4.3.17 Transportation Accident

Transportation hazards include hazardous materials (HazMat) in transit, vehicular accidents, aviation accidents, at-grade railroad crossings, and roadways vulnerable to floods. In 2013, the National Transportation Safety Board (NTSB) reported 34,678 transportation-related fatalities across the United States. Of those 34,678 fatalities, 32,719 were highway incidents, 891 were rail incidents, 443 were aviation incidents, 10 were pipeline incidents, and 615 were marine incidents (NTSB 2013). For the purpose of this plan update, transportation accidents are defined as incidents involving highway, air, and rail travel, resulting in death, serious injury, extensive property loss or damage or situations that cause delay or closure. Accidents related to hazardous materials are discussed in the environmental hazards profile in Section 4.3.4.

A transportation hazard may be defined as a condition created by movement of anything by common carrier. Transportation hazards can be divided into two categories: hazards created by the material being transported, and hazards created by the transportation medium. Transportation systems available in Pike County include roadways, rail lines, and airports. Major road accidents in the County are probable, and major rail and aviation accidents are possible. All County systems and supporting transportation resources provide services locally, regionally, and nationally. Vehicular, aviation, and railway, accidents are defined below:

- Vehicular Accidents: A vehicular accident is a road traffic incident that usually involves one vehicle colliding with another vehicle or other road user, such as an animal or a stationary roadside object. A vehicular accident may result in injury, property damage, or possible fatalities. Many factors contribute to vehicular accidents, including equipment failure, poor road conditions, weather, traffic volume, and driver behavior.
- Aviation Accidents: According to the International Civil Aviation Organization, an aviation accident occurs during operation of an aircraft between the time a person boards the aircraft with intent to fly to a destination, to the time the person has disembarked the aircraft. Three different situations qualify as an aviation accident: (1) a person is fatally or seriously injured; (2) the aircraft sustains damage or structural failure; or (3) the aircraft is missing or inaccessible. An aviation incident is an occurrence, other than an accident, associated with operation of an aircraft that affects or could affect the safety of operation (International Civil Aviation Organization 1994). Airport accidents and incidents have the potential to occur while the plane is over County airspace; not only directly on airport property.
- Railway Accidents: Railway accidents involve one or more trains. They can involve a train derailment or one train impacting another train, vehicle, or pedestrian.

This section provides a profile and vulnerability assessment of the transportation accident hazard for Pike County.

Location and Extent

Vehicular Accidents

Within Pike County, there are a total of 645 miles of developed state and municipal roads. State highways account for 392 miles of this total while 252 miles are local municipal roads. The County is home to significant transportation routes such as Interstate 84, US 209, US 6, PA 739, PA 434, PA 590, PA 507, PA 447, PA 402, and PA 390. Accidents can occur at any point along the roadways in the County. Figure 4.3.12-1 illustrates major transportation routes in the County. Figure 4.3.12-2 shows the traffic volume on key roadways.

There is no warning time for vehicular accidents. Factors contributing to these accidents are typically associated with the driver, vehicle, and environment. Factors associated with the driver include error, speeding, experience, and blood-alcohol level. Factors associated with the vehicle include type, condition, and center of gravity. Environmental factors include quality of the infrastructure, weather, and obstacles. The majority of vehicular accidents are attributed to the driver. Vehicular accidents can severely affect those directly involved, as well as others not directly involved. Other effects of vehicular accidents may include severe traffic delays, lost sales to businesses, delayed commodity shipments, and increased insurance costs (Cova and Conger 2003).

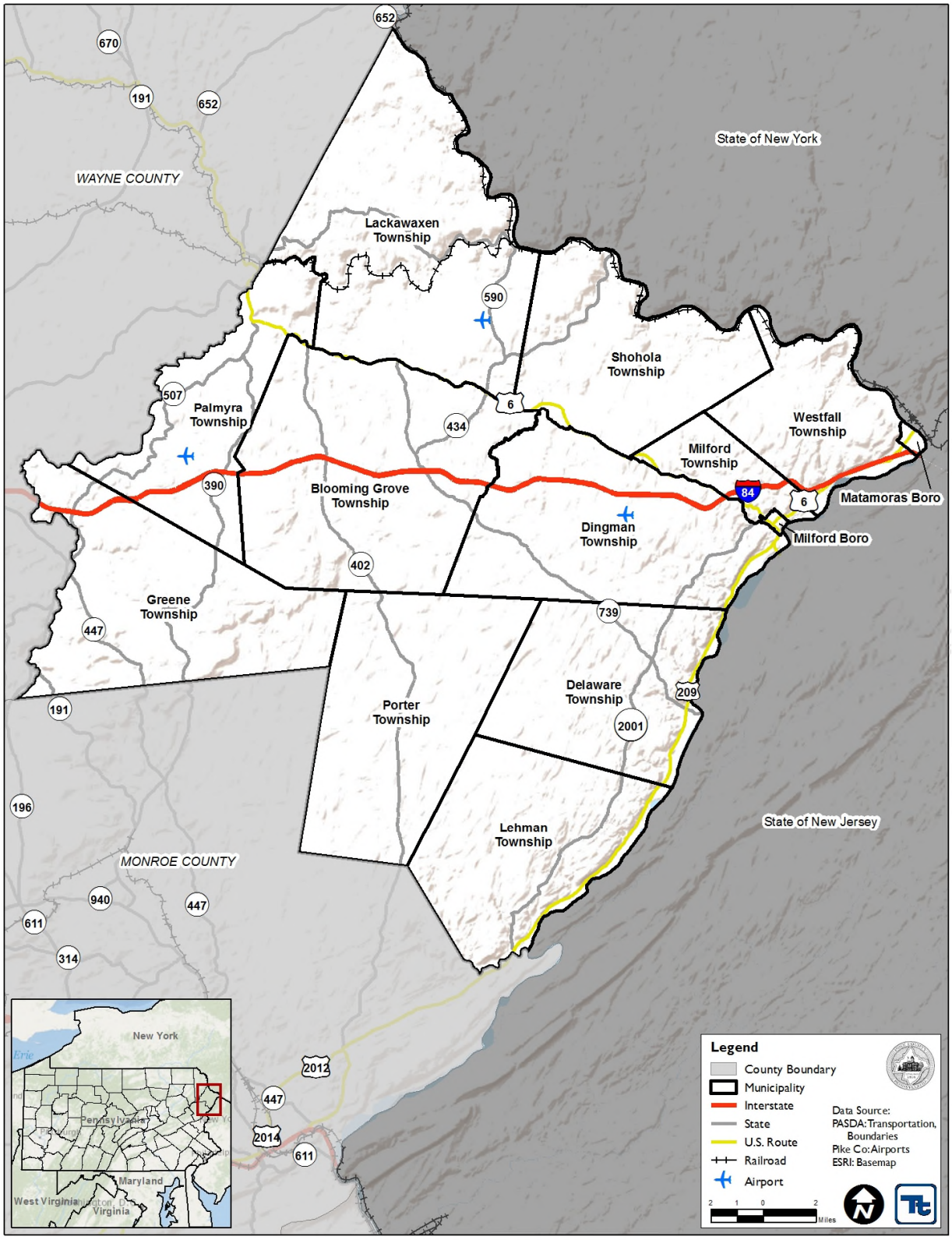
Railway Accidents

There are two railroad lines operating in the County which transport passengers and freight of all types, including hazardous materials. One rail line is owned by Norfolk Southern Railway and is leased by the Central New York Railroad and its parent company, the New York, Susquehanna, and Western Railroad (NYSW). All dispatching is now done by the NYSW. The second line in operation is the Stourbridge Railroad, a local shortline operation that is owned by the Lackawaxen-Honesdale Shippers Association. It directly interchanges at Lackwaxen, PA with the Norfolk Southern Railway that owns the mainline route between Binghamton and Port Jervis. The same line of railroad is, through trackage rights, also run regularly by the New York Susquehanna and Western Railway, a subsidiary of CSX. Therefore rail users have their choice of shipping via Norfolk Southern or CSX. The Stourbridge Railroad is also used by the Wayne County Chamber of Commerce for passenger excursions, an important component of the local tourist economy. These services are carefully coordinated with freight deliveries to ensure that freight services always enjoy preference.

Aviation Accidents

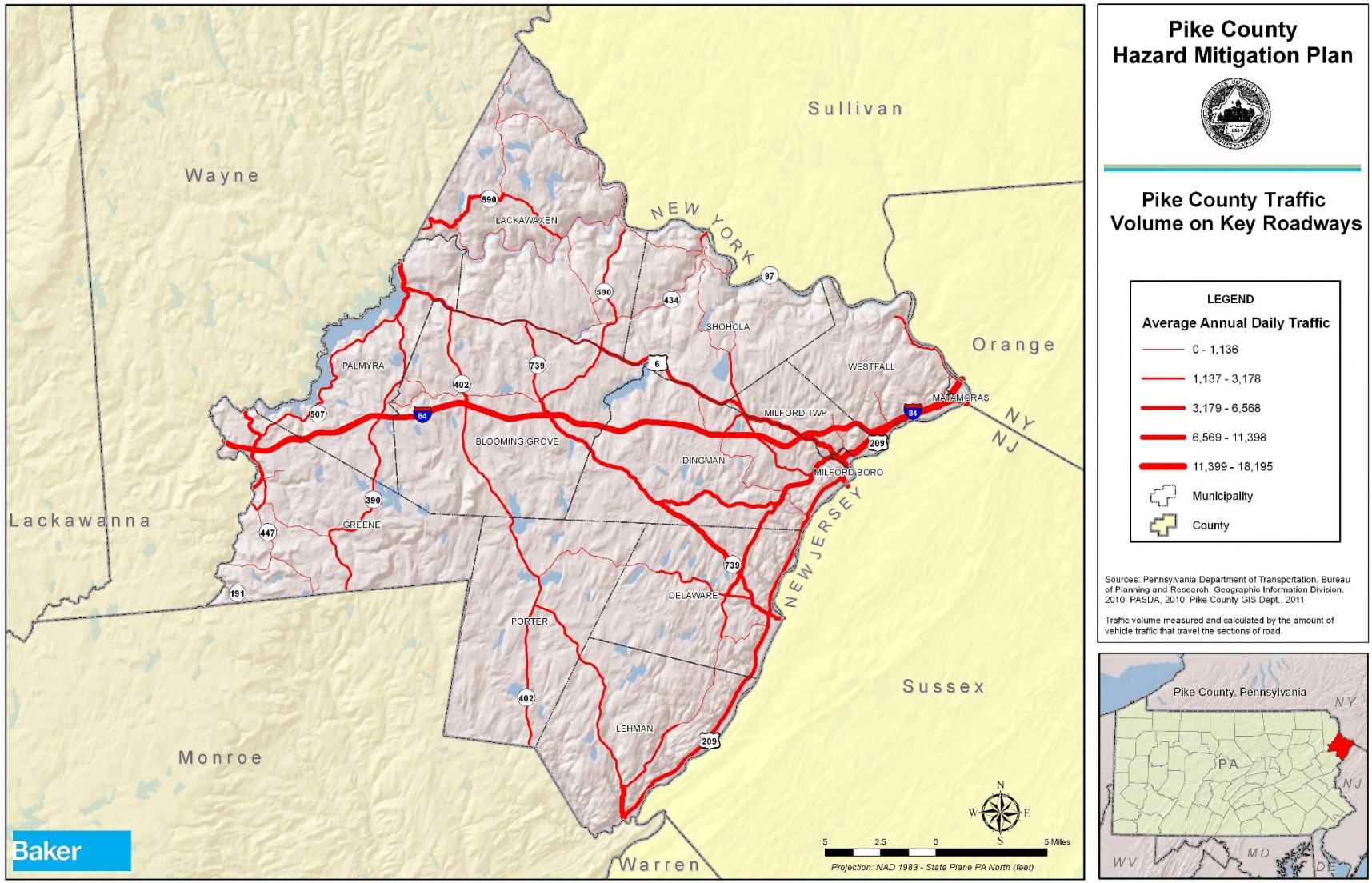
There are three private airports in Pike County for private aircraft: Myer Airfield (Dingman Twp); Mountain Bay Air Park (Palmyra Twp); and Boehm Airfield (Lackawaxen Twp). In addition, there is an abundance of air traffic from airports in neighboring municipalities and states. With Stewart International Airport in Newburgh, NY and the Wilkes-Barre Scranton Airport in Avoca, PA, much of the County finds itself under one of their approach patterns. Stewart is home to a New York Air National Guard unit which has several large C-5As at their disposal.

Figure 4.3.17-1. Pike County Transportation Systems



Sources: PennDOT, 2010; Pike County

Figure 4.3.17-2. Pike County Traffic Volume on Key Roadways



Source: PennDOT 2010

Range of Magnitude

Significant passenger vehicle, air, and rail transportation accidents can result in a wide range of outcomes from damage solely to property to serious injury or death. Most air incidents are nonfatal and cause minor injuries or property damage. The majority of motor vehicle crashes are non-fatal in Pennsylvania, but PennDOT estimates that every hour ten people are injured in a car crash, and every seven hours someone dies as a result of a car crash. Most fatal crashes occur in the summer months of July, and August, and September (PA HMP 2013).

Roadway accidents in Pike County range from minor crashes to more serious incidents that involve injuries or fatalities, or result in a release of hazardous materials (see Section 4.3.4). Information for this plan regarding fatalities associated with automobile crashes (Table 4.3.12-1), fatalities of pedestrians involved in transportation incidents (Table 4.3.13-2), and fatalities by person/crash type in Pike County (Table 4.3.13-3) was drawn from the National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System (FARS) 2015 data.

Table 4.3.17-1. Fatalities from Automobile Crashes

Year	Pennsylvania	Pike County
2010	1,324	7
2011	1,286	6
2012	1,310	8
2013	1,210	8
2014	1,195	9
Total	**6,325**	**38**

Source: NHTSA 2016

Table 4.3.17-2. Fatalities of Pedestrians

Year	Pennsylvania	Pike County
2010	145	0
2011	147	0
2012	163	1
2013	147	1
2014	161	0
Total	**763**	**2**

Source: NHTSA 2016

Table 4.3.17-3. Fatalities by Person/Crash Type in Pike County

Fatality Type	2011	2012	2013	2014	2015
Total Fatalities (All Crashes)*:	8	6	8	9	7
(1) Alcohol-Impaired Driving (BAC=.08+) Fatalities	1	0	0	8	4
(2) Single Vehicle Crash Fatalities	5	6	5	6	4
(3) Large Truck Involved Crash Fatalities	1	0	2	1	3
(4) Speeding Involved Crash Fatalities	5	4	2	4	7
(5) Rollover Involved Crash Fatalities	4	3	3	3	2
(6) Roadway Departure Involved Crash Fatalities	6	6	7	9	7

Fatality Type	2011	2012	2013	2014	2015
(7) Intersection (or Intersection Related) Crash Fatalities	0	0	0	0	0
Passenger Car Occupant Fatalities	4	1	6	3	1
Light Truck Occupant Fatalities	3	2	1	3	5
Motorcyclist Fatalities	1	2	0	2	0
Pedestrian Fatalities	0	1	1	0	0
Bicyclist (or Other Cyclist) Fatalities	0	0	0	0	0

Source: NHTSA 2016
(1) Crash Involved at Least One Driver or Motorcycle Rider With a BAC of .08 or Above
(2) Crash Involved Only One Vehicle In Transport
(3) Crash Involved at Least One Large Truck
(4) Crash Involved at Least One Vehicle Speeding
(5) Crash Involved at Least One Vehicle That Rolled Over
(6) Crash Involved at Least One Vehicle That Departed the Roadway (FHWA Definition)
(7) Crash Occured Within an Intersection or Within the Approach to an Intersection
**A Fatality Can Be in More Than One Category. Therefore Sum of the Individual Cells Will Not Equal the Total Due to Double Counting*

Rail accidents can vary widely in terms of injuries, fatalities, property damage, and interruption of service, depending on the nature and severity of the accident. Local residents may also be involved in rail accidents while traveling outside the County.

Aircraft accidents can vary from a single-engine aircraft having a "hard landing" and causing damage to the aircraft, to a crash of a small turboprop or jet aircraft, to a crash of a large jet aircraft (such as a Boeing 727). Other aircraft accidents could include helicopter or experimental aircraft crashes. Aviation accidents also can involve radio-controlled or drone aircraft devices, many of which are experimental and not subject to defined regulatory oversight, potentially complicating issues with and for the public that could arise if one of these devices crashes.

A worst case scenario within Pike County would involve an accident where a tanker truck hauling hazardous materials has an accident on Interstate 84, resulting in a release of its cargo on the major roadway. This incident would block traffic on Pike County's major transportation routes, and could threaten the health and safety of individuals on the roadways and in surrounding neighborhoods. In addition, a release could necessitate closure of critical facilities in the County. The worst-case scenario for a railroad accident would be similar to that described for a roadway accident (i.e., a train carrying a hazardous substance crashing along the rail line). The worst-case scenario for an aviation accident would be a major plane crash into a residential or industrial area, causing mass fatalities and property destruction. The most likely transportation accident in the County would involve a single vehicle hitting an object and sustaining minimal damage.

Past Occurrence

Vehicular transportation accidents are a daily occurrence across the Commonwealth of Pennsylvania and in Pike County. According to PennDOT, in 2015, Pike County had 604 vehicular crashes and seven traffic deaths. The most common transportation accidents in the County are highway accidents involving motor vehicles. The County's most serious transportation concerns involve Interstate 84 and US 209. These routes have the highest annual average traffic counts, the most truck traffic, and have illustrated the most potential for disaster in the past. Additionally, there is a temporal aspect to highway transportation accidents; in the spring and early summer, when construction and narrowed lanes are commonplace, the incidence of large-scale transportation accidents increases. Table 4.3.12-4 summarizes the overall vehicular crash data, as reported by

PennDOT, for Pike County from 2005 through 2015. Additionally, Pike County identified 10,168 vehicle accidents from 2010 to 2016 (as of October 5, 2016) (Pike County 2016).

Most motor vehicle accidents in Pike County have been limited to one to three vehicles. Recent exceptions to this include:

- A 1994 Westfall accident that occurred at the PA/NY border on I-84 westbound involving 14 vehicles,
- A 1997 accident along I-84 westbound during a snow storm involving 24 vehicles,
- A 2003 accident along I-84 eastbound in Dingman Township involving one straight truck and six tractor-trailer trucks (damage resulting from this accident took over 12 hours to clean up), and
- An early 2005 accident during a snow squall on I-84 eastbound in Westfall that involved approximately 14 vehicles.

Table 4.3.17-4. Total Number of Crashes, Traffic Deaths, and Pedestrian Deaths for Pike County, 2005 to 2015

Year	Total Crashes	Total Traffic Deaths	Total Pedestrian Deaths
2005	675	12	0
2006	641	9	0
2007	684	9	0
2008	735	13	1
2009	595	5	1
2010	667	7	0
2011	633	8	0
2012	593	6	1
2013	579	8	1
2014	591	9	0
2015	604	7	0
TOTAL	**6,997**	**93**	**4**

Sources: Pike County HMP 2012; PennDOT 2015; PennDOT 2010

Aviation accidents are the least frequent type of transportation accident. The National Transportation Safety Board (NTSB), the federal agency responsible for aviation accident information, indicates that from January 2010 to October 2016, there were 193 air transportation accidents in Pennsylvania. Of those 193 accidents, one occurred in Pike County. Prior to 2010, there have been 20 accidents identified in the NTSB database. Details regarding some of the aviation accident events that occurred in Pike County are described below.

- 1992 - a small single seat plane crashed into the Delaware River in Westfall Township, killing the pilot
- 1994 - a small plane crashed in Blooming Grove Township resulting in minor injuries
- 1995 - a small plane crashed near Mountain Bay Airpark in Palmyra Township
- 1996 - a small plane crashed off of Shiny Mountain Road in Palmyra Township, and in the same year, a small plane crashed in Lehman Township, killing two and injuring two
- 2006 - three people died from a small aircraft crash in Palmyra Township
- May 2009 - a small plane crashed into a group of trees in Dingman Township; no fatalities or injuries were reported

- August 7, 2009 – Milford/Shohola – as a plane was taking off, it became airborne early due to a dip in the runway and the plane drifted with its left wing hitting a tree. There were four people onboard and minor injuries were reported.
- March 27, 2016 – A helicopter crashed in Greene Township, killing one person. The crash occurred in a heavily wooded area north of Skytop Lodge, off Route 390 and south of Promised Land State Park.

Due to a decrease in rail traffic since 1976 with the formation of Conrail, there have been few railway accidents. Rail incidents include: the 1978 derailment north of Mill Rift, the 1995 derailment north of Pond Eddy, and a 2001 car-train collision in Lackawaxen that resulted in one death. Additionally, PEIRS data was also used identify railroad incidents that occurred between 2002 and 2009. Two railroad incidents were reported, one each in 2003 and 2005. In 2003, a New York Susquehanna & Western train derailed four cars on the Norfolk Southern line. The 2005 rail incident involved train cars derailing on the New York Susquehanna and Western rail line in Shohola Township. Neither injury nor material spill was reported for either incident (Pike County HMP 2012). The Federal Railroad Administration Office of Safety Analysis (FRA) and the NTSB were both queried for events that occurred in Pike County between 2010 and 2016. Neither resource identified rail accidents in Pike County. (FRA 2016; NTSB 2016).

Future Occurrence

Considering the current transportation network within the County and the steady increase in traffic volume, it is safe to assume that the number of vehicle accidents will continue to increase. Incidents involving air or rail should remain low. The County's population has increased over the last decade, meaning it is likely that traffic volumes have also risen. New residents have limited knowledge of detour routes and alternate routes around accidents which contributes to the accident-related congestion experienced recently in the County. The trucking industry is expected to continue, maintaining and possibly increasing the number of tractor-trailers on the County's road system. Transportation accidents may increase slightly over the next five years without proper mitigation strategies in place.

For the 2017 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of transportation accident events for Pike County. Information from PennDOT, NTSB, FRA and Pike County were used to identify the number of transportation accident events that occurred between 1950 and 2015. Using these sources ensures the most accurate probability estimates possible. The table below shows these statistics, as well as the annual average number of events and the estimate percent chance of an incident occurring in a given year. Based on these statistics, there is an estimated 100-percent chance of a transportation accident (any type) event occurring in any given year in Pike County.

Table 4.3.17-5. Probability of Future Transportation Accident Events

Hazard Type	Number of Occurrences Between 1950 and 2015	Rate of Occurrence or Annual Number of Events (average)	Recurrence Interval (in years) (# Years/Number of Events)	Probability of Event in any given year	Percent chance of occurrence in any given year
Vehicular	10,172	156.49	0.01	1.0	100%
Railway	2	0.03	33.00	0.03	3.0%
Aviation	21	0.32	3.14	0.32	31.8%

Sources: NTSB 2016; FRA 2016; PennDOT 2016; Pike County 2016

Therefore, based on this and past occurrences, the probability of transportation accidents is characterized as *highly likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1). However, the

low number of rail and air traffic accidents in the County indicates that the bulk of future transportation accidents will be roadway accidents.

Vulnerability Assessment

The entire County has been identified as the hazard area for transportation accidents. The following subsections evaluate and provide estimates for the potential impacts of transportation hazards on Pike County, including:

- Overview of vulnerability
- Data and methodology used for the evaluation
- Impacts, including those on life, safety, and health; and on general building stock, critical facilities, the economy, and future growth and development
- Further data collections that will assist in understanding this hazard over time

Overview of Vulnerability

The transportation systems in the County heavily rely upon use of its roadways. Vehicular accidents can occur on any of the roadways and can result in loss of life, destruction of property, or damage to the infrastructure, which can inhibit the use of the roadways. However, natural hazards can also cause problems for residents and commuters traveling throughout the County. Interstate 84, US-209, and PA-739 experience high volumes of vehicles, from personal vehicles to buses and larger, tractor trailers. High traffic volumes combined with severe storms (rain, snow, etc.) can lead to an increase chance of transportation accidents. Rail lines running through the northern region of the County, as well as airports in the surrounding areas can also result in transportation accidents that can impact the County.

Data and Methodology

Regarding this hazard, data were obtained from the County, local officials, and federal data sources. In addition, the Steering and Planning Committees have identified roadways within the County that are vulnerable to other natural hazards (flood).

Impact on Life, Health, and Safety

Transportation hazards could lead to potential losses in categories of human health and life, property, and natural resources. Vehicular accidents, flooded roadways, and other roadway impairments may result in injury or death to drivers and passengers on the road, the public in the immediate vicinity, and emergency services personnel. The number of people exposed depends on population density, time of exposure (day or night), and proportions of the population located indoors and outdoors.

Vehicular accidents are not the only transportation incidents that can impact human health and life, property, and natural resources; rail accidents can also impact those living near surrounding rail lines. Residents in Lackawaxen, Shohola, and Westfall Townships are vulnerable to such incidents. Two nearby airports also increase the risk of airplane accidents for most of the County.

The County and its municipalities are prepared to manage and respond to transportation hazards. Refer to Section 5 (Capability Assessment) for further information regarding Pike County emergency response capabilities.

Impact on General Building Stock, Critical Facilities, Economy, and Future Development

Because of insufficient data, a full loss estimate was not completed for the transportation hazard. Loss of roadway use and public transportation services would affect thousands of commuters, employment, day-to-day

operations within the County, and delivery of critical municipal and emergency services. Disruption of one or more of the modes of transportation in use in Pike County can lead to congestion of another, and affect both the County and the region as a whole. As discussed in Section 2.4, areas targeted for future growth and development have been identified across the County. Increased development in the County and region will lead to increased road traffic.

Table 4.3.17-5 shows the vulnerability of addressable structures and critical facilities for each kind of transportation accident. For this analysis, the hazard area for highway accidents was defined as locations within a ¼ mile of Interstate, US highways, and State roads; jurisdictions within a 5 mile radius of an airport are vulnerable to airplane accidents. Similar to highway accidents, the hazard area for rail accidents is a ¼ mile buffer around the rail lines. Using these definitions, all jurisdictions are vulnerable to at least one type of transportation accident.

Table 4.3.17-6. Addressable structures and critical facilities vulnerable to railroad, highway, and airport accidents.

Municipality	Total Addressable Structures	Addressable Structures within ¼ mi. of railroad	Critical Facilities within ¼ mi. of railroad	Addressable Structures within ¼ mi. of Major Highway*	Critical Facilities within ¼ mi. of Major Highway*	Addressable Structures within 5 mi. Radius of Airport	Critical Facilities within 5 mi. Radius of Airport
Blooming Grove Township	3,998	0	0	452	8	0	0
Delaware Township	4,253	0	0	611	4	0	0
Dingman Township	5,480	0	0	603	9	0	0
Greene Township	3,275	0	0	836	3	413	0
Lackawaxen Township	4,562	394	1	409	7	0	0
Lehman Township	5,995	0	0	303	3	0	0
Matamoras Borough	972	85	0	751	5	0	0
Milford Borough	718	0	0	707	13	0	0
Milford Township	784	0	0	431	5	0	0
Palmyra Township	3,981	27	0	2,143	5	0	0
Porter Township	912	0	0	258	2	0	0
Shohola Township	2,311	181	2	470	3	0	0
Westfall Township	1,175	107	1	551	11	0	0
TOTAL	**38,416**	**794**	**4**	**8,525**	**78**	**413**	**0**

**Major Highways include Interstates, US Highways and State Highways.*
Source: HAZUS-MH 3.1; Pike County; PADOT

Each municipality has addressable structures located within ¼ mile of major highways; Palmyra Township has the greatest number of structures (2,143) located within ¼ mile of major highways. Each municipality also has critical facilities within ¼ mile of major highways; of these, Milford Borough has the greatest number (13).

Lackawaxen Township has the greatest number of addressable structures (394), while Shohola Township has the most critical facilities (2) vulnerable to rail accidents. Greene Township is the only municipality with structures located within a 5-mile radius of an airport (the Spring Hill airport); however, structures throughout the County are vulnerable to airplane accidents as planes fly over.

Additional Data and Next Steps

Based on limited data regarding the probability and potential impact of this hazard, a quantitative loss estimate was not completed for this HMP. Over time, the County can work with appropriate agencies to collect additional data to support mitigation planning, consider potential risks, and prioritize mitigation measures for this hazard.

It is recognized that the County must compile and maintain data regarding specific concerns and past losses from this hazard. These data should include specific information regarding damage or loss of life, property, or infrastructure; and any data pertaining to potential or actual cost and logistics of responding to an event caused by this hazard (locations of road closures, map detours, traffic counts, durations of closures and detours; and costs to respond). These data will be included in future revisions of the HMP, and can be used to support future mitigation grant efforts (benefit cost analysis).

Studying traffic and potential transportation accident patterns could provide information on vulnerability of specific road segments and nearby populations. Increased understanding of the types of HazMat transported through the County will also support mitigation efforts. Maintaining a record of these frequently transported materials can facilitate development of preparatory measures to respond to a release. Predicting costs to respond to a release, remediate the environment, or repair damaged infrastructure would be useful for developing mitigation options.