4.3.1 Dam Failure

This section provides a profile and vulnerability assessment of the dam failure hazard in Chester County. A dam is an artificial barrier allowing storage of water, wastewater, or liquid-borne materials for many reasons (flood control, human water supply, irrigation, livestock water supply, energy generation, containment of mine tailings, recreation, or pollution control). Many dams fulfill a combination of these stated functions (Association of State Dam Safety Officials 2013). Dams are an important resource in the United States.

Man-made dams can be classified according to type of construction material used, methods applied in construction, slope or cross-section of the dam, how a dam resists forces of water pressure behind it, means used to control seepage, and, occasionally, purpose of the dam. Materials used for construction of dams include earth, rock, tailings from mining or milling, concrete, masonry, steel, timber, miscellaneous materials (plastic or rubber), and any combination of these materials (Association of State Dam Safety Officials 2013).

More than a third of the country's dams are 50 or more years old. Approximately 14,000 of those dams pose a significant hazard to life and property if failure occurs. About 2,000 unsafe dams are dispersed throughout the United States in almost every state.

Dams typically fail when spillway capacity is inadequate and excess flow overtops the dam, or when internal erosion (piping) through the dam or foundation occurs. Complete failure occurs if internal erosion or overtopping results in a complete structural breach, releasing a high-velocity wall of debris-filled water that rushes downstream, damaging or destroying anything in its path (Federal Emergency Management Agency [FEMA] 2015b).

Dam failures can result from the following:

- Overtopping caused by floods that exceed capacity of the dam
- Deliberate acts of sabotage
- Structural failure of materials used in dam construction
- Movement or failure of the foundation supporting the dam
- Settling and cracking of concrete or embankment dams
- Piping and internal erosion of soil in embankment dams
- Inadequate maintenance and upkeep (FEMA 2015b)

Regulatory Oversight of Dams

Potential for catastrophic flooding caused by dam failures led to enactment of the National Dam Safety Act (Public Law 92-367), which has protected Americans from dam failures for 30 years. The National Dam Safety Program (NDSP) is a partnership among states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under FEMA's leadership, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchases of needed equipment. FEMA has also expanded existing and initiated new training programs. Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most dams in the United States (FEMA 2013).

Pennsylvania Department of Environmental Protection

The Pennsylvania Department of Environmental Protection (PADEP) holds responsibility for dam safety. Hazard Potential Category 1 dams are those "where its failure could result in significant loss of life, excessive economic losses, and significant public inconvenience." Hazard Potential Category 2 dams are those "where its failure could result in the loss of a few lives, appreciable property damage, and short-duration public inconvenience" (PADEP 2009a). Owners of dams classified as Hazard Categories 1 or 2 ("high-hazard" dams) are required to create an Emergency Action Plan (EAP) that describes the dam, the inundation area if the dam were to catastrophically fail, and procedures for responding to the dam failure (such as notification to the

vulnerable population). Chester County receives copies of EAPs and inundation maps for high-hazard dams whose failure could impact local residents.

U.S. Army Corps of Engineers Dam Safety Program

The U.S. Army Corps of Engineers (USACE) is responsible for safety inspections of some federal and non-federal dams in the United States that meet the size and storage limitations specified in the National Dam Safety Act. USACE has inventoried dams and has surveyed each state's and federal agency's capabilities, practices, and regulations regarding design, construction, operation, and maintenance of the dams. USACE has also developed guidelines for inspection and evaluation of dam safety (USACE 2017b). The USACE National Inventory of Dams (NID) provides the most recent dates of inspection of the following Chester County dams:

Table 4.3.1-1. Chester County Dams and Inspection Dates

Dam Name	Most Recent Inspection Date	Dam Name	Most Recent Inspection Date
Barneston (PA 432)	April 5, 2017	Pine Grove	July 15, 2016
Beaver Creek (PA-433)	April 7, 2017	Pond #3	None
Brook Crossing Detention	October 25, 2017	Pond NO 1	May 15, 2007
Chester CO. Prison Storage Lagoon	August 8, 2016	Pond NO 2	July 10, 2014
Cold Springs Park	July 16, 2014	Pond NO 3	July 15, 2014
Crossing NO 3	August 8, 2016	Pond View Farm	October 25, 2017
Crossing NO 5	August 8, 2016	R G Struble Lake (PA-431)	April 7, 2017
Devon Detention	October 26,2017	Rock Run	April 27, 2017
Green Valley Farms	October 26,2017	Savery Mill	November 15, 2012
Hankin	July 16, 2013	Somerset Lakes Basin NO 2	June 2, 2016
Herr Foods Storage Lagoon	October 19,2017	Thomas Meeting Detention Basin	November 4, 2016
Hershey Mill	May 19, 2017	Timber	February 20, 2013
Hibernia (PA-436F)	April 7, 2017	Township Line (Airport Road)	October 3, 2017
Lake Somerset	October 31,2017	Walker Farm Lagoon	December 8, 2017
Leopard Lake	October 26,2017	Washburn Lake	December 8, 2017
Lincoln Avenue Detention Basin	November 2, 2017	Wastewater Treatment	December 5, 2014
Linpro Detention Basin	September 2, 2017	Welkinweir	November 16, 2017
Malvern Preparatory Lower	March 28, 2012	West Whiteland Business Park	September 2, 2016
Marsh Creek Reservoir (PA-437)	February 26, 2018	Westtown	December 22, 2014
Milltown	September 11, 2017	Wharton Boulevard Stormwater	October 11, 2017
Osborne Lagoon	December 3, 2014	Whiteford Ridge Detention Basin	November 4, 2016
Pickering Creek	October 3, 2017		

Federal Energy Regulatory Commission Dam Safety Program

The Federal Energy Regulatory Commission (FERC) has the largest dam safety program in the United States. FERC cooperates with a large number of federal and state agencies to ensure and promote dam safety and, more recently, homeland security. FERC staff inspect hydroelectric projects on an unscheduled basis to investigate the following:

- Potential dam safety problems
- Complaints about constructing and operating a project
- Safety concerns related to natural disasters
- Issues concerning compliance with terms and conditions of a license (FERC 2017)

Every 5 years, an independent consulting engineer, approved by FERC, must inspect and evaluate projects with dams higher than 32.8 feet (10 meters) or with total storage capacity of more than 2,000 acre-feet (FERC 2017).

FERC monitors and evaluates seismic research in geographic areas where seismic activity is a concern. This information is applied to investigate and analyze structures of hydroelectric projects within these areas. FERC staff also evaluates effects of potential and actual large floods on safety of dams. FERC staff visit dams and licensed projects during and after floods, assess extents of damage, and direct any studies or remedial measures the licensee must undertake. FERC's *Engineering Guidelines for the Evaluation of Hydropower Projects* guides FERC engineering staff and licensees in evaluations of dam safety. The publication is frequently revised to reflect current information and methodologies (FERC 2017).

FERC requires licensees to prepare EAPs and conducts training sessions on developing and testing these plans. The plans outline an early warning system in the event of an actual or potential sudden release of water from a dam failure. The plans include operational procedures that may be implemented during regulatory measures, such as reducing reservoir levels and downstream flows, as well as procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that all applicable parties are informed of the proper procedures in emergencies (FERC 2017).

4.3.1.1 Location and Extent

Forty-three (43) dams are present throughout Chester County, as shown on Figure 4.3.1-1. The vast majority of these dams pose little risk; however, 17 Hazard Category 1 "high-hazard" dams require EAPs. Table 4.3.1-2 lists dam classification definitions. Table 4.3.1-3 is a complete list of dams in Chester County with "high-hazard" dams listed first.

Figure 4.3.1-1. Dams in Chester County

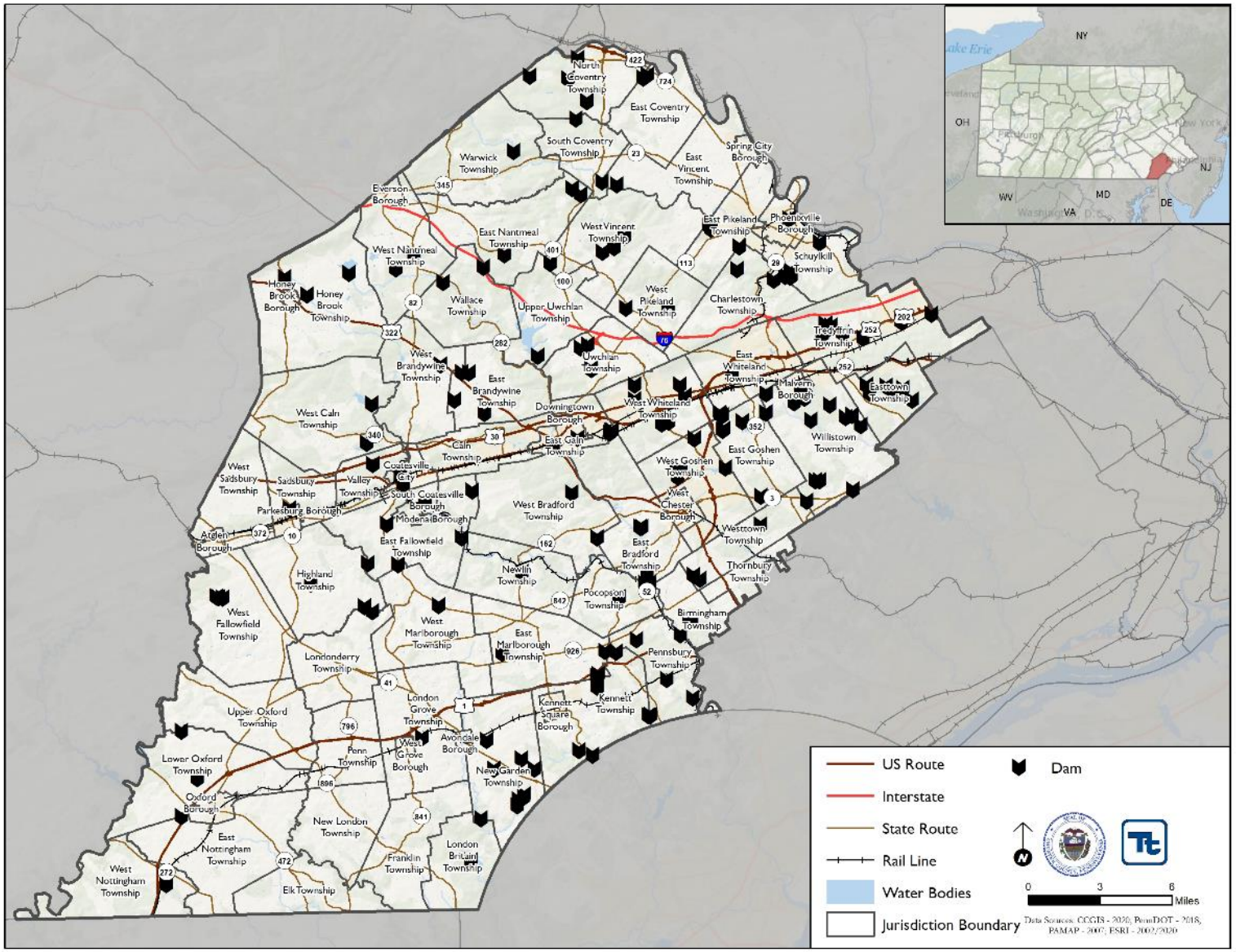

Table 4.3.1-2. Dam Classification Definitions

Size Category		
Category	**Impoundment Storage (Acre-feet)**	**Dam Height (Feet)**
A	Equal to or greater than 50,000	Equal to or greater than 100
B	Less than 50,000 but greater than 1,000	Less than 100 but greater than 40
C	Equal to or less than 1,000	Equal to or less than 40
Hazard Potential Category		
Category	**Population at Risk**	**Economic Loss**
1	Substantial (Numerous homes or small businesses or a large business or school)	Excessive, such as extensive residential, commercial, or agricultural damage, or substantial public inconvenience
2	Few (A small number of homes or small businesses)	Appreciable, such as limited residential, commercial, or agricultural damage, or moderate public inconvenience
3	None expected (no permanent structures for human habitation or employment)	Significant damage to private or public property and short-duration public inconvenience such as damage to storage facilities or loss of critical stream crossings
4	None expected (no permanent structures for human habitation or employment)	Minimal damage to private or public property and no significant public inconvenience

Source: Commonwealth of Pennsylvania 2011.

Table 4.3.1-3. Dams in Chester County

Dam Name	Municipality	Stream	Class	Permittee
High-Hazard Dams				
Barnestown (PA 432)	Wallace Township	East Branch Brandywine Creek	B-1	Chester County Water Resources Authority
Beaver Creek (PA-433)	West Brandywine and East Brandywine Townships	Beaver Creek	C-1	Chester County Water Resources Authority
Herr Food Storage Lagoon	Elizabeth Township	ADJ to Northeast Creek	B-1	Herr Foods, Inc
Hibernia (PA-436F)	West Caln Township	Birch Run	C-1	Chester County Water Resources Authority
Lake Somerset	Manheim Township	Broad Run	C-1	Somerset Lake Service Corporation
Leopard Lake	Martic Township	Darby Creek	B-1	Leopard Lakes Farm, Inc.
Lincoln Avenue Detention Basin	Martic Township	TR East Brandywine Creek	B-1	Downingtown Borough
Marsh Creek Reservoir (PA-437)	Downingtown	TR Crum Creek	C-1	DCNR
Milltown	East Goshen Township	East Branch Chester Creek	C-1	East Goshen Municipal Authority
Pickering Creek	Schuylkill Township	Pickering Creek	B-1	Aqua Pennsylvania, Inc
Pine Grove	Pine Grove	Octoraro Creek		Chester Water Authority
R G Struble Lake (PA-431)	Honey Brook Township	East Branch Brandywine Creek	B-1	Chester County Water Resources Authority
Rock Run	West Caln Township	Rock Run	B-1	Pennsylvania American Water Company
Township Line (Airport Road)	West Goshen Township	East Branch Chester Creek	B-1	Aqua Pennsylvania, Inc.

Dam Name	Municipality	Stream	Class	Permittee
Walker Farm Lagoon	East Marlborough Township	TR West Branch Red Clay Creek	C-2	East Marlborough Township
Welkinweir	East Nantmeal Township	TR Beaver Run	C-1	Green Valleys Association
Wharton Boulevard Stormwater	Uwchlan Township	Shamona Creek	C-1	Eagleview Town Center Condominium Association, Inc.
Other Dams				
Brook Crossing Detention	Brecknock Township	East Branch Brandywine Creek	C-4	East Fallowfield Township
Chester CO. Prison Storage Detention Lagoon	Brecknock Township	Watershed Pocopson Creek	C-4	Chester County Facilities Department
Cold Springs Park	North Coventry Township	TR Schuylkill River	C-4	Patty Barra
Crossing No 3	Clay Township	TR Bucktoe Creek	C-4	Hartfield Homeowners Association
Crossing No 5	Clay Township	Bucktoe Creek	C-4	Hartfield Homeowners Association
Devon Detention	Clay Township	TR Darby Creek	C-4	Waynesbrook Homeowners Association
Green Valley Farms	Colerain Township	Trout Run	C-4	Green Valley Farms
Hankin	Conestoga Township	Shamona Creek	C-4	The Hankin Group
Hershey Mill	East Goshen Township	Ridley Creek	C-3	East Goshen Township
Linpro Detention Basin	Conoy Township	TR Little Valley Creek	C-4	Brandywine Operating Partnership, LP
Malvern Preparatory Lower	Malvern Borough	TR Crum Creek	C-3	Malvern Prep School
Osborne Lagoon	Drumore Township	Watershed Leech Run	C-4	Oxford Area Sewer Authority
Pond #3	Earl Township		C-4	Hanson Aggregates Pennsylvania Inc.
Pond No 1	Earl Township	TR Valley Creek	C-4	General Crushed Stone Company
Pond No 2	Earl Township	TR Valley Creek	C-4	General Crushed Stone Company
Pond No 3	East Cocalico Township	TR Valley Creek	C-4	General Crushed Stone Company
Pond View Farm	East Cocalico Township	Ridley Creek	C-4	Joseph and Pat Bellanca
Savery Mill	East Donegal Township	Bennetts Run	C-4	Savery Mill Homeowners Association
Somerset Lakes Basin No 2	East Earl Township	TR Broad Run	C-4	Somerset Lake Service Corporation
Thomas Meeting Detention Basin	East Earl Township	TR Valley Creek	C-4	Thomas Meeting Associates
Timber	East Earl Township	TR Culbertson Run	C-4	Villages at Timberlake
Washburn Lake	East Earl Township	TR Pigeon Creek	C-4	Christopher H. and Patricia C. Washburn
Wastewater Treatment	East Hempfield Township	Watershed TR Tweed Creek	C-4	Oxford Area Sewer Authority
West Whiteland Business Park	East Hempfield Township	TR Valley Creek	C-4	Whiteland Business Park Owners Association
Westtown	Westtown Township	Hickman Run	C-3	Westtown School
Whiteford Ridge Detention Basin	East Lampeter Township	TR Valley Creek	C-4	Whiteford Ridge Homeowners Association

Source: USACE 2020

Extent or magnitude of a dam failure event can be measured in terms of classification of the dam. FEMA has three classification levels of dam hazard potential: low, significant, and high. The classification levels build on each other. The hazard potential classification system should be used with the understanding that failure of any dam or water-retaining structure could represent a danger to downstream life and property (FEMA 2004). Each FEMA classification level of dam hazard potential is described as follows:

- Low-hazard potential dams are those where failure or misoperation would result in no probable loss of human life and low economic or environmental losses. Losses are principally limited to the owner's property.
- Significant-hazard potential dams are those where failure or misoperation would result in no probable loss of human life but could cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns. Significant-hazard potential dams are often located in predominantly rural or agricultural areas.
- High-hazard potential dams are those where failure or misoperation will probably cause loss of human life.

Table 4.3.1-4 lists USACE-developed classifications of hazard potentials of dam failures, based only on potential consequences of a dam failure; this classification does not consider probability of failure.

Table 4.3.1-4. U.S. Army Corps of Engineers Hazard Potential Classification

Hazard Category[1]	Direct Loss of Life[2]	Lifeline Losses[3]	Property Losses[4]	Environmental Losses[5]
Low	None (rural location, no permanent structures for human habitation)	No disruption of services (cosmetic or rapidly repairable damage)	Private agricultural lands, equipment, and isolated buildings	Minimal incremental damage
Significant	Rural location, only transient or day-use facilities	Disruption of essential facilities and access	Major public and private facilities	Major mitigation required
High	Certain (one or more) extensive residential, commercial, or industrial development	Disruption of essential facilities and access	Extensive public and private facilities	Extensive mitigation cost or impossible to mitigate

[1] Categories are assigned to overall projects, not individual structures at a project.

[2] Loss-of-life potential is based on inundation mapping of area downstream of the project. Analysis of loss-of-life potential should consider the population at risk, time of flood wave travel, and warning time.

[3] Lifeline losses include indirect threats to life caused by the interruption of lifeline services from project failure or operational disruption; for example, loss of critical medical facilities or access to them.

[4] Property losses include damage to project facilities and downstream property and indirect impact from loss of project services, such as impact from loss of a dam and navigation pool, or impact from loss of water or power supply.

[5] Environmental impact downstream caused by the incremental flood wave produced by the project failure, beyond what would normally be expected for the magnitude flood event under which the failure occurs.

Source: USACE 2016

The Beaver Creek Dam is projected to be the most significant due to the potential impact of a dam failure from this dam. Failure of this dam would create a rush of water that would impact residents in East Caln Township, Caln Township, East Brandywine Township, Downingtown Borough, and West Bradford Township.

4.3.1.2 Past Occurrence

There have been two significant dam failures in Pennsylvania. The worst dam failure to occur in the U.S. took place in Johnstown, PA, in 1889 and claimed 2,209 lives. Another dam failure took place in Austin, PA, (Potter County) in 1911 and claimed 78 lives. To date, there have not been any dam failures in Chester County's recent history.

No dam failures or incidents have been recorded in Chester County.

4.3.1.3 Future Occurrence

Likelihood of a dam failure in Chester County is difficult to predict. Dam failure events are infrequent and usually coincide with events that cause them, such as earthquakes, landslides, and excessive rainfall and snowmelt. However, the risk of such an event increases for each dam as the dam's age increases or frequency of maintenance decreases.

"Residual risk" to dams is risk that remains after implementation of safeguards. Residual risk to dams is associated with events beyond those that the facility was designed to withstand. However, probability of any type of dam failure is low in today's dam safety regulatory and oversight environment.

Based on Risk Factor Methodology Probability Criteria (further defined in Section 4.4), and assuming regular maintenance and inspections of the dams in Chester County, dam failures are considered *unlikely* in the county.

4.3.1.4 Vulnerability Assessment

To understand risk, a community must evaluate the assets exposed or vulnerable within the identified hazard area. The dam failure hazard is of significance to Chester County because 43 dams are present across Chester County, 17 of which are classified as high-hazard by PADEP. Warning time for dam failure is often limited. These events are frequently associated with other natural hazard events such as earthquakes, landslides, or severe weather, limiting their predictability and compounding the hazard. Populations without adequate warning of the event are highly vulnerable to this hazard. Direct and indirect losses associated with dam failures include injury and loss of life, damage to structures and infrastructure, agricultural losses, utility failure (power outages), and stress on community resources.

Impact on Life, Health, and Safety

The entire population residing within a dam failure inundation zone is considered exposed and vulnerable. Of the population exposed, the economically disadvantaged and the population over the age of 65 are the most vulnerable. Economically disadvantaged populations are more vulnerable because they are likely to evaluate their risk and make decisions to evacuate based on the net economic impact to their family. The population over the age of 65 is also highly vulnerable because they are more likely to seek or need medical attention that may not be available because of isolation during a flood event, and they may have more difficulty evacuating.

Other than the population in the dam failure inundation zone, the safety of the first responders on-scene are also at risk. First responders would be responsible for traffic control and responding to transportation accidents. There would be a higher than normal call volume and demand of first responders during a dam failure. Continuity of operations including continued delivery of services may be impeded and additional personnel would potentially be needed due to the lack of fire and police personnel in the county.

Dam failure events are frequently associated with other natural hazard events such as earthquakes, landslides, or severe weather, which limits their predictability and compounds the hazard. Populations without adequate warning of the event are highly vulnerable to this hazard.

Table 4.3.1-5 indicates the total population residing in dam inundation areas by jurisdiction. In total, there are 12,414 people in the county residing in a dam inundation zone. Of this total, the Borough of Downingtown has the greatest number of residents (4,814 people) in a dam inundation zone.

Table 4.3.1-5 Estimated Chester County Population Exposed to Dam Inundation Areas

Jurisdiction	Total Population	Population Within a Dam Inundation Area	
		Number	Percent of Total
Atglen (B)	1,459	0	0.0%
Avondale (B)	1,295	0	0.0%
Birmingham (Twp.)	4,207	306	7.3%
Caln (Twp.)	14,198	1,493	10.5%
Charlestown (Twp.)	5,813	0	0.0%
Coatesville (C)	13,147	873	6.6%
Downingtown (B)	7,929	4,814	60.7%
East Bradford (Twp.)	9,959	571	5.7%
East Brandywine (Twp.)	8,416	267	3.2%
East Caln (Twp.)	4,876	53	1.1%
East Coventry (Twp.)	6,770	172	2.5%
East Fallowfield (Twp.)	7,567	40	0.5%
East Goshen (Twp.)	18,199	586	3.2%
East Marlborough (Twp.)	7,326	0	0.0%
East Nantmeal (Twp.)	1,723	0	0.0%
East Nottingham (Twp.)	8,929	0	0.0%
East Pikeland (Twp.)	7,331	4	0.1%
East Vincent (Twp.)	10,603	110	1.0%
East Whiteland (Twp.)	7,062	0	0.0%
Easttown (Twp.)	11,415	0	0.0%
Elk (Twp.)	1,786	0	0.0%
Elverson (B)	1,405	0	0.0%
Franklin (Twp.)	4,506	0	0.0%
Highland (Twp.)	1,370	0	0.0%
Honey Brook (B)	1,865	0	0.0%
Honey Brook (Twp.)	8,205	112	1.4%
Kennett (Twp.)	8,177	0	0.0%
Kennett Square (B)	6,159	0	0.0%
London Britain (Twp.)	3,241	0	0.0%
London Grove (Twp.)	2,450	0	0.0%
Londonderry (Twp.)	8,615	0	0.0%
Lower Oxford (Twp.)	5,058	12	0.2%
Malvern (B)	3,440	0	0.0%
Modena (B)	873	351	40.2%
New Garden (Twp.)	12,111	0	0.0%
New London (Twp.)	1,312	0	0.0%
Newlin (Twp.)	5,921	787	13.3%
North Coventry (Twp.)	7,996	393	4.9%

Jurisdiction	Total Population	Population Within a Dam Inundation Area	
		Number	Percent of Total
Oxford (B)	5,420	0	0.0%
Parkesburg (B)	3,781	0	0.0%
Penn (Twp.)	5,511	0	0.0%
Pennsbury (Twp.)	3,649	143	3.9%
Phoenixville (B)	16,815	55	0.3%
Pocopson (Twp.)	4,838	249	5.1%
Sadsbury (Twp.)	3,919	0	0.0%
Schuylkill (Twp.)	8,639	26	0.3%
South Coatesville (B)	1,276	2	0.2%
South Coventry (Twp.)	2,631	0	0.0%
Spring City (B)	3,320	95	2.9%
Thornbury (Twp.)	3,181	20	0.6%
Tredyffrin (Twp.)	29,481	0	0.0%
Upper Oxford (Twp.)	2,518	0	0.0%
Upper Uwchlan (Twp.)	11,509	83	0.7%
Uwchlan (Twp.)	18,869	76	0.4%
Valley (Twp.)	7,661	131	1.7%
Wallace (Twp.)	3,678	249	6.8%
Warwick (Twp.)	2,543	0	0.0%
West Bradford (Twp.)	12,869	110	0.9%
West Brandywine (Twp.)	7,482	36	0.5%
West Caln (Twp.)	9,080	19	0.2%
West Chester (B)	19,888	0	0.0%
West Fallowfield (Twp.)	2,596	0	0.0%
West Goshen (Twp.)	23,021	110	0.5%
West Grove (B)	2,846	0	0.0%
West Marlborough (Twp.)	771	0	0.0%
West Nantmeal (Twp.)	1,999	41	2.1%
West Nottingham (Twp.)	2,718	18	0.7%
West Pikeland (Twp.)	4,069	0	0.0%
West Sadsbury (Twp.)	2,393	0	0.0%
West Vincent (Twp.)	5,257	0	0.0%
West Whiteland (Twp.)	18,403	0	0.0%
Westtown (Twp.)	10,916	8	0.1%
Willistown (Twp.)	10,895	0	0.0%
Chester County (Total)	**517,156**	**12,414**	**2.4%**

Sources: ACS 2014-2018 U.S. Census; Chester County GIS 2020
Notes: B – Borough; C – City; Twp. – Township; % - Percent

Impact on General Building Stock

All buildings and infrastructure located in the dam failure inundation zone are considered exposed and vulnerable. Property located closest to the dam inundation zone has the greatest potential to experience the largest, most destructive surge of water. Table 4.3.1-6 shows the total replacement cost value for buildings within

the dam inundation area. There is a total of 5,074 buildings vulnerable to dam failure. Approximately 32 percent of these buildings sit within the Borough of Downingtown, which equates to $1.5 billion in replacement cost value.

Table 4.3.1-6 Estimated General Building Stock Exposure to Dam Failure

Jurisdiction	Total Number of Buildings	Total RCV (Replacement Cost Value)	Buildings Within a Dam Inundation Area			
			Number of Buildings	Percent Total	RCV (Replacement Cost Value)	Percent Total
Atglen (B)	583	$300,171,233	0	0.0%	$0	0.0%
Avondale (B)	436	$275,491,131	0	0.0%	$0	0.0%
Birmingham (Twp.)	1,774	$1,521,752,088	141	7.9%	$127,924,821	8.4%
Caln (Twp.)	5,696	$4,389,258,174	578	10.1%	$584,015,106	13.3%
Charlestown (Twp.)	2,655	$2,334,124,537	0	0.0%	$0	0.0%
Coatesville (C)	3,545	$2,658,702,748	277	7.8%	$493,310,814	18.6%
Downingtown (B)	2,619	$2,678,308,815	1,632	62.3%	$1,584,749,201	59.2%
East Bradford (Twp.)	4,033	$3,166,888,223	250	6.2%	$181,914,091	5.7%
East Brandywine (Twp.)	4,201	$2,499,920,165	166	4.0%	$101,465,130	4.1%
East Caln (Twp.)	1,509	$1,864,909,402	52	3.4%	$119,577,449	6.4%
East Coventry (Twp.)	3,832	$2,200,926,728	137	3.6%	$150,739,263	6.8%
East Fallowfield (Twp.)	4,025	$1,984,687,476	23	0.6%	$12,227,680	0.6%
East Goshen (Twp.)	6,498	$5,680,635,001	197	3.0%	$121,553,030	2.1%
East Marlborough (Twp.)	3,888	$3,646,563,821	0	0.0%	$0	0.0%
East Nantmeal (Twp.)	1,509	$1,131,945,456	0	0.0%	$0	0.0%
East Nottingham (Twp.)	4,960	$3,185,167,607	0	0.0%	$0	0.0%
East Pikeland (Twp.)	3,959	$2,751,413,608	17	0.4%	$124,930,910	4.5%
East Vincent (Twp.)	3,872	$2,764,012,516	48	1.2%	$23,873,512	0.9%
East Whiteland (Twp.)	5,002	$8,143,686,632	0	0.0%	$0	0.0%
Easttown (Twp.)	4,583	$3,998,338,009	0	0.0%	$0	0.0%
Elk (Twp.)	1,361	$754,193,647	0	0.0%	$0	0.0%
Elverson (B)	716	$516,332,051	0	0.0%	$0	0.0%
Franklin (Twp.)	2,468	$1,537,535,450	0	0.0%	$0	0.0%
Highland (Twp.)	1,304	$1,067,555,265	0	0.0%	$0	0.0%
Honey Brook (B)	771	$446,825,932	0	0.0%	$0	0.0%
Honey Brook (Twp.)	4,871	$3,389,705,910	58	1.2%	$20,469,746	0.6%
Kennett (Twp.)	4,166	$4,134,894,338	0	0.0%	$0	0.0%
Kennett Square (B)	1,956	$1,600,982,472	0	0.0%	$0	0.0%
London Britain (Twp.)	1,782	$1,064,040,035	0	0.0%	$0	0.0%
London Grove (Twp.)	4,233	$3,148,102,405	0	0.0%	$0	0.0%

Jurisdiction	Total Number of Buildings	Total RCV (Replacement Cost Value)	Buildings Within a Dam Inundation Area			
			Number of Buildings	Percent Total	RCV (Replacement Cost Value)	Percent Total
Londonderry (Twp.)	1,755	$1,034,199,367	0	0.0%	$0	0.0%
Lower Oxford (Twp.)	2,585	$2,325,017,464	19	0.7%	$9,341,854	0.4%
Malvern (B)	1,149	$1,256,307,741	0	0.0%	$0	0.0%
Modena (B)	226	$143,886,459	98	43.4%	$97,595,622	67.8%
New Garden (Twp.)	5,418	$5,996,313,471	0	0.0%	$0	0.0%
New London (Twp.)	2,955	$1,850,994,293	0	0.0%	$0	0.0%
Newlin (Twp.)	1,188	$767,919,221	137	11.5%	$71,507,516	9.3%
North Coventry (Twp.)	4,367	$2,814,129,243	265	6.1%	$145,462,949	5.2%
Oxford (B)	1,795	$1,620,222,123	0	0.0%	$0	0.0%
Parkesburg (B)	1,478	$791,790,495	0	0.0%	$0	0.0%
Penn (Twp.)	2,962	$3,335,917,017	0	0.0%	$0	0.0%
Pennsbury (Twp.)	1,793	$1,741,030,601	81	4.5%	$83,498,009	4.8%
Phoenixville (B)	6,031	$4,404,373,172	46	0.8%	$237,135,626	5.4%
Pocopson (Twp.)	1,781	$1,616,048,060	102	5.7%	$114,933,221	7.1%
Sadsbury (Twp.)	2,244	$1,514,078,865	0	0.0%	$0	0.0%
Schuylkill (Twp.)	4,116	$3,296,773,180	42	1.0%	$73,855,475	2.2%
South Coatesville (B)	669	$656,482,254	62	9.3%	$258,171,934	39.3%
South Coventry (Twp.)	1,655	$1,175,837,157	0	0.0%	$0	0.0%
Spring City (B)	1,282	$913,935,869	103	8.0%	$325,582,321	35.6%
Thornbury (Twp.)	1,222	$1,249,939,720	11	0.9%	$8,727,080	0.7%
Tredyffrin (Twp.)	10,751	$13,427,976,905	0	0.0%	$0	0.0%
Upper Oxford (Twp.)	2,098	$1,327,197,078	0	0.0%	$0	0.0%
Upper Uwchlan (Twp.)	4,459	$3,757,709,779	34	0.8%	$29,307,678	0.8%
Uwchlan (Twp.)	6,633	$7,025,589,763	26	0.4%	$13,440,867	0.2%
Valley (Twp.)	3,430	$2,597,377,442	77	2.2%	$330,922,211	12.7%
Wallace (Twp.)	2,069	$1,322,743,721	157	7.6%	$112,730,185	8.5%
Warwick (Twp.)	2,175	$1,133,542,100	0	0.0%	$0	0.0%
West Bradford (Twp.)	6,163	$3,995,074,181	85	1.4%	$61,477,406	1.5%
West Brandywine (Twp.)	4,149	$2,231,906,820	21	0.5%	$9,110,251	0.4%
West Caln (Twp.)	6,021	$2,765,167,902	19	0.3%	$7,656,710	0.3%
West Chester (B)	4,156	$5,374,643,016	0	0.0%	$0	0.0%
West Fallowfield (Twp.)	2,171	$1,743,066,295	0	0.0%	$0	0.0%
West Goshen (Twp.)	8,399	$9,444,801,871	42	0.5%	$21,952,790	0.2%
West Grove (B)	1,053	$499,625,186	0	0.0%	$0	0.0%

Jurisdiction	Total Number of Buildings	Total RCV (Replacement Cost Value)	Buildings Within a Dam Inundation Area			
			Number of Buildings	Percent Total	RCV (Replacement Cost Value)	Percent Total
West Marlborough (Twp.)	967	$997,081,475	0	0.0%	$0	0.0%
West Nantmeal (Twp.)	1,830	$1,139,858,316	34	1.9%	$15,508,576	1.4%
West Nottingham (Twp.)	1,989	$1,196,217,005	28	1.4%	$15,728,905	1.3%
West Pikeland (Twp.)	2,120	$1,506,034,830	0	0.0%	$0	0.0%
West Sadsbury (Twp.)	1,876	$1,651,357,888	0	0.0%	$0	0.0%
West Vincent (Twp.)	3,532	$2,587,356,437	0	0.0%	$0	0.0%
West Whiteland (Twp.)	7,022	$7,660,221,171	0	0.0%	$0	0.0%
Westtown (Twp.)	4,175	$3,282,102,771	9	0.2%	$11,128,477	0.3%
Willistown (Twp.)	6,043	$4,727,817,226	0	0.0%	$0	0.0%
Chester County (Total)	**232,759**	**$194,736,735,824**	**5,074**	**2.2%**	**$5,701,526,414**	**2.9%**

Sources: Chester County GIS 2020; RS Means 2019
Notes: B – Borough; C – City; Twp. – Township; % - Percent

Impact on Critical Facilities

Dam failures may also impact critical facilities and infrastructure located in the downstream inundation zone. Consequentially, dam failure can cut evacuation routes, limit emergency access, and/or create isolation issues. Dam failure can cause severe downstream flooding and may transport large volumes of sediment and debris, depending on the magnitude of the event. Widespread damage to buildings and infrastructure affected by an event would result in large costs to repair these locations. In addition to physical damage costs, businesses can be closed while flood waters retreat and utilities are returned to a functioning state. Further, utilities such as overhead power lines, cable, and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas.

Critical facility exposure to the dam failure boundary was examined. Table 4.3.1-7 lists critical facilities and utilities within the dam inundation area. Refer to Section 4 (County Profile) for more information about the critical facilities and lifelines in Chester County.

Table 4.3.1-7 Critical Facilities and Utilities Within the Dam Inundation Zone

Jurisdiction	Facility Types																								
	Bridge	Child Care Facility	Church	Dam	District Court	Electrical Substation	Emergency Operations Center	EMS Station	Fire Station	Historic	Long Term Care	Major Business	Military	Municipal Building	POD	Police Station	Post Office	Potable Water Treatment	Radio Tower	Rail Station	SARA Site	School	Sewer Plant	Telecom	Wastewater Treatment
Atglen (B)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Avondale (B)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Birmingham (Twp.)	4	0	0	2	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caln (Twp.)	12	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	1	0	0	1	0	0	0
Charlestown (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coatesville (C)	9	1	0	2	0	0	0	1	1	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Downingtown (B)	14	4	6	1	0	1	1	1	2	2	0	5	1	1	1	1	0	1	0	2	8	8	0	1	0
East Bradford (Twp.)	13	0	0	2	0	1	0	1	0	8	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1
East Brandywine (Twp.)	12	0	1	2	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
East Caln (Twp.)	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0
East Coventry (Twp.)	9	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
East Fallowfield (Twp.)	2	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Goshen (Twp.)	6	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Marlborough (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Nantmeal (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Nottingham (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Jurisdiction	Facility Types																								
	Bridge	Child Care Facility	Church	Dam	District Court	Electrical Substation	Emergency Operations Center	EMS Station	Fire Station	Historic	Long Term Care	Major Business	Military	Municipal Building	POD	Police Station	Post Office	Potable Water Treatment	Radio Tower	Rail Station	SARA Site	School	Sewer Plant	Telecom	Wastewater Treatment
East Pikeland (Twp.)	2	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
East Vincent (Twp.)	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	3	0	0	0	0
East Whiteland (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Easttown (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elk (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elverson (B)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Franklin (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Highland (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Honey Brook (B)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Honey Brook (Twp.)	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kennett (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kennett Square (B)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
London Britain (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
London Grove (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Londonderry (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lower Oxford (Twp.)	3	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malvern (B)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Modena (B)	2	0	0	0	0	0	1	1	1	1	0	0	0	1	0	0	1	0	0	0	2	0	0	0	0

Jurisdiction	Facility Types																								
	Bridge	Child Care Facility	Church	Dam	District Court	Electrical Substation	Emergency Operations Center	EMS Station	Fire Station	Historic	Long Term Care	Major Business	Military	Municipal Building	POD	Police Station	Post Office	Potable Water Treatment	Radio Tower	Rail Station	SARA Site	School	Sewer Plant	Telecom	Wastewater Treatment
New Garden (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New London (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Newlin (Twp.)	8	0	0	1	0	0	1	0	0	4	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
North Coventry (Twp.)	11	0	1	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
Oxford (B)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parkesburg (B)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Penn (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pennsbury (Twp.)	6	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phoenixville (B)	8	0	0	2	0	0	0	0	0	4	0	2	0	0	0	0	0	1	0	0	1	0	0	0	0
Pocopson (Twp.)	5	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Sadsbury (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schuylkill (Twp.)	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0
South Coatesville (B)	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
South Coventry (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spring City (B)	2	0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	1	0	1	0	0
Thornbury (Twp.)	5	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tredyffrin (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Oxford (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Uwchlan (Twp.)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Jurisdiction	Facility Types																							
	Bridge	Child Care Facility	Church	Dam	District Court	Electrical Substation	Emergency Operations Center	EMS Station	Fire Station	Historic	Long Term Care	Major Business	Military	Municipal Building	POD	Police Station	Post Office	Potable Water Treatment	Radio Tower	Rail Station	SARA Site	School	Sewer Plant	Telecom	Wastewater Treatment
Uwchlan (Twp.)	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Valley (Twp.)	8	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wallace (Twp.)	9	0	0	1	0	0	0	0	1	2	0	0	0	0	0	0	1	0	0	0	2	0	0	1	0
Warwick (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Bradford (Twp.)	9	0	0	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
West Brandywine (Twp.)	5	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Caln (Twp.)	2	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Chester (B)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Fallowfield (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Goshen (Twp.)	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Grove (B)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Marlborough (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Nantmeal (Twp.)	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Nottingham (Twp.)	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Pikeland (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Sadsbury (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Vincent (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Jurisdiction	Facility Types																								
	Bridge	Child Care Facility	Church	Dam	District Court	Electrical Substation	Emergency Operations Center	EMS Station	Fire Station	Historic	Long Term Care	Major Business	Military	Municipal Building	POD	Police Station	Post Office	Potable Water Treatment	Radio Tower	Rail Station	SARA Site	School	Sewer Plant	Telecom	Wastewater Treatment
West Whiteland (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Westtown (Twp.)	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Willistown (Twp.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chester County (Total)	**187**	**7**	**11**	**25**	**1**	**6**	**3**	**4**	**5**	**50**	**1**	**13**	**1**	**3**	**1**	**1**	**4**	**3**	**1**	**2**	**31**	**9**	**8**	**3**	**1**

Sources: Chester County GIS 2020
Notes: B – Borough; C – City; Twp. – Township;

Impact on the Economy

Severe flooding that follows an event like a dam failure can cause extensive structural damage and withhold essential services. The cost to recover from flood damages after a surge will vary depending on the hazard risk of each dam. Severe flooding that follows an event like a dam failure can cause extensive damage to public utilities and disruptions to delivery of services. Loss of power and communications may occur, and drinking water and wastewater treatment facilities can become temporarily out of operation. Debris from surrounding buildings can accumulate should the dam mimic major flood events, such as the 1 percent annual chance flood event that is discussed in Section 4.3.6 (Flood, Flash Flood, Ice Jam).

Impact on the Environment

The environment is vulnerable to several risks in the event of a dam failure. Water releases from dams usually contain very little suspended sediment; this can lead to scouring of riverbeds and banks. The inundation may introduce foreign elements into local waterways, resulting in destruction of downstream habitat and impacting many animal and plant species, especially endangered species. The subsequent rush of water downstream can rapidly increase flow rate and turbidity of streams and rivers in minor dam failures or overwhelm terrestrial habitat with floodwaters in severe dam failures.

Cascading Impacts to Other Hazards

Dam failures can often result in the release of hazardous materials, either swept up in floodwaters or in sediment that is contained behind the dam, such as in areas with mining upstream. After the flood waters subside, contaminated and flood-damaged building materials and contents must be disposed of properly. Contaminated sediment must be removed from buildings, yards, and properties.

Dam failures may result in significant water quality and debris disposal issues. Flood waters can back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooding waterway. The contents of unsecured containers of oil, fertilizers, pesticides, and other chemicals get added to flood waters. Water supplies and wastewater treatment could be offline for weeks. After the flood waters subside, contaminated and flood-damaged building materials and contents must be disposed of properly. Please reference Sections 4.3.6 (Flood, Flash Flood, Ice Jams) and 4.3.4. (Environmental Hazard Materials) for more information.

Future Changes that May Impact Vulnerability

Understanding future changes that effect vulnerability in the county can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The county considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

An increase in development and population can increase likelihood of a dam failure incident. Future migration to larger jurisdictions may also increase the likelihood of an incident. The tables and hazard maps included in the jurisdictional annexes contain additional information regarding the specific areas of development that would increase county vulnerability to dam inundation areas.

Projected Changes in Population

Estimated population projections provided by the Center of Rural Pennsylvania indicates that Chester County's population will continue to increase into 2040, increasing total population to approximately 603,068 persons

(The Center of Rural Pennsylvania 2013). Persons that move into dam inundation areas are at greater risk to be impacted if there is a dam failure event.

Climate Change

The June 2009 Pennsylvania Climate Impact Assessment indicated that Pennsylvania is very likely to undergo increased temperatures and precipitation in the 21st century (PADEP 2009). Increased precipitation will occur in the form of heavy rainfalls, which have the potential to increase the risk to dam failures. Increases in precipitation may stress the dam wall. Existing dams may not be able to retain and manage increases in water flow from more frequent, heavy rainfall events. Heavy rainfalls may result in more frequent overtopping of these dams and flooding of the county's assets in adjacent inundation areas. However, the probable maximum flood used to design each dam may be able to accommodate changes in climate.

Change of Vulnerability Since the 2015 HMP

This vulnerability assessment was based on the most current and best available data, including updated building and critical facility inventories. For future HMP updates, additional dam failure inundation areas can be delineated and used to spatially assess the asset exposure. A customized general building stock list could be generated in the Hazus model to assess future impacts at the structural level versus the census-block level. Depth grids could be generated for the inundation areas and used in Hazus to estimate potential losses similar to those listed in the flood profile (Section 4.3.7).