

4.1 Dam Failure

4.1.1 Description

FEMA defines a dam as “any artificial barrier of at least a minimum size, including appurtenant works, that impounds or diverts water or liquid-borne solids on a temporary or long-term basis.” Dam failure occurs when that impounded water is suddenly released in an uncontrollable manner. A dam/levee failure can result in the uncontrolled release of floodwaters downstream of a facility. Water released from the dam during failure will always flow downhill, and the resulting flood wave can cause significant damage to buildings and infrastructure downstream. The unexpected nature of the flood wave also increases the likelihood of loss of life in the impacted area due to reduced warning times.

Dams can fail for one or a combination of the following reasons:

- Overtopping caused by floods that exceed the capacity of the dam
- Structural failure of materials used in dam construction
- Movement and/or failure of the foundation supporting the dam
- Settle and cracking of concrete or embankment dams
- Inadequate maintenance and upkeep
- Deliberate acts of sabotage

According to Ohio Administrative Code Rule 1501:21-13-01 (2010), dams are classified as Class I-IV dams based on the following criteria:

- Class I: Dams having a total storage volume greater than 5,000 acre-feet or a height of greater than 60 feet.
- Class II: Dams having a total storage volume greater than 500 acre-feet or a height of greater than 40 feet.
- Class III: Dams having a total storage volume greater than 50 acre-feet or a height of greater than 25 feet.
- Class IV: Dams having a total storage volume of 50 acre-feet or less and a height of 25 feet or less.

4.1.2 Location

Dam locations can be seen in **Figure 4.1.1**. Dam properties are also listed in **Table 4.1.1**. The status of each dam’s Emergency Action Plan as of October 1, 2020 is indicated in the table (Source: ODNR).

Table 4.1.1: Dam Locations in Clinton County, Ohio

Class	Name	Owner	Impoundment	Length (ft)	Height (ft)	Pool Acres	Storage (ac-ft)	EAP Status
I	Blanchester Reservoir No. 3 Dam	Village of Blanchester	Dam and Spillway	420	15.1	11.4	94	Not Approved
I	Blanchester Reservoir No. 4 Dam	Village of Blanchester	Upground	2,900	16	11.4	164	Not Approved
I	Blanchester Reservoir No. 6 Dam	Village of Blanchester	Upground	3,560	24	16.31	258.2	Approved

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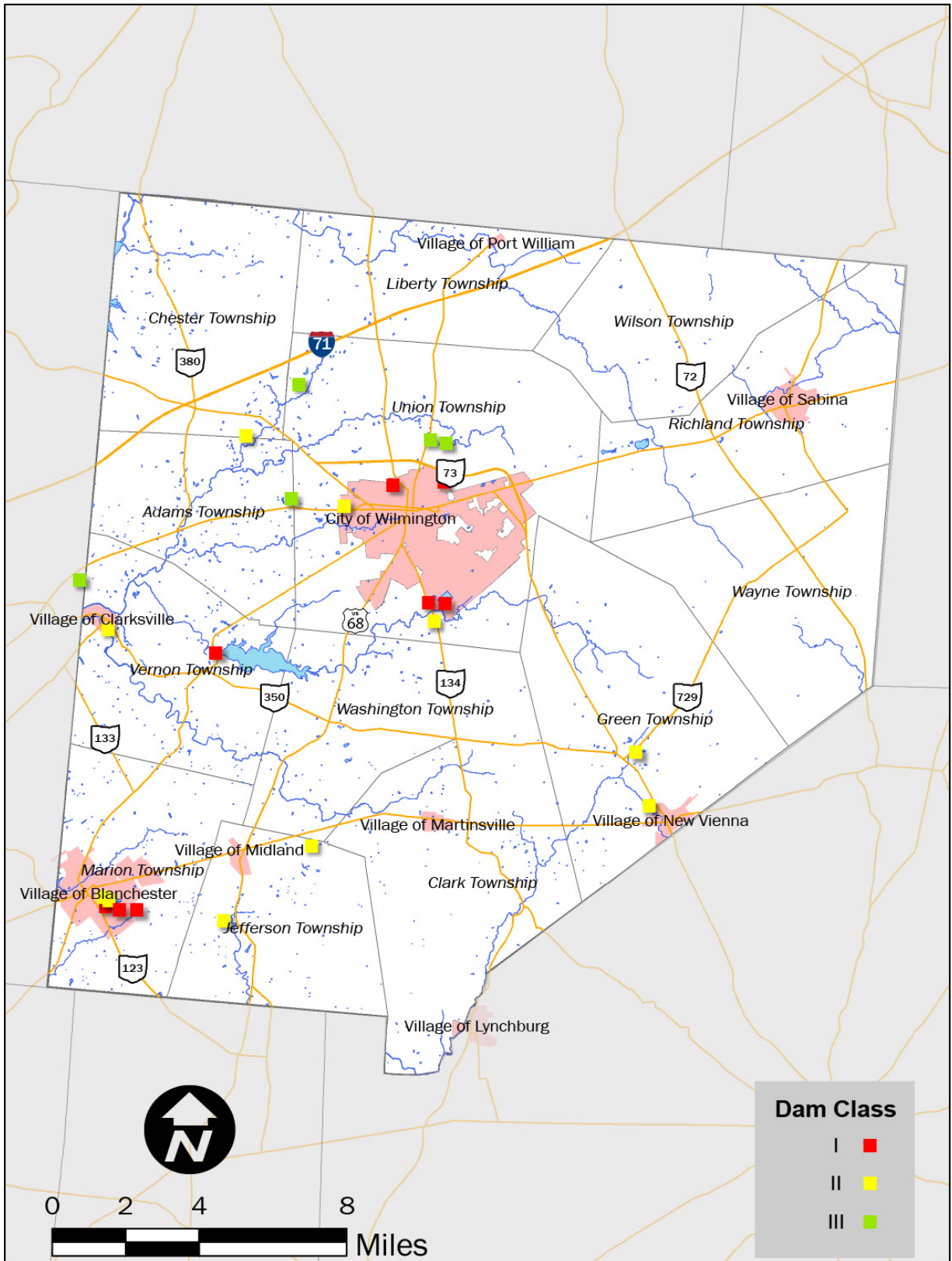
Class	Name	Owner	Impoundment	Length (ft)	Height (ft)	Pool Acres	Storage (ac-ft)	EAP Status
I	Clinton County Tributary No. 4 Dam	Clinton County	Dam and Spillway	624	20.2	0	220	Approved
I	Clinton County Tributary No. 1 Dam	Clinton County	Dam and Spillway	665	14.6	0	102	Approved
I	Cowan Lake Dam	ODNR, Division of Parks and Watercraft	Dam and Spillway	860	62.5	670	24,974	Approved
I	Wilmington Upground Reservoir No. 1	City of Wilmington	Upground	3,570	18.6	15.6	371	Approved
I	Wilmington Upground Reservoir No. 2	City of Wilmington	Upground	6,200	31	55.6	1382	Approved
II	Blanchester Reservoir No. 1 & 2 Dam	Village of Blanchester	Upground	2,585	10.4	7.1	68	Not Approved
II	Blanchester Reservoir No. 5 Dam	Village of Blanchester	Upground	4,574	14	17.9	227	Not Approved
II	Clarksville Upground Reservoir	Village of Clarksville	Upground	820	18	1.9	33.7	Not Approved
II	Baptist Foundation Lake Dam	Mathew 25 Ministries	Dam and Spillway	530	35.8	4.5	64.6	Not Approved
II	Houston Upground Reservoir	Village of Blanchester	Upground	2,200	12.9	6	71.1	Not Approved
II	Clinton County WWT Lagoon	Clinton County Sewer District	Upground	5,000	10	22.7	199	Approved
II	Roberts Lake Dam	Scott & Heidemarie Lewis	Dam and Spillway	250	19.1	3.3	27.4	Not Approved
II	Burtonville Lake Dam	Burtonville Heights Lake Assoc.	Dam and Spillway	390	24.8	4.4	41.2	Not Approved
II	Snow Hill Inc. Lake Dam	Snowhill Country Club, LLC	Dam and Spillway	410	23.6	4.4	54	Approved
II	New Vienna Wastewater Treatment Lagoons	Village of New Vienna	Upground	3,200	14	8.9	86.3	Not Approved
III	Stokes Lake Dam	Dale Stokes Raspberry Farm LLC	Dam and Spillway	600	16.6	5.8	51.9	Not Approved

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Class	Name	Owner	Impoundment	Length (ft)	Height (ft)	Pool Acres	Storage (ac-ft)	EAP Status
III	Ellis Lake Dam	Jeff & Shelly Higgins	Dam and Spillway	530	30.7	3.8	38.2	Not Approved
III	Pheasant Run Dam 1	Union Township	Dam and Spillway	350	14	3.8	-	Not Approved
III	Pheasant Run Dam 2	LASUSA CORP	Dam and Spillway	470	18	6.7	-	Not Approved

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Figure 4.1.1: Dam Locations in Clinton County, Ohio



4.1.3 Extent

As previously mentioned, Class I dams have a total storage volume greater than 5,000 acre-feet or a height of greater than 60 feet. Sudden failures of Class I dams would increase the probability that one of the following conditions would result in:

- Loss of human life.
- Structural collapse of at least one residence or one commercial or industrial business.
- All items listed below for failure of Class II and III dams.

Sudden failures of Class II dams would result in at least one of the following conditions:

- Disruption of a public water supply or wastewater treatment facility, release of health hazardous industrial or commercial waste, or other health hazards.
- Flooding of residential, commercial, industrial, or publicly owned structures.
- Flooding of high-value property.
- Damage or disruption to major roads including, but not limited to, interstate and state highways and the only access to residential or other critical areas such as hospitals, nursing homes, or correction facilities as determined by the chief.
- Damage or disruption to railroads or public utilities.
- Damage to downstream class I, II, or III dams or levees or other dams or levees of high value. Damage to dams or levees can include, but is not limited to, overtopping of the structure. At the request of the dam owner, the chief may exempt dams from the criterion of this paragraph if the dam owner owns the potential affected property.

Sudden failures of Class III dams would result in at least one of the following conditions:

- Property losses including, but not limited to, rural buildings not otherwise described in the Ohio Administrative Code Rule 1501:21-12-01 (2010), and class IV dams and levees not otherwise listed as high-value properties in this rule.
- Damage or disruption to local roads including, but not limited to, roads not otherwise listed as major roads.

Sudden failures of Class IV dams would result in property losses restricted mainly to the dam and rural lands, and the loss of human life is not probable.

4.1.4 History

There have been no reported dam failures in Clinton County.

4.1.5 Probability

Dam failures are unlikely but are never impossible. All dams, especially Class I dams, should have an Emergency Action Plan (EAP) in place.

4.1.6 Vulnerability Assessment

Infrastructure Impact

Failures of Class I and Class II dams could flood roadways, including major routes and local roads. Utility infrastructure (wastewater, drinking water, and commercial and industrial waste lines) may be disrupted or destroyed.

Population Impact

The local population could be impacted by loss of utilities, including the local water supply. Health hazards may also be released into the flood waters during a dam failure which may cause indirect harm to the local population.

Property Damage

At least one residential or commercial property is likely to face structural collapse during a Class I dam failure. Class II dam failure has the potential to damage high value properties. Residential, commercial, and industrial properties may be damaged, as well as publicly owned properties. Properties that are owned by the dam owner may be exempt from the property damage calculation.

Loss of Life

Loss of life is likely during a Class I dam failure. Loss of life during a Class II or Class III dam failure is unlikely.

Economic Losses

Economic losses can include damages from flooding crops, damaged goods, and the flooding of vital roadways.

Emergency Action Plans (EAPs) have been completed for some of the Class I and Class II dams; however, the data is subjected to agreements where it cannot be published publicly. The Ohio Department of Natural Resources (ODNR) holds record of these EAPs.

4.1.7 Land Use and Development Trends

Development that has occurred in areas that will flood after a dam failure should be prepared for rapid flooding. Land use plans can limit development in these areas. To better understand where development should be limited, dam failure inundation maps should be completed for as many dams as possible.