Risk Factor Methodology
  - Possible

Risk Assessment

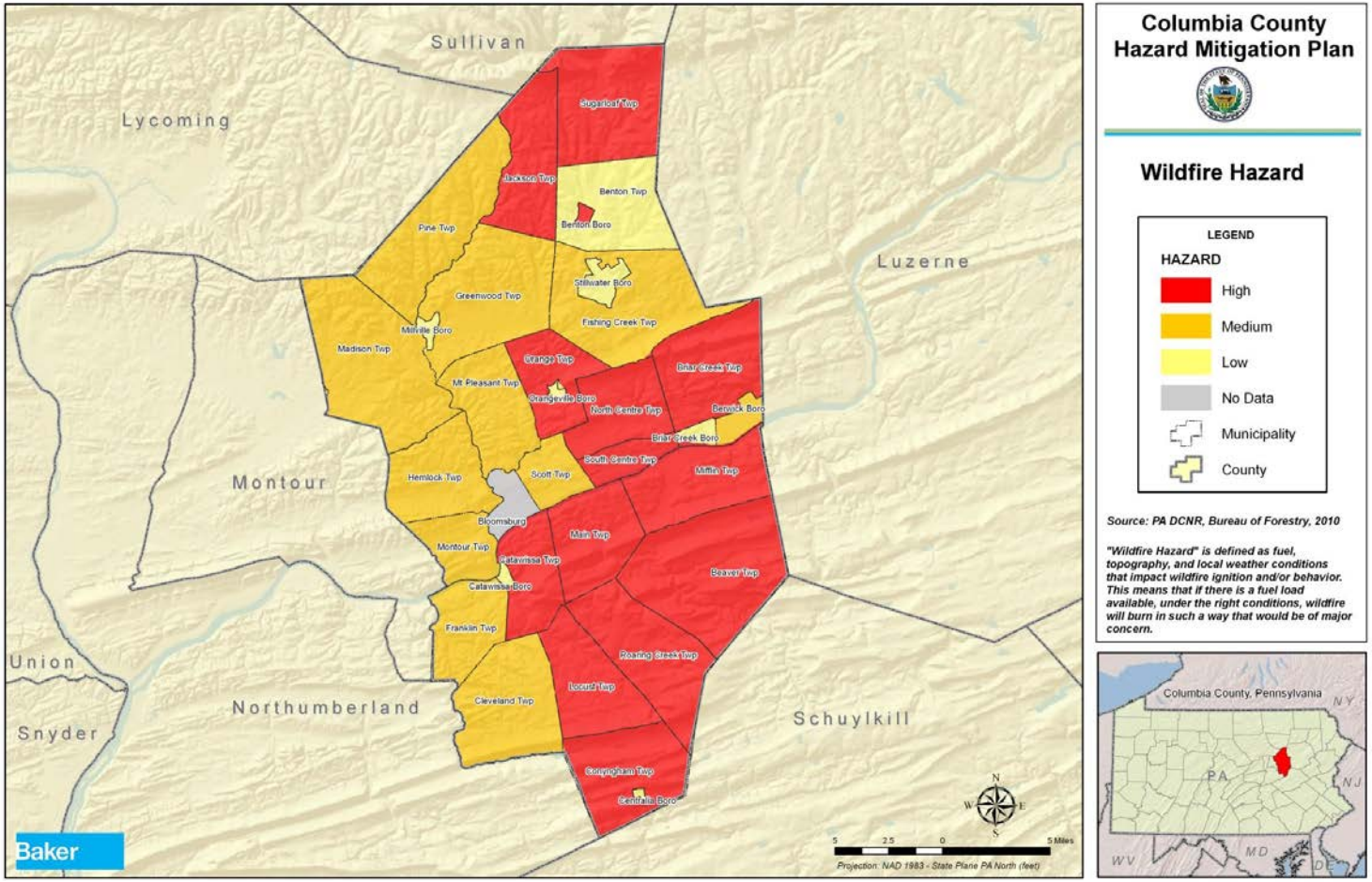
Tornado, Windstorm

Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (4 x .30) + (2 x .30) + (3 x .20) + (2 x .10) + (1 x .10) = 2.7
- 2.7 = High Hazard

Risk Assessment

Wildfire



Risk Assessment

Wildfire

- Wildfire ratings in Columbia County
  - Based on fuel, topography & local weather
  - 14 high
  - 11 medium
  - 7 low
- Between 2010 & 2014, District 18, Weiser
  - 541 fires
  - 995 Acres burned
- Future Occurrence Risk Factor Methodology
  - Possible

Risk Assessment

Wildfire

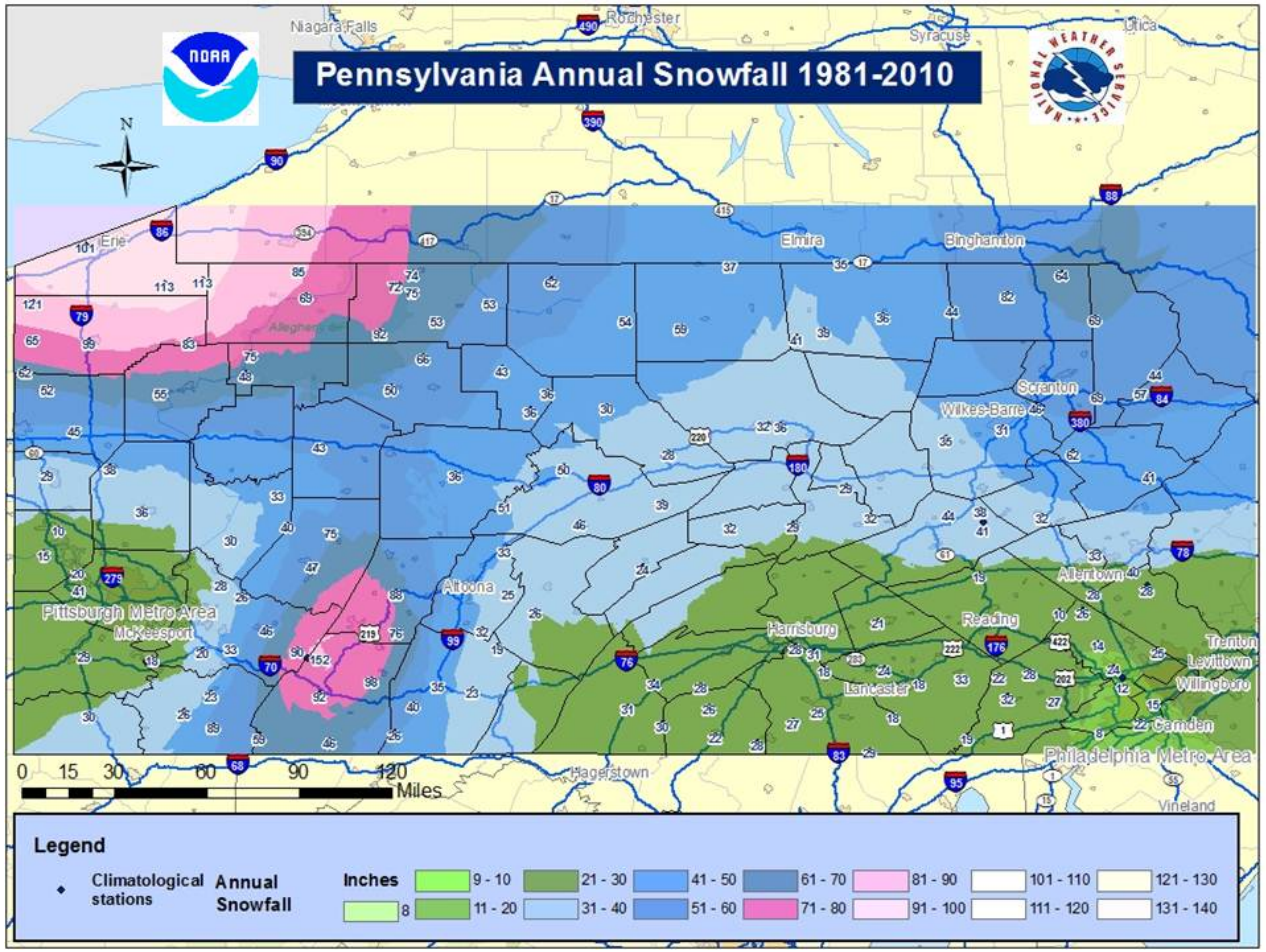
Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (2 x .30) + (1 x .30) + (2 x .20) + (3 x .10) + (1 x .10) = 1.7

- 1.7 = Low Hazard

Risk Assessment

Winter Storm



Risk Assessment

Winter Storm

Table 4.3.10-2: Probability of Measurable Snowfall in Columbia County by Snow Station Location (NCDC, 2011a).

MONTH	PROBABILITY (%)	
	BERWICK	MILLVILLE 2 SW
January	100.00%	97.60%
February	96.60%	95.00%
March	86.70%	84.20%
April	16.70%	21.40%
May	0.00%	0.00%
June	0.00%	0.00%
July	0.00%	0.00%
August	0.00%	0.00%
September	0.00%	0.00%
October	3.20%	2.50%
November	46.90%	56.10%
December	90.60%	87.50%

- Future Occurrence Risk Factor Methodology
  - Highly Likely

Risk Assessment

Winter Storm

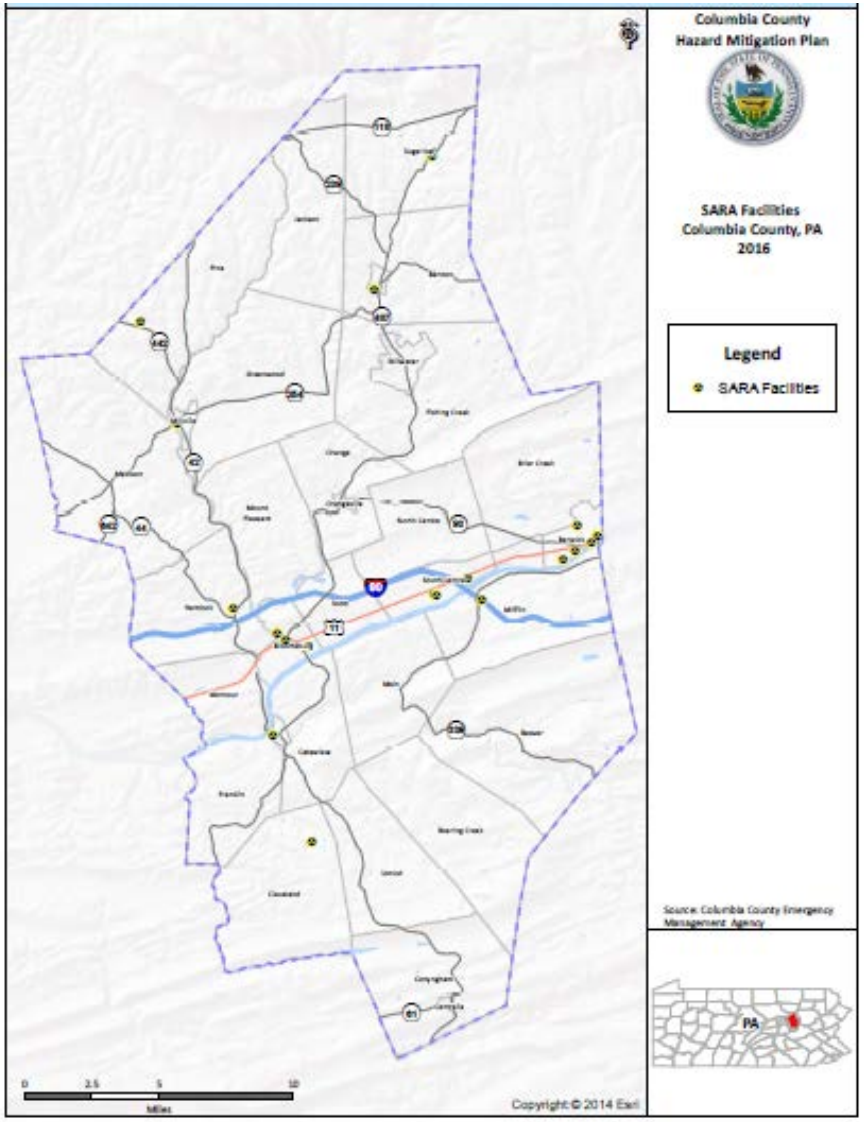
Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (4 x .30) + (2 x .30) + (4 x .20) + (1 x .10) + (2 x .10) = 2.9

- 2.9 = High Hazard

Risk Assessment

Environmental Hazards: Hazardous Materials



Risk Assessment

Environmental Hazards: Hazardous Materials

- Columbia County
  - 20 facilities using or storing extremely hazardous substances
  - Planning process continually evaluated by LEPC
- EPA Identified Toxic Release Inventory (TRI)
  - Six Identified Sites as of 2014
- Transportation of Hazardous Materials
  - Roadway
  - Railway
- Atlantic Sunrise Expansion Project
  - Potential for accidents similar to any transportation method

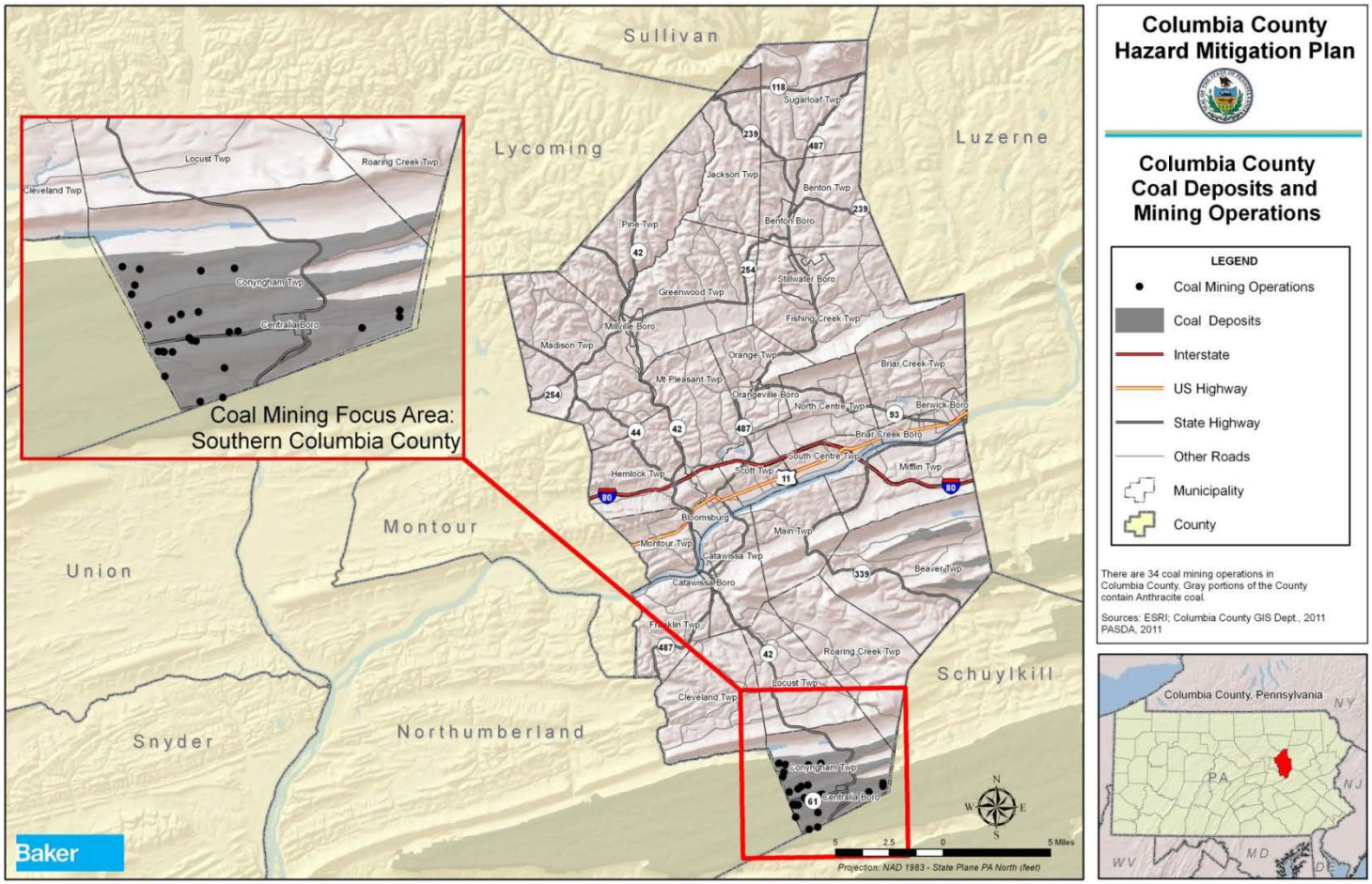
Risk Assessment

Environmental Hazards: Hazardous Materials

- Principal Classes of Hazardous Materials
  - Flammable liquids
  - Corrosives
  - Flammable gases
- Most Common Substances
  - Diesel fuel
  - Propane
  - Fuel oils
- Most Common EHS
  - Chlorine
  - Sulfuric Acid

Risk Assessment

Environmental Hazards: Coal Mining Incidents



Risk Assessment

Environmental Hazards: Coal Mining Incidents

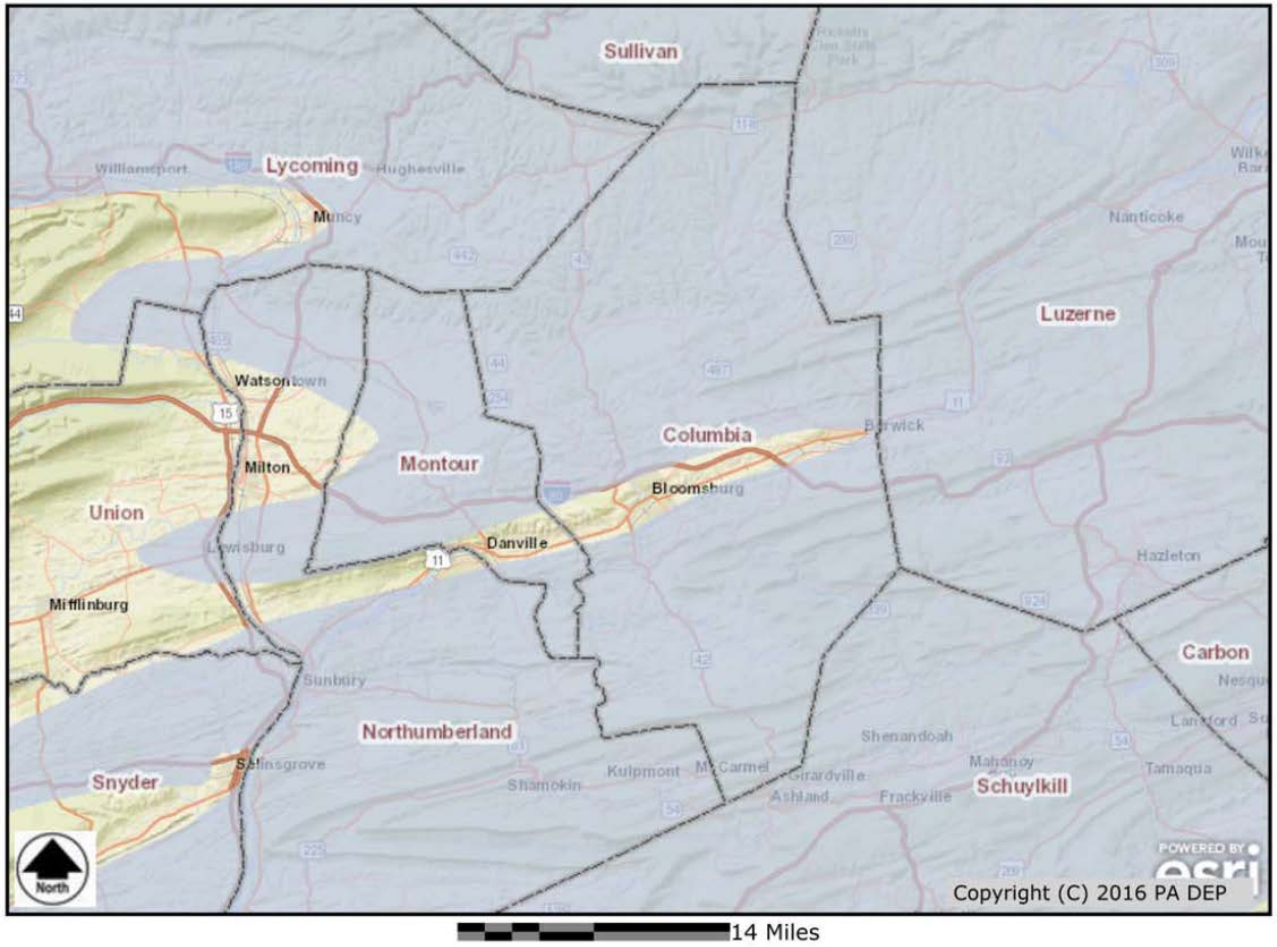
- No active underground mines

- 3 active surface mines
  - 41 employees
  - 323,036 tons of coal produced (2014)

- Potential problems
  - Mine subsidence
  - Underground fire
  - Stream contamination from mine drainage
  - Modification of vegetation
  - Elevation changes

Risk Assessment

Environmental Hazards: Oil and Gas Well Incidents



Legend

Marcellus Formation

County Boundaries

Risk Assessment

Environmental Hazards: Oil and Gas Well Incidents

- Columbia County
  - No active oil or gas wells
  - 3 plugged wells
    - 2 Sugarloaf
    - 1 Jackson
  - No active Marcellus shale wells

- Potential problems
  - Surface water and soil contamination
  - Fires, blowouts, explosions
  - Surface water depletion from fracking

Risk Assessment

Environmental Hazards Summary

- Hazardous material releases occur frequently, but difficult to predict

- **Oil & gas wells**
  - Monitored strictly through DEP reducing potential

- **Coal mining**
  - Less prominent, decreasing risk
  - Mine subsidence remains a concern

- **Future Occurrence Risk Factor Methodology**
  - Likely

Risk Assessment

Environmental Hazards Summary

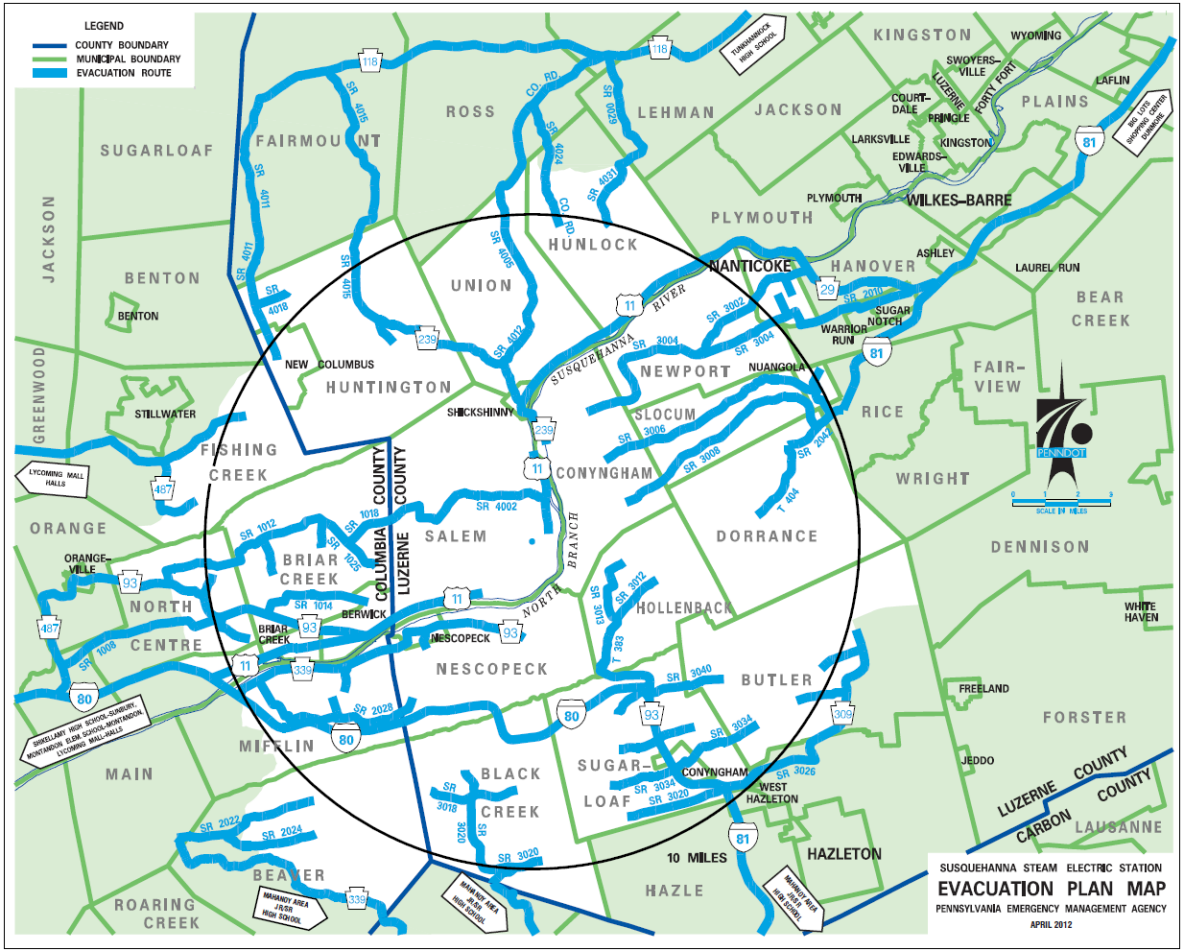
Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (3 x .30) + (3 x .30) + (3 x .20) + (4 x .10) + (2 x .10) = 3.0

- 3.0 = High Hazard

Risk Assessment

Nuclear Incidents



Risk Assessment

Nuclear Incidents

- Plume Exposure Pathway EPZ
  - Exposure to whole body radiation from radioactive plume
  - 10 miles
  - Eight municipalities

- Ingestion Exposure Pathway EPZ
  - Exposure from ingestion of water or foods contaminated with radiation
  - 50 miles
  - Entire county

Risk Assessment

Nuclear Incident

- Three Mile Island
  - March 1979
  - General Emergency
- Worst case scenario for Columbia County
  - General Emergency
- Historical events for Columbia County
  - Five unusual events
  - Three alerts

Risk Assessment

Nuclear Incident

Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (1 x .30) + (2 x .30) + (3 x .20) + (4 x .10) + (4 x .10) = 2.3
- 2.3 = Moderate Hazard

Risk Assessment

Utility Interruption

- Fuel, water, electric, telecommunications

- Primary focus – electric power failure
  - Impacts
    - Food spoilage
    - Loss of water supply
    - Loss of heating/air conditioning
    - Basement flooding
    - Lack of indoor lighting
    - Lack of telephone & internet service

Risk Assessment

Utility Interruption

- Worst case scenario for Columbia County
  - Winter storm causing long term regional outages
  - Injury or death due to inability to heat homes
- Short term utility interruptions
  - Difficult to predict
  - Frequent by-product of severe weather events
- Future Occurrence Risk Factor Methodology
  - Possible

Risk Assessment

Utility Interruption

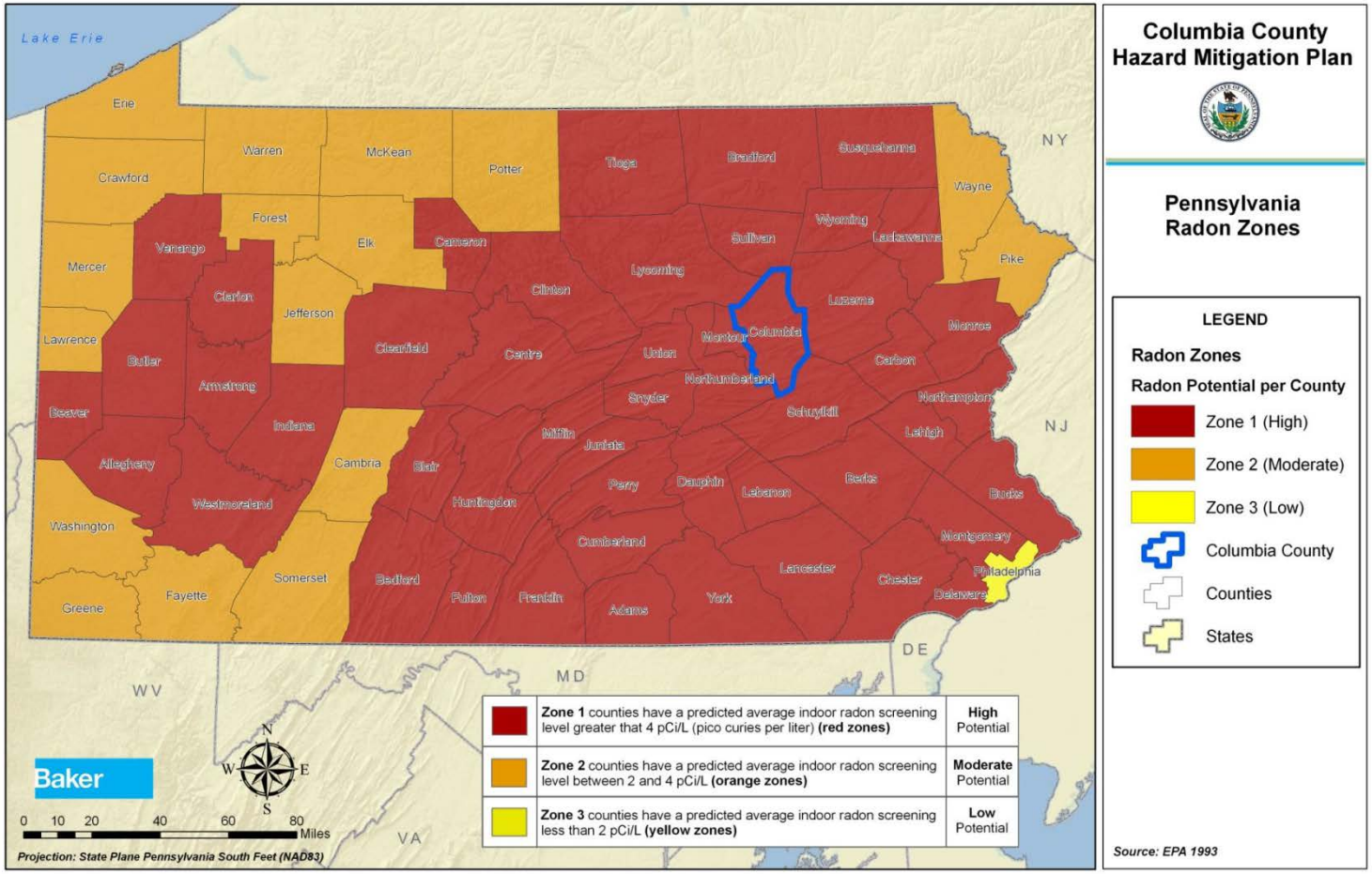
Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (2 x .30) + (1 x .30) + (3 x .20) + (3 x .10) + (2 x .10) = 2.0

- 2.0 = Moderate Hazard

Risk Assessment

Radon



Risk Assessment

Radon

- Radon gas
  - Cannot be seen or smelled
  - Exposure is 2nd leading cause of lung cancer
  - Number one cause in non-smokers
  - Responsible for 21,000 lung cancer deaths each year
  - 2,900 in people who never smoked

Risk Assessment

Radon

- Nationwide average
  - Inside homes 1.3 pCi/L
  - Outdoors 0.4 pCi/L
- Pennsylvania
  - Mostly zone 1
  - Predicted indoor average of more than 4.0 pCi/L
  - 270,000 homes estimated – levels of 20 pCi/L or higher
  - Only 10% of homes in PA have been tested
- Future Occurrence Risk Factor Methodology
  - Possible

Risk Assessment

Radon

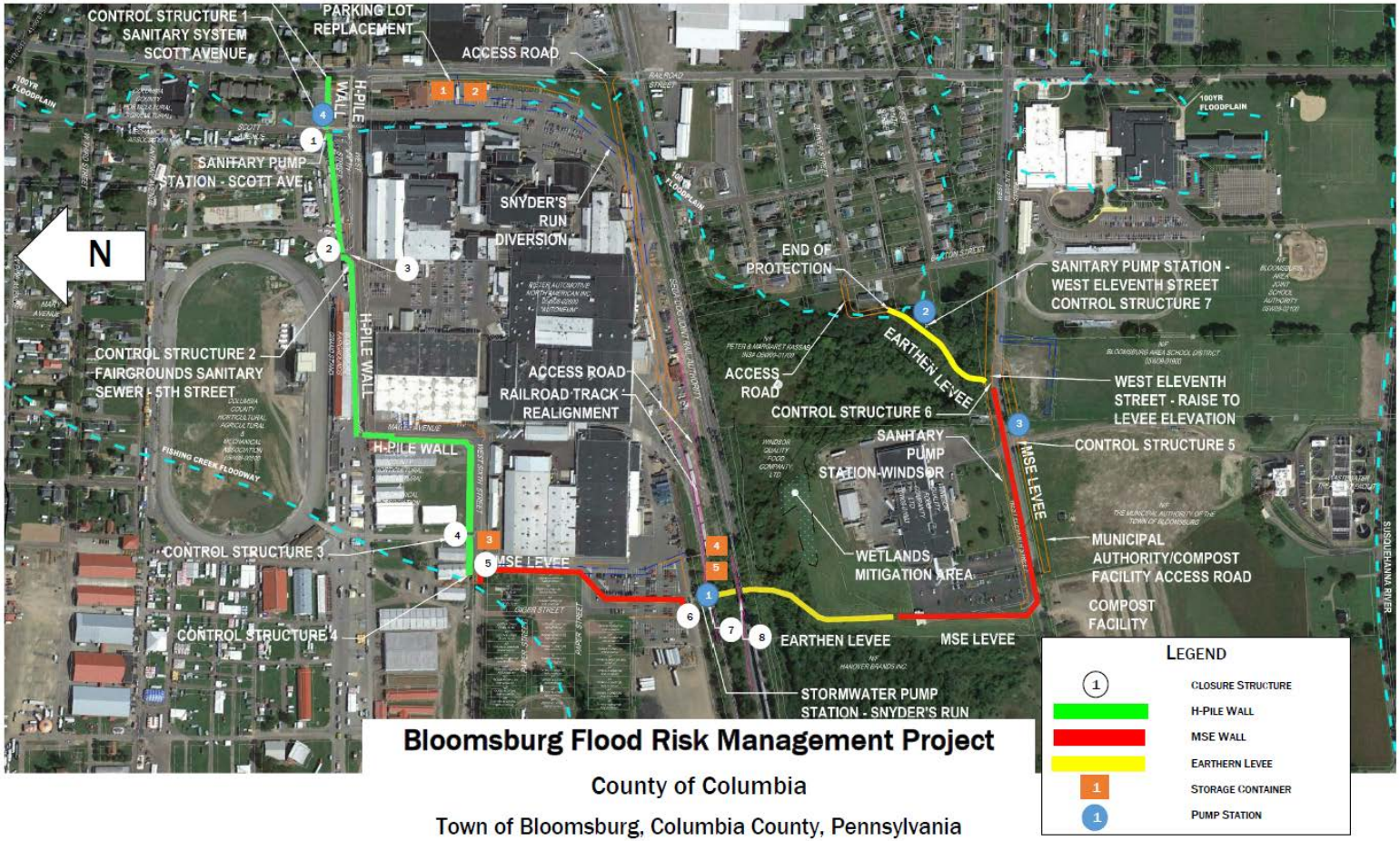
Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (2 x .30) + (1 x .30) + (1 x .20) + (4 x .10) + (4 x .10) = 1.9

- 1.9 = Low Hazard

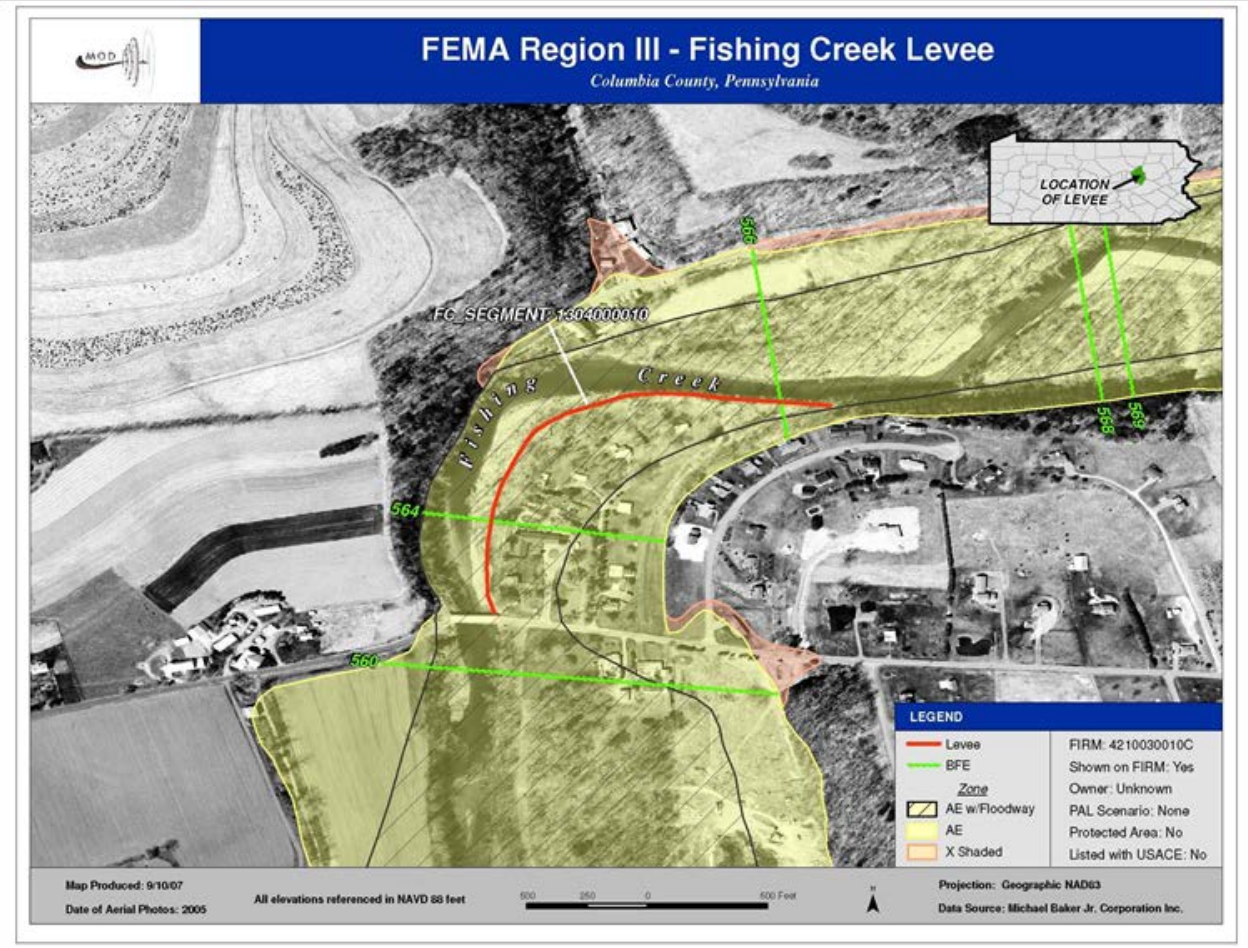
Risk Assessment

Levee Failure



Risk Assessment

Levee Failure



Risk Assessment

Levee Failure

- Columbia County
  - Two levees
  - One failure in September 2011
    - Fishing Creek Levee in Orangeville
    - One home and One cabin

- Vulnerability
  - Homes and businesses behind levee in Orange Twp.
  - One active & one empty factory in Bloomsburg

Risk Assessment

Levee Failure

Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (1 x .30) + (2 x .30) + (1 x .20) + (4 x .10) + (3 x .10) = 1.8

- 1.8 = Low Hazard

Risk Assessment

Dam Failure

Table 4.3.11-1: Dams per municipality in Columbia County (DEP, 2016).

MUNICIPALITY	# DAMS	MUNICIPALITY	# DAMS
Beaver Township	3	Locust Township	0
Benton Borough	1	Madison Township	0
Benton Township	2	Main Township	0
Berwick Borough	0	Mifflin Township	1
Bloomsburg, Town of	0	Millville Borough	0
Briar Creek Borough	0	Montour Township	1
Briar Creek Township	3	Mt Pleasant Township	0
Catawissa Borough	0	North Centre Township	0
Catawissa Township	1	Orange Township	0
Centralia Borough	0	Orangeville Borough	1
Cleveland Township	0	Pine Township	1
Conyngham Township	2	Roaring Creek Township	2
Fishing Creek Township	1	Scott Township	0
Franklin Township	0	South Centre Township	0
Greenwood Township	0	Stillwater Borough	0
Hemlock Township	0	Sugarloaf Township	1
Jackson Township	0	TOTAL	20

Risk Assessment

Dam Failure

- 20 high hazard, significant, low-hazard dams in Columbia County
- 2 High hazard dams in county
  - Both in Briar Creek Township
  - Major threat to residents
- 7 High hazard dams outside of county which pose a threat to the county
- Future Occurrence Risk Factor Methodology
  - Unlikely

Risk Assessment

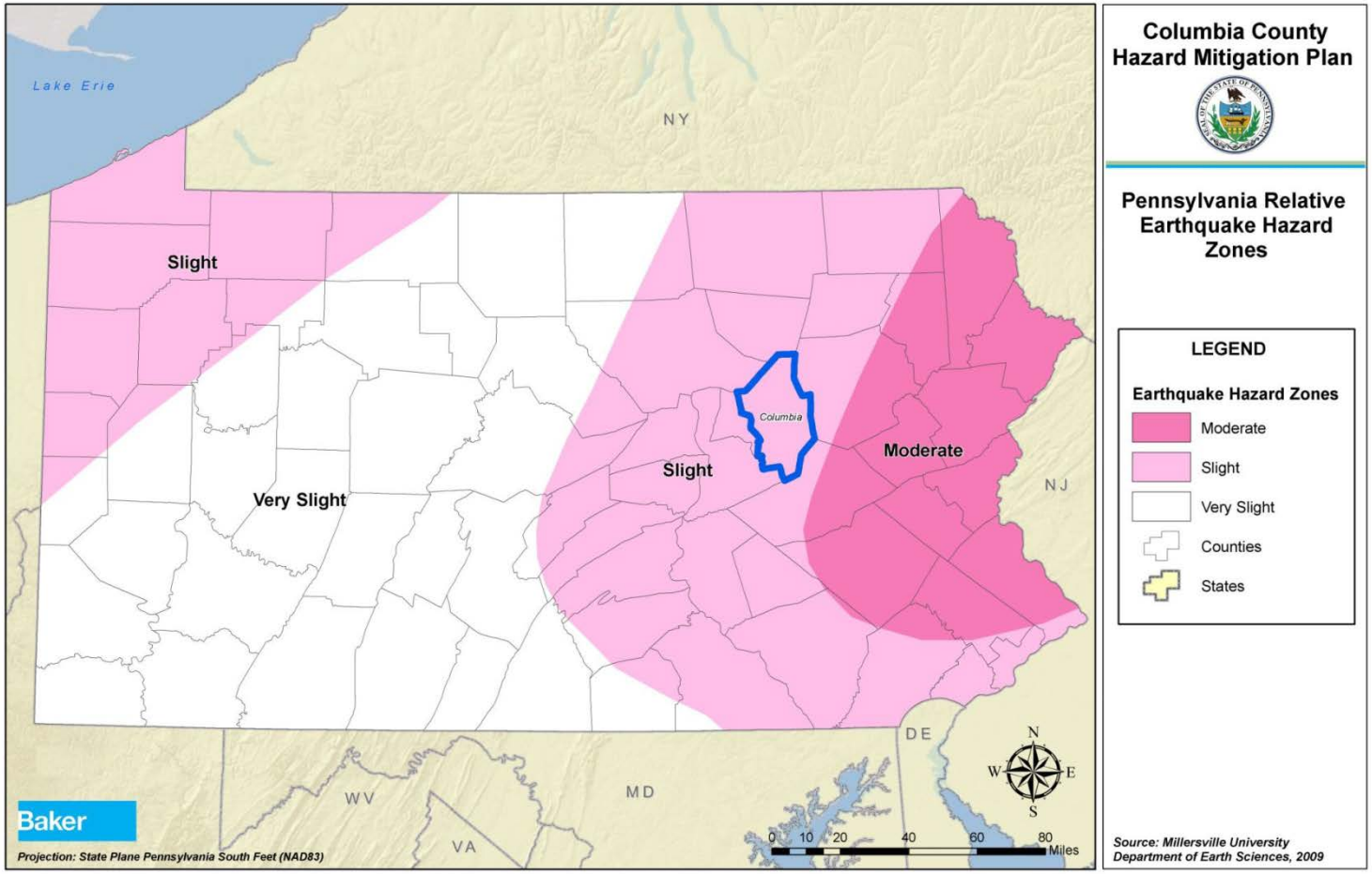
Dam Failure

Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (1 x .30) + (3 x .30) + (2 x .20) + (4 x .10) + (2 x .10) = 2.2
- 2.2 = Moderate Hazard

Risk Assessment

Earthquake



Risk Assessment

Earthquake

- DCNR – no earthquakes with epicenter located in Columbia County
- Earthquakes near Columbia County
  - Magnitude less than 3.5
- Earthquakes in Pennsylvania
  - Magnitude less than 6.0
- Future Occurrence Risk Factor Methodology
  - Unlikely

Risk Assessment

Earthquake

Risk Factor Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x.10)]

- (1 x .30) + (1 x .30) + (1 x .20) + (4 x .10) + (1 x .10) = 1.3

- 1.3 = Low Hazard

Risk Assessment

Countywide Hazard Ranking and Risk Factor (RF)

HAZARD RISK	HAZARD NATURAL (N) or MAN-MADE (M)	RISK ASSESSMENT CATEGORY					RISK FACTOR
		PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
HIGH	Flood, Flash Flood, Ice Jam (N)	4	3	3	2	3	3.2
	Environmental Hazards (M)	3	3	3	4	2	3.0
	Winter Storm (N)	4	2	4	1	2	2.9
	Tornado, Windstorm (N)	4	2	3	2	1	2.7
MODERATE	Nuclear Incident (M)	1	2	3	4	4	2.3
	Dam Failure (M)	1	3	2	4	2	2.2
	Drought (N)	2	1	4	1	4	2.2
	Utility Interruption (M)	2	1	3	3	2	2.0
LOW	Hurricane, Tropical Storm, Nor'easter (N)	2	2	2	1	2	1.9
	Landslide (N)	2	1	3	2	2	1.9
	Radon Exposure (N)	2	1	1	4	4	1.9
	Levee Failure (M)	1	2	1	4	3	1.8
	Pandemic (N)	2	1	2	1	4	1.8
	Wildfire (N)	2	1	2	3	1	1.7
	Earthquake (N)	1	1	1	4	1	1.3

Risk Assessment

Jurisdictional Risk Comparison

	Flood, Flash Flood, Ice Jam	Environmental Hazards	Winter Storm	Tornado, Windstorm	Nuclear Incident	Dam Failure	Drought	Utility Interruption	Hurricane, Tropical Strom, Nor Easter	Landslide	Radon Exposure	Levee Failure	Pandemic	Wildfire	Earthquake
	3.2	**3.0**	**2.9**	**2.7**	**2.3**	**2.2**	**2.2**	**2.0**	**1.9**	**1.9**	**1.9**	**1.8**	**1.8**	**1.7**	**1.3**
Beaver Township	=	=	=	=	>	>	=	=	=	=	=	=	=	>	=
Benton Borough	>	=	=	=	=	=	=	=	=	<	=	=	=	>	=
Benton Township	=	=	=	=	=	=	=	=	=	<	=	=	=	<	=
Berwick Borough	=	=	=	=	>	>	=	=	=	=	=	=	>	=	=
Bloomsburg, Town of	>	=	=	=	=	<	=	>	=	=	=	>	>	<	=
Bloomsburg University	<	=	=	=	=	<	=	=	=	=	=	=	>	<	=
Briar Creek Borough	=	=	=	=	>	>	=	=	=	=	=	=	=	<	=
Briar Creek Township	=	=	=	=	>	>	=	=	=	=	=	=	=	>	=
Catawissa Borough	>	=	=	=	=	=	=	=	=	=	=	=	=	<	=
Catawissa Township	=	=	=	=	=	<	=	=	=	=	=	=	=	>	=
Centralia Borough	<	=	=	=	=	<	=	=	<	=	=	=	=	<	=

Risk Assessment

Jurisdictional Risk Comparison

	Flood, Flash Flood, Ice Jam	Environmental Hazards	Winter Storm	Tornado, Windstorm	Nuclear Incident	Dam Failure	Drought	Utility Interruption	Hurricane, Tropical Strom, Nor Easter	Landslide	Radon Exposure	Levee Failure	Pandemic	Wildfire	Earthquake
	3.2	**3.0**	**2.9**	**2.7**	**2.3**	**2.2**	**2.2**	**2.0**	**1.9**	**1.9**	**1.9**	**1.8**	**1.8**	**1.7**	**1.3**
Cleveland Township	=	=	=	=	=	=	=	=	=	=	=	=	=	<	=
Conyngham Township	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Fishing Creek Township	=	=	=	=	>	=	=	=	=	<	=	=	=	<	=
Franklin Township	=	=	=	=	=	<	=	=	=	=	=	=	=	<	=
Greenwood Township	=	=	=	=	=	=	=	=	=	<	=	=	=	<	=
Hemlock Township	>	=	=	=	=	<	=	>	=	=	=	=	=	<	=
Jackson Township	=	=	=	=	=	<	=	=	=	=	=	=	=	=	=
Locust Township	=	=	=	=	<	<	=	=	=	=	=	=	=	=	=
Madison Township	=	=	=	=	=	<	=	=	=	<	=	=	=	<	=
Main Township	=	=	=	=	=	<	=	=	=	=	=	=	=	=	=
Mifflin Township	=	=	=	=	>	=	=	=	=	=	=	=	=	=	=

Risk Assessment

Jurisdictional Risk Comparison

	Flood, Flash Flood, Ice Jam	Environmental Hazards	Winter Storm	Tornado, Windstorm	Nuclear Incident	Dam Failure	Drought	Utility Interruption	Hurricane, Tropical Strom, Nor Easter	Landslide	Radon Exposure	Levee Failure	Pandemic	Wildfire	Earthquake
	3.2	**3.0**	**2.9**	**2.7**	**2.3**	**2.2**	**2.2**	**2.0**	**1.9**	**1.9**	**1.9**	**1.8**	**1.8**	**1.7**	**1.3**
Millville Borough	=	=	=	=	=	<	=	=	=	=	=	=	=	<	=
Montour Township	>	=	=	=	=	=	=	>	=	>	=	=	=	<	=
Mt. Pleasant Township	=	=	=	=	=	<	=	=	=	=	=	=	=	<	=
North Centre Township	=	=	=	=	>	<	=	=	=	=	=	=	=	=	=
Orange Township	=	=	=	=	=	<	=	=	=	=	=	>	=	=	=
Orangeville Borough	=	=	=	=	=	<	=	=	=	=	=	=	=	<	=
Pine Township	=	=	=	=	=	=	=	=	=	=	=	=	=	<	=
Roaring Creek Township	=	=	=	=	=	>	=	=	=	=	=	=	=	=	=
Scott Township	=	=	=	=	=	<	=	>	=	=	=	=	=	<	=
South Centre Township	=	=	=	=	>	<	=	=	=	=	=	=	=	=	=
Stillwater Borough	=	=	=	=	=	<	=	=	=	=	=	=	=	<	=
Sugarloaf Township	=	=	=	=	=	=	=	=	=	>	=	=	=	=	=

Risk Assessment

Task #1 – Countywide and Jurisdictional Risk Evaluation

- **Handout:** Risk Factor and Jurisdictional Risk Matrix.
- Part I–Provide comments on the countywide hazard-risk rankings and Risk Factor.
- Part II–Provide comments on your jurisdictional risk and how it compares to the County.

Mitigation Strategy

What is a Mitigation Strategy?

- The approach you take to reduce or avoid long-term vulnerabilities to the identified hazards
  - Goals
  - Objectives
  - Actions & Projects

Mitigation Strategy
Goals and Objectives

- **Goals**: General guidelines that describe what your community would like to achieve.

- **Objectives**: Define strategies that must be implemented to achieve the identified goal. Objectives are more specific and measureable.

Mitigation Strategy
Goals and Objectives

Example:

- ***Goal:*** Increase public awareness and support for hazard mitigation.

- ***Objective:*** Publicize the hazard mitigation plan and encourage the implementation of mitigation actions.

Mitigation Strategy

Task #2 – Goals and Objectives Evaluation

- **Handout:** Proposed *Goals* with corresponding *Objectives*.
- Provide comments on any Goals or Objectives that you feel need to be revised, eliminated or replaced.
- Suggest other *Goals* and *Objectives* based on perceived need.

Mitigation Strategy

Mitigation Action Techniques

Six Categories of Mitigation Techniques:

- Prevention
- Property Protection
- Public Education and Awareness
- Natural Resource Protection
- Structural Project Implementation
- Emergency Services

Mitigation Strategy
Mitigation Action Plan

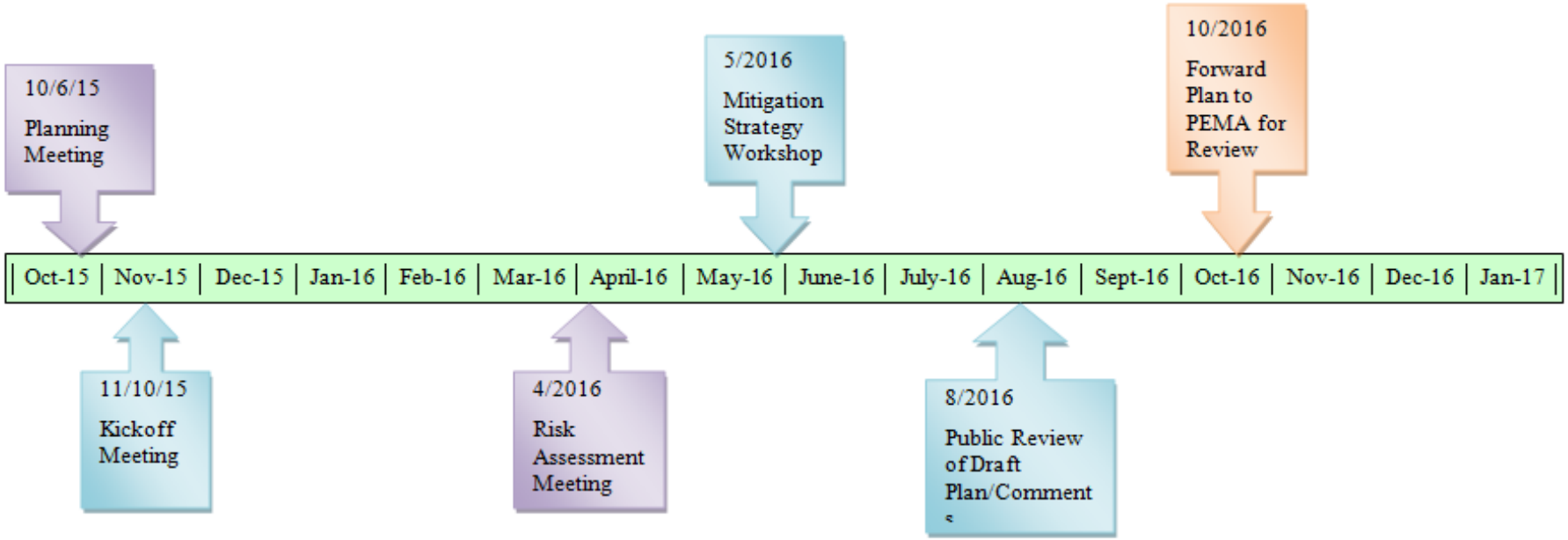
- Identifies a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard.
- **Example:**
  - **Goal**: Increased public awareness and support for hazard mitigation
  - **Objective**: Publicize the hazard mitigation plan and encourage the implementation of mitigation actions.
  - **Action**: Set up a booth at the Bloomsburg Fair and distribute hazard mitigation information

Mitigation Strategy

Task #3 Mitigation Action Selection and Development

- Handout: Mitigation Action Form

- A Mitigation Action should include the following information

  - Action title
  - Jurisdiction(s) involved
  - Mitigation technique category (see handout)
  - Hazard(s) addressed
  - Estimated cost
  - Potential funding source(s)
  - Lead agency or department
  - Implementation schedule

Columbia County 2017 Hazard Mitigation Plan Update Timeline