

Table 2-5 - Hazard Risk Assessment Matrix

Frequency		Impact				Risk Factor Index								
Annual Event	5	Catastrophic				$Risk\ Factor = Frequency \times (.25 \times (Critical\ Facilities)) + .40 \times (Social) + .25 \times (Economic) + .10 \times (Environmental)$								
Every 5 Years or less	4	Extensive												
Every 10 Years or less	3	High												
Every 30 Years or less	2	Moderate												
Greater than 30 Years	1	Low												
Hazard	Frequency of Occurrence and Location	Impact				Risk Factor	Vulnerability							
		Critical Facilities (25% Vulnerability Factor)	Social (40% Vulnerability Factor)	Economic (25% Vulnerability Factor)	Environmental (10% Vulnerability Factor)		(a) Health and Safety of Persons in the Affected Area at the Time of the Incident (Injury and Death)	(b) Health and Safety of Essential Personnel	(c) Continuity of Government	(d) Property, Facilities, and Infrastructure	(e) Delivery of Services	(f) The Environment	(g) Economic and Financial Condition	
Civil Disorder - Vulnerabilities and impacts are contingent upon numerous factors including issues, politics and method of response. Some type of civil disorder occurs every day with minimal impact.	2	Small events occur frequently, however larger events are not as common. This is a county-wide hazard.	1	1	1	1	2.000	Nominal impact to the health and safety of people in the affected area.	Nominal impact to first responders. Minor injury from missiles and physical confrontations.	Nominal and short-term impact on continuity of county government operations.	Impact on property, facilities and infrastructure will likely result from acts of vandalism and will be nominal in scope.	Nominal impact on the delivery of services resulting from work stoppages.	Limited environmental impact unless acts of sabotage are performed.	Economic and financial impact to the community will be nominal.
Dam Failure - Vulnerabilities and impacts are dependent on the type of release (whether gradual or catastrophic), volume released, its impact to the environment, and meteorology.	2	There are 6 dams in Snyder County that are registered with the U.S. Army Corps of Engineers in the National Inventory of Dams; 5 dams are considered high hazard dams, and therefore require Emergency Action Plans. Areas with high-hazard dams are the most vulnerable: Beavertown, Troxelville, and Beaver Springs.	1	2	2	1	3.300	Generally low impact on health and safety. However, the catastrophic, unannounced breach of a high hazard dam could result in a substantial number of deaths and injuries.	Low impact to first responders. Primary threat comes from debris and possible hazardous materials contamination.	Low impact on continuity of government operations unless located in the inundation curve.	Vital lifelines (roads, gas and water pipelines) may be damaged as a result of released waters.	Moderate impact on the delivery of services to the affected area.	Limited environmental impact that is contingent upon the nature of the inundation area. Urban environments will have higher potential to release hazardous materials.	Impact is contingent upon the nature of the event.
Drought - Vulnerability and impacts are contingent upon the duration of the drought period and area of impact.	4	Snyder County has experienced many droughts and one recorded period of unseasonably dry weather. None of these events, however, have caused significant damage to the County or its residents. This is a county-wide hazard.	1	2	2	2	7.000	Limited impact. Severe drought conditions may require water rationing and distribution to affected communities.	N/A	Low impact to government. Prolonged drought periods may require the suspension of services such as public schools.	Low impact to property, facilities and infrastructure. Water utilities may lose pressure. Hydroelectric power generation could suffer.	Low impact to the delivery of services. Hospitals may be required to make use of alternate water supplies.	Low impact. A reduction to ground water supplies creates situations conducive to sinkholes. Non-domestic animals may be impacted.	Long-term water shortages will have a high impact on agribusiness, public utilities and other industries reliant upon water for production (i.e., plastics) or services (i.e., landscaping).
Earthquake - Vulnerabilities and impacts are contingent upon numerous factors including geographic location, magnitude and method of response. The earth is dynamic and some earthquake events occur every day with minimal impact.	1	No significant earthquakes have occurred in Snyder County. Neighboring counties, such as Centre and Lebanon County, have experienced minor earthquakes with minimal damage. No one area in Snyder County is at higher risk than others.	1	1	1	1	1.000	Low impact exists for fatalities and injuries. Area of impact generally small.	Moderate impact. Protective actions required to protect responders from fire hazards and environmental concerns.	Low impact, unlikely to cause re-location of government operations.	Low impact to the transportation infrastructure, structures burned and displaced populations.	Low impact to the delivery of services. Services likely to be temporarily interrupted in the area of impact.	Low impact to area of operations, including animal life due to limited extent of hazards.	Low impact to the economic and financial community. Primary impact will be to the repair or replacement of structures in the area of operations.
Flooding - Vulnerabilities and impacts are dependent upon the type and location of flooding.	5	Flooding occurs every year in Snyder County. Areas in the floodplain along one of the major rivers or creeks in the Snyder County are at the greatest risk.	1	3	3	2	12.000	High impact. Potential for loss of life and injuries, especially in urbanized areas prone to flash flooding.	Potentially high impact to first responders involved in swift water rescue activities. Protective actions required to protect responders from hazards and environmental concerns.	Low impact, unlikely to cause re-location of government operations.	Moderate impact. Utility outages, transportation infrastructure closures and isolated populations. Varying levels of damage to structures, particularly mobile homes.	Moderate disruption of basic life support systems, typically of short duration.	Environmental impact should be limited to the release of hazardous substances.	Depending on the scope and magnitude of flooding, long-term economic disruption is possible, especially among small businesses.
Hazardous Materials - Vulnerabilities and impacts is dependent on the type of chemical, volume released, its impact to the environment, and meteorology.	5	Numerous forms of transportation in Snyder County, hazardous materials such as chemicals, oils, and radioactive materials are frequently transported through the county. Areas along U.S. Route 11/15, 522, or other heavily traveled routes are at the greatest risk.	1	2	1	2	7.500	High impact to the health and safety of people living in the impact area.	Protective actions required to protect responders from hazardous materials exposure.	Low impact to continuity of operations.	Moderate impact to property, facilities, and infrastructure.	Low impact to the delivery of services.	Moderate impact to the areas of highest concentration.	Low impact to the economic and financial community of the impacted area.
Hurricane/Tropical Storms - Vulnerability and impacts a factor of storm strength and area of impact.	4	Hurricanes, tropical storms, and windstorms will occur in the county in the spring and summer months. Most hurricanes that approach Snyder County are eventually downgraded to tropical storms or tropical depressions by the time they reach central Pennsylvania. Heavy rain and flooding produced by a hurricane, tropical storm, or tropical depression will have the greatest impact on the county. This is a county-wide hazard.	2	3	3	2	10.600	High impact. Potential for large numbers of injuries and loss of life.	Protective actions required to protect responders from hazards and environmental concerns.	Moderate impact. Impacted local government operations required to activated their COG Plans.	High impact. Numerous failures in electrical and other critical infrastructure.	High impact on affected area. Widespread disruptions in basic life support services.	Some hazardous material releases will occur.	Moderate impact. Short and long-term disruption of local economy; Statewide impacts on government services unlikely.
Landslides - Vulnerabilities and impacts are contingent upon numerous factors including geographic location, and nature of the slope failure.	2	The Pennsylvania Department of Transportation estimates it spends \$10 million annually on repair contracts for roadways damaged by landslides throughout the Commonwealth. No significant landslides have been documented in Snyder County. This is a county-wide hazard.	1	1	1	1	2.000	Nominal impact to the health and safety of people in the affected area unless the landslide is both sudden and catastrophic.	Nominal impact to first responders.	Little or no impact on continuity of government operations.	Vital lifelines (roads, gas and water pipelines) may be cut as a result of landslides.	Limited impact on the delivery of services.	Limited environmental impact unless the landslide shears pipelines or damages hazardous material storage facilities (above or below ground tanks, etc).	Limited economic and financial impact to the community unless road networks are extensively damaged.
Nuclear Power Plant - Vulnerabilities and impacts contingent upon the type of radiation released, duration of release, direction and speed of winds, and volume of release.	1	Pennsylvania is home to Three Mile Island which is the only nuclear power plant in the U.S. to reach the emergency classification level of General Emergency. Since then, significant improvements have been made regarding plant safety. Although no nuclear facilities are located in Snyder County, facilities in other counties and states could affect the people of Snyder County. This is a county-wide hazard.	2	3	3	4	2.850	Potential for significant impact to the health and safety of residing in the 10 mile emergency planning zone or 50 ingestion pathway zone.	Potential for significant impact. Protective actions and special equipment required to protect responders from radiation exposure.	Low impact to continuity of operations depending upon the location of the incident. A design basis accident at TMI would have a catastrophic impact on state government operations.	Potentially catastrophic impact to property, facilities, and infrastructure resulting from radionuclide contamination.	Potentially high impact on the delivery of services in and to the affected.	High impact to the areas of highest concentration of radiological particulate.	High impact to the economic and financial community of the impacted area. Potentially catastrophic impact on agribusiness resulting from radionuclide ingestion and product embargoing.
Power Failure - Vulnerabilities and impacts are contingent upon numerous factors including time of year, population density, scope of outage area and duration of the event.	5	Power failures occurs every year although generally with minimal impact. Wide spread Power failures occur associated with unusual weather events once every 5 years. This is a county-wide hazard.	2	2	2	1	9.500	Generally low impact on health and safety. However, long-term outages during extremely hot or cold weather can have secondary health consequences.	Nominal impact to first responders.	Low impact on continuity of government operations if emergency backup power sources are available.	Limited impact on property or infrastructure.	Prolonged outages may result in disruption of water/sewage treatment operations.	Environmental impact should be limited to the release of hazardous substances.	Protracted outages could result in substantial disruption of commerce and financial activities, as well as loss of revenue.

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Public Health Emergency - Communicable diseases and noncommunicable diseases	3 Avian Bird Flu - A 1986 outbreak in Schuylkill, Northumberland, and Snyder counties led to the killing of around 307,000 chickens and turkeys costing the Commonwealth an estimated \$650,000. This is a county-wide hazard.	1	3	5	1	8.400	Potential for significant impact on the general population.	Potential for significant impact on essential personnel. However, with precaution, low impact is expected.	Low impact on continuity of government.	Potential for high impact on property, facilities, and infrastructure, including points of dispensing for Strategic National Stockpile pharmaceuticals.	Low impact on the delivery of services.	Low impact on the environment, unless outbreak of public health emergency would reach animal population and requires culling.	A large outbreak could have high impact on the economy of Snyder County.
Radon - Snyder County is located in Pennsylvania's highest risk area for Radon and Radon product emissions.	5 No home is considered safe from radon until tested. In the first two years of Radon testing in Pennsylvania, approximately 59 percent of all homes tested were found to be contaminated by Radon and Radon products. This is a county-wide hazard.	1	3	1	2	9.500	Over time, impact can be severe. Excessive exposure to Radon is a known cause of lung cancer.	Low impact to first responders. Primary threat comes exposure over an extended period of time.	Low impact on continuity of government.	Low physical impact on property and facilities. However, untreated high Radon levels can greatly lessen property value.	Low impact on delivery of services.	Radon can have a high impact on the environment if untreated.	Low impact unless high levels of Radon are detected and go untreated, which can severely decrease property value.
Severe Weather - Vulnerability and impacts are a factor of type of event, strength of event, and area of impact.	5 Pennsylvania and Snyder County are vulnerable to severe weather, including blizzards and/or heavy snowfall, heavy fog, hail, heavy precipitation (rain), high winds, ice storms, unseasonable temperature extremes, hurricanes, and severe thunderstorms. This is a county-wide hazard.	1	2	2	1	8.250	Minimal local impact. Minimal potential for loss of life and injuries.	Protective actions require to protect responders from hazards, particularly downed power lines.	Limited impact, unlikely to cause re-location of government operations.	Moderate impact. Utility outages, transportation infrastructure closures and isolated populations. Varying levels of damage to structures, particularly mobile homes.	Low impact. Local disruption of basic life support systems, typically of short duration.	Low impact on ecosystems	Limited impact on financial and commercial systems.
Severe Winter Weather - Vulnerability and impacts are dependent upon the time and intensity of the event.	4 Located in Central Pennsylvania, Snyder County is vulnerable to an array of winter weather. This weather has the ability to close businesses, cancel classes, and disrupt roadways throughout the County. This is a county-wide hazard.	2	3	3	1	10.200	Severe winter weather and freezing temperatures can result in hypothermia and other cold-related injuries, especially among the elderly. Snow removal activities can lead to an increase in mortality caused by coronary failure.	Low impact to emergency workers. Primarily from prolonged exposure to cold temperatures. Secondary danger from vehicular accidents.	Low impact to government. Prolonged severe cold weather periods may require the suspension of services such as public schools. This situation occurred during the winter of 1995-1996.	Low impact. The primary consequence of prolonged severe cold weather is loss of power related to excessive demand and downed power lines resulting from ice storms.	Impact to the service delivery would be to medical facilities, nursing homes, assisted living facilities. Some government offices may be required to shut down.	Moderate impact. There would be limited overall impact to the electric grid.	Prolonged periods of extreme cold weather could have a major impact on business-related heating costs and could lead to short-term fuel shortages and inflation of heating oil and natural gas prices.
Subsidence - Vulnerabilities and impacts are contingent upon numerous factors including geographic location, whether it is gradual or catastrophic and method of response.	2 Subsidence related events occurs several times each year, usually with minimal impact. This is a county-wide hazard.	1	2	1	1	2.800	Nominal impact to the health and safety of people in the affected area as most events are not catastrophic in nature.	Nominal impact to first responders.	Little or no impact on continuity of government operations.	Vital lifelines (roads, gas and water pipelines) may be damaged as a result of subsidence.	Limited impact on the delivery of services.	Limited environmental impact unless the subsidence shears pipelines or damages hazardous material storage facilities (above or below ground tanks, etc).	Limited economic and financial impact to the community unless road networks are extensively damaged.
Terrorism - Vulnerabilities and impacts are contingent upon the method of the attack, the amount of force applied, and the population density of attack location.	1 On September 11, 2001 the United States was attacked by foreign terrorists. Flight 93 was a casualty of this attack. Pennsylvania has many targets of opportunity for terrorists - political, industrial, historical, and military. This is a county-wide hazard.	3	3	3	3	3.000	Moderate impact to the health and safety of people in the affected area.	Protective actions required to protect responders from chemical, nuclear and biological hazard exposure.	Impact on continuity of operations can range from nominal to catastrophic and will be contingent upon the type and location of the terrorism event.	Impact on property, facilities and infrastructure can range from nominal to catastrophic and will be contingent upon the type and location of the terrorism event.	Impact on the delivery of services can range from nominal to catastrophic and will be contingent upon the type and location of the terrorism event.	Environmental impact can range from nominal to catastrophic and will be contingent upon the type and location of the terrorism event.	Economic and financial impact to the community can range from nominal to catastrophic and will be contingent upon the type and location of the terrorism event.
Tornado - Vulnerability and impacts are contingent upon the strength of the tornado, time of day, time on the ground, and area of impact.	4 According to the National Climatic Data Center, Snyder County has witnessed five tornados since 1957. This is a county-wide hazard.	1	2	2	1	6.600	Extensive impact in the affected area. Potential for mass fatalities and large number of injured.	Moderate impact. Personal protective equipment is required for emergency worker safety from downed utility lines, hazardous materials, and debris.	Low/limited impact because of the de-centralized nature of Pennsylvania state government. However, some locally affected government agencies may be forced to relocate some mission critical operations.	Extensive local impact. Massive failures in electrical, communications and other critical infrastructure.	Extensive impact. In the area of Impact Wide-spread, short-term disruptions in basic life support services in affected areas. 911 systems temporarily overwhelmed.	Low impact on ecosystems	Limited impact on financial and commercial systems.
Transportation - Vulnerabilities and impacts are contingent upon numerous factors including location, timing and method of response. Some type of transportation event occurs every day with minimal impact.	5 Transportation accidents occur every day with minimal individual impact. The worst accidents will involve multiple vehicles or hazardous materials. These accidents are not as common. Also, airline, railway, and pipeline accidents can occur but are not frequent. Areas along major routes such as U.S. Route 11/15 and U.S. Route 522 are at the greatest risk. Also, Selinsgrove faces a greater risk due to the local airport.	1	2	1	2	7.500	Fatal accidents occur on a daily basis.	Nominal risk to first responders	Low impact on continuity of government operations.	Moderate impact on property or infrastructure.	Nominal impact on the delivery of services	Environmental impact should be limited to the release of hazardous substances.	Nominal impact.
Urban Fire - Vulnerabilities and impacts are contingent upon numerous factors including geographic location, whether it is gradual or catastrophic and method of response. Some type of urban fire occurs every day with minimal impact.	4 Urban Fires that involve one structure occur every day with minimal impact. Major fires that involve more than one structure occur several times a year. The City of Reading is the most vulnerable to urban fires. Higher populated, more condensed towns face the greatest risk.	1	1	1	1	4.000	Urban structure fire related deaths occur monthly.	Moderate risk to emergency responders as a result of training and personal protective equipment.	Low impact on continuity of government operations.	Moderate impact on property or infrastructure.	Nominal impact on the delivery of services.	Environmental impact should be limited to the release of hazardous substances.	Nominal impact.
Wildfire - Vulnerabilities and impacts are dependent on the location and climatological / meteorological conditions.	1 According to the National Climatic Data Center (NCDC), no significant wildfires have been recorded in Snyder County. However, the rural nature of the County makes it prone to wildfires. The size and impact of a wildfire depends on its location, climate conditions, and the response of firefighters. If the right conditions exist, these factors can usually mitigate the effects of wildfires. Rural areas face the greatest risk.	1	1	1	1	1.000	Low potential exists for fatalities and injuries.	Moderate impact. Protective actions required to protect responders from fire hazards.	Low impact, unlikely to cause re-location of Government operations.	Low impact to the transportation infrastructure, structures burned and displaced populations.	Low impact to the delivery of services. Services likely to be temporarily interrupted in the area of impact.	Low impact to area of operations, including animal life due to limited extent of fires.	Low impact to the economic and financial community. Primary impact will be to the replacement of structures in the area of operations.